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BBA Entrance Exam, Second Edition

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Preface

Dear BBA Entrance Exam Aspirant,

This exclusive book has been written keeping in mind the needs of those of you who wish to streamline your preparation strategy for the various BBA entrance examinations and are looking for a focused and intensive practice-based approach towards these tests.

BBA Entrance Exams guide is a comprehensive and structured approach to understanding the fundamental concepts assessed in the various BBA entrance exams such as **DU JAT, IPU CET, NPAT, SET, UGAT** and others. To attain a high score in these examinations, you will need to build a strong theoretical foundation and get hands-on practice on relevant questions that test you on the key concepts expected from a BBA exam aspirant.

This is exactly what this book will help you achieve!

The book covers syllabus for entrance exams of BBA, BBM and BBS and provides ample practice in the form of fully solved past years' papers with detailed answer explanations and analysis along with exhaustive model test papers based on previous years' papers for additional practice.

In addition, it follows a methodical structure wherein key concepts are refreshed and are followed by a battery of practice tests for immediate practice and retention of learning.

The book also contains section-specific and question-specific strategies to provide you that winning edge that is so essential to set one up for success in a competitive examination.

With all the above features — review of key concepts, targeted practice tests, exhaustive model tests, answer explanations and analysis of all questions along with strategies to crack the exams — this book is a definitive guide that will equip you with the required skill set that is expected in a potential BBA exam aspirant.

We wish you the best for your Test preparation!

Wiley ExamXpert Team

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SECTION 1
INTRODUCTION

Chapter

1

About BBA Examinations

INTRODUCTION

BBA stands for Bachelor of Business Administration. It is a three year degree program in commerce and business administration offered by several prestigious universities across India. The course aims at providing fundamental education combined with practical training in business and management principles.

Through BBA courses, students can gain knowledge of business practices and processes, understand the role of economics in the world marketplace, and acquire an awareness of global business issues. They can pursue business education and learn skills that will help them perform various management and administrative roles within a company.

BBA acts as a foundation for Masters in Business Administration; it can be regarded as a more professional form of B.Com. Normally, the BBA programme is spread out over three years, which are split into six semesters. There are a few institutes that offer a four year long honors program as well. The syllabus of these programmes encompasses the following subjects:

1. Business Economics
2. Company Law
3. System Management
4. Financial Accounting
5. Marketing Management
6. Project Planning
7. Insurance
8. Operation Research
9. Business Mathematics
10. Business Information Management
11. Computer Application
12. Management Accounting
13. Human Resource Management
14. Entrepreneurship Management
15. Business Organization

BBA COLLEGES

There are many BBA colleges in India. Each college has a different selection process and unique style of imparting knowledge.

Each college requires a different skill set and strategy to crack and the primary purpose of this book is to help you identify these unique elements and plan accordingly.

Here is a list of the top BBA colleges in India:

1. Delhi University Joint Admission Test (DU JAT)
2. Narsee Monjee College of Commerce and Economics (NMCCE), Mumbai
3. Christ University, Bangalore
4. Indraprastha University Common Entrance Test (IPU CET)
5. Symbiosis Entrance Test (SET)
6. St. Xavier's College, Mumbai
7. Under Graduate Aptitude Test (UGAT)

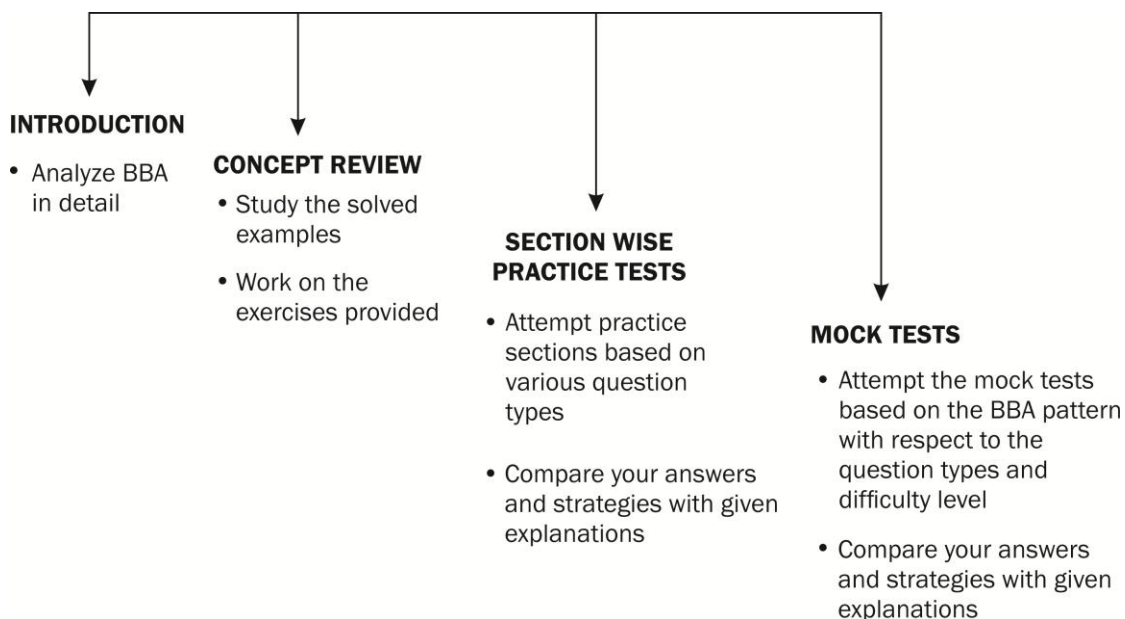
KEY FEATURES OF THE BOOK

Now let us understand how this book will assist in your preparation. The defining feature of this book is its practical, practice-driven orientation wherein there are numerous examples and practice tests provided in order to enhance the application and usage of concepts. It adopts a two-pronged approach towards preparation for the BBA entrance exams – revisiting the theory and working extensively with each question type in the different sections.

This book aims to cater to the needs of those students who wish to streamline their preparation strategy for the various BBA entrance exams. It shall prove to be a formidable tool for those self-motivated students who follow a dedicated practice based approach towards this particular test.

As described above, the book is an application driven guide aimed at aligning your test preparation with a focus on the BBA entrance exams.

STRUCTURE OF THE BOOK



This book covers the key areas tested in BBA. These include:

1. English Language (General English, Verbal Logic and Reading Comprehension)
2. Quantitative Aptitude (Inclusive of Data Interpretation and Data Sufficiency)
3. Analytical and Logical Reasoning
4. General Awareness (GK and Management Aptitude)

Every key area has a separate section devoted to it. The structure of each section is as follows:

1. Concept Review
2. Practice Tests
3. Solutions

The four sections are followed by three mocks that replicate the important BBA entrance exams with respect to their structure, question types and difficulty levels.

HOW TO USE EACH SECTION

Introduction

Before you begin your preparations, go through this section in detail to understand:

1. An analysis of the BBA course and its implications
2. What is expected of you in the various entrance examinations
3. The distinguishing features of the key entrance examinations
4. Some key strategies to keep in mind as you begin your preparation

Concept Review

Each section begins with an in-depth review of concepts. This involves a comprehensive revision of the various concepts with special focus on the requirements of the entrance exams. The section not only revisits the concepts but also provides examples to reinforce the concept's application.

Practice Tests

The Concept Review is followed by a series of practice tests. The answers to these tests are given at the end of the respective section, along with a detailed explanation on how to arrive at that particular answer.

It is recommended that you solve all the practice tests and check the solutions provided at the end of the section. Please ensure that you read the explanations, as they provide important strategies, tips and guidance on how your thought process should work when solving the questions.

Doing this will help you assess your comfort level with the different topics, identify your weak spots and develop bespoke strategies to approach each question type.

Mock Tests

The practice tests are followed by three mock tests that replicate the more important BBA entrance exams with regards to the structure of the paper, question types, difficulty level and range of questions. These will give you a flavour of actual BBA questions; and will also let you benchmark yourself against authentic scores.

Each paper comprises:

1. Question Paper
2. Answers and Explanations

Take these tests once you are comfortable with the question types and are satisfied with your section practice.

Practicing these papers will help you gauge your performance level with respect to the actual admission test and further streamline the application of concepts as well as strategies.



Note

This book is a combination of a reference book and a workbook. In order to gain the maximum benefit from the book, we would recommend that you treat it like a journey, a process. Rather than just reading it, engage with it. Practice the various exercises, complete the tests and do make it a point to go through the answers and explanations. Happy Learning!

EXAMINATION PATTERN

Every major BBA entrance examination follows a unique pattern. However, the syllabus with respect to the domains tested in these examinations remains more or less consistent. There are primarily four sections as following:

1. English Language
2. Quantitative Aptitude
3. Analytical and Logical Reasoning
4. General Awareness



Note

The IP University Common Entrance Test (IPU CET) features a section on Management Aptitude that combines elements of business awareness and management concepts. A quick reckoner for the same has been enclosed in the book for your perusal.

The details of the four sections are provided as following:

English Language

This section of the exam assesses the English language ability of a student. Most questions in this section are based on vocabulary. Following topics are covered under this section:

- Vocabulary
- Spelling Mistakes
- Synonyms and Antonyms
- Rearrangement of word in sentences
- English comprehension
- Para Jumbles
- Fill in the blanks
- English Usage errors
- Idioms and Phrases
- Cloze test
- One word substitution
- Spotting errors
- Analogies
- Inappropriate usage of words

Quantitative Aptitude

The section on Quantitative Aptitude comprises questions on mathematics from class VI to X. One needs to be conversant with the basic principles of the subject and revise the fundamentals. Topics that form this section are mentioned below:

- Number Theory
- HCF and LCM
- Square Roots
- Data Sufficiency Test

- Profit and Loss
- Surds and Indices
- Simplification
- Percentage
- Approximation
- Quantitative Comparison
- Average
- Logarithms
- Fraction and Decimals
- Commercial Math
- Ratio and Proportion
- Data Interpretation
- Compound and Simple Interest
- Partnership
- Mensuration Area
- Volume
- Data Comparison
- Discounts

Analytical and Logical Reasoning

Analytical and logical reasoning is a section that examines your aptitude for business studies. It's meant to test your general aptitude. This section needs preparation to score well. You can practice logical reasoning questions from last years' papers and practice papers. The topics assessed in this section are:

- Number Test
- Analogy Test
- Insert Missing Sequence Test
- Direction and Distance Test
- Classification (Odd Man Out) Test
- Logical Word Sequence Test
- Coding and Decoding Test
- Mathematical Operations
- Series Test
- Data Arrangement Test
- Ranking Test
- Logical Diagram (Venn Diagram)
- Relationship Test
- Alpha Numeric Symbol Sequence
- Alphabet Test
- Cubes and Cubical Dice Test
- Time Sequence Test
- Statement Arguments
- Statement Conclusion
- Data Sufficiency Test
- Logic Test
- Statements Assumptions
- Statement Action

General Awareness

BBA entrance exams check your general knowledge as well as business knowledge. Make it a habit to stay updated by following the news channels and reading the newspapers. Pay special attention to the following topics to cover this section:

- Business and General Awareness
- Business
- Trade awareness of the world and India
- Geography
- Economic Study
- General Polity
- Science
- Computer Science
- Sports
- Awards
- Current Events
- History

PLANNING AND PREPARATION

Now that you have an understanding of the structure and composition of the BBA exam, let us discuss a few targeted strategies to aid your preparation.

While familiarity with previous year exam patterns and cut-offs helps, too much scrutiny of trend analysis may prove to be counterproductive. The biggest challenge for a test-taker is to strike a judicious balance between strategy and adaptability. While it is extremely important to develop a comprehensive strategy by practicing extensively across various sections and question types, it is equally important to maintain flexibility and not approach the exam with preconceived notions. A student can adopt a multi-pronged approach towards preparation for the BBA entrance exams. This approach is defined by three key elements:

1. Review of concepts
2. Intensive practice
3. Increased awareness

An integrated application of these three elements will provide a competitive edge to a candidate preparing for the BBA entrance exams. Let us understand how.

During the examination, quickly scan the question stems, identify the question types/themes that are your strong points and attempt them first.

English Language

With respect to the General English section, the Reading Comprehension passages are generally easy-moderate in their difficulty level. The word limit of these passages is also usually between 500–700 words, making it easier for a candidate to attempt them quickly. The Vocabulary, Grammar and Usage based questions test your basic understanding of the rules of context, appropriateness and correctness as well as the fundamentals that constitute the language.

It is recommended that you revise the core concepts of grammar, correct usage, vocabulary and practice a few questions every day. Theory on idioms and phrasal verbs, figure of speech, correct usage should also be reviewed.

Quantitative Aptitude

Quantitative ability, Data Interpretation and Data Sufficiency generally appear in the same section in the BBA entrance exams. Data Interpretation questions are usually easy. The Quantitative Ability portion reflects a good mix of questions across topics. Hence, a review and revision of the core concepts will prove highly beneficial for attempting this section. You should also aim to practice different question types extensively. Revision of basic formulae, enhanced comfort with calculations, adoption of effective short cuts — all of this will help improve your efficiency and efficacy in this section.

In Data Interpretation and Data Sufficiency, avoid spending a large amount of time on caselets that appear to provide ambiguous solutions.

Analytical and Logical Reasoning

The Analytical and Logical reasoning section is generally of a higher difficulty level. However, this section can also contribute tremendously towards the overall score, provided the candidate practices the different question types extensively.

In this section, questions based on arrangements, grouping and selection can generally be attempted accurately in a short time. Questions based on Verbal Reasoning including Critical Reasoning are also reasonably easy. Questions based on Visual Reasoning, though few in number, are generally tougher and should be attempted carefully. Practice questions on arrangements, family trees, complex data situations, etc. A good working knowledge of different types of syllogisms, implicit statements and arguments will also prove helpful.

General Awareness

The General Awareness section of the BBA exam is quite difficult and requires an extensive awareness of the socio-political-economic environment. It demands familiarity with both static and current components of the environment.

BBA is a test of your ability to strike a balance between accuracy and speed. You will need to increase your speed while maintaining high levels of accuracy.

In a nutshell, revise the core concepts, practice extensively, enhance your speed, keep yourself updated with regards to current affairs and finally, believe in yourself!

All the best!

SECTION 2
ENGLISH LANGUAGE

Chapter

2

English Language Ready Reckoner

INTRODUCTION

Reading Comprehension or the ability to read, analyse and discern the meaning of written text, is an integral part of management entrance tests.

The word *comprehension* means ‘the act or action of grasping with the intellect: understanding’. As stated above, Reading Comprehension is one of the most commonly tested skills in every BBA entrance examination.

In Reading Comprehension, students have **to read passage(s) and answer questions that follow the passages**. This area tests the ability of the student to quickly **grasp what is being said in the passage** before answering the questions. Some of the questions test your ability to **recognize implications and draw inferences**. Others test your ability to **understand and critique the ideas** and information provided in the passage; while some might require an **application of the logic** used in the passage.

One can expect 1–2 Reading Comprehension passages in the various BBA entrance tests, with the number of questions ranging from 5–15. The passages are sourced from varied fields, with lengths ranging from 350–550 words.

This section aims to provide a quick revision of the various concepts related to reading and comprehension. It shall further explain, in detail, the various types of questions and effective strategies to answer them. The purpose is to provide a comprehensive and concise guide to all problems pertaining to Reading Comprehension.

The difficulty level of the questions in the section ranges from **moderate–difficult**, with several questions being direct lifts from the passage. The trick lies in **enhancing both the speed and range of your reading** in order to be equipped with the skills required to attempt this paper.

Let us begin with a quick revision of the basics.

READING COMPREHENSION

Speed Reading

We all have various comfort levels. How comfortable are you in a crowd of people? How comfortable are you on an airplane? How comfortable are you speaking in public? How comfortable do you feel driving fast? 60 kilometres per hour? 85? 120? What about 180 kilometres per hour, the speed many race car drivers travel? You might not like going that fast, but racers have learned to drive at top speeds because they have raised their comfort level.

Comfort zone speed is the speed at which people read any text as if they are in no hurry and claim that they achieve their highest level of comprehension at this speed. Imagine finishing a thin book like Harry Potter and the Chamber of Secrets in a month! The question that begs to be asked is, would reading at a low, comfort-zone speed ensure success in the Reading Comprehension section? The answer is definitely no. If one has a very slow speed then one would manage to finish only a portion of the RC section.

Speed reading is essentially a method of reading rapidly by taking in several words or phrases at a glance or by skimming. Speed reading increases the reading rate and furthers comprehension of the text.

Why is it important?

To be able to read fast is an important skill in today's world. As students and also as professionals, we read large amounts of material on a daily basis. Thus, improving our speed-reading technique is something each and every one of us should not only do, but also maintain.

A person who has an average reading speed can read **250 to 350 words per minute**. By practicing speed reading strategies, a person can increase their reading capabilities to **400 to 600 words per minute** while retaining good comprehension. As already discussed, Reading Comprehension passages can be lengthy and have a moderate-difficult comprehension level. In such a scenario, the ability to read at a competitive speed while enhancing comprehension is imperative.

There are five factors that adversely affect comprehension and speed:

1. Poor Vocabulary
2. Difficulty in understanding idiomatic and figurative usages
3. Inability to relate two sentences or ideas
4. Inability to organize information
5. Lack of concentration

Skimming and scanning

Skimming and scanning are two very different strategies for speed reading. They are each used for different purposes, and they are not meant to be used all the time.

Skimming refers to looking **only for the general or main ideas**, and works best with non-fiction (or factual) material. With skimming, your overall understanding is reduced because you do not read everything. You read only what is important to your purpose.

Unlike skimming, when **scanning**, you look **only for a specific fact or piece of information** without reading everything. You scan when you look for your friend's phone number in the telephone list, and for the sports scores in the newspaper. For scanning to be successful, you need to understand how your material is structured as well as comprehend what you read so you can locate the specific information you need. Scanning also allows you to find details and other information in a hurry.

Skip small words

Each word requires a different amount of time to process. In fact, some words are so intuitive; they can be skipped without losing the meaning of the sentence. Most native English readers do this instinctively to some degree, but this technique can be improved through practice. To understand how this works, go through the example discussed below.

The underlining hand motion/pointer method

This is a great beginner technique to force your eyes to adapt to a faster reading speed.

1. Grab a pen, chopstick or other thin stick-like object (your finger works too, but a pen works better because of its sharper tip).
2. Trace under the words and let the tip guide your eyes. The pen is just a guide; do not draw on the book.
3. Trace at a pace that is ~10 to 20% faster than your typical reading speed. Continually push yourself by speeding up once you've adapted.

The **pointer method** has three distinct **advantages**:

1. It ensures that you read at or near your current top speed
2. It helps you maintain a consistent speed
3. It reduces instances of you losing your place

If you are the type that always seems to get distracted and lose your place in the text, the pointer method has a more meaningful impact on your reading speed.

Regression

The tendency to **go back to the parts of the passage or re-read the text** is called regression. Regression unnecessarily slows you down and also affects your comprehension as a result of frequent jumps in your understanding while reading.

Readers should focus on reading a passage completely even though they feel that their concentration has temporarily wandered or they have missed something. Remember that the brain is very good at filling in learning gaps. Staying focused on the line of words that is currently being read before continuing can also increase their comprehension of the text and its meaning. Additionally, important concepts are frequently repeated in a text all the time.

Reading and comprehension speed is cut down by at least 30 percent if a person stops or regresses more than two times in every row.

Active Reading

To make the most of the time you spend studying, you need to read actively.

Active reading simply means reading something in order to gain enhanced clarity and understanding of the material, as per your requirements. It is different from passive reading. It is an important skill that aids your comprehension. An active reader applies certain questions and theories that help enhance clarity. It involves applying logical and rhetorical skills.

If you just read passively, then you are dealing only with the superficial aspect of the text. This allows you to answer certain types of questions. But typical RC passages represent a wide variety of questions and in order to tackle all of them you need the ability to read critically.

Active reading enables a reader to comprehend the underlying structure – tone, inference and organization that allows him/her to answer all types of questions.

The following techniques can help you read actively:

Looking for keywords

Identify and highlight key words and phrases as you read. These will assist you in identifying the ideas and developing an ability to understand the link between them. Some ways to identify these are:

Correlating sets of words

Correlating words refer to the use of synonyms, antonyms, nouns, adverbs, verbs and adjectives to describe ideas and/or arguments in the passage. Identifying the related words helps you come closer to the main idea of the passage. *Be selective – too much highlighting won't help.*

Connecting words and their function

Certain words function as a link between various ideas expressed by the author. These words are of high importance as they bring in the contrast/link between the ideas, opinions and thoughts expressed in the passage. Link words are many and can be categorized in terms of the function they serve in the overall progression of the thought process.

Cause – Because, Thereby

Consequence – Thus, Therefore

Time Sequence – While, When

Concession – Nevertheless, However

Opposition – But, Against

Ideas that recur

Just like similar words are used to re-emphasize an idea, ideas reappearing in a passage reiterate a point. Authors use this technique to build the main idea or concept. Look for 'guideposts' that help you understand the text—phrases like 'most importantly', 'in contrast', 'on the other hand'.

Analyzing the argument

Summarize the main points; question the material, jot down examples, and so on. This shall involve you in a constructive dialogue with the content and help you comprehend and retain it more efficiently.

Some questions that can be posed while reading are – *Who wrote it? When? Who is the intended audience? Why do you think it was written? Is it an excerpt from a longer piece of text?*

Keeping pace with inferences

Inferences use logical thought to arrive at a point. Every piece of text progresses in a logical manner and these areas in a passage are fertile ground for questions, especially, inferential questions, which judge the readers' ability to comprehend the reasoning of the author. Some common ways in which an author proceeds to build inferences are – contrast, cause, consequence, purpose and explanation.

Paying attention to the opening paragraph

The manner in which the author introduces the text reveals a lot about the writers' attitude, aim, viewpoint or approach. Writers use different ways to introduce texts. For example, a text can be introduced with the help of analogies, anecdotes, examples, contrasts, etc. An analogy is a comparison in which an idea or a thing is compared to another thing that is quite different from it. It aims at explaining that idea or thing by comparing it to something that is familiar. An anecdote is a short account of an amusing or interesting incident which helps enliven the text.

Focusing on the organization of the passage

One should pay attention to the organization of the passage, the structure and logical flow of ideas. Along with this, an understanding of the different types of Reading Comprehension passages—whether they are argumentative, discursive, descriptive or analogous in their construction shall also help a candidate develop effective strategies to approach these passages. Certain key features of the passage structures are:

Argumentative passages

These passages present the arguments made by the author with respect to a particular subject. In such passages the author presents arguments and counter arguments with the assistance of arguments, facts and information. These passages are logic driven in their construction and elucidation. Questions in such passages demand an understanding of the logical structure of the passage and inferences based on the same.

Discursive passages

In such passages, the author presents his/her ideas and opinions and reinforces the same with the use of logic and data.

Descriptive passages

Descriptive passages are generally narrative in nature. They include a description of an event/activity/phenomenon. In these passages, techniques of skimming and scanning might be of assistance as the questions will be more factual in nature and can be located easily.

Analogy based passages

These passages draw comparisons between two unrelated objects or points of reference. These passages demand an in-depth understanding of the analysis and comparisons being drawn. Hence, you are required to analyse the structure and draw inferences.

Building Vocabulary

If a person cannot understand the meaning of the words in a text, their reading speed will decline. This is because a reader will need to pause in order to figure out what they are reading. Additionally, learning words often requires a quick look in the dictionary.

Practice

A person cannot improve their comprehension and reading skills without constant practice. This is always important for a reader to continue developing their ability to comprehend more and read faster. The most effective way of achieving sufficient training in processing information and reading at an augmented rate is to practice. One way to make reading practice more interesting is to find a text that a person likes to read. Finally, always bear in mind that there are no obstacles in how a person can improve their reading comprehension and reading speed. All it takes is practice.

Eclectic Reading

You must increase your scope of reading. Reading across areas is vital for competitive examinations. Familiarity with different topics would help you comprehend the passage easily and would provide you a cutting edge in solving Reading Comprehension questions.

Let us quickly recapitulate the points discussed above:

1. Firstly, one needs to be aware that one is not required to understand each and every word of the comprehension. The focus should be on identifying the main idea and a summarization of the passage. You need to eliminate the words, phrases, sentences that are not useful and focus on keywords.

2. **Practice extensively**, especially by solving previous year papers. By solving the previous year papers, you can understand and identify the distribution of various question types in the examination. You can also develop effective strategies for attempting each question.
3. Improve your vocabulary
4. **Practice active reading** and learn to identify words, ideas, concepts that are integral to the passage. This will improve your accuracy and reduce the time spent by you on these passages.
5. **Eliminate the answer options:** The approach of eliminating choices is more effective than that of selecting choices. One trick that can be of assistance is – '**BANE**'. This approach involves eliminating choices that are:
 - (a) Too **B**road
 - (b) **A**lien (Not contextually relevant)
 - (c) Too **N**arrow
 - (d) Too **E**xtrême
6. **Never apply external knowledge to the given passage.** Confine your understanding to the information provided in the passage only.

Types of Reading Comprehension Questions

Reading Comprehension questions can be broadly categorized into six types, each employing different types of approaches in order to answer the question. The ability to identify these question types; understanding the aim of the question and the common traits of correct and incorrect answers is extremely important. Depending upon how specific one is in classifying questions, there are about six question types.

1. Main Idea
2. Specific Idea
3. Logical Structure
4. Implied Idea
5. Further Application
6. Tone

Type of Questions	Description	Common Question Stems	Approach
Main Idea Questions	<p><i>Main idea</i> questions ask you to identify the "primary purpose" or the "main point" of the passage.</p> <p>In order to answer these questions correctly, you must be able to identify the essence of the passage and develop an understanding of the overall idea presented in the passage</p>	<ul style="list-style-type: none"> ➤ Which of the following most accurately states the main idea of the passage? ➤ The primary purpose of the passage is to ➤ The passage is primarily concerned with which of the following? ➤ The author of this passage is primarily concerned with ➤ Which one of these is the best title for the passage? 	<ul style="list-style-type: none"> ➤ Typically, the main idea appears at the beginning or the end of the passage, so pay special attention to these parts. ➤ Eliminate any option that is either too specific or too general ➤ Do not go back and read/skim the entire passage to find the answer

Type of Questions	Description	Common Question Stems	Approach
Specific Idea Questions	<p>These questions ask specific information mentioned or stated in the passage.</p> <p>The answers are mentioned explicitly within the passage.</p>	<ul style="list-style-type: none"> ➤ True/Not True Questions ➤ Questions on timelines/statistics ➤ The author mentions which of the following? ➤ Which of the following is true according to the passage? ➤ The author provides information that would answer which of the following questions? 	<ul style="list-style-type: none"> ➤ As long as you know which part of the passage contains the answer you can attempt these questions even if you have read the passage cursorily. ➤ Do not hesitate to refer the passage. These extra seconds shall ensure accuracy.
Logical Structure Questions	<p>These questions test your understanding of the overall logic of the author i.e. how s/he uses it to develop the passage. Here, the main idea and paragraph summaries you formulate will be helpful</p> <p>Keywords can also help us identify the “logical direction” of the text- words like “moreover”, “although”, “ironically”, “but” etc.</p>	<ul style="list-style-type: none"> ➤ The author uses .example in order to illustrate.... ➤ The author develops the passage primarily by.... ➤ Meaning of a phrase question ➤ Synonym/Antonym question 	<ul style="list-style-type: none"> ➤ Read the options, revisit the part of the passage where the information asked in the question is stated (in case the question asks you something specific) and then choose the correct option. ➤ If you can phrase the answer before looking at the options, it shall help improve accuracy.
Implied Idea Questions	<p>These are the kind of questions where the answers are not explicitly stated in the passage, but they are implied. This again demands a higher level of comprehension.</p>	<ul style="list-style-type: none"> ➤ The passage uses _____ to imply that... ➤ Which of the following cannot be inferred from the passage...? ➤ What does the author mean by...? ➤ The sentence, ‘ _____’, implies that.... 	<ul style="list-style-type: none"> ➤ Implied idea questions require you to understand what is implied by but not necessarily stated in the passage. ➤ To ensure accuracy you should use the process of elimination
Further Application Questions	<p>Further Application questions ask you to take information and conclusions in the passage and apply them to similar situations or ideas.</p> <p>The key to this question type is the ability to identify the linking elements of an argument and assess their application in similar situations.</p>	<ul style="list-style-type: none"> ➤ The author of the passage would be most likely to agree with which of the following? ➤ Which of the following statements would provide the most logical continuation of the final paragraph? ➤ [an idea or action described in the passage] is most similar to which of the following? 	<ul style="list-style-type: none"> ➤ Read the last paragraph carefully as this would give you an idea of what may follow next. ➤ Pay attention to the general progression of the passage e, in terms of ideas and their elucidation in each paragraph. Then apply the same logic to elaborate the ideas and build on them

Type of Questions	Description	Common Question Stems	Approach
Tone Questions	<p>Tone questions require the candidate to identify the attitude or mood of a specific part of the passage or of the entire passage.</p> <p>Tone questions test your ability to recognize an attitude or disposition of the author, which is identified by the use of adjectives and trigger words.</p>	<ul style="list-style-type: none"> ➤ The tone of the author in the passage is.... ➤ The tone of the passage is..... 	<ul style="list-style-type: none"> ➤ The tone of a passage cannot be ascertained from a single word or paragraph ➤ First, without looking at the options, think of a tone for the passage. Then check the options and select the one that closely replicates your description. ➤ Read the first and last paragraph very thoroughly to answer such questions.

Let us practice a few passages in order to enhance our understanding of the different question types:

Directions for examples 1 to 15: Read the following passages carefully and answer the questions at the end of each passage.

PASSAGE 1

Politics is local but most problems are international. That is the fundamental problem for national governments caught between the twin forces of globalization and voters' anger. The European refugee crisis, for example, seems to cry out for a continent-wide solution. But the tide of migrants has been vast and national governments have been tempted to put up barriers first, and answer questions later. The latest example saw Sweden introduce checks on those travelling from Denmark, leading the other country, in turn, to impose temporary controls on its southern border with Germany. Anti-immigration parties have been gaining in the polls, with the exception of the German Chancellor; mainstream politicians want to head off the challenge. In a way, this looks like the same mismatch that has plagued the euro, a single currency without a unitary fiscal and political authority.

Many economists have advocated much greater integration of the euro zone in the wake of the bloc's crisis. The European banking system would be stronger if there was a comprehensive deposit insurance scheme, the economy would be more balanced if there were fiscal transfers from rich to poor countries. But such plans are unpopular with voters in rich countries (who perceive them as handouts) and in poor countries (who worry about the implied loss of local control that reforms would require). All that the European Union's (EU) leaders have managed so far is to cobble together solutions (such as the Greek bail-outs) at the last minute. Gone is the pledge of unity of the G20's summit in London in 2009, when leaders agreed on a co-ordinated stimulus in response to the financial crisis. Central banks are now heading in different directions; the Federal Reserve has just tightened monetary policy while the European Central Bank and the Bank of Japan are committed to easing. Trade creates tighter links between countries, but global trade growth has been sluggish in recent years. The OECD thinks that trade grew by only 2% in volume in 2015. No longer is trade rising faster than Global GDP, as it was before the crisis. International agreements require compromise, which leaves politicians vulnerable to criticism from inflexible components. Voters are already dissatisfied with their lot after years of sluggish gains (or declines) in living standards. When populist politicians suggest that voters' woes are all the fault of foreigners, they find a ready audience. Furthermore, economic woes can lead to much more aggressive foreign policy. In the developed world, demographic constraints (a static or shrinking workforce) may limit the scope for the kind of rapid growth needed to reduce the debt burden and make voters happier. Boosting that sluggish growth rate through domestic reforms (breaking up producer cartels, making labor markets more flexible) is very hard because such reforms arouse strong opposition from those affected. The danger is that a vicious cycle sets in. Global problems are not tackled because governments fail to co-operate, voters get angrier and push their leaders into more nationalistic positions and conflict which poses a threat to all.

Example 1**What can be concluded from the example of the Greek bailout cited in the passage?**

- (a) There is tremendous political turmoil in Greece.
- (b) The approach to the Greek financial crisis by Euro zone was not appropriate.
- (c) Greece has recovered from the financial crisis.
- (d) A comprehensive system of deposit insurance need not to be effective.

Example 2**Which of the following is the central idea of the passage?**

- (a) A unified approach to regional issues is unwanted and impractical.
- (b) Globalization is on the decline which will reduce social unrest.
- (c) Unlike America and Asia, Europe is in severe financial difficulty.
- (d) International co-operation is declining which is dangerous.

Example 3**Which of the following has/have been the outcome(s) of economic woes?**

- (A) Uncompromising or antagonistic foreign policy.
 - (B) An all-powerful single financial regulator for Europe.
 - (C) Drop in trade volumes.
- (a) Only (A) (b) Only (B) (c) (A) and (C) (d) (B) and (C)

Example 4**Which of the following is true in the context of the passage?**

- (a) It is difficult for developed countries to achieve a high growth rate at present.
- (b) Europe needs greater economic integration.
- (c) Politicians need to take the right steps rather than popular ones.
- (d) Anti-globalization sentiment is quite high.

Example 5**Which of the following can be said about the G20 summit in London in 2009?**

- (a) It was organized to address the fallout of the financial crisis.
- (b) Countries did not follow-up with a harmonized approach to the crisis.
- (c) Sentiments of unity were expressed at the summit.
- (d) It was unsuccessful as assurances did not translate into action.

Example 6**Which of the following best explains the phrase 'The danger is that a vicious cycle sets in' in the context of the passage?**

- (a) Failure to sacrifice individual interests for common good perpetuates global problems.
- (b) With rise in income, consumption is boosted and so is debt.
- (c) Having common reforms takes away a country's autonomy.
- (d) Boosting trade with OECD countries makes economies vulnerable to oil price fluctuations.

Example 7**Which of the following is the author's view on the refugee crisis?**

- (a) It is an unmanageable problem controlling Europe and Asia.
- (b) To stem migration, rich countries need to safeguard their orders.
- (c) Politicians have responded appropriately.
- (d) A joint approach is required to resolve the crisis.

Solutions

1. From the passage, it can be said the approach to the Greek financial crisis was not appropriate by the euro zone.
The correct answer is option (b).
2. From the passage it can be said that international co-operation is declining which is dangerous.
The correct answer is option (d).
3. Uncompromising or antagonistic foreign policy and Drop in trade volumes.
The correct answer is option (c).
4. Politicians need to take the right steps rather than popular ones.
The correct answer is option (c).
5. G20 summit was organised to address the fallout of the financial crisis.
The correct answer is option (a).
6. Failure to sacrifice individual interests for common good perpetuates global problems.
The correct answer is option (a).
7. A joint approach is required to resolve the crisis.
The correct answer is option (d).

PASSAGE 2

Much remained a mystery about Bernie Madoff's crime, even after he pleaded guilty in March 2009. But one thing, it seemed, that everybody knew was true was this: his wife and sons were guilty too. From the first weeks after his arrest, unidentified "former prosecutors" and "criminal lawyers who have followed the case" and "legal sources" were repeatedly quoted in various media outlets asserting that Ruth, Mark, and Andrew Madoff were under investigation and would soon be indicted. Glossy magazine articles would speculate carefully; garish Internet blogs would accuse recklessly; television commentators would wink and nod knowingly. All that fierce, smug certainty about their guilt-unsupported by any cited facts-effectively drove Madoff's immediate family into exile.

In an era of hypermedia, with mobile phone paparazzi and self-defined Internet commentators constantly on the alert for ways to attract attention, it is worth noting that these attacks on the Madoff family were a sharp departure from the typical public reaction to cases of white-collar crime, going back more than a century.

Of course, such criminals-confidence men, embezzlers, crooked politicians, fraudsters of all kinds-were attacked savagely by the press and the public when their crimes came to light. But their wives and children were almost never included in those attacks; rather they were almost always ignored or, at the very least, quickly left alone. There were a few exceptions where criminal charges were actually filed against a close relative, who was then pulled to the whipping post of public attention. In general, however, even the wives and children of executed murderers were left to rebuild their lives in relative obscurity, unless they sought the spotlight themselves.

The treatment over the years of organized-crime defendants is instructive. Despite widespread fascination with the murderous escapades of so-called “Mafia dons” and crime-family “capos”, it was extremely rare for any attention to fall on the elderly Mrs. Mafia Don or the capos’ children—even though a realist might have wondered how much they knew about why their husband or father had asked all his closest buddies to wear guns and sleep on mattresses in the garage. On rare occasions, a mobster’s relatives actively courted publicity. But those who didn’t were routinely ignored by the media and certainly were never publicly and repeatedly accused of complicity in their husbands’ or fathers’ crimes.

Yet the public outcry against Ruth Madoff and her sons began almost from the instant of Madoff’s arrest and did not cease. By the time he pleaded guilty, it was deafening.

From the beginning, however, there were facts in the Madoff case that just didn’t seem to be consistent with the family’s guilt. First, there was the fact that none of them fled the country. Perhaps Bernie Madoff, seventy years old at the time of his confession, felt too old and tired to leave as a wealthy fugitive; and perhaps Ruth, even if she were guilty and faced arrest and a lifelong imprisonment, would not leave without him. But his two sons, if they were guilty, had the opportunity, the means, and the motive to flee. The end was clearly in sight weeks in advance, there was still a princely sum in the bank, and they and their families were relatively young and portable. Surely, Madoff, before turning himself in, would have handed his sons the keys to the company jet and enough cash to let them live comfortably beyond the reach of the law for the rest of their lives. After all, if they were his accomplices, their only other option would have been to stay and go to prison.

And yet Madoff did not flee – and neither did his wife or sons.

Then, there was his confession. Some hostile theorists immediately argued that Madoff and his guilty sons staged his confession so they could turn him in and thereby deflect suspicion from themselves. But this would have been a worthless gesture unless they all could have been absolutely sure that no incriminating evidence would surface later and none of their other low-level accomplices would finger the sons in a bid for leniency—assumptions that were not remotely realistic if the sons were actually guilty. Moreover, if Madoff truly believed anyone could be insulated from suspicion simply by turning himself in, wouldn’t he have arranged for that to be Ruth?

Logic aside, assumptions about the family’s guilt began to run up against the fact that, as the Madoff investigation progressed, the predicted arrests of his wife and sons simply did not happen.

Example 8

According to the author, why did the wife and sons of Madoff not flee the country?

- (a) Because Bernie Madoff had already pleaded guilty
- (b) Because they did not have the opportunity and means to flee
- (c) Because they had deflected suspicion from themselves by turning Bernie Madoff in
- (d) None of the above

Example 9

How did the family of Bernie Madoff react to media frenzy declaring them guilty?

- (a) They launched counter publicity to prove they were not guilty
- (b) They sued the media for defamation
- (c) They stayed away from public eye
- (d) They approached the media to confess their crime

Example 10

What is the point the author has highlighted in the given passage?

- (a) That the Madoff crime came to light because of the dynamism of hypermedia
- (b) That the treatment over the years of organized-crime defendants has changed
- (c) That media tends to run parallel trials to the court
- (d) That families of criminals must also be indicted

Example 11

Which of the following sentences is incorrect?

- (a) It was the facts about the Madoff case that indicated that his family was guilty
- (b) Madoff had been arrested following his confession
- (c) Media has always shown extensive interest in the exploits of mafia dons and other criminals
- (d) Madoff had committed a white-collar crime

Solutions

8. The author nowhere mentions the reason why Ruth Madoff and her sons did not flee. He just highlights the fact that they had the means, motive and time to do so. Refer these statements – ‘the public outcry against Ruth Madoff and her sons began almost from the instant of Madoff’s arrest and did not cease. By the time he pleaded guilty, it was deafening’ Further, in the penultimate paragraph the author himself disproves the theory that Bernie Madoff turned himself in to save his family. This makes options (a), (b) and (c) incorrect. Therefore, the correct answer is option (d).

The correct answer is option (d).

9. The last line of the first paragraph states that all the media frenzy surrounding the Madoff family drove them into exile. In other words, this means that the family stayed away from the public eye.

The correct answer is option (c).

10. While the author mentions that traditionally media did not target the families of mafia and dons, the Madoff case highlighted a marked departure from that tradition when the media pointed fingers at the Madoff family. Thus, the treatment of the organized-crime defendants has changed over the years. Option (c) – that media tends to run parallel trials to the court– has merely been hinted at in the first paragraph and is not the central theme of the passage.

The correct answer is option (b).

11. The question asks you to identify the incorrect statement. Options (b), (c), and (d) are clearly stated in the paragraph. This makes (a) the right answer. This can also be checked from the passage. The first line of the sixth paragraph states that “the facts in the Madoff case did not seem to be consistent with the family’s guilt”, meaning that the facts did not point to the family of Bernie Madoff as guilty.

The correct answer is option (b).

PASSAGE 3

Many years ago, one mustard dominated the supermarket shelves: French’s. It came in a plastic bottle. People used it on hot dogs and bologna. It was yellow mustard, made from ground white mustard seed with turmeric and vinegar, which gave it a mild, slightly metallic taste. If you looked hard in the grocery store, you might find something in the speciality-foods section called Grey Poupon, which was Dijon mustard, made from the more pungent brown mustard seed. In the early seventies, Grey Poupon was no more than a hundred-thousand-

dollar-a-year business. Few people knew what it was or how it tasted, or had any particular desire for an alternative to French's or the runner-up, Gulden's. Then one day, the Heublein Company, which owned Grey Poupon, discovered something remarkable: if you gave people a mustard taste test, a significant number had only to try Grey Poupon once to switch from yellow mustard. In the food world that almost never happens; even among the most successful food brands, only about one in a hundred has that kind of conversion rate. Grey Poupon was magic.

So Heublein put Grey Poupon in a bigger glass jar, with an enamelled label and enough of a whiff of Frenchness to make it seem as if it were still being made in Europe (it was made in Hartford, Connecticut, from Canadian mustard seed and white wine). The company ran tasteful print ads in upscale food magazines. They put the mustard in little foil packets and distributed them with airplane meals – which was a brand-new idea at the time. Then they hired the Manhattan ad agency Lowe Marschalk to do something, on a modest budget, for television. The agency came back with an idea: A Rolls-Royce is driving down a country road. There's a man in the backseat in a suit with a plate of beef on a silver tray. He nods to the chauffeur, who opens the glove compartment. Then comes what is known in the business world as the *reveal*. The chauffeur hands back ajar of Grey Poupon. Another Rolls Royce pulls up alongside. A man leans his hand out of the window. "Pardon me. Would you have any Grey Poupon?"

In the cities where the ads ran, sales of Grey Poupon leaped 40 to 50 percent, and whenever Heublein bought airtime in new cities sales jumped 40 to 50 percent again. Grocery stores put Grey Poupon next, to French's and Gulden's. By the end of the 1980's Grey Poupon was the most powerful brand in mustard. "The tagline in the commercial was that this was one of life's finer pleasures." Larry Elegant, who wrote the original Grey Poupon spot, says, "and that, along with the Rolls Royce, seemed to impart to people's minds that this was something truly different and superior."

The rise of Grey Poupon proved that the American supermarket shopper was willing to pay more – in this case \$3.99 instead of \$1.49 for eight ounces – as long as what they were buying carried with it an air of sophistication and complex aromatics. Its success showed, furthermore, that the boundaries of taste and custom were not fixed: that just because mustard had always been yellow didn't mean that customers would use only yellow mustard. It is because of Grey Poupon that the standard American supermarket today has an entire mustard section. And it is because of Grey Poupon that a man named Jim Wigon decided, four years ago, to enter the ketchup business. Isn't the ketchup business today exactly where mustard was thirty years ago? There is Heinz and, far behind, Hunt's and Del Monte and a handful of private label brands. Jim Wagon wanted to create the Grey Poupon of ketchup.

Wigon is from Boston. He runs his ketchup business-under the brand World's Best Ketchup-out of the catering business of his partner, Nich Schiarizzi, in Norwood, Massachusetts. He starts with red peppers, Spanish onions, garlic, and a high-end tomato paste. Basil is chopped by hand, because the buffalo chopper bruises the leaves. He uses maple syrup, not corn syrup, which gives him a quarter of the sugar of Heinz. He pours his ketchup into a clear ten-ounce jar, and sells its for three times the price of Heinz, and for the past few years he has crisscrossed the country, peddling World's Best in six flavours – regular, sweet, dill, garlic, caramelized onion, and basil – to speciality grocery stores and supermarkets. If you were in Zabar's on Manhattan's Upper West Side a few months ago, you would have seen him at the front of the store, in the spot between the sushi and the gefilte fish. In front of him, on a small table, was a silver tureen filled with miniature chicken and beef meatballs, a box of toothpicks, and a dozen or so open jars of his ketchup. "Try my ketchup!" Wigon said, over and over, to anyone who passed. "If you don't try it, you're doomed to eat Heinz the rest of your life."

In the same aisle at Zabar's that day two other demonstrations were going on, so that people were starting at one end with free chicken sausage, sampling a slice of prosciutto, and then pausing at the World's Best stand before heading for the cash register. They would look down at the array of open jars, and Wigon would impale a meatball on a toothpick, dip it in one of his ketchups, and hand it to them with a flourish. The ratio of tomato solids to liquid in World's Best is much higher than in Heinz, and the maple syrup gives it an unmistakable sweet kick. Invariably, people would close their eyes, just for a moment, and do a subtle double take. Some of them would look slightly perplexed and walk away, and others would nod and pick up a jar. "You know why you like it so much?" he would say, in his broad Boston accent, to the customers who seemed most impressed.

“Because you have been eating bad ketchup all your life!” Jim Wigon had a simple vision: build a better ketchup – the way Grey Poupon built a better mustard – and the world will beat a path to your door.

Example 12

Why has the author termed Grey Poupon as “magic”?

- (a) It had a different taste and was seen as belonging to speciality-foods division
- (b) It was made from Dijon mustard
- (c) It commanded a conversion rate uncommon in the food world
- (d) It came in a bigger glass jar than French’s

Example 13

How many years did it take for Grey Poupon to grow from a hundred-thousand dollar a year brand to the most powerful brand in mustard?

- (a) Less than 5 years
- (b) About 5–10 years
- (c) About 15–20 years
- (d) More than 25 years

Example 14

What kind of audience was Grey Poupon reaching out to through its ads?

- (a) Frequent Flyers
- (b) Those who did not like the taste of French’s
- (c) Buyers of large quantities of mustard
- (d) Rich and sophisticated customers

Example 15

Which of the following statements is correct?

- (a) World’s Best Ketchup was cheaper than Heinz
- (b) Wigon claimed that people will be doomed if they tried Heinz Ketchup
- (c) World’s Best Ketchup was thicker than Heinz
- (d) People who were perplexed with the taste tended to pick up the jar of World’s Best Ketchup

Solutions

12. The ‘Grey Poupon’ has been termed as ‘magic’ because its conversion rate i.e. the number of people who converted to it from normal mustard, after tasting this mustard was unheard of in the food industry. Therefore, option (c) is the correct answer.

The correct answer is option (c).

13. The author talks of ‘Grey Poupon’ as small business in the early seventies. Later, he mentions that ‘Grey Poupon’ had become the most powerful brand in mustard by the end of the 1980’s. This constitutes a time of roughly 15–20 years and hence, option (c) is the correct answer.

The correct answer is option (c).

14. The author mentions the advertisement that Grey Poupon used in order to increase its sales – an ad which included a chauffeur driven Rolls-Royce. Also, the last line of the third paragraph states that with the image of the Rolls-Royce in the advertisement, Grey Poupon seemed to project something that was ‘truly different and superior’. Hence, it can be understood that the brand was trying to reach out to the rich and sophisticated people. Therefore, option (d) is the correct answer.

The correct answer is option (d).

15. In the last paragraph of the passage, the author mentions that the ratio of tomato solids to liquid in World’s Best Ketchup was much higher than that of Heinz, which means that World’s Best Ketchup was thicker than Heinz. Hence, option (c) is the correct answer.

The correct answer is option (b).

Directions for examples 16 to 20: The following is an excerpt from a recent article by David Ewing Duncan. Read the passage and answer the questions within its context.

PASSAGE 4

Eye surgeon Virendar Sangwan has perfected a procedure so cutting-edge that most who have tried it have failed. In an operating theatre in the central Indian city of Hyderabad, he surgically implants corneas grown in a petri dish from stem cells by his colleague Geeta Vemuganti in patients with damaged eyes. Together they perform about 80 corneal regeneration procedures a year, making the L.V. Prasad Eye Institute, where they work, one of the most prolific facilities in the world using stem cells to regenerate tissues of any kind.

The Sangwan-Vemuganti team uses stem cells found in the tissues of living adults, not ones derived from embryos. Teams all over the world are working with adult stem cells, trying to coax them to regrow cells in hearts, brains, livers and other organs, but progress is slow. Besides corneas, scientists have had some success regrowing skin cells and bone tissues, but those procedures remain experimental. “A number of programs around the world have tried to perfect this treatment, but they have had bad outcomes,” says University of Cincinnati eye surgeon and stem cell specialist Edward Holland. “It is impressive what they are doing at Prasad.”

In addition to the Hyderabad project, only Holland’s program and a half-dozen others in the world conduct operations using corneas grown from stem cells.

The treatment uses stem cells harvested from the limbus, located where the cornea touches the white of the eye. For those with damaged corneas, these cells – called “limbic” and “conjunctiva” – are harvested from a patient’s good eye, if he has one, or from a close relative. They are placed in a petri dish and chemically tweaked to grow into the lower layer of a cornea, called epithelium. It is then transplanted into the eye of the patient where in most cases it takes hold and grows. In 56% of the cases at the Prasad Institute, patient could still see clearly after 40 months later.

Indians are well known for reverse engineering, meaning they can deduce how drugs are made in order to produce generic versions. But in this case, Sangwan and Vemuganti, a pathologist, developed the technique on their own from reading papers and running experiments in the lab. Sangwan says he had a number of patients with burned eyes who could not be helped with standard corneal transplants from cadavers, so he persuaded Vemuganti to try growing corneas in her lab. “You know how to grow cells, and I know how to do the transplant surgery.” Vemuganti recalls him saying. “Why don’t we work together?” She smiles and shakes her head. “I had no clue if this was going to work.”

Vemuganti’s major innovation was developing a platform on which to grow corneas. First she designed a circular glass tube about the size of a stack of coins. Then she overlaid the glass with tissue from a human placenta which is “a good surface to grow corneas on.” She says. After that she placed stem cells in four places around a circle, added a growth medium, and watched the corneas begin to grow.

Commercial interests among stem cell companies for the procedure has been scant because of the perceived small volume of patients, says venture capitalist Antoun Nabhan of Bay Capital, who sits on the board of Cellerant, a leading stem cell company in San Carlos, Calif. But corneal stem cell treatment may have wider

applications, say ophthalmologist Ivan Schwab of University of California at Davis. “These stem cells are similar to others in the body that make mucous membrane,” he says. “These techniques of growing stem cells might one day be used to treat mucous- membrane tissue in the sinuses, bladder, and other organs.”

Example 16

According to the article Sangwan-Vemuganti team’s cutting- edge procedure of implanting cornea grown from stem cells is considered a major advancement by the experts because

- (a) they derive stems cells from embryos.
- (b) their labs are customised to grow stem cells.
- (c) they regrow cells in hearts, brains, livers with stems cells from tissues of living adults.
- (d) they derive stem cells from tissues of living adults and grow cells in labs.

Example 17

Sangwan-Vemuganti procedure is carried out on

- (a) patients requiring any corneal transplant
- (b) patients with damaged corneas
- (c) patients with damaged eyes of any kind
- (d) None of the above

Example 18

The world recognises this Indian innovation because Indian scientists are normally known

- (a) to be good at analysing and finding out a method of how an existing drug is made.
- (b) as they are good researchers of drugs.
- (c) as they are good at carrying out experiments to create generic drugs.
- (d) as they are able to carry out drug trials on large samples.

Example 19

The pathologist, Vemuganti, started growing cornea in a petri dish

- (a) by following procedures published in research papers.
- (b) by inventing a totally new procedure.
- (c) by experimenting with procedures published in journals.
- (d) by following the instruction of the transplant surgeon.

Example 20

In the context of the passage choose the correct set of meanings for the words: PLATFORM and GENERIC

- (a) Lab table; related to genes
- (b) Method; related to genes
- (c) Lab experiments; without a brand name
- (d) Methodology; without a brand name

Solutions

16. The answer can be found in the second paragraph of the passage. Sangwan-Vemuganti team uses stem cells found in the tissues of living adults and not the ones derived from embryos. The passage says that scientists all over the world have tried similar experiments, but have had bad outcomes. Hence, (d) is correct. Options (a) and (c) are contradictory to the information given in the second paragraph. Option (b) is incorrect because the team is praised for perfecting the procedure and not for having customized labs.

The correct answer is option (d).

17. The first paragraph says that the team implants cornea in patients with damaged eyes.

The correct answer is option (c).

18. Refer to the first line of the fifth paragraph, “Indians are well known for engineering, meaning they can deduce how drugs are made in order to produce generic versions.”

The correct answer is option (a).

19. Refer to the fifth paragraph, “...Sangwan and Vemuganti, a pathologist, developed the technique on their own from reading papers and running experiments in the lab.”

The correct answer is option (c).

20. ‘Generic’ is mentioned in the fifth paragraph. The author says that Indians apply reverse engineering in order to produce generic versions of the drugs. So, it is implied that they try to deduce how the branded drugs are made and then produce the non-branded versions of the same. ‘Platform’ is mentioned in the first line of the sixth paragraph. Since the paragraph talks about the various methods involved in developing a suitable place for growing corneas, so ‘platform’ refers to the methodology involved. Hence, (d) is correct.

The correct answer is option (d).

Directions for examples 21 to 22: Read the edited excerpt of an article by NELSON VINOD MOSES and answer the questions in this context.

PASSAGE 5

A successful non-resident Indian employed in the United States returns to a backward Indian village and transforms the lives of the villagers. Sounds familiar? At 31, Ashwin Naik is pacing through the path Shah Rukh Khan traced in his off beat Bollywood movie, Swades. Naik had just quit his cushy job in a genomics firm in the US to join MIT Sloan School of Business. With a month in hand, he headed home and travelled through the remote areas of Bagalkot district in Karnataka. The woeful social conditions he saw moved him. Naik chucked the MBA course and in six months set up Vaatsalya Healthcare, a rural healthcare delivery system.

In February 2005, Vaatsalya’s first hospital opened in Hubli. Two more centres were opened in Gadag and Karwar to offer specialist services of surgeons and facilities such as physiotherapy for children suffering from cerebral palsy. “We introduced paediatric surgery for infants below six months,” says Naik. “Else, patients would have to be taken to distant cities of Hubli or Bangalore.” Naik plans 100 more units in five states in the next three years. Mere charity by an affluent, middle-class professional? Far from it. Vaatsalya is one among rapidly spreading “for profit” social enterprises that serves the poor and brings in profit. Mumbai-based Ziqitza, an imbalance services company, is another. It never refuses a patient for money, and charges Rs. 50 to 200.

Done fleetingly in India and elsewhere till now, entrepreneurial minds with a social conscience are methodically creating such models at a greater pace. “There has been a boom in the past two years,” says Varun Sahni, country director of Acumen Fund, a US based social fund that invests in companies that target low income communities. “Currently, there are about 1,000 in India.”

The timing seems perfect. There is a wide market acceptance and funding has been coming in easily. These enterprises work across a swathe of areas including healthcare, education, rural energy, agriculture, arts and crafts, banking and more. “For profit” entrepreneurs are obsessed with social and environmental impact in addition to the financial returns. Since they are answerable to the investors, they try expanding the business rapidly. SKS Microfinance, for instance, started in 1998 and has now over 900,000 customers, 440 branches and an outstanding loan disbursement of over Rs. 452 crores as of August 2007.

Example 21

Identify the appropriate business model of the kind of enterprise described by the author.

- (a) Servicing societies at no profit
- (b) Profiting from poor people
- (c) Setting up enterprises for masses of low-income groups on experimental basis.
- (d) Setting up enterprises for social causes for profit and expand rapidly

Example 22

Which of the following companies does not illustrate the idea explained by the author?

- (a) SKS Microfinance
- (b) Acumen Fund
- (c) Ziqitza
- (d) Vaatsalya Healthcare

Solutions

21. The second paragraph talks about the business model described by the author. Vaatsalya is an example of the enterprise based on the business model in question. Refer to line “Vaatsalya is one...brings in profit.” The last paragraph further says that ‘For profit’ entrepreneurs try expanding the business rapidly as they are answerable to investors. This makes option (d) correct. Option (a) is incorrect because these are ‘For profit’ enterprises and not ‘no profit’ enterprises. Option (b) is negated because these are social enterprises and charge a very nominal fee from the poor. Option (c) is incorrect because the passage doesn’t say that these enterprises are set up on experimental basis.

The correct answer is option (d).

22. As per the passage, Acumen Fund is a US based social fund that invests in companies that target low income communities. The companies in other three options are examples of the ‘For profit’ enterprises.

The correct answer is option (b).

PARA JUMBLES

Para jumbles are jumbled paragraphs. Basically, you are given a paragraph, but the sentences are **not in the right order**. It is now up to you to **rearrange these sentences** to form a coherent, logical paragraph.

This type of a question is quite common in management entrance tests. Para jumbles are not necessarily a test of your language skills. The study of para jumbles is more closely **related to reasoning** than to reading comprehension because we take some statements and using clues try to put them into a coherent sequence—essentially trying to use logic and reason to solve a puzzle which is not mathematic but verbal in structure.

This means that even if you are not conversant with the idea being discussed or familiar with the topic on which the paragraph is based, you can still easily resolve the jumble with extremely high accuracy levels.

Para Jumble Concepts

Things not to be done

Here are a few things NOT to be done while attempting these questions:

1. Reading the sentences and trying to resolve the jumble on the **basis of the flow of ideas**. While this approach makes sense intuitively, the paragraph might be a tricky one wherein the flow of ideas might not be easily discernible. Most people lose focus by reading the statements given over and over again. Sometimes, it is next to impossible to make out which sentence follows which one.
2. Not attempting a para jumble because the topic on which is the paragraph is based is from a **genre that you are not conversant with**.
3. Reading the sentences in the order of all the **combinations provided**. Generally, every jumbled paragraph has four options. Each option suggests a different sequence for resolving the jumble. While it is highly tempting to read the sentences in all the possible combinations, doing this will not only confuse you but, after some time, every combination will start appearing correct! Also, solving all options will waste your time tremendously

Mandatory Pairs

The best way to solve a para jumble is to try and identify **Mandatory Pairs**. A *mandatory pair* is a sequence that you know cannot exist in any other order. In other words, two or more statements that have to be grouped together, if we are following the rules of the language, constitute a mandatory pair.

There are many types of mandatory pairs. But there is only one basic tool to identify them. Look at para jumbles like a detective and search for clues that the thief or in this case paper-setter has left for you. (**keywords**). Then, just like a detective, use these clues to form a sequence or connection and complete the chain!

Types of mandatory pairs

I. Names, proper nouns, pronouns

Sometimes, we can identify mandatory pairs or a longer sequence with the help of the names, proper nouns and pronouns used. Also, keep in mind that English demands the presence of an **antecedent** for a pronoun, that is, if a pronoun has been used; it needs to refer to a noun or another pronoun. Identifying the antecedent can also help identify the mandatory pair.

The use of personal pronouns (I, me, you, us, he, they, it etc...) and demonstrative pronouns (this, that, these, those) is extremely helpful in resolving para jumbles.

Example 1

Look at the statements given below:

- A. Mr. Kumar checked the quality of food and asked flood victims about the help from the government.
- B. He also instructed officials to focus more on the quality of food, and sanitation for women, at the camps.
- C. Chief Minister Nitish Kumar and Minister for Water Resources Rajiv Ranjan Singh and other officials inspected several relief camps in Patna district, from Maner to Athamalgola.

Solution: What, according to you, should be the sequence of the statements given? Obviously, the answer is CAB. Let us understand why. Statement c contains the full name of the person – Nitish Kumar. Statement a contains the surname – Mr. Kumar, while statement b introduces the personal pronoun – he. Thus, the correct sequence is CAB.

Let us look at another example:

Example 2

- A. Trump (70) also confirmed that he would be addressing an Indian-American event in New Jersey next month, the proceeds of which will benefit global victims of Islamic terror.
- B. “The Hindu community has made fantastic contributions to world civilisation and to American culture and we look forward to celebrating our shared values of free enterprise, hard work, family values, and a strong American foreign policy,” Mr. Trump said in a statement.
- C. Republican presidential nominee Donald Trump has praised Hindu community’s “fantastic” contributions to world civilization and American culture.
- D. He issued a short 24-second video message inviting Indian-Americans to attend the “incredible” event on October 15.

(a) ABCD

(b) ABDC

(c) CABD

(d) BCAD

Solution: Using the concept of identifying mandatory pairs based on noun/pronoun usage, we can easily identify the sequence of sentences. The full name of the speaker appears in the third sentence, followed by his surname in statement A. The pronoun appears in the last statement making option (c) **CABD** the correct sequence.

II. Cause and effect

There are instances where a cause and effect relationship can be identified. Such a relationship may exist in the form of a mandatory pair or run through the paragraph.

There are some cause-effect indicators (refer the table) that can help one establish a cause and effect relationship.

CAUSE	For, Because ..., Due to (the fact that), In order to ..., Resulting from ..., Since...
EFFECT	So, Accordingly, As a result, Consequently, Hence, Therefore,

Look at the statements given below:

Example 3

- A. Scientists and wildlife conservationists are seeing red over the threat posed to Gangetic river dolphins by the National Waterways project.
- B. The development of the Ganga for shipping is seen by wildlife conservationists as the single-largest threat to the survival of the species, whose numbers are declining in most parts of their natural habitat.
- C. India has a huge untapped potential of inland waterways and the Centre plans to develop a 1600 km waterway between Allahabad and Haldia for inland transportation
- D. This is mainly due to construction of dams and barrages on the river.

(a) ABCD

(b) ABDC

(c) CBDA

(d) BCAD

Solution: In the above set of statements, it can easily be ascertained that statement d is describing the reasons for the phenomenon described in statement b. Thus, BD becomes a mandatory pair. Statement a has to be the opening line as it is introducing the idea that is elucidated in the passage. Hence, option b becomes the correct answer.

III. Chronology

At times you can see a logical chain of events in the para jumble. It could also be in the form of a set of instructions to be followed in a certain order. If you look for keywords associated with the sequence, you can easily figure out the right order.

Also, some questions have a statement that refers to a point in time. The reference may be in the past, present or future. Accordingly you can decide its place in the sequence. In such situations—the past will always come first, followed by the present and then the future.

Example 4

- A. The second time, he remembered was when Shima fell into the river while dancing on the Yamuna pontoon bridge during another outing and Joe once again saved her.
- B. This was the third time he had saved Shima's life.
- C. The first one was when she slipped during an office Christmas Day picnic to the Taj Mahal
- D. Two days after the office fire incident Shima's father called him up with the request that he should make it convenient to visit his place on the coming Sunday evening.

(a) DCBA

(b) BCAD

(c) BACD

(d) ABCD

Solution: In the above set of statements, you can easily identify the order of the statements by paying attention to the sequence of events. Thus, BCAD becomes the only order in which the statements can exist in order to form a coherent flow of ideas.

IV. Transition words

Transition words make the shift from one idea to another very smooth. They organize and connect the sentences logically.

These may be of two types:

1. Extending words (*also, again, as well as, furthermore, in addition, likewise, moreover, similarly, consequently, hence, subsequently, therefore, thus...*)
2. Contrasting words (*yet, but, however, still, nevertheless...*)

Observing the transition words shall provide you clues with respect to the connected sentences. Consider the examples below (please note that the words provided herein are not exhaustive, merely indicative)

Time (Beginning, During, Ending)	First/second/next/last time, When, Whenever, While, By the time, Till, Until, Afterward(s), At first, Initially, Meanwhile, Meantime, Simultaneously, Eventually, Finally....
Sequence	And, After, Following, Later, Next, Subsequently, Then,
Conclusion	So, In all, In summation, In conclusion, To conclude
Contrast	But, Either ... or, Yet, Although, Despite, Though, Whereas, While, However, In contrast, Instead, Nevertheless, Nonetheless, On the contrary, On the other hand, Otherwise
Similarity	Neither ... nor, Either ... or, In other words, Likewise, Similarly
Additional Information	And, Additionally, Also, Besides, Further, Furthermore, In addition, Moreover

Example 5

- A. **Hence**, more and more administrators are becoming aware of the critical need to keep parents apprised of the newer methods used in schools.
- B. **Therefore**, the great influence of parents cannot be ignored or discounted by the teacher.
- C. However important we may regard school life to be, there is no gain saying the fact that children spend more time at home than in the classroom.
- D. They can become strong allies of the school personnel or they can consciously or unconsciously hinder and thwart curricular objects.
- (a) BADC (b) CDBA (c) CBDA (d) CDAB

Solution: In the above mentioned parajumble, we can identify two transition words – Hence and Therefore. Both these keywords are used to explain the consequence of something. Upon perusal of the text, it is apparent that statement b is the explanation for statement c while statement a concludes the passage. Thus, CB become a mandatory pair making option c the correct response.

V. General to specific

In case one is stuck between two statements that appear to form a mandatory pair but one cannot decide the sequence of the statements, that is which one should come first, we follow the principle of **general to specific**.

Example 6

Let us elucidate the concept with an example:

- A. He made an interesting comment about our store's pricing policy.
- B. He said that we could offer discounts and incentives to encourage people to buy in lesser quantities but more frequently
- C. Discounts could be given ranging from 15 – 20 percent on every purchase made.
- D. The lesser the quantity, the more frequently the customers will have to visit the store. The more frequent the visits, the more incentives they can earn.
- (a) ABCD (b) ABDC (c) BDCA (d) ABCD

Solution: In the jumble given above, there can be some confusion between BCD and BDC. In such a scenario, we follow the general to specific rule. Statement c is a specific example of the proposal outlined in statement d. Hence the correct sequence is ABDC, making answer option b the correct response.

Some other ways in which mandatory pairs can be identified are through the use of:

- 1. Obvious Openers:** You may sometimes come across statements that are obvious openers, that is, it is clear that the paragraph begins with them. They could either be introducing the idea or contain all the relevant terms/definitions. These statements can be definitions, universal truths or philosophical statements.
- 2. Obvious Conclusions:** Sometimes, you can easily figure out the concluding line of the paragraph. Keywords might also be available to help narrow your choices.
- 3. Use of Acronyms:** The rule is that if both full form as well as short form is present in different sentences, then the sentence containing full form will come before the sentence containing short form.
- 4. Definition and Example:** In any sentence is working as an example, place it after the sentence it is explaining. It might not necessarily form a mandatory pair but the example has to follow the idea/hypothesis/theory it is elucidating.
- 5. Use of Articles:** By their very definition, when the author uses 'a/an'— he wants to make a general statement - wants to introduce the noun followed by a/an for the first time but when he uses 'the' he wants to refer back to some previously discussed noun. It means having 'the' is very unlikely in the opening sentence. If 'a/an' and 'the' both are used for the same noun then the sentence containing 'the' will come after the sentence containing a/an.

SENTENCE REARRANGEMENT

Another type of question that involves application of the principles of para jumbles is **Sentence Rearrangement**. In such questions, a sentence is fragmented into different parts and presented in a jumbled order. You are required to ascertain the placement of each part in order to form a logically coherent and consistent sentence.



You can use the principles of mandatory pairing to resolve sentence re-arrangement questions as well.

Let us look at a few examples: *Rearrange the following sentence fragments to make meaningful sentences.*

Directions for examples 1 to 2: In the following questions, the first and the last sentences of the sequence are given as 1 and 2. Rearrange the other sentences so that they form a logical and meaningful sequence.

Example 1

1. As he crossed toward the pharmacy at the corner he involuntarily turned his head because of
 - A. a blindingly white parallelogram of sky being unloaded from the van—a dresser with mirrors across which, as across a cinema screen,
 - B. a burst of light that had ricocheted from his temple, and saw,
 - C. passed a flawlessly clear reflection of boughs sliding and swaying not arboreally, but with a human vacillation, produced by the nature of those
 - D. with that quick smile with which we greet a rainbow or a rose,
2. who were carrying this sky, these boughs, this gliding façade.

(a) ABCD

(b) DACB

(c) DCAB

(d) **BDAC**

Solution: In the above question, the first and last parts of the sentence have been provided. The statement following 1 has to provide a cause for the behaviour. The only option that does that is option b. While Option a builds on option b by providing a description of what he saw, option d has to precede it because it expands to the act of seeing itself. Option c extends the description provided in a and connects seamlessly with the last statement by providing a reference for the relative pronoun 'who' used in it. Thus, the correct order is BDAC, which makes option D correct.

Example 2

1. My very photogenic mother died in a freak accident (picnic, lightning) when I was three,
 - A. surely, you all know those redolent remnants of day suspended, with the midges, about some hedge in bloom
 - B. and, save for a pocket of warmth in the darkest past, nothing of her subsists within the hollows and dells of memory,
 - C. over which, if you can still stand my style (I am writing under observation), the sun of my infancy had set:
 - D. or suddenly entered and traversed by the rambler, at the bottom of a hill, in the summer dusk
2. a furry warmth, golden midges

(a) ABCD

(b) DACB

(c) DCAB

(d) **BCAD**

Solution: You can solve this question by identifying the linking words and finding the connecting portions. The use of 'and' in option b connects it with the first sentence as it expands on the feelings of the writer. Similarly, option c follows b and options a and d are connected through the use of 'or'. This makes BCAD the correct sequence.

Directions for examples 3 to 5: Rearrange the jumbled parts to produce the proper sequence. Choose the correct sequence.

Example 3

Smoke oozed up between the planks.

P: Passengers were told to be ready to quit the ship.

Q: The rising gale fanned the smouldering fire.

R: Everyone now knew there was fire on board.

S: Flames broke out here and there.

The correct sequence is:

(a) SRQP

(b) QPSR

(c) RSPQ

(d) QSRP

Solution: The first sentence describes the scene of fire. Thus (S) is the opening sentence as it takes that description forward. The "fire" needs to be mentioned before the introduction of sentence (Q). Hence, RQ is a mandatory pair. Only option (a) has RQ.

The correct answer is option (a).

Example 4

Most of the universities in the country are now facing financial crisis.

P: Cost benefit yardstick thus should not be applied in the case of universities.

Q: The current state of affairs cannot be allowed to continue for long.

R: Universities cannot be equated with commercial enterprises.

S: Proper development of universities and colleges must be ensured.

The correct sequence is:

(a) QRPS

(b) QSPR

(c) QRSP

(d) QPRS

Solution: RP is a mandatory pair as the reason that cost benefit yardstick should not be applied to universities is that universities cannot be equated with commercial enterprises. Moreover, S is clearly the concluding section.

The correct answer is option (a).

Example 5

The study of speech disorders due to brain injury suggests that patients can think having adequate control over their language.

P: But they succeed in playing games of chess.

Q: Some patients, for example, fail to find the names of objects presented to them.

R: How they manage to do this we do not know.

S: They even find it difficult to interpret long written notices.

The correct sequence is:

(a) QSRP

(b) RPSQ

(c) QSPR

(d) RSQP

(BBA: DU JAT 2012)

Solution: R adds to the introduction of Dr S. Radhakrishnan, given in 1, by referring to him as the 'second President of India'. Thus, 1R becomes a mandatory pair. The achievements of Dr. Radhakrishnan are recounted in S and further reflected upon in P. Q follows P as it explains Radhakrishnan as an educationist who wrote and spoke tirelessly about tradition, change and potential in the Indian society. Thus, the correct sequence is RSPQ.

The correct answer is option (a).

VOCABULARY

The various BBA examinations focus extensively on Vocabulary. Of the 30–40 questions that comprise the English section, approximately 45–50% are based on vocabulary. The different types of questions that you might see from the vocabulary section are as following:

1. Synonyms/ Antonyms
2. One word substitution
3. Fill in the blanks
4. Idioms/ Phrasal Verbs
5. Cloze Test
6. Spellings

Hence, it is important that one strengthens one's fundamentals and enhances the repertoire of vocabulary – with respect to the meaning and application of words. However, enhancing one's vocabulary is not as difficult as it might appear. All it requires is attention to detail, a willingness to learn and some creativity!. Before we look at these question types, let's get some basic vocabulary strategies and concepts in place.

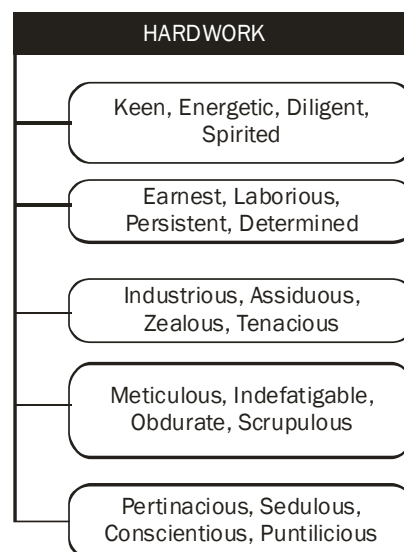
Vocabulary Concepts

Given below are a few tips to improve your vocabulary. Go through them and use the ones that prove beneficial for you.

1. **Make up as many associations and connections as possible.** Say the word aloud to activate your auditory memory.

Relate the word to words you already know. Start with a simple word. Example – HAPPY and associate it with progressively difficult words – Cheery, Merry, Jovial, Jocular, Content, Radiant, Blithe, Exuberant, Ebullient, Propitious etc. Consider the example provided in the table

2. **Play with words:** Play Scrabble, Boggle, and do crossword puzzles. These and other word games are available on the computer, so you are not dependent on a partner to play.
3. **Use vocabulary lists or vocabulary cue cards:** Flash cards are a great way to improve your vocabulary as they organize and structuralize material in a convenient and easy to learn format.
4. **Take vocabulary tests:** The study material consists of comprehensive practice and mock tests that will help you assess and enhance your verbal ability. Practice these diligently and keep adding to your skills.



Always Try to Predict the Answer for Vocabulary in Context Questions

Whenever you come across any vocabulary in context question such as a Fill in the blank question or a question from a Reading Comprehension passage, always try to predict the answer before you take a look at the answer choices given to you. This will prevent you from getting confused between similar looking answer choices. Your prediction doesn't have to be very accurate – even something broad like 'the word should be a positive word' or a 'negative word' can be good enough to eliminate some wrong answers.

Let's say you get a fill in the blank question on the test such as this one,

Since Indian cricket team is in great form, it will _____ the upcoming cricket World Cup.

- (a) lose (b) surrender (c) win (d) abandon

The first thing that you should do is just read the above sentence and not look at the options. After reading the sentence, make a prediction in your head as to what kind of word you think should go in the blank. The word can be anything; it can even be in Hindi. In the above sentence, the logical word has to be 'win' because if the team is in great form, the only logical thing is for it to emerge victorious. Once you have made this prediction, look at the answer choices and go with the one that best matches your prediction, that is (c).

This approach will also help you identify whether your weak area is vocabulary or comprehension. For example, if you notice that you are making the wrong predictions for what you think should be the answer, then you are not being able to understand the meaning of the sentence correctly. In that case, even if you memorize the entire dictionary, it won't help because your problem is not vocabulary in the first place. Similarly, if you notice that you are making the correct predictions but not getting the answer right, then you need to work at first strengthening your vocabulary base.

Use Keywords and Connectors to Make Predictions

You have just learnt above that you should always try to predict the correct answer for vocabulary in context questions. In order to be able to make these predictions correctly, try to look for two kinds of clues:

(a) The Keywords

(b) The Connectors

Keywords are words that tell you the meaning of the word that should go in the blank.

For example, consider this sentence:

Known for their bravery, horses are used as symbols of _____ in several cultures.

- (a) arrogance (b) courage (c) loyalty (d) speed

As most of you might have guessed, the correct answer should be (B), courage. But why can't the answer be (c), loyalty? Because the sentence talks about horses being known for their 'bravery', that is, courage, so 'bravery' becomes your keyword in this sentence. Hence, even though horses are also known for loyalty, speed, and stamina, the answer still has to be *courage* because it is connected to the keyword in the sentence.



Remember that the Keyword does not necessarily have to be a word; it can also be a phrase or a clause.

If 'bravery' were to be replaced with 'devotion' in the original sentence, then what should be the answer?

Known for their devotion, horses are used as symbols of _____ in several cultures

The answer will then change to 'loyalty', because the keyword now becomes 'devotion'. This is how keywords can help you decide which word to go with in the blank, so you must consciously look for the keyword in every sentence that you see.

However, sometimes the keyword, on its own, may not be enough to convey the entire meaning of the sentence. For example, consider a variation of the above sentence:

Although horses are known for their devotion, in some cultures they are used as symbols of _____.

- (a) arrogance (b) courage (c) loyalty (d) treachery

The Keyword is still 'devotion' but the meaning of the sentence has reversed because of the use of 'Although'. We call such words *Connectors* because they help you determine the connection between two parts of a sentence – whether they are connected in the same manner or in a contrasting manner.

In the above example the word that goes into the blank has to contrast with the keyword 'devotion', so the answer should actually be 'treachery'.

Here is a list of some common 'contrasting' and some 'same-direction' connectors:

Same direction connectors

Because	As a result of	Likewise
Since	Also	Moreover
And	Due to	Consequently
Hence	Thus	Additionally



The ; (semi colon) is also a same direction connector.

Contrasting connectors

Despite	Nonetheless	Ironically
Yet	Nevertheless	Rather
But	While	Contrastingly
However	Although	

Note that every sentence may not necessarily have a connector. In such sentences the meaning, obviously, always goes in the same direction.

Use your Knowledge of Word 'Charge' to Narrow Down your Choices

Words can have a positive charge (a positive meaning), a negative charge (a negative meaning) or a neutral charge (neutral meaning). If you can identify whether your desired answer should have a negative or a positive charge, you can again narrow down your choices.

For example, let's say the question asks you to select the synonym of UNRULY from the following options:

- (a) Faithful (b) Ethical (c) Disdainful (d) Disobedient

Now, you may not be aware of the exact meaning of UNRULY but you may have heard of it being used somewhere in the negative sense, such as in newspapers. For example, you may remember this headline from a newspaper that you had read sometime in the past '*The police used tear gas to control the unruly mob*'. So then you know that 'unruly' is a negative word, which means you also know that the synonym of 'unruly' will also be a negative word. With this knowledge, you can immediately eliminate options A and B because they are both positive words. So, you now have a 50% chance of getting the answer correct because you have managed to come down to two options.

The correct answer, by the way, is D because 'Unruly' means 'disobedient' or 'difficult to control'.

So the lesson for you is that you can get to the correct answer even if you don't know the meaning of every given word. However, it definitely helps if you have a good vocabulary so go through the word list given at the end of this section and try to remember as many of those words as you can.



In order to become good at identifying word charge, start reading the newspaper and some current affairs magazines. Even if you won't remember all the words you come across, your subconscious mind will remember whether they carry a positive, negative, or neutral connotation.

Use your Knowledge of Word Roots to Eliminate Options

Word roots are the building blocks of words. For example the root 'onym' means *name* and the root 'syn' means *same*. This gives you the word 'synonym'. Similarly the root 'anti' means *opposite*, which combined with 'onym' gives you the word 'antonym'. The root 'pseudo' means *fake*, which combined with 'onym' gives you the word 'pseudonym'.

Thus, if you are aware of some common word roots, you can at least eliminate some of the wrong options. For example, let's say that in a particular fill in the blank question you have made the prediction that your answer should be a positive word and you are stuck between the two words – *Malediction* and *Benediction* – both of whose meanings you do not know.

How do you decide which word to go with then?

Word roots can come to your rescue here because you may have heard of words such as *malnutrition* or *malnourishment*, which should tell you that 'mal' has a negative connotation. Similarly, you may have heard of words such as *beneficial* or *benevolent*, which should tell you that 'bene' has a positive connotation. Thus, if you need to pick the positive word from amongst the two, you should pick 'Benediction' (which means 'blessing').

So, the knowledge of root words can help you eliminate options or even take you to the correct answer.



While the knowledge of some common roots is definitely beneficial, don't spend too much effort trying to memorize every possible word root because you won't be able to spot most of them in an actual word in any case.

One good book to start with is *Word Power Made Easy*.

To understand how roots help, let's look at an example – Can you identify, which of the following given words would mean – '*Not agreeing with established beliefs or standards*'

- (a) Heterogeneous (b) Heterodox (c) Heteronym (d) Heterosexual

The correct answer would be (b). The root of all the given words is hetero, which means other. 'Heterogeneous' means made up of parts that are different. 'Heteronym' refers to one of two or more homographs (as a bass voice and bass, a fish) that differ in pronunciation and meaning. 'Heterosexual' is someone who is sexually attracted to people of the opposite sex.

Let's look at another example – Can you identify, which of the following given words would mean – '*The point in the path of a celestial body that is farthest from the sun*'

- (a) Heliolatro (b) Heliocentric (c) Aphelion (d) Heliotrope

The correct answer is (c). The root of all the given words is helio, which means the sun. Latreia means "worship. So, 'Heliolatro' is sun worship.' Centric' means center. Hence, 'Heliocentric' means having or relating to the sun as the center. 'Heliotrope' is a variable colour averaging a moderate to reddish purple. Aphelion consists of two words – Apo + Helion (Away + sun).

Word Roots

Given below is a list of some commonly used word roots. You are advised to go through the list and use it to build your vocabulary.

Root, Prefix, or Suffix	Meaning	Examples
a-	without	amoral, amorphous, asexual
ambi-	on both sides	ambidextrous, ambivalent
ante-	before or in front	antecedent, antedate
anti-	against	antipathy, antisocial
aqu/aqua-	water	aquatic, aqueous, aquarium, aqueduct
bene-	good	benefit, benediction, benevolent
bi-	two	bifurcate, biannual, bisect
bio-	life	biology, biography, biome
cede/ceed	go or yield	precede, exceed, recede
circum-	around	circumscribe, circumnavigate, circumvent
contra-	against or opposite	contradiction, contraception, controversy
cycl	circle	bicycle, cyclical
de-	reduce or remove	deescalate, defenestrate, decelerate
di-, dis-	apart or away	digress, disappear, diverge
dict	speak or say	edict, dictation, dictator, prediction, contradiction
dox	belief	orthodox, paradox, heterodox
du-, duo-	two	dual, duology, duochrome
em-, en-	into, in	embrace, enclose, encircle
esce	becoming	coalesce, adolescence, obsolescent, tumescent
ex-	out or way	exit, exhale, extirpate, exile
extra-, extro-	beyond or outside	extraordinary, extraterrestrial
fid/e	faith	bonafide, fidelity, confide
fore	before, previously, earlier	forestall, before, forebear, forebode, forecast
gram	writing, letters	diagram, grammar, epigram, telegram
graph	writing, recording	stenography, autograph, graphics
hetero-	different	heterosexual, heterozygous, heterogeneous, heterodox
homo-	same	homogenous, homosexual, homologous
hyper-	excessive	hyperactive, hyperbole
hypo-	under, below	hypothermia, hypocrite, hypoglycemic
inter-	between	intercede, interlude

Root, Prefix, or Suffix	Meaning	Examples
intra-/intro-	inside, within	introvert, intramural, intravenous
junct	joining	juncture, conjunction, disjunction
-less	without	listless, aimless, heartless
-logy	the study of	biology, geology, psychology
mal, male	bad, evil	malediction, malice
mis-	bad or incorrect	misprint, misbehave, misstep
-ness	state of being	likeness, greatness
non-	not, without	nonfiction, nonresident
ob-	against or before	obdurate, obfuscate
omni-	all, everything	omnipotent, omniscient, omnivorous
pedi, pede	foot	pedestrian, pedicure
phil	love or affinity	bibliophile, philanthropy
pre-	before or earlier	pretest, preamble
pro-	before or forward	proceed, prologue
re-	again, backwards	reaction, rebound, reuse
sub-	under or lower	submarine, subprime
temp	time	temporal, contemporary, temporarily
tort	twist	tortuous, contortion
trans-	across or beyond	transnational, transit
un-	not or opposite	unimpressive, unwanted, unwarranted

Taking Words Apart

Word	Prefix	Root	Suffix	Meaning
Concurrence	con: with	curr: run	ence: act of	Act of running with, happening at same time
Exaggerate	ex: out	ag: to do, act	---	To act out
Irreversible	ir: not	vers: turning	ible: able to	Not able to turn back
	re: again			
Malediction	male: bad	dict: to say	---	To say bad things, a negative statement
Precursor	pre: before	curs: to run	or: one who	Something that comes before
Unity	uni: one	---	ty: state of	State of being one, a single thing or being
Untenable	un: not	ten: holding	able: able to	Not able to hold on

However, as mentioned above, spending too much time on word roots is not advisable, as it is not always possible to identify the root in a given word. In the subsequent pages, we will review the fundamentals of the various vocabulary concepts. While we have made an attempt to provide detailed lists and explanations, please note that they are not exhaustive. Their purpose is to serve as guideposts in your preparation and provide a framework for it. Kindly use the information provided in the following pages to build a baseline and then work on enhancing your knowledge.

Synonyms and Antonyms

Synonyms and Antonyms are two frequently tested domains in the vocabulary section of the BBA entrance exams. While 'Synonyms' express a relation of similarity i.e. they refer to words that are similar in meaning to one another; antonyms express contradiction i.e. they refer to those words that are opposite to each other in meaning.

As stated above, the English language is a dynamic and evolving language. Hence, it is imperative for any student of the language to not only understand the literal meaning of a word, but also to form associations and understand contextual implications. A question on identifying synonyms and antonyms helps the testing authorities do just that; therefore, it is recommended, that you work with the list provided below as an exercise sheet- understand the meanings provided and then add your own words to the list. This shall help you enhance vocabulary as well as increase retention of new words.

Word	Synonym	Antonym
Abandon	Discard, vacate, renounce, relinquish, abnegate, forsake	Retain, maintain, uphold, stay
Accord	Agree, grant	Withhold, remove, disagree
Adversity	Difficulty, misfortune	Fortune, luck, serendipity
Affluent	Plentiful, rich	Poor, impoverished
Aggravate	Annoy, infuriate	Alleviate, appease, mollify
Amenable	Agreeable, favourable	Uncooperative, resistant
Anguish	Distress, sorrow	Happiness, contentment
Apathetic	Dispirited, lifeless	Enthusiastic, eager, passionate
Arrogant	Disdainful, imperious	Modest, unpretentious
Astonish	Confound, overwhelm	Explain, describe
Atrocious	Appalling, detestable	Admirable, superb
Augment	Add, enlarge	Decrease, hinder
Awkward	Graceless, inept	Graceful, amenable
Baffle	Confuse, deceive	Enlighten, comprehend
Banal	Common, plain	Original, indigenous
Barren	Desolate, sterile	Fertile, fruitful, stimulating
Berate	Criticize, disapprove	Praise, applaud
Betray	Deceive, fool	Loyal, conceal
Bias	Inclination, predisposition	Impartial, fair, unbiased
Bitter	Acrid, sour	Warm, balmy, sweet, amicable

Word	Synonym	Antonym
Bliss	Happiness, joy	Misery, affliction, anguish
Bluff	Boast, feign	Diplomatic, evasive
Brief	Concise, short	Lengthy, extensive
Brisk	Fast, swift	Sluggish, slow
Candid	Honest, truthful	Secretive, guarded
Caricature	Cartoon, imitation	Authentic, unadulterated
Casual	Informal, natural	Formal, thorough
Cease	Desist, stop	Begin, continue
Chaotic	Disordered, messy	Tidy, well-ordered
Cherish	Esteem, love	Neglect, abandon
Circumvent	Avoid, go around	Embrace, confront
Commemorate	Celebrate, honour	Disgrace, dishonour
Compensate	Balance, recompense	Penalize, deprive
Competent	Able, capable	Inadequate, unfit
Conceive	Design, plan	Misconstrue, impromptu
Contradict	Deny, oppose	Confirm, corroborate
Courteous	Polite, well-mannered	Rude, Offensive
Craving	Desire, longing	Animus, abhorrence, antipathy
Credulous	Confident, trustful	worldly, suspicious
Decent	Honourable, pure	Improper, indecent
Designate	Name, select	Untitled, incognito
Detain	Hold, keep	Release, liberate
Disclose	Announce, reveal	Conceal, hide
Dogma	Belief, view	Open-mindedness, liberal
Durable	Constant, lasting	Perishable, frail
Dwindle	Abate, diminish	Increase, flourish
Eager	Earnest, keen	Uninterested, apathetic
Eccentric	Abnormal, idiosyncratic	Ordinary, conventional
Emanate	Arise, radiate	Withdraw, absorb
Embezzle	Purloin, steal	Compensate, return
Eminent	Distinguished, prominent	Unimportant, unknown
Endure	Last, persist	Fade, short-lived
Exhaust	Deplete, empty	Invigorate, refresh

Word	Synonym	Antonym
Exhilarated	Cheerful, zestful	Depressing, boring
Explicit	Definite, specific	Vague, implicit
Fastidious	Exacting, particular	Easy-going, sloppy
Federation	Alliance, band	Authoritarianism, despotism
Feeble	Helpless, infirm	Strong, brave
Fervour	Intensity, passion	Apathy, unconcern
Feud	Argument, dispute	Accord, comradeship
Filth	Dirt, squalor	Clean, fresh
Flatter	Compliment, praise	Offend, insult
Fleet	Nimble, swift	Dilatory, sluggish, tardy
Frivolous	Inconsequential, trivial	Sensible, serious, important
Frugal	Prudent, saving	Extravagant, lavish
Genuine	Actual, real	Fake, bogus
Goad	Provoke, badger	Dissuade, deter, dissuade
Greed	Avarice, longing	Generous, temperance, asceticism
Guile	Cunning, deceit	Candor, frank, direct
Gullible	Credulous, unsuspecting	Cynical, suspicious
Habitual	Accustomed, regular	Unaccustomed, occasional
Handicap	Disability, disadvantage	Benefit, advantage
Harass	Annoy, disturb	Assist, aid, soothe
Harmless	Innocuous, inoffensive	Dangerous, objectionable
Harsh	Hard, coarse	Refined, smooth
Hasty	Abrupt, hurried	Considered, slow
Haughty	Arrogant, pretentious	Modest, humble
Humiliate	Humble, shame	Aggrandize, glorify
Hygiene	Cleanliness, sanitation	Uncleanliness, dirty
Hypocrisy	Duplicity, falseness	Honesty, sincerity
Ideal	Goal, perfection	Attainable, real, concrete
Idle	Lazy, unoccupied	Industrious, sedulous, diligent
Ignorant	Stupid, unintelligent	Discerning, learned
Illogical	Incongruent, rambling	Logical, rational
Illustrious	Eminent, famous	Unknown, obscure
Imitate	Copy, reflect	Original, veritable, authentic, innovative

Word	Synonym	Antonym
Immense	Huge, mammoth, gargantuan, Brobdingnagian	Diminutive, small, bantam
Impartial	Candid, impersonal, disinterested	Biased, partisan
Implicate	Accuse, insinuate	Absolve, exonerate, acquit
Importune	Beg, solicit	Command, aid, benefaction
Inadvertent	Accidental, unintentional	Deliberate, intentional
Indifferent	Apathetic, disinterested	Watchful, prudent, observant
Isolate	Detach, quarantine	Amalgamate, integrate, unify
Jargon	Argot, slang	Standard, profoundness
Jovial	Genial, merry	Miserable, gloomy
Justification	Excuse, reason	Indictment, question
Juvenile	Adolescent, immature	Mature, adult
Keen	Clever, observant	Reluctant, unenthusiastic
Labour	Toil, work	Leisure, idleness
Liberal	Lenient, open-minded	Conservative, bigoted
Limitation	Boundary, constraint	Extension, strength
Lucid	Clear, understandable	Equivocal, ambivalent, ambiguous
Lucky	Auspicious, fortunate	Unfortunate, hapless, ill-fated
Manipulate	Control, shape	Transparent, expound
Marginal	Borderline, limited	Core, vast
Maze	Complexity, labyrinth	Order, harmony, cohesion
Merge	Blend, fuse	Separate, split
Narrow	Confined, restricted	Wide, broad
Necessary	Mandatory, requisite	Dispensable, expendable, non-essential
Negate	Contradict, refute	Confirm, validate, ratify
Negligent	Careless, remiss	Conscientious, careful
Nice	Affable, benign	Impolite, unfriendly, discourteous, haughty
Noble	Aristocratic, distinguished	Ignoble, dishonourable
Novice	Beginner, nonprofessional, neophyte, tyro	Adroit, maestro, expert, veteran
Nuisance	Annoyance, offense	Benediction, gratification, help
Obedient	Faithful, loyal	Disobedient, rebellious, unruly
Objection	Disapproval, protest	Acquiescence, approval
Obligatory	Compulsory, required	Voluntary, optional

Word	Synonym	Antonym
Opportune	Advantageous, auspicious	Disadvantageous, ill- timed
Pacify	Appease, placate	Agitate, incite, provoke
Paramount	Chief, leading	Subordinate, inconsequential, marginal
Partisan	Biased, dogmatic	Impartial, fair, unbiased
Passive	Inactive, lethargic	Active, assertive
Permeate	Diffuse, disseminate, percolate, imbue	Block, sparse, barrage
Perpetuate	Endure, preserve	Halt, eradicate, expunge, annihilate
Perplex	Astonish, baffle	Elucidate, facilitate, enlighten
Persecute	Afflict, harass	Succor, protection
Radiate	Effuse, emanate	Concentrate, converge, focus
Realize	Accomplish, fulfil	Forfeit, relinquish
Receptacle	Container, repository	
Reconcile	Atone, conciliate	Estrange, alienate
Regret	Deplore, grieve	Applaud, welcome
Reliable	Dependable, trustworthy	Unreliable, untrustworthy, dodgy
Sanction	Approval, permit	Prohibit, ban
Shallow	Superficial, trivial	Profound, serious
Shrewd	Careful, calculating	Gullible, candid, naïve
Slight	Delicate, slender, insult	Sturdy, burly, compliment
Spontaneous	Impromptu, unplanned	Planned, forced, calculated
Stabilize	Balance, steady	Destabilize, weaken, wobble
Tame	Domesticate, subdue	Wild, independent, fierce
Tangle	Intertwine, twist	Disentangle, unravel
Thrift	Conservation, prudence	Profligacy, extravagance
Tumult	Agitation, commotion	Silence, tranquility
Turbulent	Disordered, violent	Peaceful, calm, quiet
Urbane	Suave, sophisticated, debonair, elegant, cultivated	Uncouth, boorish
Vain	Boastful, inflated	Modest, humble, unpretentious
Valid	Authorized, legitimate	Invalid, illegal, void
Variety	Assortment, diversity	Uniformity, agreement
Verify	Authenticate, substantiate	Invalidate, refute, disprove
Yearling	Youngling, col, filly, whelp, puppy	Elder, doyen, veteran

Word	Synonym	Antonym
Yearn	Desire, pine for, longing	Detest, hate, abominate, loathe
Yielding	Pliant, tractable, compliant, submissive	Stubborn, obstinate, obdurate, recalcitrant

Directions for examples 1–4: Choose the word closest in meaning to the word given in CAPITALS.

Example 1

FATUOUS

- (a) Brainless (b) Fatal (c) Sensible (d) Tolerable

Solution: Fatuous means ‘foolish or inane, especially in an unconscious, complacent manner; silly’ Brainless would be the best synonym from the given options.

The correct answer is option (a).

Example 2

LACONIC

- (a) Milky (b) Wicked (c) Cheerful (d) Precise

Solution: Laconic means ‘using few words; expressing much in few words; concise’. Precise would be the best synonym from the given options.

The correct answer is option (d).

Example 3

GROVEL

- (a) Stones (b) Crawl (c) Ghastly (d) Salute

Solution: Grovel means ‘to lie or crawl with the face downward and the body prostrate, especially in abject humility’ Crawl would be the best synonym from the given options.

The correct answer is option (b).

Example 4

NEBULOUS

- (a) Starry (b) Porous (c) Various (d) Vague

(BBA: CBS 2010)

Solution: Nebulous means ‘hazy, vague, indistinct, or confused.’ Vague would be the best synonym from the given options.

The correct answer is option (d).

Directions for examples 5–6: For each word written in capital letters, choose a word from the given alternatives which is opposite in meaning.

Example 5

ELEVATION

- (a) Prominence (b) Lift (c) Depression (d) Erect

Solution: *Depression* which means sadness or dejection would be the correct antonym of *elevation* which means loftiness of thought or feeling. *Elevation* also means an elevated place or position while *depression* means an area that is sunk below its surroundings.

The correct answer is option (c).

Example 6

ECONOMY

- (a) Frugality (b) Prudence (c) Prodigality (d) Savings

(BBA: SET 2010)

Solution: The appropriate antonym of *economy* (which means frugality in the expenditure or consumption of money, materials, etc.) would be *prodigal* which refers to someone who is wastefully or recklessly extravagant. *Frugal* and *prudent* are synonymous and refers to someone who is not wasteful.

The correct answer is option (c).

Words Often Confused or Misused

Some words sound so similar, it's easy to confuse or misuse them when writing. Computer spell check won't catch these mistakes! Use this list as a reference whenever you're unsure about which word fits in the context.

Word	Meaning
Ability	power to do
Abilities	powers and skills, especially of the mind
Capacity	a potential but undeveloped power
Accede	implies actual agreement
Concede	yielding without necessarily agreeing
Accept	to agree or admit
Except	to omit: to exempt
Adapt	to make fit
Adopt	to select or choose
Adept	skilled: proficient
Admit	used for less serious matters
Confess	implies a personal fault
Affection	a feeling, an emotion or the state of being

Word	Meaning
Affectation	artificial manner: pretentious display
Alternate	a substitute or second
Alternative	choice between two or more things
Artisan	a handicraftsman; a mechanic
Artist	a person who practices one of the fine arts
Assay	to make a trial or an experiment
Essay	to make an intellectual or bodily effort
Attenuate	to make slender or thin, or to reduce in force or value
Extenuate	to lessen by partial excuse: to mitigate
Berth	a place for sleeping in a train or aboard a ship
Birth	bringing forth

Word	Meaning
Beside	at the side of or close to
Besides	in addition to
Burn	to be damaged by fire or extreme heat
Bourn	seasonal stream
Canvas	a strong, coarse cloth
Canvass	to discuss, to solicit
Capable	able or competent
Capacious	roomy: of large content
Casual	due to chance; not permanent
Causal	of the nature of cause and effect
Censer	an incense-burning vessel
Censor	official who examines plays, books, news etc.,
Censure	expression of disapproval or blame
Ceremonial	formal
Ceremonious	addicted or showing addiction to ceremony
Collision	violent encounter of moving bodies
Collusion	fraudulent secret understanding between ostensible opponents
Complacent	self-satisfied
Complaisant	obliging
Confidant	person to whom one confides one's private affairs
Confident	feeling or showing assurance

Word	Meaning
Conscious	awake to one's surroundings or aware of
Conscientious	obedient to dictates of conscience
Continuance	duration
Continuation	going on with: resuming something
Credible	believable
Creditable	praiseworthy
Credulous	too ready to believe
Decry	disparage or condemn
Descry	make out dimly
Depository	a person entrusted with the safekeeping of something
Depository	storehouse
Dessert	course of fruit, sweetmeats and so on, taken at the end of a meal
Desert	uninhabited and barren place
Deserter	a member of the armed forces who absconds from duty
Divers	a person who dives as a sport
Diverse	of differing kinds
Draft	sketch or work to be done or order for drawing money
Draught	one continuous act of drinking; current of air; an artist's sketch of a picture.
Drought	thirst; continuous dry weather

Word	Meaning
Economic	pertaining to economy
Economical	saving; frugal
Effectual	answering its purpose
Effective	operative; striking; fit for service
Efficacious	producing desired effect
Efficient	competent; capable
Eligible	desirable; suitable
Illegible	unreadable
Eminent	distinguished; notable
Imminent	about to happen soon
Endemic	regularly found among a people
Epidemic	prevalent for the time among community
Euphemism	substitute of mild for blunt expression
Euphuism	high flown style or writing
Expedient	suitable; advisable
Expeditious	done with or marked by promptness
Factitious	artificial
Facetious	given to or marked by pleasantry
Fain	well pleased; only too glad
Feign	pretend, simulate
Farther	more far (distance)
Further	in addition to; promote
Foreign	strange and unfamiliar
Forgo	go without; relinquish
Gage	pledge; security; challenge

Word	Meaning
Gauge	standard measure; measure exactly
Gamble	risky undertaking
Gambol	frisk; caper
Gentle	well born; mild
Genteel	elegant; stylish
Gaol	prison
Goal	object of effort; destination
Historic	noted in history
Historical	belonging in the past
Hoard	stock; store
Horde	gang; troop
Honorary	conferred by way of honor; unpaid
Honorable	deserving or bringing honor
Human	having the qualities of a man
Humane	benevolent compassionate
Humility	humbleness
Humiliation	abasement
Idle	without work
Idol	an image of a deity
Imaginary	existing only in imagination
Imaginative	full of imagination
Imminent	about to happen soon
Immanent	inherent; pervading the universe
Impassable	that cannot be traversed
Impassible	not liable to pain or injury
Impossible	difficult; not possible
Imperial	of an empire; of an emperor; supreme

Word	Meaning
Imperious	domineering; urgent
Indict	accuse, especially by legal process
Incite	put into words
Industrial	of industries
Industrious	diligent
Judicial	of or by a court of law
Judicious	sensible, skillful
Knave	rogue
Nave	body of church apart from chancel and aisle
Last	after all others
Latest	most recent
Lea	piece of meadow or pasture land
Lee	side of something away from the wind
Lifelong	during the whole length of life
Livelong	the whole length of
Luxuriant	profuse; florid
Luxurious	fond of luxury; self – indulgent
Main	chief; principal; the high sea
Mane	long hair on horse's or lion's neck
Mean	ignoble; intermediate
Mien	person's bearing or looks
Mendacity	lying
Mendacity	begging
Momentary	lasting only a moment
Momentous	of great importance

Word	Meaning
Naught	nothing
Nought	the figure 0
Negligent	heedless
Negligible	that need not be taken account of
Notable	worthy of note; striking
Notorious	known to deserve an ill name
Oar	bladed pole used for steering a boat
Ore	native mineral yielding metal
Official	properly authorized by an office
Officious	intrusively kind, meddling
Ordinance	authoritative direction; decree
Ordnance	department for military stores
Peaceable	disposed or leading to peace
Peaceful	having or marked by peace
Peal	long ringing of bells
Peel	rind of fruit; thin soft bark of young shoots
Persecute	subject to ill treatment
Prosecute	pursue or carry on; institute legal proceedings
Perspicacious	having sight; discerning
Perspicuous	expressed with clearness; lucid
Physic	medicinal drugs
Physique	bodily structure and development
Popular	of the people; generally liked
Populous	thickly populated

Word	Meaning
Prescribe	lay down authoritatively
Proscribe	exile; ostracize
Presumptive	that may be assumed to be correct
Presumptuous	forward; arrogant
Raise	set upright; make stand up
Raze	completely destroy; wipe out
Regretful	full of regret
Regrettable	undesirable- unwelcome
Reverend	deserving reverence
Reverent	feeling or showing reverence
Rhyme	identity between terminal sounds of words or verse lines
Rime	hoarfrost
Sanatory	tending to health, curative.
Sanitary	of the conditions that affect health, especially with regards to dirt and infections.
Seam	line of junction between two edges, especially those of pieces of cloth, etc. turned back and sewn together
Seem	have the appearance of being
Sear	wither or blast
Seer	inspired person
Sere	withered; dried up
Sensual	self-indulgent; carnal; licentious
Sensuous	stimulating or operating through the senses; aesthetic
Sensible	having or showing good sense

Word	Meaning
Sensitive	touchy or quick to take offence
Sequel	what follows after; after effects; upshot
Sequence	succession; coming after or next
Significance	meaning; importance
Signification	sense or exact meaning or a term etc.
Social	relating to society, living in communities
Sociable	fitted for or disposed to companionship or conversation
Spacious	having ample space; roomy
Specious	fair-seeming; apparently good, but not genuine
Spiritual	concerned with the spirit or soul
Spirituos	containing distilled spirit
Straight	without curves or angles
Strait	narrow; strict
Team	a side of players
Teem	to prolific with
Temperance	avoidance of excessive indulgence
Temperament	idiosyncrasy; natural disposition
Temporal	earthly; secular
Temporary	lasting only a short time
Vacation	fixed period of cessation from work
Vocation	occupation or calling

Word	Meaning
Vain	showy and valueless; conceited
Vane	weathercock
Vein	tube that carries blood from any part of the body to the heart
Vale	valley
Veil	curtain
Verbal	oral
Verbose	prolix
Venal	guilty of taking bribes; mercenary
Venial	excusable
Virtual	such in practice though not in same

Word	Meaning
Virtuous	morally good
Wave	undulate
Waive	forego
Whit	particle; jot
Wit	intelligence; understanding
Willing	cheerfully ready or given
Willful	committed intentionally
Wreck	destruction or disablement
Wreak	inflict or cause a lot of damage
Yoke	wooden neck piece; bond or union
Yolk	yellow part of egg

One Word Substitution

One word substitutions are a test of a student's proficiency in the usage of English Language and the application of the literal meanings of words in a particular context. You are required to find a suitable one word replacement for a clause/phrase given that encapsulates the central idea being conveyed. We have enclosed an indicative list of one word substitutions for your reference. Go through the list and apply the principles of association and word roots to enhance your understanding.

Description	One Word Substitute
A person who does not believe in God	Atheist
Scientist who studies the evolution of mankind	Anthropologist
Government by one person	Autocracy
The life history of a person written by himself	Autobiography
To cut off a body part of a person	Amputate
A place for ammunition and weapons	Arsenal
A place where old government or public records are kept	Archives

Description	One Word Substitute
A man who does a thing for pleasure and not as a profession	Amateur
Animals/plants that live in water	Aquatic
Animals which live both on land and sea	Amphibian
The ability to use either hand with ease	Ambidexterity
Allowance paid to wife on legal separation	Alimony
Voluntary giving up of throne in favour of someone	Abdication

Description	One Word Substitute
A person appointed by two parties to solve a dispute	Arbitrator
A person who studies stars, planets and other heavenly bodies	Astronomer
A person who studies the influence of heavenly bodies on human beings	Astrologer
A collection of poems	Anthology
A statement which is accepted as true without proof	Axiom
A person who does not accept institutions of government	Anarchist
The practice of having two wives or husbands at a time	Bigamy
A lover and collector of books	Bibliophile
A collection of flowers	Bouquet
Government by the officials	Bureaucracy
A person, nation that is involved in war	Belligerent
An event which happens once in two years	Biennial
The act of speaking disrespectfully about sacred things	Blasphemy
A person in charge of a museum	Curator
One who lives on flesh	Carnivorous
One who feeds on human flesh	Cannibal
Belonging to or living at the same time	Contemporaries
Centre of attraction	Cynosure
A critical judge of any art and craft	Connoisseur
A religious war	Crusade
One who teaches dancing	Choreographer
A person who is bad at spellings	Cacographer

Description	One Word Substitute
The art of writing	Calligraphy
A person recovering from a bout of ill health	Convalescent
Soldiers who fight on horseback	Cavalry
A doctor who specializes in treating heart diseases	Cardiologist
A person who draws maps	Cartographer
A poem of lamentation	Elegy
Words which are inscribed on the grave or the tomb in the memory of the buried	Epitaph
Lasting one day	Ephemeral
A person who leaves his own country and goes to live in another	Emigrant
Fit to be eaten	Edible
A book that contains information on various subjects	Encyclopaedia
Someone who is devoted to the pleasure of eating and drinking	Epicure
One who is very selective in one's taste	Fastidious
A religious extremist	Fanatic or Bigot
One who believes in fate	Fatalist
An exact copy of handwriting, printing, etc	Facsimile
The animals of a certain region	Fauna
The plants of a particular region	Flora
Murder of brother	Fratricide
One who runs away from justice or the law	Fugitive
Easily broken	Fragile
A place for grains	Granary

Description	One Word Substitute
Murder on the basis of race or ethnicity	Genocide
A place for housing aeroplanes	Hangar
The art of cultivating and managing gardens	Horticulture
Murder	Homicide
A vehicle which is used to carry a dead body	Hearse
A line at which the earth and the sky seem to meet	Horizon
Holding an office without any remuneration	Honorary
One who acts against religion	Heretic
One who lives on herbs	Herbivorous
A person who is unable to pay his debts	Insolvent/Bankrupt
A sound that cannot be heard	Inaudible
That cannot be easily approached	Inaccessible
Incapable of being corrected	Incorrigible
Incapable of being repaired	Irreparable
Incapable of being read	Illegible
Incapable of being avoided	Inevitable
Incapable of being practised	Impracticable
A person who comes to one country from another in order to settle there	Immigrant
One too strong to be overcome	Invincible
That cannot be erased	Indelible
Travelling under another name than one's own	Incognito
One who does not tire easily	Indefatigable
One who supervises in the examination hall	Invigilator
One who journeys from place to place	Itinerant

Description	One Word Substitute
A home or room used for ill or injured people	Infirmary
Murder of an infant	Infanticide
Soldiers who fight on foot	Infantry
Liable to catch fire easily	Inflammable
A period of interval between two reigns or governments	Interregnum
One who compiles a dictionary	Lexicographer
A person who talks continuously	Loquacious
One who is skilled in foreign languages	Linguist
One who cuts precious stones	Lapidist
A person who hates mankind	Misanthrope
One who hates marriage	Misogamist
A place where dead bodies are kept for post mortem	Mortuary
Working only for the sake of money	Mercenary
Murder of mother	Matricide
One who dies for a noble cause	Martyr
The first speech delivered by a person	Maiden speech
A place where coins are made	Mint
A hater of womankind	Misogynist
A place where dead bodies are kept for identification	Morgue
The practice of being married to one person at a time	Monogamy
A person who is sent to propagate religion	Missionary
The study of coins	Numismatics
A person having same name as another	Namesake
A strong desire to return home, homesickness	Nostalgia

Description	One Word Substitute
A beginner, new to anything, inexperienced	Novice or Tyro
A person who looks at the Brighter side of things	Optimist
One who has lost both parents	Orphan
One who is present everywhere	Omnipresent
One who is all powerful	Omnipotent
One who knows everything	Omniscient
That which cannot be seen through	Opaque
An account in the newspaper of the funeral of a deceased person	Obituary
A home for orphans	Orphanage
One who is skilled in midwifery	Obstetrician
One, who looks after horses at an inn	Ostler
One who eats everything	Omnivorous
A person who looks at the darker side of things	Pessimist
Fit to drink	Potable
Murder of father	Patricide
One who collects stamps	Philatelist
Literary theft or passing off an author's original work as one's own	Plagiarism
The practice of marrying more than one wife at a time	Polygamy
The practice of marrying more than one husband at a time	Polyandry
(A decision made by) votes of all qualified citizens	Plebiscite
One who does not care for art and literature	Philistine
Government by the rich	Plutocracy
An imaginary name assumed by an author for disguise	Pseudonym

Description	One Word Substitute
A remedy for all diseases	Panacea
A person who is a specialist in Child diseases	Paediatrician
One who makes a vain display of his knowledge	Pedant
One who speaks many languages	Polyglot
The study of ancient writing	Paleography
A number of policemen called to quell a riot	Posse
One who goes on foot	Pedestrian
That can be carried easily	Portable
An act of separation from other persons to avoid infection	Quarantine
The art of elegant speech or writing	Rhetoric
Murder of King or Queen	Regicide
Violating or profaning religious things/places	Sacrilege
A person who walks in sleep	Somnambulist
A person who talks in sleep	Somniloquist
A thing kept as a reminder of a person, place or event	Souvenir
The last work (literary) of a writer	Swan song
A job with high salary but little responsibility	Sinecure
A person who is indifferent to pleasure and pain and has Control over his passions	Stoic
Murder of sister	Sororicide
An event which happens once in three years	Triennial
A person/student who absents himself from class or duty without permission	Truant
A person who does not take any intoxicating drink	Teetotaler

Description	One Word Substitute
That which can be seen through	Transparent
Government based on religious principles	Theocracy
One extremely fond of one's wife	Uxorious
An imaginary perfect social and political system	Utopia
Murder of wife	Uxoricide

Description	One Word Substitute
A literal and precise repetition of an original work	Verbatim
Skilled and interested in different things	Versatile
A person having extensive experience in an area one,	Veteran
A forgivable, pardonable	Venial

BBA Word List

As discussed above, vocabulary will comprise a significant chunk of the questions you'll see on the various BBA entrance tests. This does not, however, mean that you need to cram thousands of words.

We have spent considerable time and effort going through previous years' question papers to come up with a list of around 350 high frequency words, that is, words that are more likely to appear on the test. Of course this is not a fool proof list and you will, almost certainly, see words from outside this list on the test but as a first step it is a good idea to start with this list. Once you complete these words and, assuming you still have time on your hands, you can easily do more words beyond these 350.

Remember that 'consistency' is the most important thing when it comes to taking in words. We suggest that you start with a small number of words every day – say 10 words or so – and then gradually take this number up. Even if you progress at the rate of 10 words a day, you would have completed all 350 words in just 35 days!

Word	Meaning
Abate	lessen
Abhor	hate
Abstain	stay away from
Absurd	utterly or obviously senseless, illogical, or untrue
Abundant	present in great quantity; more than adequate
Accommodate	to do a kindness or a favor to; oblige
Accumulate	to gather or collect
Accurate	free from error or defect
Adequate	fully sufficient, suitable, or fit
Adherent	supporter; follower

Word	Meaning
Adorn	to decorate or add beauty to
Adversity	difficulty or problems
Advocate	to support or speak in favour of
Affection	fond attachment, devotion, or love
Affluent	prosperous; rich
Agitated	excited; disturbed.
Allege	to assert without proof
Ally	friend
Alms	money, food, or other donations given to the poor or needy
Amalgamation	to combine or merge

Word	Meaning
Annul	to make void or null; abolish; cancel
Anticipate	to realize beforehand; foretaste or foresee
Anxious	worried
Apologize	to offer an apology or excuse for some fault, insult, failure, or injury
Appal	horrified
Aptitude	capability; ability
Assiduous	hard working
Astonish	surprise
Auspicious	favorable
Averse	opposed
Backlash	a strong or violent reaction
Bait	a lure or a trap
Banish	to expel from a country or place
Beaming	radiant; cheerful.
Bestow	to present as a gift; give
Binding	the act of fastening, securing, uniting, or the like. anything that binds
Bizarre	unusual, strange, odd.
Blemish	imperfection or flaw
Blister	swelling on the skin
Boast	to speak with exaggeration and excessive pride
Brim	the upper edge of anything hollow; rim
Brittle	easily damaged or destroyed; fragile
Broadcast	to transmit (programs) from a radio or television station
Broke	penniless, bankrupt.

Word	Meaning
Bundle	several objects or a quantity of material gathered or bound together
Captive	a prisoner
Cajole	to persuade or coax
Cautious	showing, using, or characterized by caution
Cement	to make firm
Clumsy	awkward in movement or action
Collaboration	coming together
Colossal	extraordinarily great in size, extent, or degree
Comatose	lacking alertness or energy
Combing	untangling; searching
Commend	recommend or praise
Commute	travel
Compliance	to yield, acquiesce or follow
Composed	calm; tranquil; serene
Conceal	to hide
Concede	to surrender or yield
Concise	brief
Condone	to overlook or pardon
Conducive	favourable
Confer	to consult together; to award
Confiscate	to seize
Conflict	to come into collision or disagreement
Conspicuous	easily seen or noticed
Contemplate	to observe or think about
Contend	compete; vie
Contradict	to deny or disagree with something
Crafty	cunning; deceitful

Word	Meaning
Crucial	very important
Cumbersome	difficult or tedious; requiring a lot of effort
Cunning	skill employed in a shrewd or sly manner, as in deceiving; craftiness
Curtail	cut short
Cynical	distrusting the motives of others
Dangling	hanging
Decoy	a trap
Defensive	protective
Degrade	to lower in dignity or estimation
Deliberate	carefully weighed or considered; studied
Delighted	highly pleased
Demolish	to destroy or ruin a building or other structure
Denounce	to condemn or censure openly or publicly
Deploy	to move strategically or appropriately
Derive	to receive or obtain from a source or origin
Descending	coming down
Despair	loss of hope; hopelessness
Determined	resolute; staunch; decided
Devastating	destructive
Dilapidated	in a bad condition
Dilute	to reduce the effect of something
Disgrace	the loss of respect, honor, or esteem
Disguise	to change the appearance
Disgusted	strong aversion or dislike

Word	Meaning
Dismay	become sad or disheartened
Dispense	to deal out; distribute
Distinguish	to mark off as different (often followed by from or by)
Distracted	having the attention diverted
Divine	of or relating to a god
Divisive	forming or expressing division or distribution
Divulge	reveal
Dormant	inactive or lifeless; asleep
Drenched	to wet thoroughly; soak
Dwindling	to become smaller and smaller; shrink
Eccentric	peculiar or odd
Elaborate	worked out with great care and nicety of detail
Elated	overjoyed
Elegant	tastefully fine or luxurious in dress, style, design, etc.
Elicit	to draw or bring out or forth; evoke
Eliminate	to remove or get rid of
Emaciated	very thin; malnourished
Embrace	to hug
Encompass	to include
Encounter	to come upon or meet with
Encumber	to impede or hinder; hamper; retard
Endangered	threatened with extinction
Endure	to resist or tolerate; to sustain
Engage	to occupy the attention or efforts of
Engross	to occupy completely
Enhance	to raise to a higher degree; intensify

Word	Meaning
Enormous	huge
Entice	to lead on by exciting hope or desire; allure
Erode	to eat into something or destroy
Exhausted	tired
Expedite	to speed up the progress of something
Explicit	clearly expressed
Expulsion	the act of driving out or expelling
Extinct	no longer in existence
Falsehood	a false statement; lie
Fanatic	a person with extreme devotion to a cause
Fancy	imagination
Fascinate	to attract and hold attentively by a unique power
Fasten	to attach firmly or securely in place; fix securely to something else
Fastidious	excessively particular, critical, or demanding; hard to please
Fatal	causing or capable of causing death; mortal
Fate	fortune
Ferocious	savagely fierce, as a wild beast
Fictitious	not genuine; false
Fixate	to fix; make stable or stationary
Forbid	to command (a person) not to do something
Forfeit	a fine; penalty
Formidable	causing fear, apprehension, or dread

Word	Meaning
Foster	to promote the growth or development of; encourage
Frail	having delicate health; weak
Fragile	something that can break easily
Frantic	urgent
Garrulous	excessively talkative
Generous	liberal in giving or sharing; unselfish
Germane	important or relevant
Gracious	pleasantly kind, benevolent, and courteous.
Grief	keen mental suffering or distress; sharp sorrow
Grumbling	to murmur or mutter in discontent
Habitat	the natural environment of an organism
Handy	conveniently available or accessible
Harbour	to house or contain
Hasten	to move or act with haste; hurry
Haughty	proud; snobbish
Heralded	proclaims or announces
Hesitate	to be reluctant or wait to act because of fear or indecision
Homage	respect or reverence paid or rendered
Hone	sharpen
Hostile	unfriendly
Hurdle	barrier or obstruction
Hurl	to throw or fling with great force or vigor
Immerse	to plunge into or place under a liquid; dip

Word	Meaning
Imminent	likely to occur at any moment; impending
Impair	to weaken or damage
Imperative	absolutely necessary or required; unavoidable
Imperceptible	very slight, gradual, or subtle
Impetus	stimulus or a moving force
Imply	to indicate or suggest without being explicitly stated
Impoverished	very poor
Impute	attribute a cause to something
Inadvertently	unintentionally
Incline	slope or tilt
Indifferent	without interest or concern; not caring
Indiscriminate	not discriminating; lacking in care, judgment, selectivity, etc.
Indispensable	absolutely necessary, essential, or requisite
Indistinct	not distinct; not clearly marked or defined
Infamous	having an extremely bad reputation
Inferior	lower in station, rank, degree, or grade
Initiate	to begin, set going, or originate:
Introduce	to present (a person) to another so as to make acquainted.
Introspect	to think deeply
Jeopardise	endanger
Jolly	in good spirits; merry
Jubilant	showing great joy, satisfaction, or triumph

Word	Meaning
Judicious	using or showing judgment; prudent
Lament	to feel or express sorrow or regret for
Lavish	expensive
Legitimate	according to law; lawful
Lenient	not strict; permissive
Lethargy	laziness
Loophole	a means of escape or evasion
Malice	hatred or ill will
Mandatory	obligatory; compulsory
Mask	a covering for all or part of the face, worn to conceal one's identity.
Mason	house builder
Meagre	very little
Melancholy	sad
Menace	something that threatens to cause evil, harm, injury, etc.; a threat
Morph	to change one's form or appearance
Midst	surrounded by something
Mismanage	to manage incompetently or dishonestly:
Monitor	to observe or record
Morose	gloomily or sullenly ill-humored
Mourn	to feel or express sorrow or grief.
Multitude	a great number of something
Myriad	various
Myth	a traditional story about some legend
Narrate	to give an account or tell the story of

Word	Meaning
Nascent	dormant or inactive
Nominal	being such in name only; so-called
Notorious	widely and unfavorably known
Nurture	to nourish or look after
Oblige	to extend a favour
Obscure	unclear or hidden
Obsolete	no longer in general use; fallen into disuse
Obstacle	something that obstructs or hinders progress.
Offended	to irritate, annoy, or anger
Omnipresent	present everywhere
Optimistic	someone who looks at the positive side of things
Orthodox	conservative or conventional
Overwhelmed	to overpower or overcome
Pamper	to treat or gratify with extreme or excessive indulgence, kindness, or care
Pause	a temporary stop or rest, especially in speech or action
Penalize	to subject to a penalty, as a person.
Pensive	dreamily or wistfully thoughtful:
Perennial	lasting for an indefinitely long time; enduring:
Perish	to die
Perpetual	continuing or enduring forever; everlasting.
Persistent	not giving up
Persuade	to convince
Pertinent	important or relevant
Perturbed	disturbed or bothered

Word	Meaning
Phenomenon	a fact, occurrence, or circumstance observed or observable:
Philanthropist	someone who does a lot of charity
Pitch	to erect or set up (a tent, camp, or the like); to propose
Plague	to annoy, bother or pester
Plead	to appeal or entreat earnestly:
Pledge	a solemn promise or agreement to do or refrain from doing something:
Plethora	plenty of something
Plunge	to jump
Ponder	to consider something deeply and thoroughly
Possess	to have as belonging to one; own
Pounced	to swoop down suddenly and grasp, as a bird does in seizing its prey.
Premises	compound or boundary
Prerequisite	required beforehand
Presume	to take for granted, assume, or suppose:
Pretentious	someone who thinks too much of himself/herself
Prevail	to be widespread or current; exist everywhere or generally:
Prohibit	to forbid (an action, activity, etc.) by authority or law:
Projection	prediction
Prompt	done, performed, delivered, etc., at once or without delay
Provoke	to anger, enrage, exasperate, or vex.

Word	Meaning
Prowl	to rove or go about stealthily, as in search of prey, something to steal, etc.
Proximity	nearness in place, time, order, occurrence, or relation.
Purported	reputed or claimed; alleged
Pursue	to follow in order to overtake, capture, kill, etc.; chase.
Quaint	having an old-fashioned attractiveness or charm
Quash	to put down or suppress completely; subdue
Queer	strange or odd from a conventional viewpoint
Quest	a search or pursuit made in order to find or obtain something
Quintessential	the most perfect or typical example of something
Quiver	to shake with a slight but rapid motion; vibrate tremulously
Radiant	emitting rays of light; shining; bright:
Reckon	to count, compute, or calculate, as in number or amount.
Reconciliation	compromise
Rehearse	to practice
Reiterate	to say or do again or repeatedly; repeat, often excessively.
Relevant	bearing upon or connected with the matter in hand; pertinent:
Reluctant	unwilling; disinclined:
Rely	to depend confidently

Word	Meaning
Remedy	something that cures or relieves a disease or bodily disorder
Remorse	deep and painful regret for wrongdoing
Repel	to drive or force back (an assailant, invader, etc.)
Repressed	restrained or oppressed
Resurrect	to raise from the dead; bring to life again.
Retain	to keep possession of.
Retrieve	to recover or regain
Rever	high degree of respect
Revive	to activate, set in motion, or take up again; renew
Revolutionize	to bring about a revolution in; effect a radical change in
Rigid	stiff or unyielding; not pliant or flexible; hard
Rim	the outer edge, border, margin, or brink of something
Robust	strong and healthy; hardy
Rupture	the act of breaking or bursting
Sacred	devoted or dedicated to a deity or to some religious purpose
Sanction	authoritative permission or approval, as for an action.
Sane	free from mental disorder; having a sound, healthy mind
Sanity	soundness or rationality
Scanty	small in amount, quantity, etc.; barely sufficient.
Scatter	to throw loosely about; distribute at irregular intervals
Scout	search

Word	Meaning
Scrutinize	to examine in detail with careful or critical attention.
Seek	to go in search or quest of
Segregate	to separate or set apart from others or from the main body or group
Seize	to take hold of suddenly or forcibly; grasp:
Sheepish	embarrassed or bashful, as by having done something wrong or foolish.
Shower	a brief fall of rain or, sometimes, of hail or snow.
Shrewd	astute or sharp in practical matters:
Shrunk	reduce in size
Slated	scheduled
Soaked	to lie in and become saturated with water or some other liquid.
Soiled	to make unclean, dirty, or filthy, especially on the surface
Solitary	alone; without companions; unattended:
Solitude	the state of being alone
Sparingly	economical
Specimen	example or prototype
Stalling	not moving
Stimulate	to rouse to action or effort, as by encouragement or pressure
Strive	to exert oneself vigorously; try hard:
Stubborn	unyielding or inflexible
Substantial	of ample or considerable amount, quantity, size, etc.:

Word	Meaning
Substitute	a person or thing acting or serving in place of another.
Subversion	to overthrow something
Succinct	expressed in few words; concise
Succumb	to give way to superior force; yield:
Sulking	to remain in a sullen, ill-humored, or offended mood
Summon	to call upon to do something specified.
Superficial	being at, on, or near the surface; shallow
Superior	higher in station, rank, degree, importance, etc.
Superstition	a belief or notion, not based on reason or knowledge
Surrender	give up
Surpass	overtake
Sympathetic	compassionate
Synonymous	similar
Taboo	proscribed by society as improper or unacceptable:
Tame	changed from the wild or savage state; domesticated:
Teeming	filled or overcrowded with
Tenacious	holding fast
Tending	inclined towards something
Tepid	moderately warm; lukewarm
Threaten	to utter a threat against; menace
Thrift	economical management; economy
Thrive	to prosper; be fortunate or successful.
Toil	hard and continuous work; exhausting labor or effort.

Word	Meaning
Tout	to solicit business, employment, votes, etc.
Trauma	a tragic occurrence
Tremble	to shake involuntarily with quick, short movements, as from fear
Trivial	of very little importance or value; insignificant
Ubiquitous	present everywhere
Ulterior	being beyond what is seen or avowed; intentionally kept concealed
Unconscious	without awareness, sensation, or cognition.
Uproar	a state of violent and noisy disturbance
Upsurge	to surge up; increase; rise
Urge	to push or force along; impel with force or vigor
Vague	not clearly or explicitly stated or expressed
Variance	difference
Verge	edge or border
Veto	to cancel something
Viable	capable of living.

Word	Meaning
Vigilant	keenly watchful to detect danger; wary
Vilify	to speak ill of; defame; slander.
Vindictive	disposed or inclined to revenge; vengeful
Vital	very important or necessary
Void	having no legal force or effect
Volatile	changing quickly or unpredictable
Voracious	craving or consuming large quantities of food
Waft	to carry lightly and smoothly through the air or over water
Wailing	high pitched crying
Weary	fatigued; tired
Wreck	any building, structure, or thing reduced to a state of ruin.
Yearn	to have an earnest or strong desire; long
Yield	to surrender
Zeal	enthusiasm
Zenith	the top most point

Vocabulary Question Types Tested on the BBA

Now that you have gone through all the important concepts in vocabulary type questions, let's take a look at the actual question types that you are likely to get on the BBA entrance exams.

Regular fill in the blank questions

These are your typical fill in the blank questions that you have been doing from your school days. A sentence will be given to you with one or more blanks. You'll have a choice of five words from which you need to select that one word which can correctly fit into that blank. You can get both one blank and two blank questions on the entrance exams, though two-blank questions are more common.

Example 1 (One Blank Question)

Chennai was _____ by the recent floods that lasted for almost a week.

- (a) celebrated (b) vindicated (c) helped (d) devastated

Solution: Remember the strategy that we discussed in the earlier part of this module – always try to predict the answer first and only then look at the options. In this case the word that goes into the blank has to be a negative word because if the floods lasted for a week, they must have had a detrimental impact on Chennai. Options such as ‘celebrated’, ‘helped’ and ‘granted’ can be immediately eliminated because these are all positive words. Even if you are not sure of the meaning of ‘vindicated’ (which means revengeful), you would most likely be aware of the meaning of ‘devastated’ and realize that it is a good fit for the blank, so you should go with ‘devastated’ as the answer.

Example 2 (Two Blank Question)

Although many students feel that two blank questions are _____, they are actually _____ than one blank questions, which tend to be more difficult.

- (a) easy.....vexing (b) tough.....easier (c) difficult.....harder (d) short.....complicated

Solution: For two-blank questions also you need to follow the same strategy of first predicting the answer. However, two blank questions actually become easier because you can use your prediction for one blank to eliminate some options, without even looking at the words for the other blank. Always try to start with whichever blank looks easier to you.

For example, in the above question, we know that the first blank has to contain a word such as ‘difficult’. So options (a) and (d) can be easily eliminated without even looking at their second word because ‘easy’ and ‘short’ have no connection with ‘difficult’. So, even if you did not know the meaning of ‘vexing’ in the first option, it shouldn’t really matter because you have already eliminated that option on the basis of its first word. Similarly, the second blank should contain a word such as ‘simple’, which eliminates option (c), leaving you with option (b) as the correct answer. Thus, you should use this strategy to narrow down your answer choices using your prediction for any one blank.

Spelling test

These questions test your knowledge of how words are spelt. You will be given five words one of which may have been wrongly spelt. You need to select this one word, mark it as the answer and your job is done. What makes these questions a little difficult is that sometimes all the words will be correctly spelt, but students end up assuming that there must be an error somewhere and end up marking a correctly spelt word as the answer. Thus, if you see an answer choice that says ‘No error’, keep in mind that all the words may have been correctly spelt.

Let’s take a look at an example:

Example 3

In the given options, one of the words may have been misspelt. Find that word.

- (a) Pronunciation (b) Allergy (c) Demolition (d) Transit

Solution: The correct answer is (a) as the correct spelling is ‘pronunciation’.

Synonyms and antonyms

In these questions, a set of four words will be given to you, two of which will be either synonyms or antonyms. You need to identify this pair of words that are either synonyms or antonyms and mark it as the answer. The best way to approach these questions is to go through all the pairs of words given in each of the answer choices and try to identify which of these contains a pair of synonyms or antonyms.

Let's take a look at an example,

Example 4

In the following question, four words are given of which two words are most nearly the same or opposite in meaning. Find the two words which are most nearly the same or opposite in meaning and indicate the number of the correct letter combination, by darkening the appropriate oval in your answer sheet.

- A. Exorbitant
- B. Tenacious
- C. Daring
- D. Cheap

- (a) A-C (b) C-D (c) B-C (d) A-D

Solution: Exorbitant and Cheap are antonyms

The correct answer is option (d).



Note

Synonym/antonym questions appear as part of the Reading Comprehension passage. In each passage certain words will be highlighted, and you will need to find out their synonyms or antonyms in context of the overall passage. For synonym and antonym questions, in case you are not very sure of the meaning of the word that is given to you, use your knowledge of word roots and word charge to see if you can narrow down your answer choices by eliminating some of the options.

Example 5

Find the Synonym of WRATH from the given options.

- (a) Dislike (b) Guilt (c) Garland (d) Anger

Solution: If you know the meaning of Wrath, which is 'extreme anger', you immediately know that the correct answer is (d). However, even if you don't know the exact meaning but have some idea of it, you can immediately eliminate an option such as 'garland' because you definitely know 'wrath' is a feeling and not an object.

Example 6

What is the Antonym of LUMINOUS?

- (a) Shiny (b) Radiant (c) Dark (d) Angry

Solution: Luminous means shiny or giving out light. Thus, the opposite should mean lacking light or darkness. (c) should be the correct answer.



Note

The frequently asked question types in this test are Fill in the blanks, identification of synonyms and antonyms, analogies and odd words.

Let us consider a few examples

Example 7

Fill in the blanks with the correct combination

In a case of acute _____, _____ membranes secrete excessive _____.

- (a) sinus, mucous, mucous (b) sinus, mucus, mucous
 (c) sinusitis, mucous, mucus (d) sinus, mucous, mucus

Solution: The correct sentence should read – *In a case of acute sinusitis, mucous membranes secrete excessive mucus.* ‘Sinus’ is one of the hollow cavities in the skull connecting with the nasal cavities whereas ‘Sinusitis’ is the condition of inflammation of the sinus. ‘Mucous’ is an adjective used for tissues/membranes (that secretes mucus); ‘mucus’ is the viscous, slimy mixture secreted by the nasal gland.

Thus, option (c) is the correct answer.

Example 8

Nature is _____ and unchangeable, and it is _____ as to whether its hidden reasons and _____ are _____ to man or not.

The option that best fill the blanks in the above sentence would be:

- (a) relentless, indifferent, actions, understandable
- (b) persistent, heartless, actions, comprehensible
- (c) inexorable, apathetic, activities, explicable
- (d) harsh, indifferent, actions, understandable

Solution: Options (a) and (c) are almost synonyms in their answer options. However, option (c) is the correct choice as it uses the word ‘explicable’ which is a better fit in the circumstances.

Directions for examples 9 to 13: In each of the following questions four words are given, of which two words are most nearly the same or opposite in meaning. Find these two words and choose the number of the correct letter combination.

Example 9

- A. Befuddle
- B. Stand
- C. Concede
- D. Skitter

- (a) C – B
- (b) A – C
- (c) B – D
- (d) A – D

Solution: ‘Skitter’ means to move hurriedly. It is opposite in meaning to ‘stand’.

The correct answer is option (c).

Example 10

- A. Tyranny
- B. Uncanny
- C. Despotism
- D. Perch

- (a) A – C
- (b) B – D
- (c) A – D
- (d) C – D

Solution: ‘Tyranny’ and ‘despotism’ are synonyms. Both of them refer to cruel and oppressive power.

The correct answer is option (a).

Example 11

- A. Vamoose
- B. Prolific
- C. Fecund
- D. Adversity

- (a) A – D
- (b) D – C
- (c) B – A
- (d) B – C

Solution: 'Prolific' and 'fecund' are synonyms. Both of them mean fertile or productive

The correct answer is option (d).

Example 12

- A. Colloquy
- B. Heinous
- C. Muddle
- D. Jumble

(a) B – C (b) A – B (c) D – A (d) C – D

Solution: 'Muddle' and 'jumble' are synonymous as the meaning of both is related to confusion.

The correct answer is option (d).

Example 13

- A. Atrocious
- B. Flagitious
- C. Conscious
- D. Ambitious

(a) C – D (b) A – B (c) A – D (d) D – B

Solution: 'Atrocious' and 'flagitious' are synonyms. Both of them mean awful or exceptionally wicked.

The correct answer is option (b).

Directions for examples 14 to 18: In the following questions, there is one pair of synonym or antonym. Find the correct pair.

Example 14

- (a) Wheedle–Cajole (b) Manoeuvre–Dexterity
- (c) Gimmick–Consequent (d) Pressurize–Undulate

Solution: 'Wheedle' and 'cajole' mean to influence or urge by flattering.

The correct answer is option (a).

Example 15

- (a) Teetotaler–Versatile (b) Hoodwink–Charitable
- (c) Coax–Hoax (d) Guileful–Dodgy

Solution: 'Guileful' and 'dodgy' are synonyms, both of which mean characterised with the skill of deception.

The correct answer is option (d).

Example 16

- (a) Regenerate–Intestate (b) Theocracy–Ex gratia
- (c) Perquisite–Prerequisite (d) Obliging–Unamiable

Solution: 'Obliging' means friendly and helpful. It is opposite in meaning to 'unamiable', which means not friendly and unpleasant.

The correct answer is option (d).

Example 17

- (a) Autonomy–Cursory (b) Concord–Contention
(c) Serene–Promiscuous (d) Stringent–Hopeful

Solution: ‘Concord’ means harmony or agreement, while ‘contention’ is a heated disagreement. So, they are antonyms.

The correct answer is option (b).

Example 18

- (a) Incognito–Impunity (b) Massacre–Obstinate
(c) Inveterate–Acumen (d) Erudite–Unlettered

Solution: ‘Erudite’ is a learned person, while ‘unlettered’ is an uneducated person. So, they are opposite in meaning.

The correct answer is option (d).

Directions for examples 19 to 28: Choose appropriate synonyms of the underlined word from the given sentences.

Example 19

She loves to wear cozy outfits during frost weather.

- (a) Comfortable (b) Modish (c) Luring (d) Inexpensive

Solution: ‘Cosy’ means comforting warmth and relaxing.

The correct answer is option (a).

Example 20

The image that you have uploaded on Facebook is muddled.

- (a) Striking (b) Appealing (c) Murky (d) Gleaming

Solution: ‘Muddled’ and ‘murky’ mean hazy or unclear.

The correct answer is option (c).

Example 21

The third question of microeconomic paper today was fiddly.

- (a) Undemanding (b) Rational (c) Pitiably (d) Thorny

Solution: ‘Fiddly’ means tricky or difficult to do.

The correct answer is option (d).

Example 22

A spider usually chelicerae with tooth that injects venom.

- (a) Toxin (b) Spit (c) Durable (d) Glue

Solution: ‘Venom’ denotes toxin or poison.

The correct answer is option (a).

Example 23

A yellow card is shown against a player for infraction of the playing parameter.

- (a) Breach (b) Trail (c) Encroach (d) Demark

Solution: 'Infraction' and 'breach' refer to the violation of any rule.

The correct answer is option (a).

Example 24

A gravitationally bound system containing scrap, stars, dirt and gas is known as galaxy.

- (a) Cloud (b) Cosmos (c) Leftovers (d) Eclipse

Solution: 'Scrap' and 'leftover' refer to the part of something left after it is being used.

The correct answer is option (c).

Example 25

Recent recital of women athlete at Rio Olympic took India to a new level worldwide.

- (a) Medals (b) Reward (c) Performance (d) Recognition

Solution: 'Recital' means performance or act.

The correct answer is option (c).

Example 26

It is good to see on-going inventiveness being brought into practice by the Government of India for entrepreneurship development.

- (a) Imagination (b) Propaganda (c) Memo (d) Bill

Solution: 'Inventiveness' refers to creative imagination.

The correct answer is option (a).

Example 27

During his presidential tenure, Dr. A.P.J. Abdul Kalam was tenderly known as the People's President.

- (a) Political (b) Diplomatic (c) Affectionate (d) Astuteness

Solution: 'Tenderly' means affectionate or kind-hearted.

The correct answer is option (c).

Example 28

The newly opened attire store has witnessed an overwhelming response in the market.

- (a) Apparel (b) Electronic (c) Retail (d) Grocery

Solution: 'Attire' and 'apparel' mean something related to wear and clothing.

The correct answer is option (a).

Directions for examples 29 to 33: In each of the following sentences, there are two blank spaces. Below each sentence, five pair of words have been denoted by letters (A), (B), (C), (D) and (E). Find out which pair of words can be filled up in the blanks in the sentence in the same sequence to make the sentence meaningfully complete.

Example 29

Efforts to _____ the issue will not be successful _____ both sides continue to blame each other.

- (a) resolve, if (b) discuss, unless
(c) address, whether (d) settled, because

Solution: The words- 'resolve, if' will fill the two blanks here because only they add meaning to the sentence and are grammatically correct.

The correct answer is option (a).

Example 30

The economy has managed to retain its _____ edge despite _____ demand for its exports.

- (a) leading, healthy (b) competitive, shrinking
(c) sharp, favourable (d) predominant, average

Solution: The words- 'competitive, shrinking' will fill the two blanks here because only they add meaning to the sentence and are grammatically correct.

The correct answer is option (b).

Example 31

It will be _____ for the management to implement the policy because of the employees' _____ to change.

- (a) inconvenient, willing (b) complicated, concern
(c) burden, decision (d) impossible, resistance

Solution: The words- 'impossible, resistance' will fill the two blanks here because only they add meaning to the sentence and are grammatically correct.

The correct answer is option (d).

Example 32

Analysts are looking _____ to more mergers in the banking _____ which will boost the economy.

- (a) around, arena (b) ahead, rivals
(c) forward, sector (d) perhaps, partners

Solution: The words 'forward, sector' will fill the two blanks here because only they add meaning to the sentence and are grammatically correct.

The correct answer is option (c).

Example 33

After the devastating fire, the Board has no _____ except _____ of their textile factory.

- (a) idea, inauguration (b) estimate, running
(c) power, modernizing (d) option, closure

Solution: The words- 'option, closure' will fill the two blanks here because only they add meaning to the sentence and are grammatically correct.

The correct answer is option (d).

Directions for examples 34 to 36: Choose the set of words, that when inserted in the sentence with blanks, best fit the meaning of the sentence as a whole.

Example 34

He was _____ because his plans had gone _____.

- (a) pleased awry (b) distraught awry
(c) pleased distraught (d) awry distraught

Solution: Given the context of the sentence, both blanks should be filled by words having the same tone. Hence, options (a) and (c) can be eliminated, where one word (*pleased*) has a positive tone and other negative. Among options (b) and (d), *distraught* which means to be distracted or deeply agitated would fit in the first blank and *awry* which means to be away from the expected or proper direction would fit in the second.

The correct answer is option (b).

Example 35

The musical performance _____ my _____ and made the evening memorable.

- (a) deliberated intentions (b) masqueraded nerves
(c) stimulated senses (d) freed nostrils

Solution: The key to solving this question is to correctly figure out a link between the *performance* and the two blanks which led to a *memorable* event. Looking at the options one can easily figure out that “stimulated” (which means to excite or invigorate) in the first blank and “senses” in the second establishes that link and thus would be the appropriate answer.

The correct answer is option (c).

Example 36

He worked with so much _____ that no one could _____ with him.

- (a) Laziness criticize (b) competition zeal
(c) zeal compete (d) zeal praise

(BBA: CBS 2009)

Solution: Looking at the options, only *zeal* and *laziness* fits in the first blank. Hence, (b) is eliminated. Among them “compete with” is grammatically correct and also makes the sentence logically correct.

The correct answer is option (c).

Directions for examples 37 to 45: Find the correctly spelt word.

Example 37

- (a) Treachrous (b) Treacherous (c) Trecherous (d) Trechearous

Solution: The correct spelling of the word is ‘treacherous’.

The correct answer is option (b).

Example 38

- (a) Occasionaly (b) Ocasionally (c) Occasionally (d) Occasionally

Solution: The correct spelling of the word is ‘occasionally’.

The correct answer is option (d).

Example 39

- (a) Tommorrow (b) Ominious (c) Commisioner (d) Separate

(BBA: DU JAT 2012)

Solution: The correct spelling of option (a) is ‘tomorrow’. The correct spelling for option (b) is ‘ominous’. The correct spelling for option (c) is ‘commissioner’.

The correct answer is option (d).

Cloze Test

A cloze test is a special type of fill in the blank question in which you are given a short paragraph with certain words removed and blanks put in their place. For each blank you have some options given, from which you need to select the correct word for that blank. As you can see, it is very similar to a regular fill in the blank question. The only difference is that instead of a sentence, you have an entire paragraph to work with and comprehend and the number of blanks also generally tends to be higher – usually ten blanks. This is actually a beneficial thing for you because if you understand the paragraph correctly, you can get as many as ten questions correct and in quick time.



Always try to make a prediction in your head for what kind of word will go in a blank before you check the options given to you for that blank. Even something like whether it should be a positive or negative word will help you narrow down your choices.

Directions for examples 1 to 3: In the following three passages some of the words have been left out. First read the passage and try to understand what it is about. Then fill in the blanks with the help of the alternatives given.

Example 1

The last decade has been (1) for management education and development. When the economies of most western countries were (2) in the early 1980s there were (3) cuts both in corporate training and in higher education. During the boom years of the mid 1980s there were some (4) in both areas. In the early 1990s industrialised countries were in the (5) of another severe recession and a (6) retrenchment was to be recession reasonably (7) throughout the training world. But this has not been the case so far. Many leading companies are (8) their belief in training as the key to future competitiveness and governments are (9) an era of rapid (10) in higher education.

1. (a) dogmatic (b) paradoxical (c) praiseworthy (d) outstanding
2. (a) galvanised (b) developing (c) faltering (d) privatised
3. (a) judicious (b) marginal (c) proportionate (d) severe
4. (a) reactivation (b) slashing (c) pro-activity (d) curiosity
5. (a) area (b) grip (c) context (d) mood
6. (a) critical (b) profound (c) slight (d) tough
7. (a) fabricated (b) advocated (c) projected (d) expected
8. (a) asserting (b) rejecting (c) managing (d) criticising
9. (a) establishing (b) encouraging (c) circulating (d) preaching
10. (a) degradation (b) communication (c) exhibition (d) expansion

Solutions

1. A paradox is a statement that contradicts itself. The paragraph explains how the norm of cutting down on management education in times of economic unsteadiness in the 1980s has not been followed since 1990. So, in this sense, the decade has been paradoxical.

The correct answer is option (b).

2. The sentence talks about cuts in corporate training and higher education. Moreover, since the next sentence talks of a 'boom' in the mid-1980s, this definitely was not so in early 1980s. So, 'faltering', which means being weak or unsteady, will fill the blank.

The correct answer is option (c).

3. The paradox of the decade that has been discussed shows that corporate trainings and higher education must have severely been reduced during the economic crises in the 1980s.

The correct answer is option (d).

4. After the slashes or cuts in training and education during the economic crises of early 1980s, when there came a boom in the economy, the scenario must have changed and the activity (training and education) that was stopped, would have been reactivated. So, option A will fill the blank.

The correct answer is option (a).

5. Countries were again seized or held in the problem of economic crises. So, 'grip' will fill the blank most appropriately.

The correct answer is option (b).

6. 'Retrenchment' is the reduction of expenditure. The sentence talks of severe recession that was expected to lead to retrenchment. This retrenchment would have been a tough one like that in the early 1980s, where training and education was severely cut. So, 'tough' would fit the blank suitably.

The correct answer is option (d).

7. Tough retrenchment through the training world was being expected. People did not fabricate, advocate or project it. They expected the scenario to be the same as in early 1980s. So, 'expected' would fit the blank suitably.

The correct answer is option (d).

8. The line 'but this has not been the case so far' refers to the expected retrenchment in the training world. This means that something positive happened. So, rejecting, criticising or mere managing the beliefs of training cannot be the case. It is the assertion in training.

The correct answer is option (a).

9. From the context of the sentence, it is clear that it talks of moving towards an era of massive higher education, so 'encouraging' would fit the blank perfectly.

The correct answer is option (b).

10. Governments will not encourage degradation, exhibition or mere communication of higher education. It is the expansion that is to be encouraged.

The correct answer is option (d).

Example 2

Lady Macbeth suffers none of her husband's uncertainty. She desires the kingship for him and wants him to ___(11)___ Duncan in order to obtain it. While Duncan is asleep, Macbeth stabs him, despite his doubts and a number of supernatural portents, including a vision of a bloody dagger. When Duncan's death is ___(12)___ the next morning, Duncan's sons Malcolm and Donalbain flee to England and Ireland, respectively, fearing that whoever killed Duncan desires their ___(13)___ as well.

Fearful of the witches' ___(14)___ that Banquo's heirs will seize the throne, Macbeth hires a group of murderers to kill Banquo and his son Fleance. They ambush Banquo on his way to a royal feast, but they fail to kill Fleance, who ___(15)___ into the night. Macbeth becomes ___(16)___; as long as Fleance is alive, he fears that his power remains ___(17)___ . At the feast that night, Banquo's ghost visits Macbeth. When he sees the ghost, Macbeth raves fearfully, startling his guests, who include most of the great Scottish nobility. Lady Macbeth tries to neutralise the damage, but Macbeth's kingship incites increasing ___(18)___ from his nobles and subjects.

Frightened, Macbeth goes to visit the witches ___(19)___ their cavern. There, they show him a sequence of demons and spirits who present him with further prophecies: he must be beware of Macduff, a Scottish nobleman who opposed Macbeth's accession to the throne; he is incapable of being harmed by any man born of woman; and he will be safe ___(20)___ Birnam Wood comes to Dunsinane Castle.

- | | | | |
|-----------------------|--------------|-------------|----------------|
| 11. (a) murder | (b) save | (c) protect | (d) killed |
| 12. (a) defined | (b) reveal | (c) unveil | (d) discovered |
| 13. (a) fortification | (b) defence | (c) demise | (d) well-being |
| 14. (a) eyes | (b) prophecy | (c) poem | (d) power |
| 15. (a) escape | (b) escaped | (c) escapes | (d) fleeing |

16. (a) depressed (b) glad (c) furious (d) dejected
17. (a) secure (b) persistent (c) obstinate (d) insecure
18. (a) co-operation (b) assistance (c) help (d) resistance
19. (a) in (b) on (c) at (d) of
20. (a) for (b) when (c) as (d) until

Solutions

11. The context implies that Lady Macbeth wanted her husband to kill King Duncan to obtain the kingship. The next sentence also states that while Duncan is asleep, Macbeth stabs him. Therefore, options (B) and (c) can not be the correct answers. As infinitives always take the base form of the verb with the preposition 'to', we can eliminate option (d) as well. Now as we are left with option (a), we can select it as the most suitable answer.

The correct answer is option (a).

12. We can eliminate options (b) and (c) as the sentence is in passive form; therefore, the past tense of the verb will be used. Out of 'defined' and 'discovered', the latter seems more appropriate in this case. Therefore, we can select option (d) as the most suitable answer.

The correct answer is option (d).

13. Duncan's sons Malcolm and Donalbain escape as they had a fear that they could also get killed by the one who murdered their father. Among the given options, only option (c) i.e. 'demise' suits the blank as the other options are synonyms of 'protection' or 'safety'. Therefore, we can eliminate options (a), (b), and (d).

The correct answer is option (c).

14. The context implies that the witches made the prediction that Banquo's heirs will seize the throne. Therefore, we need to look for a synonym of 'prediction'. Considering the given options 'prophecy' is the only word that fills the blank appropriately.

The correct answer is option (b).

15. In the given context, the base form of the verb will be used. By observing the given options, the most obvious option is 'escapes' as it fits with third person singular number. On the basis of this, we can eliminate options (a), (b) and (d).

The correct answer is option (c).

16. Macbeth wanted to kill Fleance who escaped into the night. The incident would obviously make a king exceptionally angry. By observing the given options, the most obvious option is 'furious', which is a synonym of 'angry'. In the given situation, a king cannot be glad or feel miserable, depressed or dejected. On the basis of this, we can eliminate options (a), (b) and (d).

The correct answer is option (c).

17. The context implies that Macbeth had a fear that Fleance could control his power and become a king. Thus, he feels that his power or kingship is not secure. Among the given options, only option (d) i.e., 'insecure', fits into the context. Rest of the options are positive in nature and denote a sense of security or protection. On the basis of this, we can eliminate options (a), (b) and (c).

The correct answer is option (d).

18. The context implies that in spite of all efforts of Lady Macbeth, the kingship of Macbeth was facing increasing confrontation from his nobles and subjects. This infers the use of a negative word. Among the given options, only option (d) suits the blank as all the other options are synonyms of 'help' or 'support'. On the basis of this we can eliminate options (a), (b) and (c).

The correct answer is option (d).

19. By observing the given options, the most obvious option is 'in'. 'On' is used to refer to the surface of something. 'At' is used to indicate a place or destination. 'Of' is used to show certain relation or connection. However, 'in' is used to indicate location within or inside. In the given context, Macbeth goes to visit the witches 'in' their cavern. Therefore, we can select option (a) as the most suitable answer.

The correct answer is option (a).

20. By observing the given options, the most obvious option is 'until'. 'For' is used to indicate the use of something. 'When' is used to introduce a single completed event. 'As' is used to introduce two events occurring at the same time. 'Until' means not before or up to the event mentioned. Macbeth was told that he will be safe until Birnam Wood comes to his Castle. Therefore, we can select option (d) as the most suitable answer.

The correct answer is option (d).

Example 3

Apparently it may look trivial to ask if one can identify a healthy person from an ill one but the concept of health and illness has (21) human beings for long. In fact, disease and its complementary idea, health, may have some very specific notions rooted in the cultural and social (22) of the people. Those who may qualify as healthy in one socio-cultural context could very well be called ill under a different social context. This is not to deny the now universally accepted parameters of health but to underline the complexity of this concept, which has a bearing on the way individual, society and the state respond to the challenges of disease and demands of health. This is also reflected in the fact that in modern times we have seen many new categories entering into the definition of diseases- Depression, Obesity, Dyslexia, Attention Deficit Disorder (ADD), Anorexia and (23). Similarly, a number of body states earlier counted in the category of disease are no more considered to be (24). The (25) Indian system of medicine, Ayurveda, conceived of illness as emanating from an imbalance in the basic vital elements phlegm, bile and gas (Kaf, Pitta, Vayu) while the Chinese system of health assumed that it is the breakdown in the dynamic harmony between the Yin and Yang within the human body, which is the cause of disease.

- 21.** (a) contrived (b) confounded (c) confined (d) controlled
22. (a) history (b) diversity (c) aspects (d) milieu
23. (a) so on (b) so (c) etc. (d) such as
24. (a) symptoms (b) complaints (c) syndromes (d) illnesses
25. (a) recent (b) new (c) ancient (d) defunct

Solutions

21. The author talks about how the concept of health and illness is confusing for many as there are no set parameters for judging a healthy person. Here, 'confounded', which means perplexed, will suit appropriately.

The correct answer is option (b).

22. Here, 'milieu', which is a person's social environment, will fit appropriately as the author talks of the notions of disease and health that are formed because of the cultural and social setup or environment a person lives in.

The correct answer is option (d).

23. Looking at the options, it is clear that 'so on' will fill the blank. The presence of 'and so on' after a list of items means 'continuing in the same way'. 'Etc.' also means the same, but it is not preceded by 'and'.

The correct answer is option (a).

24. The author talks about some earlier states that were categorised under diseases. He mentions 'no more' in this context, which shows an absence of something that was once present. So, 'diseases' or 'illnesses' will fit the blank appropriately.

The correct answer is option (d).

25. The author talks about 'Ayurveda', which is not a new concept. So, words such as 'recent' and 'new' cannot be used. Now, since Ayurveda is still in use and many have strong faith in it, it cannot be called 'defunct' or 'outdated'. Thus, by elimination process, 'ancient' is the answer.

The correct answer is option (c).

Idioms and Phrasal Verbs

The English language is a living language having more than 1,000,000 words. It is one of the most flexible languages in the world. Just like any other language, understanding the English language demands knowledge beyond the literal meaning of words. It requires its speakers to understand the connotation of a word, its tone and figurative usage. Idioms fall into this final category.

Idioms are a group of words/expressions that have a figurative meaning—a meaning separate from the literal meaning conveyed by the constituent words.

BBA entrance exams include approximately 4–5 questions on idioms and their meanings. These questions are usually of a moderate difficulty level. Questions based on proverbs and phrasal verbs have also been asked. Therefore, a comprehensive knowledge of idioms/phrasal verbs and their usage shall be of great assistance, not only for the examination, but also for enhancing your understanding and comprehension of the language.

As stated above, there are numerous idioms in the English language and the list is continuously evolving. One of the most effective ways to increase one's skill set in this section is to group idioms based on common areas or themes. Let us look at a few examples.

Idioms Based on Animals

Idiom	Meaning	Idiom	Meaning
Paper Tiger	Pretending to be tougher or more dangerous than one really is	Bee in one's bonnet	An idea that constantly occupies one's thought
Dropping like flies	Dying/giving up quickly	Catch a weasel asleep	To surprise someone who is normally alert and on his/her guard
Eager beaver	A person who is excited about doing certain work	A fine kettle of fish	A situation that is not satisfactory; a mess
Straight from the horse's mouth	Directly from the original source	Nest egg	Money saved for the future
Elephant in the room	A problem or controversial issue everyone is aware of but tries to avoid talking about because it is embarrassing or will cause conflict	Red Herring	A red herring is a misleading piece of information aimed at providing a distraction from the real facts of a situation

Idioms Based on Body Parts

Idiom	Meaning	Idiom	Meaning
To get someone's back up	To really annoy someone	Take it on the chin	To be brave and not complain when bad things happen to you
To have your back to the wall	To be in a difficult or desperate situation	To raise eyebrows	To shock people
Water off a duck's back	Criticisms of or warnings to a particular person that have no effect	To drag your feet	To be deliberately slow
Achilles heel	A small fault or weakness in a person or system that can result in its failure	Take it on the chin	To exhibit courage when being criticized or when facing hardships
Break a leg	Used to wish someone good luck	By the skin of ones teeth	To barely just manage to do something

Idioms Based on Colours

Idiom	Meaning	Idiom	Meaning
White Elephant	An expensive item that is costly to maintain	In the black	Meaning successful or profitable
Blue pencil	To censor or limit information	Blue Stocking	Intelligent/Scholarly woman
Chase rainbows	When someone tries to get or achieve something that is difficult or impossible	A golden handshake	A large sum of money that is paid to a retiring manager or director, or to a redundant worker
To look through rose-coloured/ tinted spectacles/ glasses	When someone is overly optimistic about things in life	Red in tooth and claw	Involving opposition or competition that is violent and without pity
Scream blue murder	Is to scream loudly and for a long time, especially in order to protest about something	Nail your colours to the mast	To say publicly and firmly what you believe or who you support

Idioms Based on Food

Idiom	Meaning	Idiom	Meaning
The best thing since sliced bread	An excellent person or thing	The apple doesn't fall from the tree	A child usually behaves in a similar way to his or her parent(s)
The apple of somebody's eye	Used to indicate the person who someone loves most and is very proud of	Half a loaf is better than no bread	Something is better than nothing
The icing on the cake	Extra and not essential element that is added to an already good situation or experience and that makes it even better	Still waters run deep	Means a person who seems to be quiet or shy may surprise you by knowing a lot or having deep feelings

Idiom	Meaning	Idiom	Meaning
A good egg	A person who you can rely on to behave well	A fish out of water	A person who feels uncomfortable or awkward because he or she is in surroundings that are not familiar
A rotten apple	Someone who does bad things and influences other people so that they do bad things too	A curate's egg	Something with both good and bad parts or qualities

There are several other themes that can be used to group idioms and their usage. These are –

- Time
- Emotions
- Humour
- Names
- Clothing
- Technology
- Money
- Nature

Idiom	Meaning
<i>A bitter pill</i>	A situation or information that is unpleasant but must be accepted
<i>A dime a dozen</i>	Anything that is common, inexpensive, and easily available
<i>Ace in the hole</i>	A secret advantage
<i>Achilles' heel</i>	A metaphor for a fatal weakness in spite of overall strength
<i>Actions speak louder than words</i>	Intentions are judged better by what is done than by what is said
<i>Add insult to injury</i>	To worsen an unfavourable situation or a loss
<i>All ears</i>	Pay complete attention to what is being said; awaiting an explanation
<i>All thumbs</i>	Clumsy, awkward
<i>An arm and a leg</i>	Very expensive or costly
<i>At the drop of a hat</i>	Without any hesitation; instantly

Idiom	Meaning
<i>Back to the drawing board</i>	To start again from the beginning planning an event; idea or scheme as When an attempt fails, and it's time to start planning all over again
<i>Ball is in your court</i>	It is up to you to make the next decision or step
<i>Barking up the wrong tree</i>	Looking in the wrong place
<i>Basket case</i>	One made powerless or ineffective, as by nerves, panic, or stress
<i>Beat around the bush</i>	To treat a topic, but omit its main points, often intentionally or to delay or avoid talking about something difficult or unpleasant
<i>Beat a dead horse</i>	To uselessly dwell on a subject far beyond its point of resolution
<i>Bed of roses</i>	A rich person. A very rich family
<i>Best of both worlds</i>	A situation wherein someone has the privilege of enjoying two different opportunities
<i>Bite off more than one can chew</i>	To take on more responsibility than one can manage

Idiom	Meaning
<i>Bite the bullet</i>	To endure a painful or unpleasant situation that is unavoidable
<i>Bite the dust</i>	Euphemism for dying or death
<i>Break a leg</i>	A saying from the theatre that means "good luck"
<i>Burn the midnight oil</i>	To work late into the night, alluding to the time before electric lighting
<i>Bust one's chops</i>	To say things intended to harass
<i>By the seat of one's pants</i>	To achieve through instinct or do something without advance preparation
<i>By the skin of one's teeth</i>	Narrowly; barely. Usually used in regard to a narrow escape from a disaster
<i>Call it a day</i>	To declare the end of a task
<i>Cat nap</i>	A nap
<i>Chalk up</i>	To attribute something to a particular cause
<i>Champ at the bit or Chomp at the bit</i>	To show impatience or frustration when delayed
<i>Cheap as chips</i>	Inexpensive or good value
<i>Chew the fat</i>	To chat idly or generally waste time talking
<i>Chink in one's armor</i>	An area of vulnerability
<i>Clam up</i>	To become silent; to stop talking
<i>Cold shoulder</i>	To display aloofness and disdain
<i>Couch potato</i>	A lazy person
<i>Crocodile tears</i>	Fake tears or drama tears(fake cry)
<i>Cut a rug</i>	To dance

Idiom	Meaning
<i>Don't give up your day job</i>	A phrase implying that one is not proficient at performing a particular task and that they should not try to perform the task professionally
<i>Every cloud has a silver lining</i>	Be optimistic; every bad situation has some good aspect to it
<i>Fit as a fiddle</i>	In good physical health
<i>For a song</i>	Almost free. Very cheap
<i>Get bent out of shape</i>	To take offense; to get worked up, aggravated, or annoyed
<i>Grasp the nettle</i>	To tackle a difficulty boldly
<i>Grass is always greener on the other side</i>	A phrase implying that a person is never satisfied with their current situation; they think others have it better
<i>Have a blast</i>	To have a good time or to enjoy oneself
<i>Have eyes in the back of one's head</i>	Someone can perceive things and events that are outside of their field of vision
<i>Heard it through the grapevine</i>	You learned something through means of a rumour
<i>Hit the road</i>	To leave
<i>Hit the sack/sheets/hay</i>	To go to bed to sleep
<i>Jump ship</i>	Leave a job, organization, or activity suddenly
<i>Kick the bucket</i>	Euphemism for dying or death
<i>Kill two birds with one stone</i>	To accomplish two different tasks at the same time and/or with a single action
<i>Let the cat out of the bag</i>	To reveal a secret
<i>No horse in this race</i>	No vested interest in the outcome of a particular contest or debate

Idiom	Meaning
<i>Off the hook</i>	To escape a situation of responsibility, obligation, or (less frequently) danger
<i>Once in a blue moon</i>	Something that occurs very rarely
<i>Piece of cake</i>	A job, task or other activity that is pleasant – or, by extension, easy or simple
<i>Preaching to the choir</i>	To present a side of a discussion or argument to someone who already agrees with it; essentially, wasting your time
<i>Pull somebody's leg</i>	To tease or to joke by telling a lie
<i>Put the cat among the pigeons</i>	To create a disturbance and cause trouble
<i>Raining cats and dogs</i>	Raining really strong or hard
<i>Right as rain</i>	Needed, appropriate, essential, or hoped-for and has come to mean perfect, well, absolutely right
<i>Shoot the breeze</i>	To chat idly or generally waste time talking

Idiom	Meaning
<i>Shooting fish in a barrel</i>	Frivolously performing a simple task
<i>Spill the beans</i>	Reveal someone's secret
<i>Spin one's wheels</i>	Expel much effort for little or no gain
<i>Split the whistle</i>	To arrive just on time
<i>Sunny smile</i>	Very happy
<i>Take with a grain of salt</i>	To not take what someone says too seriously; to treat someone's words with a degree of scepticism
<i>Throw under the bus</i>	To betray or sacrifice someone for selfish reasons
<i>Through thick and thin</i>	In both good and bad times
<i>Thumb one's nose</i>	To express scorn or to disregard
<i>To steal someone's thunder</i>	To take credit for something someone else did
<i>Under the weather</i>	Feel sick or poorly
<i>Wild goose chase</i>	A frustrating or lengthy undertaking that accomplishes little

Now, let us guess the answers to the following idioms:

Idiom	Meaning
A. Xerox Subsidy	I. To encounter something more powerful than one expected.
B. To do a Devon Loch	II. A state of confusion or disarray
C. Hairy at the heels	III. A situation with conflicting choices
D. At sixes and sevens	IV. To fail at the critical moment, especially when everyone expects you to succeed
E. Enough to cobble dogs with	V. Someone who is dangerous or untrustworthy.
F. Catch-22	VI. Surplus
G. To catch a tartar	VII. Using workplace photocopier for personal use.
H. To buy a lemon	VIII. A newly bought vehicle that gives trouble constantly.

Solutions

1. **A – VII 'Xerox subsidy'** is a euphemism for using the official photocopying machine for personal use.
2. **B –IV Devon Loch** If someone does a Devon Loch, they choke at the critical moment and fail at the last minute.
3. **C- V 'Hairy at the heels'** refers to a person who is presents danger and cannot be trusted
4. **D – II 'At sixes and sevens'** is used to describe a state of confusion or disarray.
5. **E –VI 'Enough to cobble dogs with'** is used to refer to an excess of something.
6. **F – III 'Catch-22'** refers to a predicament/dilemma involving choices that are mutually conflicting.
7. **G – I 'To catch a tartar'** is to encounter or be forced to reckon with someone or something that proves more powerful, troublesome or formidable than one expected.
8. **H –VIII 'To buy a lemon'** means to buy a vehicle that gives problems persistently.

Phrasal Verbs

Phrasal Verb	Meaning
Abide by	To respect or obey a decision, a law or a rule
Account for	To explain, give a reason
Add up	To make sense, seem reasonable
Advise against	To recommend not doing something
Agree with	To have the same opinion as someone else.
Allow for	To take into consideration
Appeal to	1. To plead or make a request 2. To be attractive or interesting
Apply for	To make a formal request for something (job, permit, loan, etc.)
Back away	To move backwards, in fear or dislike
Back down	To withdraw, concede defeat
Back up	1. To give support or encouragement 2. To make a copy of (file, program, etc.)
Bank on	To base your hopes on something/someone
Black out	To faint, lose consciousness

Phrasal Verb	Meaning
Block off	To separate using a barrier.
Blow up	1. To explode 2. To get angry
Boil down to	To be summarized as
Boot up	To start a computer by loading an operating system or program
Break away	To separate from a crowd
Break down	1. To go out of order, cease to function 2. To lose control of one's emotions
Break into	To enter by force
Break out	To start suddenly
Break out of	To escape from a place by force
Break up	To come to an end (marriage, relationship)
Bring up	To raise (a child)
Brush up on	To improve, refresh one's knowledge of something
Bump into	To meet by chance or unexpectedly
Burn out	1. stop (something) working 2. become exhausted from over-working

Phrasal Verb	Meaning
Call back	To return a phone call
Call off	To cancel
Calm down	To become more relaxed, less angry or upset
Carry on	To continue
Carry out	1. To do something as specified (a plan, an order, a threat) 2. To perform or conduct (test, experiment)
Check in	To register at a hotel or airport
Check out	1. To pay one's bill and leave (a hotel) 2. To investigate
Clam up	To refuse to speak
Clamp down on	To act strictly to prevent something
Come across	1. To find by chance 2. To appear, seem, make an impression
Come forward	To present oneself
Count on	To rely or depend on (for help)
Cut down on	To reduce in number or size
Cut out	1. To remove using scissors 2. To stop doing something
Deal with	To handle, take care of (problem, situation)
Die down	To calm down, become less strong
Do without	To manage without
Drag on	To last longer than expected
Draw up	To write (contract, agreement, document)
Dress up	wear elegant clothes
Drop in	To visit, usually on the way somewhere

Phrasal Verb	Meaning
Drop off	1. To deliver someone or something 2. To fall asleep
Drop out	To leave school without finishing
Ease off	To reduce, become less severe or slow down (pain, traffic, work)
End in	To finish in a certain way; result in
End up	To finally reach a state, place or action
Fall through	To fail; doesn't happen
Figure out	To understand, find the answer
Fill out	To complete (a form/an application)
Find out	To discover or obtain information
Focus on	To concentrate on something
Get along (with)	To be on good terms; work well with
Get at	To imply
Get away	To escape
Get by	To manage to cope or to survive
Get in	To enter
Get into (+noun)	To enter
Get off	1. To leave (bus, train, plane) 2. To remove
Get on	To board (bus, train, plane)
Get on with (something)	To continue to do; make progress
Get on (well) with (somebody)	To have a good relationship with
Get out	To leave

Phrasal Verb	Meaning
Get out of	To avoid doing something
Get over	To recover from (illness, disappointment)
Get over	To recover from (illness, disappointment)
Get rid of	To eliminate
Get together	To meet each other
Get up	To rise, leave bed
Give in	1. To cease opposition; yield 2. To hand in; submit
Give up	To stop doing something
Go through	To experience
Grow up	To spend one's childhood; develop; become an adult
Hand in	To submit (report, homework)
Hand out	To distribute
Hang out	To spend time in a particular place or with a group of friends
Hang up	To end a phone conversation
Hold on	1. To wait 2. To grip tightly
Hurry up	To be quick, act speedily
Iron out	To resolve by discussion, eliminate differences
Join in	To participate
Join up	1. To engage in, become a member of 2. To meet and unite with
Keep on	To continue doing something
Keep up with	To stay at the same level as someone or something
Kick off	To begin, start
Leave out	To omit, not mention
Let down	To disappoint
Look after	To take care of
Look down on	To consider as inferior

Phrasal Verb	Meaning
Look on	To be a spectator at an event
Look for	To try to find something
Look forward to	To await or anticipate with pleasure
Look up to	To admire
Make fun of	To laugh at/ make jokes about
Make up	To invent (excuse, story)
Mix up	To mistake one thing or person for another
Move in	To arrive in a new home or office
Move out	To leave your home/office for another one.
Nod off	To fall asleep
Own up	To admit or confess something
Pass away	To die
Pass out	To faint
Pay back	To reimburse
Put off	To postpone, arrange a later date
Put on	To turn on, switch on
Put out	To extinguish
Put up	To accommodate, give somebody a bed
Pick up	To collect somebody
Point out	To indicate/direct attention to something
Rely on	To count on, depend on, trust
Rule out	To eliminate
Run away	To escape from a place or suddenly leave
Run into	To meet by accident or unexpectedly (also: bump into)
Run out of	To have no more of something.
Set off	To start a journey;
Set up	To start a business

Phrasal Verb	Meaning
Shop around	To compare prices
Show off	To brag or want to be admired
Show up	To appear/arrive
Shut up (impolite)	To be silent, stop talking
Sit down	To take a seat
Stand up	To rise from a sitting position
Stick up for	To defend
Take after	To resemble, in appearance or character
Take care of	To look after
Take off	To leave the ground
Take on	To hire or engage staff
Take out	To remove; extract

Phrasal Verb	Meaning
Tell off	To reprimand/criticize severely
Think over	To consider
Try on	To wear something to see if it suits or fits
Turn down	To refuse
Use up	To finish a product (so that there's none left)
Watch out	To be careful
Wear out	1. To become unusable 2. To become very tired
Work out	1. To do physical exercise 2. To find a solution or calculate something
Wipe off	To clean (board, table).

Directions for examples 1 to 3: Choose the meaning of the idioms from the four options given below.

Example 1

SMELL RAT

- (a) bad smell (b) to be in a bad mood
(c) dirty place (d) suspect foul dealings

Solution: To *Smell Rat* means to suspect that something is wrong (I don't think this was an accident. I smell a rat.)

The correct answer is option (d).

Example 2

TO TAKE WITH A PINCH OF SALT

- (a) to add a little salt to the dish (b) not to believe completely
(c) to spoil relations (d) to hurt someone's feelings

Solution: To *take with a pinch of salt* means to listen to a story or an explanation with considerable doubt (They took my explanation with a pinch of salt. I was sure they didn't believe me.)

The correct answer is option (b).

Example 3

TO PUT ONE'S FOOT DOWN

- (a) to refuse to work (b) to take a firm stand
(c) to get down from a vehicle (d) to step cautiously

(BBA: SET 2009)

Solution: *To put one's foot down* means to tell someone in a strong way that they must do something or that they must stop doing something (You can't just let him do what he wants, you'll have to *put your foot down*.)

The correct answer is option (b).

Directions for examples 4 to 6: Choose the meaning of the part of the sentences underlined.

Example 4

He was asked to give the main message in a nutshell.

- (a) Quickly (b) Step-by-step (c) Correctly (d) Concisely

Solution: *In a nutshell* means a concise, brief description of something. (Well, to *put it in a nutshell*, we're going to have to start again.)

The correct answer is option (d).

Example 5

Dr. Desai is always on call, even at weekends.

- (a) on the phone (b) available for duty (c) out of the house (d) available for conversation

Solution: *On call* here would mean that Dr. Desai is always available for duty.

The correct answer is option (b).

Example 6

The popularity of the yesteryears' superstar is on the wane.

- (a) decreasing (b) growing more (c) at its peak (d) at rock-bottom

(BBA: SET 2009)

Solution: *On the wane* means in a period of decline or decrease (The tide was near the turn and already the day was on *the wane*.)

The correct answer is option (a).

Directions for examples 7 to 16: Four alternatives are given for the idiom/phrase given in the sentence. Choose the alternative which best expresses the meaning of the idiom/phrase.

Example 7

To cast aspersions

- (a) to act as the pillar of support (b) to raise aspirations
(c) to make unpleasant remarks (d) to dissolve all the differences

Solution: 'To cast aspersions' means to make unpleasant remarks on something or someone.

The correct answer is option (c).

Example 8

On the cards

- (a) impossible (b) shocking
(c) evident (d) anticipated

Solution: 'On the cards' is used for an event that is likely to occur in the future.

The correct answer is option (d).

Example 9

Dark horse

- (a) an extremely corrupt person (b) a notorious criminal
(c) an extremely rich person (d) an un expected winner

Solution: 'Dark horse' is used to refer a person whose talents and abilities are unknown but who unexpectedly wins or succeeds.

The correct answer is option (d).

Example 10

To turn over a new leaf

- (a) to change for the better (b) to start writing a new book
(c) to work on a novel idea (d) to clear the garden

Solution: 'To turn over a new leaf' means to start anew or afresh.

The correct answer is option (a).

Example 11

To keep up one's appearances

- (a) to make public appearances now and then (b) to maintain one's looks and appearance
(c) to keep up an outward show of prosperity (d) to make it appear that one is not concerned

Solution: 'To keep up one's appearances' means to make things/situations appear alright whether they are actually not.

The correct answer is option (c).

Example 12

Take to one's heels

- (a) to measure up to one's standard (b) to shake in one's shoes
(c) to run away (d) to run slowly

Solution: 'Take to one's heels' means to run away.

The correct answer is option (c).

Example 13

Off and on

- (a) repeatedly (b) always (c) occasionally (d) never

Solution: 'Off and on' refers to now and then or intermittent.

The correct answer is option (c).

Example 14

To take with a grain of salt

- (a) to make more palatable (b) to take a small quantity of
(c) to make something meaningful (d) to accept with misgiving

Solution: 'To take with a grain of salt' means viewing something with scepticism.

The correct answer is option (d).

Example 15

To talk through one's hat

- (a) to talk carefully (b) to talk softly
(c) to talk nonsense (d) to talk secretly

Solution: 'To talk through one's hat' means talking without having an understanding of what is being talked about.

The correct answer is option (c).

Example 16

Ins and outs

- (a) entrances and exits (b) details and complexities
(c) passages and pathways (d) rules and regulations

Solution: 'Ins and outs' means all details and complexities of a situation.

The correct answer is option (b).

Directions for examples 17 to 18: Choose the option that is the closest in meaning to the phrases in bold:

Example 17

He was a king who ruled his subjects **with a high hand**.

- (a) Sympathetically (b) Oppressively
(c) Democratically (d) Generously

Solution: 'With a high hand' means in an arrogant or dictatorial manner. Hence, 'oppressively' would be close in meaning to this particular idiom.

The correct answer is option (b).

Example 18

I **racked my brains** to solve this difficult problem.

- (a) I read a large number of books. (b) I consulted several people.
(c) I used my common sense (d) I subjected my mind to hard thinking.

Solution: 'Rack one's brains' means to think long and hard. Hence, option (d) is the correct answer.

The correct answer is option (d).

Direction for examples 19 to 20: Select the most appropriate meanings of the idiomatic phrase in bold:

Example 19

I was supposed to give a speech to my English class, but I **got cold feet** and I didn't go.

- (a) My English class-room makes my feet feel too cold.
(b) My feet got cold so didn't go.

- (c) I got too nervous and I didn't go.
- (d) It was winter time and I had no socks for my feet.

Solution: The idiom 'to get cold feet' means to become very nervous or to lose courage. Hence, option (c) is appropriate.

The correct answer is option (c).

Example 20

Take care of what you say! You will have to **eat your words!**

- (a) You have no food to eat.
- (b) You will have to take back what you have said.
- (c) You are not good with your language.
- (d) None of the above

Solution: 'To eat one's words' means to retract or withdraw what one has said. Hence, option (b) is correct.

The correct answer is option (b).

GRAMMAR

Grammar provides structure to language and if we are to communicate effectively it is essential that we understand how this structure works. Studying grammar for BBA entrance exams requires focus on correct usage. Almost every BBA entrance exam features 4-5 questions on Grammar. Hence, it is imperative that you have an understanding of the various concepts and their application.

The English grammar and its nuances need to be mastered if you wish to perform well in this section. The correct usage of tenses, articles, nouns and pronouns should be known to you along with that of adjectives and adverbs. **Questions in this section include –**

1. Error spotting
2. Parts of speech
3. Identifying the grammatically correct sentence
4. Use of prepositions
5. Fill in the blanks
6. Sentence correction
7. Use of phrases/Modifiers

Keeping this in mind, this section provides a quick revision of the key rules and concepts you need to know and understand to crack this exam.

Parts of Speech

In the English language, words are the smallest unit of expression with distinct meanings. Based on their use and functions, words are categorized into several types or parts of speech. These are

1. Noun
2. Pronoun,
3. Verb
4. Adverb,
5. Adjective
6. Conjunction,
7. Preposition
8. Interjection

Nouns

Nouns are 'naming words', Words that are used to name persons, things, animals, places, ideas, or events are nouns. There are different types of nouns but more often than not, the errors come from countable and uncountable nouns.

1. **Countable** – Countable nouns refer to anything that can be assigned a count, and has a singular and plural form. Examples: Bottle, Computer, Shirt
2. **Mass (Non-countable)** – Non-countable nouns are those nouns that can't be counted as it is not possible to break them into separate elements. They need determiners and quantifiers in order to be put in units and counted. Examples: Milk, Oil, Sand, Oxygen

Please note: Uncountable nouns are always in singular number. They don't have a plural form!



All these nouns are uncountable as per the English language: *accommodation, advice, baggage, behaviour, bread, furniture, information, luggage, news, progress, traffic, travel, trouble, weather, work, tea, sugar, water, air, rice, knowledge, beauty, anger, fear, love, money, research, safety, evidence*

The noun 'hair' is considered uncountable in English; hence it does not have a plural version. It can be countable only when referring to individual hairs. Consider the examples given below:

She has long blond **hair**.

I washed my **hair** yesterday.

My father is getting a few grey **hairs** now. (Refers to individual stands of hair)

I found **a hair** in my soup! (Refers to a single strand of hair)

3. **Collective**– Collective nouns refer to a collection of persons or things that is considered as a whole. Example: class, pride, fleet, pack, deck, flock

Countable Nouns	Non- countable nouns
Some, Any	Some, Any
Many, Few	Much, Little

Pronouns

Definition – A pronoun is a word that replaces a noun or a group of words used as a noun. It acts as a substitute for a noun.

Pronouns are classified into various categories. The more important of these are –

1. Personal Pronouns
2. Relative Pronouns
3. Demonstrative Pronouns
4. Reflexive/ Intensive/Emphatic Pronouns
5. Indefinite Pronouns
6. Reciprocal Pronouns
7. Possessive Pronouns
8. Interrogative Pronouns

In the following portion we shall focus on the more commonly confused usage of personal pronouns.

Personal pronouns

Personal pronouns refer to the speaker or speakers. They take the place of proper nouns (the names of people, places or things) and are used to avoid repetition

They can be spoken in the First, Second or Third person.

First Person – The subject of the sentence is **the person speaking**.

I am so tired today!

We are going to the mall.

Second Person – The subject of the sentence is **the person or people being spoken to**.

You seem very excited about your trip.

You should have waited for the professor.

Third Person – The subject of the sentence is **the person, people, or things being spoken about**.

He is going to see a film this afternoon.

They will have to resolve the issues at the earliest.

Impersonal pronouns

Pronouns which substitute nouns that refer to inanimate objects or are in the neuter gender are called Impersonal pronouns.

Types of Personal Pronouns – There are three common types of personal pronouns:

1. Subject pronouns,
2. Object pronouns
3. Possessive pronouns

Subject Pronouns – Subject pronouns (I, You, He, She, It, They, We) are used in place of the subject in the sentence. Example: **Richa and Riya** study in Xth grade. **They** are twins. "Richa and Riya" are the subject and "they" is the subject pronoun.

Object Pronouns – Object pronouns (Me, You, Him, Her, It, Us, Them) are used in place of the object in the sentence (the noun that receives the action in a sentence). Example: After Rayman bought a phone, it got broken within a week, "it" is the object pronoun used to replace "phone."

Possessive Pronouns – Possessive pronouns are used in the place of a noun phrase to indicate ownership (My, Our, Your, Her, His, Its, Their, Mine, Yours, Ours). They show who or what owns something. For example –

My apartment is big.

Your dinner is ready.

His favorite subject at school is English.

This book is **mine**.

The puppy dumped **its** water bowl.

Kindly note the difference between possessive adjectives and possessive pronouns

Possessive Adjectives	Absolute Possessive Pronouns
My, your, his, her, its, our, their, whose	Mine, yours, his, hers, ours, theirs

Let us take a few examples –

1. Take Karan's bike to the house.
2. Take *his* bike to the house – In this example, the possessive adjective 'his' replaces 'Karan'
3. Take *his* to the house – In this example, the absolute possessive pronoun 'his' replaces 'Karan's bike.'
4. Anyone who listens to rock music ought to have *his* brain examined – This is a possessive adjective.
5. If we are work hard and are determined, victory shall definitely be *ours* – This is an absolute possessive pronoun.

In the following sentence, identify the possessive adjective and the possessive pronoun -

Some envy *my* success, while some fear it; but it is *mine*, a manifestation of dreams that are *ours*, soaring above *their* fear and jealousy.

Solution: In the sentence provided above, *my* and *their* are possessive adjectives, while *mine* and *ours* are absolute possessive pronoun.

The words *hers*, *ours*, *theirs*, and *yours* are sometimes termed 'absolute' or 'independent' unlike other pronouns, they don't require an antecedent. They can be used independently of show possession. Kindly note that no apostrophe is required for these pronouns.

It's is the abbreviation of "it is". For example- "*It's* (= it is) raining cats and dogs". However, *Its* is the possessive form of "it" and shows ownership. For example: "Sanjeev has a beautiful watch. I can't remember *its* brand though".

Selecting personal pronouns

Personal pronouns help us to avoid the constant repetition of a noun. The noun for which the pronoun is used is called its antecedent. Identifying the correct antecedent helps in the selection of the correct personal pronoun.

The pronoun should agree with the antecedent with respect to number (singular or plural), person (first, second, or third person), gender (masculine, feminine, neuter), and case (subject, object, possessive).

Use of I v/s me

Both *I* and *me* are 1st person singular pronouns, which means that they are used by one person to refer to himself or herself. *I* is the subject pronoun, and is used for the person “doing” the verb. Consider the following examples:

I am waiting for my friends (I is the subject for *am waiting*)

I don't think he is as willing to consider a new idea. (I is the subject for *think*)

Me is the object pronoun, used as the object (or receiver) of the action of the verb, as in these examples:

My father took me to the doctor. (Me is the object of *took*)

She motivated me to participate in the competition. (Me is the object of *motivated*)

Note: If you are having trouble deciding, take out the other person and try completing the sentence. That should help you decide the right pronoun.

He is taller than _____. (**I/me**)

Solution: If we complete the sentence, we see that the sentence will read ‘he is taller than I am’. Hence, the subject pronoun ‘I’ is required here.

Charu and _____ (**I/me**) are going out.

Solution: The action of ‘going out’ is being performed by both Charu and I. So the blank should be filled by a pronoun in the subjective (nominative) case. Thus, ‘I’ is required here, not ‘me’.

The cat followed Raghav and _____ (**I/me**).

Solution: The action of ‘following’ is being performed by the cat on the objects. So the blank should be filled by a pronoun in the objective (accusative) case. Thus, the object ‘me’ is required here, not ‘I’.

Who v/s whom

The pronoun ‘who’ is used in place of the subject while the pronoun ‘whom’ is an object pronoun.

In case of any doubts, follow this simple rule; If you can replace the word with ‘he’ or ‘she’; use ‘who’. However, if you find yourself using ‘her’ or ‘him’ to replace the word, then use ‘whom’. The same principle applies to the use of ‘whoever’ and ‘whomever’

Consider the following sentences-

Frank is the man (who/whom) has been chosen (The correct answer is ‘who’; as ‘he’ is the man who has been chosen)

Frank is the man (who/whom) we have chosen (The correct pronoun is ‘whom’ as ‘We- subject’ have chosen ‘him’)

Now try and identify the correct pronoun usage in the following sentences:

1. Frank is the man (who/whom) they say, will be chosen.
2. Frank, the man (who/whom) you thought so highly of, has won the election
3. (Who/whom) are you talking to?
4. You can go with (whoever/whomever) you want
5. The prize will be given to (whoever/whomever) writes the best essay

Solutions:

- | | |
|------------|-------------|
| 1. Who | 2. Whom |
| 3. Whom | 4. Whomever |
| 5. Whoever | |

Who, which or that

Who, which and that are relative pronouns (i.e. they are used to refer back to a person or thing previously mentioned). While we use 'who' to refer to people; 'which' and 'that' are used largely to refer to things.

However, when introducing a restrictive relative clause, we use that rather than which. Consider the following examples:

My car that is big consumes a lot of petrol (Here it is important for me to tell you that my car is big as this information is essential to my sentence)

My car, which is big, consumes a lot of petrol (In this sentence, 'which' is introducing additional information that does not impact the sentence as a whole; I can simply say – "my car consumes a lot of petrol")

We don't use that to introduce a non- restrictive additional clause –

My bag, that is blue, is quite old (Incorrect)

My bag, which is blue, is quite old (Correct)

In case of any doubts, refer to the following table:

Relative pronoun	Relative clause referring to person or people	Relative clause referring to things	Restrictive relative clause	Non-restrictive relative clause
that	√	√	√	X
which	X [used in traditional texts]	√	X	√
who	√	X	√	√

Use of 'each other' and 'one another'

Each other refers to two items while one another refers to more than two items.

At the campus I came across my colleague and we complimented each other.

The guests at the party knew one another.

(The sentence implies that each guest knew the rest.)

The scientists at the conference were exchanging ideas with each other.

(This sentence implies that the exchange was happening between two scientists at a time.)

The table given below illustrates the various kinds of pronouns with an example of each kind. Fill up the table with a few more examples:

Type	Pronouns	Example
Possessive	Mine, yours, his, her, ours, theirs	This dress is mine.
Reflexive	Myself, yourself, himself, herself, itself, oneself, ourselves, yourselves, themselves	He cooked the lunch himself.
Reciprocal	Each other, One another	They really like each other.
Relative	That, which, who, whose, whom, where, when	The bike that broke down has now been repaired.
Demonstrative	This, that, these, those	That book is a bestseller.
Indefinite	Anything, anybody, anyone, something, somebody, some, nothing, nobody, none, no one	None was present for the session,
Interrogative	Who, what, why, where, when, whatever	Who is at the door?

Cases of nouns/pronouns

Nominative Case (Subjective Case)	Accusative Case (Objective Case)	Genitive Case (Possessive Case)
It refers to the subject of the verb.	It is called the objective case because it refers to the direct object of a verb. On the other hand, the 'dative case' refers to the indirect object of the verb.	It refers to the possession of another noun.
A noun or pronoun is in the subjective case when it is used as the subject of the sentence or as a predicate noun.	A noun or pronoun is in the objective case when it is used as a direct object, an indirect object, or an object of the preposition.	A noun or pronoun is in the possessive case when it is used to show ownership of an object.
Examples: Nancy participated in the state championship. I love dancing.	Examples: Neha gave me money. The teacher gave the notes to the student.	Examples: Where did you find my books? This pen is mine.

Refer the following table in case of any doubts –

		First Person	Second Person	Third Person	Impersonal
Subjective	Singular	I	You	She, He	It
	Plural	We	You	They	They
Objective	Singular	Me	You	Her, him	It
	Plural	Us	You	Them	Them
Possessive Subjective	Singular	My	Your	Her, His	Its
	Plural	Our	Your	Their	Theirs
Possessive Objective	Singular	Mine	Yours	Hers, His	Its
	Plural	Ours	Your	Theirs	Theirs

Adjectives

This part of speech modifies/qualifies a noun or a pronoun. Adjectives can specify the quality, the state or action that a noun or pronoun refers to.

1. Adjectives nearly always appear immediately before the noun that they modify.

Example: We enjoyed the insightful performance and the scintillating company.

2. At times adjectives appear in a list/string, wherein, they follow a set order according to category.

Example: A long, sharp and polished pickaxe was found in his backpack.

3. When indefinite pronouns- something, anybody, someone- are modified by an adjective, the pronoun precedes the adjective.

Example: I saw something shocking while coming to work.

4. There are certain adjective + word combinations in which the adjective always follows the word being modified

Example: President elect, Heir apparent, lives in the city proper.

5. Most adjectives can be used in front of the noun, as well as, after the verb. However, there are some adjectives that can only be used in one out of the two ways:

Examples of adjectives that always appear in front of the noun: atomic, east/west/north/south, indoor/outdoor

Examples of adjectives that always appear after the verb: afraid, alive, alone, apart, aware

6. Degrees of adjectives.

Adjectives can express degrees of modification. The degrees are known as the Positive, the Comparative and the Superlative.

The word than frequently follows the comparative and the word The precedes the superlative

There are certain adjectives that signify extreme comparison and don't require comparatives or superlatives. Example: Unique

Positive	Comparative	Superlative
fair	Fairer	fairest
tall	Taller	tallest
thin	Thinner	thinnest

The comparative degree of the adjective is created by the addition of the suffix -er, and the superlative is created by the addition of the suffix -est. However, there are some adjectives that do not prescribe to these norms:

Positive	Comparative	Superlative
good	Better	best
bad	Worse	worst
little	Less	least

Some adjectives form the comparative and superlative by using more and most respectively:

Positive	Comparative	Superlative
important	more important	most important
miserable	more miserable	most miserable
recent	more recent	most recent

One should not use more with a comparative adjective formed with the suffix -er, nor should one use most with a superlative adjective formed with the suffix -est.

Many is used before plural countable nouns while **much** is used before uncountable nouns:

Anu didn't have much experience.

On the way she made many mistakes.

Much time was wasted on unproductive tasks.

(Considerable amount of time)

Little is used for uncountable nouns while **few** for countable nouns.

There is little milk left.

Only a few bottles of milk are there.

Verbs

Verbs depict actions, events or states of beings. Most verbs are action words, but a few verbs indicate state of being or existence. Identifying the verb is the most important step in understanding the meaning of a sentence. It states something about the subject of the sentence. The more common categories of verbs are:

Type of verb	Definition	Examples	Sentence Examples
Action verbs (Transitive)	Verbs that have subjects/objects that receive the action of the verb. The object can be a thing or a person.	Kick, Feed, Make, Drive, Lift	The boy kicked the ball. I fed the biscuits to the dog. She drove her mother to the airport.
Action verbs (Intransitive)	Intransitive verbs do not have a receiver of the action.	Die, Arrive, Respond, Wait, Sit, Look	I almost died of shame at the party He arrived on time. Mary responded to all questions with a lot of patience.
Auxiliary Verbs	Also known as helping verbs, these are verbs that combine with a main verb and form a verb phrase These include modals as well	Be, Do, Have, Can, Could, May, Might, Must, Shall, Should, Will, Would	I am sure that I will be able to attend the party tonight. We may go shopping after the movie.
Finite Verbs	A verb that has a subject is a finite verb. It can be identified as the main verb of the sentence. It is indicative of tense, number and gender of the subject.	Appear, Promise, Enjoy, Love, Hate	I enjoyed myself at the party. All of them love pizza She promised to attend the function.
Non-finite Verb	A verb that is not the main verb of the sentence and does not reflect the tense, number or gender of the subject	Expand, Leave, Smile	He plans to expand his business. Leaving him alone is not an option. A smile is the surest way to win hearts.
Regular Verbs	A verb that follows the rules of semantics and syntax in the creation of its past participle and past tense.	Accept, Arrive	They have accepted the opportunity. My courier has not arrived.
Irregular Verb	These verbs do not usually follow the semantics and syntax in the creation of their past participle and past tense.	Go, Say, Sleep	I went to school in Delhi Sleeping is my favorite past time.

Adverbs

Adverbs are also modifying words, but, unlike adjectives, they modify verbs, adjectives and other adverbs. Consider the example below:

She is fast– Here fast is modifying the pronoun ‘she’, hence, it is an adjective

She runs fast– Here ‘fast’ is modifying the verb ‘runs’, hence, it is an adverb.

We use adverbs to say how something happens, where or when something happens, how often something happens, to strengthen/weaken the meaning of an adjective, adverb or verb.

The three main ways in which adverbs are constructed from adjectives are:

1. Add ly to the adjective
2. For –y ending, drop the –y and add –ily
3. For a consonant + le ending, drop the –e and add – ly

Examples of adverb usage are–

Vishal is going to have dinner here (Place)

I was thinking about this yesterday. (Time)

I often visit the local gurudwara (Frequency)

I am extremely annoyed (Degree)

We walk briskly in the park (Manner)

Kinds of adverbs

The different categories of adverbs, based on their meaning are:

1. Adverbs of Time (which show when)
 - I have seen this before.
 - Yesterday he arrived late.
 - The work shall begin now.
2. Adverbs of Frequency (which show how often)
 - I have warned him twice
 - I have not seen him once.
 - He often mistakes me for his friend
3. Adverbs of Place (which show where)
 - Go and sit there.
 - The little child followed his mother everywhere.
 - I looked up just in time.
4. Adverbs of Manner (which show how or in what manner)
 - Sabina speaks loudly.
 - The Marathas fought bravely.
 - This book is well written.

5. Adverbs of Degree or Quantity (which show how much)

She looked too beautiful.

The vegetables almost ready.

I am fully prepared.

Position of adverbs

Adverbs of manner, which answer the question how (e.g. well, fast, quickly, carefully, calmly) are generally placed after the verb or after the object if there is one:

It is raining heavily.

The ship is going slowly.

She speaks English well.

He does his work carefully.

Adverbs or adverb phrases of place (e.g. here, there, everywhere, on the wall) and of time (e.g. now, then, yet, today, yet, today, next, Sunday) are also usually placed after the verb or after the object if there is one.

He will come here.

I looked everywhere

Hang the picture there.

I met him yesterday.

When there are two or more adverbs after a verb (and its object), the normal order is: adverb of manner, adverb of place, adverb of time.

She sang well in the concert.

We should go there tomorrow evening.

He spoke earnestly at the meeting last night.

Adverbs of frequency, which answer the question 'how often' (e.g. always, never, often, rarely, usually, generally) and certain other adverbs like almost, already, hardly, nearly, just, quite are normally put between the subject and the verb if the verb consists of only one word. If there is more than one word in the verb, they are put after the first word:

His wife never cooks.

He has never seen a tiger.

I have often told him to write neatly.

We usually have breakfast at eight.

If the verb is am/are/is/was, these adverbs are placed after the verb:

I am never late for school.

He is always at home on Sundays.

We are just off.

The auxiliaries have to and used to prefer the adverb in front of them:

I often have to go to college on foot.

He always used to agree with me.

When an adverb modifies an adjective or another adverb, the adverb usually comes before it:

Rama is a rather lazy boy.

The dog was quite dead.

The book is very interesting.

Do not speak so fast.

But the adverb enough is always placed after the word which it modifies:

Is the box big enough?

He was rash enough to interrupt.

He spoke loud enough to be heard.

Here is a list of some important adverbs from the exam perspective

- 1. Since** – Since is used to denote when an activity started. For example, I have been waiting here since yesterday.
- 2. Too** – Too is used before adjectives. The use of too much before adjectives is wrong.
You are too much nice to him. INCORRECT
You are too nice to him. CORRECT
- 3. Enough** – When enough is used to modify adjectives or adverbs, it is always put after the adjective or adverb.
Is the house enough large? INCORRECT
Is the house large enough? CORRECT
- 4. Fairly/rather** – Use fairly to modify positive adjectives and rather to modify negative adjective.
Aakash is a fairly intelligent student CORRECT
Aakash is a rather intelligent student INCORRECT
Aakash is a fairly dumb student INCORRECT
Aakash is a rather dumb student CORRECT
- 5. Still** – Use still to show that something started in the past and continues into the present.
He still hasn't given me the answer to my question.

Prepositions

Prepositions refer to a word or group of words that is used with a noun, pronoun, or noun phrase to show direction, location, or time, or to introduce an object. Some of the most commonly used prepositions are–

Prepositions – time

Preposition	Usage	Example
on	days of the week	on Wednesday
in	months/seasons, time of day, year	in September/in autumn in the night in 2008
at	a specific point of time	at quarter past ten
since	from a certain point of time (past till now)	since 1983
for	over a certain period of time (past till now)	for 10 years

Prepositions – place (position and direction)

Preposition	Usage	Example
in	Used when an object lies within the boundaries of an area or within the confines of an enclosed space	In India, in the van, in the lounge
at	Used when the noun that follows the preposition is treated as a point in relation to which another object is positioned	at the house, at the airport, at work
on	Indicates the position of an object with respect to a surface on which it rests	On the roof, on the table on the bus,

Here are a few important points to be remembered with respect to prepositions:

A preposition is usually placed before its object, but sometimes it is placed after it:

Examples: Who are you taking to (Incorrect: To whom are you talking)

What are you looking for (Incorrect: For what are you looking?)

Which of these chairs did you sit on? (Incorrect: You sat on which of these chairs?)

A word may be used as an adverb or a preposition. One decides its role on the basis of the position and function of the word in that particular sentence.

Example: She jumped **up** from her chair. (Adverb)

She walked **up** the stairs and entered the chamber. (Preposition)

Rahul took the **up** escalator and reached the top of the apartments. (Adjective)

The businessman **upped** his offer by a million rupees and bought the house. (Verb)

The teacher agreed to **take up** the matter with the higher authorities. Particle ('take up' = phrasal verb)

His business venture is on the **up**. Noun

Getting her to agree to anything is an **uphill** task. Prefix (= a letter or word used at the beginning of a word)



The set of statements given above elucidate the various ways in which a word is used in a sentence thereby influencing the role or part of speech it plays in that particular sentence. It is important that you are able to correctly identify the part of speech a word belongs to in order to assess its grammatical correctness.

There are certain words that may function as a preposition in a sentence, though, categorically speaking; they are not prepositions in themselves. Some of them are:

I. The word 'Than' is a conjunction, but sometimes it is used as a preposition.

Example: I can't accept lesser than the market price for this painting. ('Than' conjunction used as a preposition – 'market price' a noun phrase)

II. Similarly, the word 'But' is a conjunction, but sometimes it is used as a preposition...

Example: What can we do but wait?

All is lost but hope ('but' Conjunction used as a preposition (here 'but' means "except"))

III. 'A' is an ARTICLE, but at times it is used as a preposition...

Example: I visit the temple twice a month

She pays me Rs. 500 a day [Article 'a' used as a preposition (in the sense of "per")]

By – for people (and time) With- for things	Example: Please ensure that you reach the venue by 6:00pm with the gifts.
Beside: By the side of Besides: In addition to	Example: At the party, she sat beside me. I have invited my neighbours to the party besides my friends.
Between– Comparison for two clearly demarcated entities Among– Comparison for more than two entities	Example: Between Sanjeev and Vyom, Sanjeev is shorter Among all my friends, Neha is my favourite



Quick Tip

In order to identify the preposition in a sentence, check for its object. Consider the example: *The boy stood up and ran down the road.* In this sentence, there is only one preposition- ‘down’, as it has an object – the road. *Please note that a preposition will always have an object.* ‘Up’ is a verb.

Conjunctions

A conjunction is a word which joins sentences, words and clauses. The most commonly used conjunctions are: and, yet, but, for, nor, or, and so

I like pizzas and burgers

My sister had fallen asleep, so I went to the movies alone

She doesn't like studying but she can chat on the phone all day long.

Conjunctions join together sentences and often make them more compact:

Ashwin and Jadeja are good bowlers. [Ashwin is a good bowler and Jadeja is a good bowler]

The man is poor, but honest. [The man is poor, but he is honest.]

Some Conjunctions are used in pairs. Conjunctions which are thus used in pairs are called Correlative Conjunctions or Correlatives:

The chief Correlatives are:

- | | | |
|-------------------------|---------------------------|--------------------|
| 1. Either or | 2. Neither nor | 3. Whether or |
| 4. Both and | 5. Not only but also | 6. Though yet |
| 7. So that | 8. As as | 9. So as |
| 10. No sooner than | 11. Hardly when. | |

Types of conjunctions

Conjunctions are divided into two categories:

1. Co-ordinating
2. Subordinating

A Co-ordinating Conjunction joins together clauses of equal rank.

Read the sentence:

Cats weep and dogs growl.

The sentence contains two independent statements or two statements that can function as separate sentences individually. Hence the Conjunction joining together these two statements or clauses of equal rank is called a Co-ordinating Conjunction.

The chief Co-ordinating Conjunctions are:

And, but, for, or, nor, also, either.... or, neither.... nor

A Subordinating Conjunction joins a clause to another on which it depends for its full meaning.

Read the sentence:

I read the book because my friend recommended it.

The sentence contains two statements or clauses one of which, 'because my friend recommended it', is dependent on the other. Hence the Conjunction introducing the dependent or subordinate clause is called a Subordinating Conjunction.

The chief Subordinating Conjunctions are:

After, because, if, that, though, although, till, before, unless, as, when, where, while

Certain words are used both as **Prepositions** and **Conjunctions**:

Preposition

Stay till tomorrow

I have not met him since Monday.

Conjunction

I shall stay here till my mother returns.

We shall go since it is getting dark

Interjections

Interjections express emotions and are followed by an exclamation point.

Examples of interjection:

Ouch! That hurt

Hurray, we won!

Now, let us consider a few questions:

Example 1

Name the part of speech of the underlined word in the following sentence:

The evil that men do lives after them.

- | | |
|----------------------|---------------------------|
| (a) Relative pronoun | (b) Demonstrative pronoun |
| (c) Conjunction | (d) Preposition |

(BBA: SET 2011)

Solution: 'that' is a relative pronoun (a pronoun that introduce a relative clause referring to some antecedent).

The correct answer is option (a).

Example 2

Match List-I (Parts of speech) with List-II (its usage: **next**) and select the correct answer using the codes given below the lists:

List I

1. Adjective
2. Adverb
3. Preposition
4. Noun

List II

5. What **next**?
6. I will see you **next** Monday.
7. I will tell you more about it in my **next**.
8. He was sitting **next** to her.

- (a) 1-6, 2-8, 3-5, 4-7
 (b) 1-5, 2-6, 3-7, 4-8
 (c) 1-6, 2-5, 3-8, 4-7
 (d) 1-7, 2-5, 3-6, 4-8

(BBA: SET 2010)

Solution: *Next* is used as a preposition in 8 as it indicates location. (He was sitting *adjacent* to her.) It is used as a noun in 7. *Next* is used as an adjective qualifying Monday in 6. It's used as an adverb in 1-What happens next? (Here the verb *happens* is unstated but implied)

The correct answer is option (c).

Example 3

Find the correct match of grammatical function with usage for the word:

AFTER

Grammatical function Usage

- | | |
|----------------|---|
| 1) adjective | 5) You may go after having your lunch |
| 2) adverb | 6) It appears to be the after effect of the disease |
| 3) conjunction | 7) Many graduates are hankering after jobs |
| 4) preposition | 8) He came soon after |
- (a) 1-8, 2-5, 3-6, 4-7
 (b) 1-6, 2-5, 3-8, 4-7
 (c) 1-5, 2-8, 3-7, 4-6
 (d) 1-6, 2-8, 3-5, 4-7

Solution: In statement 6, 'after' describes 'effect', so it acts as an adjective in the sentence. In statement 8, 'after' answers the question 'when'. So, it acts as an 'adverb of time'. In statement 5, 'after' joins the two parts of the sentence i.e. 'you may go' and 'having your lunch.' Hence, it is a conjunction here.

In statement 7, 'after' combines the verb 'hankering' with the noun 'jobs'. It acts as a preposition here.

The correct answer is option (d).

Subject Verb Agreement

Although you are probably already familiar with basic subject-verb agreement, this section begins with a quick review of basic agreement rules.

Simply put, subject -verb agreement states that *Subjects* and *verbs* must AGREE with one another in *number* (singular or plural). Thus, if a subject is singular, its verb must also be singular; if a subject is plural, its verb must also be plural.

Please note: - In the present tense, nouns and verbs form plurals in opposite ways: *nouns* ADD an s to the singular form; *verbs* REMOVE the s from the singular form.

Examples: The **dog** plays with the child. (Subject - Dog (singular), Verb - plays (singular))

The **dogs** play with the baby. (Subject - Dogs (plural), Verb - play (plural))

There are **two important exceptions** to subject -verb agreement.

Firstly, agreement only applies when the verb is in the present tense. In the past tense, there is no overt agreement between the subject and the verb. (if the verb is used without any helping verb)

Examples: The **girls** danced at the event.

The **girl** danced at the event.

And secondly, agreement applies only to third person subjects. There is no distinction between a first person singular and first person plural subject.

Examples: *I play* all day.

We play all day.

Also, these rules apply to all personal pronouns except *I* and *you*, which, although SINGULAR, require PLURAL forms of verbs.

Now let us look at a few basic rules:

When the subject of a sentence is composed of two or more nouns or pronouns connected by *and*, we use a plural verb.

Examples: My **car and bike** *are* red in colour.

Sheila and her friends *are* going to the mall

Please note, this rule is not followed when two nouns refer to the same object

Examples: **Rajma and Rice** *is (not are)* my favourite dish.

The captain and wicketkeeper of India *has (not have)* failed the doping test.

Also, in case of compound nouns the verb shall remain singular.

Examples: **Breaking and Entering** *is* a punishable offence.

The **bed and breakfast** on the highway **is** economical.

If the subjects are both singular and are connected by the words *or*, *nor*, *neither/nor*, *either/or*, and *not only/but also* the verb is singular.

Examples: **Jessica or Christian** *is* to blame for the accident.

Neither **the pencil** nor **the pen** *is* in the desk.

Please note: When *I* is one of the two subjects being connected by *either/or*, *neither/nor*: put it second and follow with the singular verb *am*.

Example: Neither *she* nor *I* *am* going to the party.

When a compound subject contains both a singular and plural noun or pronoun joined by *or/ nor*, the verb should agree with the part of the subject that is nearer to the verb.

Examples: Rahul or his **classmates** *play* cricket in the break.

His **classmates** or **Rahul** *plays* cricket in the break.

Some nouns which name groups (club, jury, company, team, family, group...) can be either singular or plural depending upon their meaning in individual sentences. The rule that needs to be followed in such circumstances is -

- If we refer to the group as a whole and, therefore, as a single unit, we consider the noun singular. In this case, we use a singular verb.
- If, on the other hand, we are actually referring to the individuals within the group, then we consider the noun plural. In this case, we use a plural verb.

Examples: The **jury** *was* unanimous in its decision to convict the thief.

The **jury** *were* not unanimous in their decision

A new **couple** *has* moved into our neighbourhood.

The **couple** *are* separating.

There and Here are never the subjects of a sentence. When sentences start with “there” or “here,” the subject will always be placed after the verb, so care needs to be taken to identify it correctly.

Examples: There *is* a **problem**.

There *are* many problems.

Here *is* the file you requested.

Here *are* the files you requested.

Some words end in -s and appear to be plural but are really singular and require singular verbs. (News, measles, mumps, names of subjects ending in -ics – civics, mathematics, statistics etc.) Similarly, nouns such as – scissors, trousers, shears and shorts require plural verbs.

Examples: The **news** from the front *is* bad.

Measles *is* a dangerous disease for pregnant women.

When the word **number** is preceded with the word **a**, use a plural verb. When the word **number** is preceded with the word **the**, use a singular verb.

Examples: **A number of** ideas *were* discussed.

The number of ideas *was* impressive.

Use a singular verb with distances, periods of time, sums of money, etc., when considered as a unit.

Examples: Three miles *is* too far to walk.

Five years *is* the maximum sentence for that offense.

Ten dollars *is* a high price to pay.

BUT when referring to the currency itself, a plural verb is required.

Ten dollars (i.e., dollar bills) *were* scattered on the floor.

Keep in mind that subjects don't always come before verbs in questions. Make sure you accurately identify the subject before deciding on the proper verb form to use.

Examples: Does **shahid** usually *eat* this little?

Where *are* the **pieces** of this puzzle?

Sometimes the subject is separated from the verb by such words as *with, together with, including, accompanied by, in addition to, along with, as well as, besides, not, etc.* These words and phrases are not part of the subject and have no impact on it. Ignore them and use a singular verb when the subject is singular.

Examples: The **politician**, along with the team, *is* expected shortly.

Excitement, as well as nervousness, *is* the cause of her shaking.

Do not be misled by a phrase that comes between the subject and the verb. The verb agrees with the subject, not with a noun or pronoun in the phrase.

Examples: **One** of the books *is* missing.

The **people** who listen to music *are* few.

A **bouquet** of roses *lends* elegance to the room.

With words that indicate portions—e.g., *a lot, a majority, some, all, percentage, portion*- we are guided by the noun after *of*. If the noun after *of* is singular, use a singular verb. If it is plural, use a plural verb.

Examples: A lot of the **pie** *has* disappeared.

A lot of the **pies** *have* disappeared.

A third of the **city** *is* unemployed.

A third of the **people** *are* unemployed.

All of the **pie** *is* gone.

All of the **pies** *are* gone.

In case of indefinite pronouns, as subjects, the following indefinite pronouns always take **singular verbs**.

either	anybody	somebody	everybody	nobody	each
neither	anyone	someone	everyone	no one	one
other	anything	something	everything	nothing	

Examples: **Each** of the employees *is* responsible for completing the task.

The women **each** gave *her* approval

Everyone *has* finished his/her work.

However, the following indefinite pronouns always take plural verbs:

Both	Few	Many	Several	Others
------	-----	------	---------	--------

Examples: **Many** *have* agreed to attend the event.

Few *are* interested in his petty politics.

A third group of indefinite pronouns takes **either** a singular or plural verb depending on the pronoun's meaning in the sentence

Some	Any	None	All	Most
------	-----	------	-----	------

Examples: Some of the **balance** *is* remaining.

Some of the **debts** *are* remaining.

None *was* present.

None of the **protestors** *were* arrested.

The relative pronouns (who, whom, which and that) are singular or plural, depending on the words they refer to.

Example: The **article** **that** was published in the newspaper **has** been accepted by the board.

I have read the **articles** **that were** sent by the newspaper.

Ritu is one of the **students** **who have** brought honour to the school.

Ritu is the only **one** of our students **who has** won a national award.

Directions: In the following set of statements, locate subject and verb. If the verb does not agree with the subject, correct the verb.

1. Neither he nor his brother are capable of such a crime.
2. The mother duck, along with all her ducklings, swim so gracefully.
3. The file, not the documents, were misplaced.
4. Here is the three books you wanted.
5. One of the dancers who has come is ill.
6. The building, with all its contents, is insured.
7. The principal and chairperson were interested in the proposal.
8. Some boats in the marina were damaged.
9. Many a tourists were hurt in the bombing.
10. The number of candidates contesting the election are huge.

Solutions:

1. Subject – He, His brother; Verb – are
Correct Sentence – Neither he nor his brother is capable of such a crime.
2. Subject – Mother duck; Verb – swim
Correct Sentence – The mother duck, along with all her ducklings, swims so gracefully.
3. Subject-The file; Verb-were
Correct Sentence – The file, not the documents, was misplaced.
4. Subject-three books; Verb-is
Correct Sentence – Here are the three books you wanted.
5. Subject – Dancers; Verb- is
Correct Sentence – One of the dancers who have come is ill.
6. Subject- Building; Verb – is
There is no error in this sentence.
7. Subject- The principal and chairperson; Verb – were
Correct Sentence – The principal and chairperson was interested in the proposal.
8. Subject – Some boats; Verb – were
There is no error in this sentence.
9. Subject – Tourists; Verb – were hurt
Correct Sentence – Many a tourist was hurt in the bombing. The fixed expression *many a/an...* is more formal than the single word *many*, and it is much less common. It is mainly used in poetry /literary writing /newspapers. However, *many a/an....* takes a singular noun, which can be followed by a singular verb.
10. Subject – The number; Verb – are
Correct Sentence – The number of candidates contesting the election is huge.

Parallelism

Sentence elements that have similar functions should have similar construction as well. The balance between two or more similar words, phrases or clauses is called **parallelism** in grammar. Parallelism is also called parallel structure or parallel construction.

Parallel construction prevents awkwardness, promotes clarity and improves writing style and readability.

1. Parallelism is used to balance nouns with nouns, prepositional phrases with prepositional phrases, participles with participles, infinitives with infinitives, clauses with clauses.
2. **With elements that are joined by coordinating conjunctions – *and, but (not), or, yet (not)***

Examples: I like to enjoy the *local cuisine* **and** *visiting exotic locations*. (x)

I do not enjoy *dieting* **or** *exercise*. (x)

Both the sentences mentioned above are incorrect. The correct sentences would be –

I like enjoying the local cuisine and visiting exotic locations.

OR

I like to enjoy the local cuisine and to (optional) visit exotic locations.

I do not enjoy dieting or exercising

3. Parallelism is used with elements joined by linking words and correlative conjunctions.

These include -

- | | | |
|---------------------|------------------|----------------------|
| • Either-or | • Neither-nor | • From-to (distance) |
| • From-till (time) | • Both-and | • Between-and |
| • Not only-but also | • Scarcely-when | • Hardly-when |
| • Barely-when | • No sooner-than | |

Examples: At my training session, I was not only taught how to work the register, but also how to treat customers courteously.

The correct formation for the sentence would be –

At my training session, I was taught not only **how to work the register**, but also **how to treat customers courteously**.

4. Use parallel structure with elements in lists or a series.

Example: This activity can be done individually, in pairs or can be done in groups of five. (x)

In the above example, a better construction would be –

This activity can be done individually, in pairs or in groups of five.

Let us look at another example. Consider the following sentence-

For the changeover, budget will have to be advanced, vote on account goes, and winter session has been moved back. (x)

The above sentence isn't parallel as the verb tenses don't make chronological sense. The correct sentence would be -

For the changeover, budget will have to be advanced, vote on account will go, and winter session will be moved back.

5. If there are elements being compared in a sentence, do ensure that parallelism is maintained, so as to ensure correct comparison.

Example: My house is bigger than my friend. (x)

In the above example, the comparison is taking place between two incomparable elements – my house and my friend! The correct construction would be –

My house is bigger than my friend's house.

Let us consider another example:

Do you like to watch television more than you like reading books?

Again, there is a fault in the construction of the elements being compared. The correct construction would be –

Do you like to watch television more than you like to read books?

OR

Do you like watching television more than you like reading books?

6. Use parallel structure with elements joined by a linking verb or a verb of being

Since a linking verb establishes a relationship or linkage, the elements being linked by these verbs should be parallel in construction.

Example: What she said was her meaning. (x)

For this sentence, the correct construction would be –

What she said was what she meant.

Directions: Correct the errors in the following sentences.

1. Aggression and being melancholic are behaviours that many steroid users exhibit.
2. As an artist, he drew, painted and did sculpting
3. Write me a long poem, short story and a novel that is long.
4. I do not like hot water or milk that is cold.
5. I acquired my wealth to invest carefully, work hard and finding a rich father-in-law.
6. We can either drive to Shimla or go flying to Chennai.
7. But an increasingly popular practice is exposing Indian newspapers to growing conflicts of interests: to accept payments for ads in the form of shares in the advertiser's firm.
8. I like to edit books more than I like just reading them.
9. Eating huge meals, snacking between meals and too little exercise can lead to obesity.
10. Mustaine likes people with integrity and who have character.

Solutions

1. Being aggressive and melancholic are behaviours that many steroid users exhibit OR Aggression and melancholy are behaviours that many steroid users exhibit.
2. As an artist, he drew, painted and sculpted
3. Write me a long poem, short story and a long novel.
4. I do not like hot water or cold milk.
5. I acquired my wealth by investing carefully, working hard and finding a rich father-in-law.
6. We can either drive to Shimla or fly to Chennai.
7. But an increasingly popular practice is exposing Indian newspapers to growing conflict of interests: the practice of accepting payments for ads in the form of shares in the advertiser's firm.
8. I like to edit books more than I like to read them.
9. Eating huge meals, snacking between meals, and exercising too little can lead to obesity.
10. Mustaine likes people with integrity and character

Modifiers

A modifier is so called because it is said to *modify* (change the meaning of) /describe/add information to another element in the sentence. Words, Phrases or Clauses can all act as modifiers. The most familiar examples of modifiers are adjectives and adverbs.

Since modifiers provide a description for or modify another word or phrase, their incorrect placement can result in grammatical, as well as, interpretational errors.

Let us consider some of the common errors that can be caused due to improper modifier usage/placement.

1. Misplaced modifier

Misplaced modifiers are those modifiers that are positioned so that they appear to modify the wrong thing. It is particularly important to be careful about where you are placing the simple, limiting modifiers like- *barely, almost, just, nearly, almost, only, hardly*.

Let us consider an example-

Example: Rushil has nearly managed to annoy every boss he has had.

Rushil has managed to annoy nearly every boss he has had.

Of the above two sentences, the second statement means that Rushil has annoyed almost every boss of his? The first statement conveys no meaning.

Consider another statement:

I saw an accident driving down the street!

The incorrect construction of the sentence not only changes the complete meaning of the idea but also makes it a ludicrous one! The correct construction would be –

While I was driving down the street, I saw an accident

2. Dangling modifier

When you start a sentence with a modifier, you must ensure that the statement/word/phrase/clause that follows it can, in fact, be modified by that modifier. When a modifier improperly modifies something, it is called a "dangling modifier." It is a persistent and frequent grammatical problem in writing. Such modifiers are often (though not always) located at the beginning of the sentence.

Examples: Standing on the balcony, the mountain felt peaceful.

My neighbour went on and on, describing her wedding in the elevator

As you can see from the above examples a dangling modifier is usually a phrase or an elliptical clause – a dependent clause whose subject and verb are implied rather than expressed-that functions as an adjective but does not modify any specific word in the sentence or modifies the wrong word.

You can repair these errors by-

- Naming the appropriate or logical doer of the action as the subject of the main clause.
- Changing the phrase that dangles into a complete introductory clause by naming the doer of the action in that clause:

Example: While we were in the elevator, my neighbour went on and on describing her wedding.

- Combining the phrase and main clause into one:

In the above example, the first sentence can be modified in the following way –

While I was standing on the balcony the mountain felt peaceful to me.

3. Squinting modifier

A squinting modifier refers to the ambiguous use of a modifier, wherein the modifier appears to refer to more than one set of words/phrases/clauses. A squinting modifier is essentially a type of misplaced modifier.

Look at the following scenario:

I: "Sahil performed a heroic feat at his last assignment. He shot a robber with an AK-47!"

My father: "I did not know that police officers were issued AK-47's"

I: "No, no! The robber had the gun."

In the above dialogue, the modifying phrase 'with an AK-47' can be used for both Sahil and the robber, giving rise to two possible interpretations.

Like most misplaced modifiers, a squinting modifier can be fixed by changing its position in the sentence or by rewording.

In the above dialogue if the statement is reworded so – “He shot a robber who had an AK-47”, there shall be no ambiguity in the intended meaning of the sentence,

Now, let us solve a few questions.

Directions: Correct the errors in the following sentences.

1. While walking on the grass, a snake bit him.
2. I tried calling to tell you about the seminar half a dozen times
3. Students who miss class frequently fail examinations.
4. Although extremely spicy, Rao managed to finish the curry.
5. A lover of good food and an enthusiastic cook, ice cream was introduced to America by Jefferson.
6. The store that had the big sale recently went bankrupt.
7. Please give the mirror to Manisha with the brass inlaid figures.
8. He went on trial for his impious notions of later scholars, was banished from his adopted home, but nevertheless influenced generations.
9. I put the cake beside the door that I had baked.
10. Being hungry and tired, I remained at home.

Solutions

1. While he was walking on the grass, a snake bit him **OR** a snake bit him while he was walking on the grass
2. I tried calling you half a dozen times to tell you about the seminar.
3. Students who miss class frequently, fail examinations **OR** Students who miss class, frequently fail their examinations
4. Although the curry was extremely spicy, Rao managed to finish it.
5. Ice cream was introduced to America by Jefferson who was a lover of good food and an enthusiastic cook
6. The store that had the big sale recently, went bankrupt **OR** the store that had the big sale, recently went bankrupt.
7. Please give the mirror with the brass inlaid figures to Manisha.
8. He went on trial for his impious notions, was banished from his adopted home, but nevertheless influenced generations of later scholars.
9. Beside the door, I put the cake that I baked or I put beside the door, the cake that I had baked (*both constructions are grammatically correct but the second sentence is a better construction.*)
10. As I was hungry and tired, I remained at home.

Tenses

The dictionary definition of tense is “a distinction of form in a verb to express distinctions of time or duration of the action or state it denotes.” Tense indicates time. As you are all aware, there are mainly three kinds of tenses –

1. Present tense
2. Past tense
3. Future tense

Here is a quick snapshot of the various categories of tenses, their application and the rules governing their usage.

Present Tense			
	Usage	Examples	Verb Form
Simple/ Indefinite	To describe permanent truths, scientific facts and habitual or customary activities – <ul style="list-style-type: none"> • Adverbs (generally, frequently, often, always, rarely) • With adverbial phrases (everybody, once, a week etc...) 	The sun rises in the east. A triangle has three sides.	Base form of the verb (except for the verb <i>be</i>). The only change from the base is the addition of s for third person singular. Negative sentences – Do/does not+ first or base form
	When an event or activity is part of a fixed time-table or has been planned beforehand.	The train leaves at 5:00 am.	Interrogative Sentences Do/does + subject+ first form of verb
	In exclamatory sentences beginning with here and there	Here comes the professor!	Interrogative sentences beginning with a question word – Question word+ do/does+ subject+ verb
	In general statements	Your daughter sings very well.	Negative interrogative sentences – Question word+ do/does+ subject+ verb
Continuous	For an action going on at the time of speaking.	I am talking to my friend.	Is/am/are + verb+ ing
	For a temporary action which may not actually be happening at the time of speaking.	I am learning to play the guitar.	Negative Sentences - Not is inserted between the auxiliary and main verb.
	For an action that has been arranged to take place in the near future	I am coming over in an hour.	Interrogative Sentences - auxiliary is put before the subject.
	For habitual actions, which continue in spite of warning	You are always busy chatting with your friends	Negative Interrogative sentences - Is/am/are+ not+ first form of verb +ing

Present Tense			
	Usage	Examples	Verb Form
Perfect	To indicate completed activities in the immediate past (with just)	I have just eaten breakfast.	Have/has + past participle Negative Sentences- have/has + not + participle
	For an action whose time is not definite.	My neighbour has gone to London.	Interrogative Sentences- Have/has (in the beginning) + third form of verb
	For a past event whose impact is felt in the present.	I have finished my work (I am free now)	Negative Interrogative sentences- Have/has (in the beginning) + not third form of verb
Perfect Continuous	To show that something started in the past and has continued till now. For – indicates duration Since – indicates the starting point.	I have been waiting for an hour. Have you been waiting since morning?	Has/have+ been+ verb+ ing

Past Tense			
	Usage	Examples	Verb Form
Simple/ Indefinite	For a completed action in the past.	I watched a superb play yesterday.	Regular verbs are changed to the simple past by adding -ed to the end of the root form. If the verb already ends in -e, we just add -d. <i>Irregular verbs follow no pattern when they change to the simple past tense. (Dig-dug, Rise-rose etc...)</i>
	For an action in the past (regular habit, event)	I practiced yoga regularly for two years	<i>Some verbs don't change from their present form. (Put-put, Cut-cut etc...)</i>

Past Tense			
	Usage	Examples	Verb Form
Continuous	<p>To denote an action going on at some time in the past. It may not indicate the definite time of the action</p> <p>If two actions took place in the past and one of them interrupted a longer action, the second, shorter action will be in simple past while the longer action shall take the continuous form.</p>	<p>It was raining yesterday.</p> <p>When I saw him, (second action, shorter in duration - simple past) he was playing chess.</p> <p>While I was reading, the light went off. (second action, shorter in duration - simple past)</p>	Was/were+ verb+ ing
Perfect	It is used to show that one action in a sentence finishes before a second action begins.	When I reached the station the train had already left.	Had +past participle
Perfect Continuous	<p>It shows an action that began in the past before a certain point and had also continued up to that time.</p> <p>It is used to indicate one activity in the past was happening before or after another activity had taken place</p>	<p>When you called me, I had been studying for five hours</p> <p>We had been walking for barely 5 minutes when the rain started.</p>	Had+ been+ verb+ ing

Future Tense			
	Usage	Examples	Verb Form
Simple/ Indefinite	<p>To express the future as a fact.</p> <p>To talk about what is expected to happen in the future</p>	<p>I will turn 30 next month.</p> <p>I think India will beat Pakistan in the match.</p>	<p>Will/shall+ verb</p> <p>(Generally, shall - first person; will- second+ third person)</p> <p>Interrogative Sentences- Will or shall + subject + first form of the verb.</p>
Continuous	<p>For actions that will be taking place at some time in the future.</p> <p>It relates one action in the future to another specific action or time.</p>	<p>I will be going to the mall in the evening.</p> <p>We will be going to the market after work.</p>	Will be + verb+ ing

Future Tense			
	Usage	Examples	Verb Form
Perfect	It is used to show the completion of an action by a certain time in the future.	I promise that I will have finished the assignment by the end of the week.	Will have + past participle
Perfect Continuous	For an action that will be in progress over a period of time and will continue in the future.	By next month, we will have been living here for three years.	Will/ Shall have + been + verb + ing

Directions: In the following sentences, identify the tense error and rewrite the sentence in the correct tense.

- I didn't knew this would happen.
- On Saturday, we will be living in this locality for one year.
- We were looking at the album for some time before we realized that certain pictures were missing.
- Fifteen months earlier, Rohan drove through a red light and neglected to answer the summons, an offence that the judge was unlikely to forget.
- Karen was baked a cake now.
- I will call you when the food will be ready.
- The child is sleeping for three hours now.
- My friend has visited us yesterday.
- If I was you, I would not bother about him.
- We were considering going shopping when we realized it had been raining.

Solutions

- I didn't know this would happen.
- On Saturday, we will have been living in this locality for one year.
- We had been looking at the album for some time before we realized that certain pictures were missing.
- Fifteen months earlier, Rohan had driven through a red light and neglected to answer the summons, an offence that the judge was unlikely to forget.
- Karen is baking a cake now.
- I will call you when the food is ready.
- The child has been sleeping for three hours now.
- My friend visited us yesterday.
- If I were you, I would not bother about him.
- We were considering going shopping when we realized it was raining.

Grammar Question Types

Now that we have revised the fundamentals governing the English grammar, let us understand the different ways in which these concepts are tested in the examinations. The two most common question types on the various BBA entrance examinations that are aimed at testing Grammar are– Phrase substitution questions and Spot the error questions.

1. Phrase substitution

In these questions a sentence will be given to you and a phrase in that sentence will be highlighted in bold. You will need to select from five options that one option which can best substitute this highlighted phrase. Let's take a look at an example:

The trend of wearing boots is something that has **most sure** come around this season.

(a) most surely (b) must sure (c) must surely (d) utmost sure

In the above sentence, the use of 'sure' with 'most' doesn't make sense. The correct word should be 'surely'. Thus, option (A) should be the correct answer.

As you can see, these questions will test you on basic rules of English grammar and on the idiomatically correct usage of words.



Quick Tip

Try to avoid the tendency to answer these questions based on what sounds correct to you as a lot of times we speak incorrect English. Try to apply the grammar rules you have studied in the previous section instead.

Remember that there are no shortcuts to attempting Phrase substitution questions. You will have to read the entire sentence, understand its meaning and then apply to common rules of grammar and usage that you have learned in the previous part of this module. Having said that, the sentences that you get on these tests tend to be short, with typically only two or three words underlined, so it should not be very difficult for you to get to the answer quickly. Even if you can't spot the error on reading the sentence, go through the options quickly and something might strike you as the correct answer. If one of the answer choices says 'No error', then keep in mind that the sentence may be correct as written.

2. Spot the error

These are the other type of grammar questions you will encounter on the various BBA entrance examinations. Unlike Phrase Substitution questions, in which you have to find the correct answer, in these questions you simply need to point out which part of the given sentence contains an error. It doesn't matter what that error is because nobody will ask you to highlight the same. This fact makes these questions both easy and difficult – easy because you don't necessarily need to know the correct answer to a question and difficult because you don't have any options in front of you using which you can figure out whether there is any error in the given sentence.

Let's take a look at an example:

The coach suggested that (a)/both Anand as well as Bunty take a break (b)/from training for at least one week (c)/ No error (d).

Answer: (b) Both always takes 'and' and not 'as well as'



Quick Tip

Don't try to forcibly create errors in a sentence because it could be written correctly for all you know. In case you don't spot any errors, don't hesitate to mark 'No error' as the answer as it is a perfectly legitimate answer choice.

Things to keep in mind for spot the error questions

1. The first step to answering Spot the error questions is to read the entire sentence once. Even if you think the error is in Option A or B, make sure you read all the way to the end. This approach will help prevent you from falling into traps.

2. Before selecting an answer, make sure you can state why that word or phrase is wrong. Many answers may sound strange without being incorrect. It will also help to double check the other choices to ensure that they're all correct.
3. If you don't find an error the first time you read the sentence, then you need to check each numbered part individually. Look at each numbered part and consider what the possible errors could be. For example, if you're looking at a verb, you'll want to check if there's an issue with verb tense or agreement.
4. If you still can't spot any errors go with the 'No error' option. Do not assume that every sentence will contain some error as some sentences may be correct as written.

Direction for examples 1 to 2: Choose the segment with the error. If there is no error, choose 'd'

Example 1

You don't think t'is the last time. do you? No error
 (a) (b) (c) (d)

Solution: t'is is incorrect. The correct word should be it's i.e. it is.

The correct answer is option (b).

Example 2

This is the most perfect example of her selflessness. No error
 (a) (b) (c) (d) **(BBA: SET 2010)**

Directions for examples 3 to 5: For each of the following sentence, choose the grammatically correct representation out of the four options provided:

Solution: 'most perfect' is not the correct form, as 'perfect' itself is a superlative and cannot be further qualified.

The correct answer is option (b).

Example 3

The Mughal Gardens are visited by more than a million people every winter.

- (a) Every winter the Mughal Gardens are visited by more than a million people.
- (b) The Mughal gardens, every winter, are visited by more than a million people.
- (c) A million people, every winter, go to the Mughal Gardens for a picnic.
- (d) More than a million people visit the Mughal Gardens every winter

Solution: More than a million people visit the Mughal Gardens every winter.

The correct answer is option (d).

Example 4

Shantanu introduced Hemlata to his mother for the first time yesterday.

- (a) Shantanu's mother was introduced to Hemalata for the first time yesterday.
- (b) Hemalat met Shantanu's mother for the first time yesterday.
- (c) Shantanu and Hemlata visited Shantanu's mother for the first time yesterday.
- (d) Shantanu's mother was introduced to Hemlata by Shantanu, for the first time yesterday.

Solution: Shantanu's mother was introduced to Hemlata by Shantanu, for the first time yesterday.

The correct answer is option (d).

Example 5

Penguin India has published many books by Khushwant Singh.

- (a) Many books by Khushwant Singh have been published by Penguin India.
- (b) Khushwant Singh has written many books for Penguin India.
- (c) Penguin India and Khushwant Singh have a business partnership.
- (d) Who has published many books by Khushwant Singh

(BBA: DU JAT 2011)

Solution: Many books by Khushwant Singh have been published by Penguin India.

The correct answer is option (a).

Example 6

Read the following sentence and choose the best alternative which should replace the italicized part of the sentence.

To be a great manager *requires, strong interpersonal skills, the ability to think fast, and demands* a can-do attitude.

- (a) requires strong inter-personal skills, the ability to think fast, and demands
- (b) requires strong inter-personal skills, the ability to think fast, and demands
- (c) requires strong inter-personal skills, demands the ability to think fast, and
- (d) requiring strong inter-personal skill, an ability to think fast, and demands

Solution: Comma is not needed after the word 'requires' as it is a listing of qualities and thus a separation is required only between the various items. Option B presents the sequence with the correct punctuation and is the correct response.

The correct answer is option (b).

Example 7

The tremendous insight of Einstein was that the passage of time does not appear to be the same *while standing still as it does to a person traveling* at a speed which is a significant fraction of the speed of light.

- (a) while standing still as it does to a person traveling
- (b) to a person standing still as to a person traveling
- (c) to a person who is standing still as a person who is traveling
- (d) while standing still as to traveling

Solution: The sentence has a parallelism error as the two actions being compared – standing still and travelling – both require subjects. Only option B addresses this inequity and is the correct response.

The correct answer is option (b).

Example 8

Identify the sentence that gives the same meaning as the following.

He said, "Yes, I'll come and see you."

- (a) He accepted that he will come and see me.

- (b) He said that he will come and see me.
 (c) He agreed that he will come and see me.
 (d) He said that he would come and see me.

Solution: The main sentence is in direct speech and the options are in reported speech. When direct speech is converted into reported speech, 'will' is changed to 'would'. This makes options (a), (b) and (c) incorrect.

The correct answer is option (d).

Directions for examples 9 to 12: Choose one option to fill in the blanks in the following sentences.

- (a) a (b) an (c) the (d) none

9. I had met him _____ year ago.
 10. Can you see _____ moon?
 11. He is _____ honourable man
 12. _____ people with little patience rarely succeed.

Solutions:

9. 'A' is correct. 'An' is used before a vowel and 'the' is used for a particular thing.

The correct answer is option (a).

10. As there is only one moon, so 'the' is suitable.

The correct answer is option (c).

11. As the word 'honourable' starts with a vowel sound 'o', so 'an' should be used.

The correct answer is option (b).

12. The sentence requires no article.

The correct answer is option (d).

Example 13

Choose the grammatically correct sentence.

- (a) You should at once report it to the concerned authority.
 (b) You should report it at once, to the authority concerned.
 (c) You should report it at once, to the concerned authority.
 (d) You should at once report it to the authority concerned.

Solution: 'Concerned authority' means that the authority is troubled or worried. Whereas 'authority concerned' refers to the authority that is dealing with the issue. Hence, (a) and (c) are eliminated. Option (d) is correct.

The correct answer is option (d).

Example 14

Choose the sentence in which the given word is used correctly (grammatically and semantically)

ALMOST

- (a) As I crossed the road a scooterist almost hit me.
 (b) Crossing the road a scooterist hit me almost.

- (c) A scooterist across the road almost hit me.
 (d) A scooterist almost hit me crossing the road.

Solution: Option (b) has a misplaced modifier. Option (c) can be eliminated because usage of 'across' makes the sentence illogical. In option (d) there is a dangling modifier error. Hence, (a) is the correct answer.

The correct answer is option (a).

Example 15

In the following sentence choose the erroneous segment.

(a) We took a taxi (b) so we would be on time (c) for the meeting (d)

- (a) Error in segment A (b) Error in segment B
 (c) Error in segment C (d) No error

Solution: The error is in option (b). The correct sentence will be, 'so that we would be on time.'

The correct answer is option (b).

Directions for examples 16 to 19: Which of the phrases (a), (b), (c) and (d) given below should replace the phrase given in bold in the following sentence to make the sentence grammatically correct?

Example 16

The executive had received several warnings **before been suspended** finally for his lack of punctuality.

- (a) after suspension (b) after suspending
 (c) before suspended (d) before being suspended

Solution: 'Before being suspended' will be used here because we need to replace the phrase here with past tense only.

The correct answer is option (d).

Example 17

Accordingly to the senior partner's instructions, they have remitted the amount to your bankers.

- (a) Accordingly on (b) On accord of
 (c) In accordance with (d) Accordingly as

Solution: 'In accordance with' will be used here because the other options are grammatically incorrect in the context of this sentence.

The correct answer is option (c).

Example 18

The museum **has planned of** a ten day exhibition showcasing the rich culture of the South.

- (a) plan for (b) has been planning
 (c) planning on (d) have a plan

Solution: 'Has been planning' will be used here because the other options are grammatically incorrect in the context of this sentence.

The correct answer is option (b).

Example 19

Since the collapse of his business, he has become **frequent depressed and addicted** to alcohol.

- (a) frequent depression and addicted for (b) frequently depress and addict to
(c) frequently depressing and addicted on (d) frequently depressed and addicted to

Solution: 'Frequently depressed and addicted to' because it is the only grammatically correct option in the context of this sentence

The correct answer is option (d).

Directions for examples 20 to 39: In questions 20 to 39, some of the sentences have errors and some have none. Find out which part of the sentence has an error and mark that letter (a), (b), (c) as your answer. If there is no error, mark (d) as your answer.

20. The minister for 'Education' (a)/vehemently refused (b) / the allegation that he had taken bribes.(c)/ No error. (d)
21. If I were Zubin (a) / I would not attend (b) / the wedding, come what may. (c) / No error. (d)
22. He says that (a) / he reads novels (b) / to pass away the time. (c) / No error. (d)
23. He left for Mumbai on Sunday (a) / arriving there (b) on Monday. (c) / No error. (d)
24. No sooner did the teacher (a) / enter the class room (b) / the students got up. (c) / No error. (d)
25. It is (a) / nothing else (b) / than pride. (c) / No error. (d)
26. To the ordinary man, in fact, the pealing of bells (a) / is a monotonous jangle and a nuisance(b)/ tolerably only when mitigated by remote distance and sentimental association. (c) / No error. (d)
27. The increasing mechanisation of life (a) / have led us farther away from daily contact with nature and(b)/ the crafts of the farm. (c) / No error. (d)
28. If you have a way with words, (a) / a good sense of design and administration ability (b) / you may enjoy working in the high pressure world of advertising. (c) / No error. (d)
29. Last week's sharp hike in the wholesale price of milk (a) / is a strong indication for (b) / higher cheese cost to come. (c) / No error. (d)
30. The families (a)/ are living in Gulmohar Park (b)/ for the last two decades (c)/ No error. (d)
31. Two lakhs of people (a)/ attended the meeting (b)/ held in Parade grounds (c)/ No error. (d)
32. There is a Bach's violin concerto (a)/ on the radio (b)/ at 6 pm this evening. (c)/ No error. (d)
33. Lay your books aside and (a)/ lay down to rest (b)/ for a while. (c)/ No error. (d)
34. We went (a)/ with Guptas to a (b)/ movie called 'Deewaar'. (c)/ No error. (d)
35. Once an old hermit (a)/ saw a cat (b)/ pounce upon a rat. (c)/ No error. (d)
36. A computer virus works exactly (a)/ like the biological variety (b)/ which invade the human body. (c)/ No error. (d)
37. When I first started my school (a)/ my boys had (b)/ no evident love for music. (c)/ No error. (d)
38. My uncle (a)/ has left (b)/ for Bombay last Saturday. (c)/ No error. (d)
39. Don't think (a)/ you can deceive me (b)/ like you did my brother. (c)/ No error. (d)

Solutions:

20. Here, the preposition 'for' is incorrect. To show possession, 'of' is used.

The correct answer is option (a).

21. The sentence is grammatically correct. It is in the subjunctive mood. Sentences in the subjunctive mood follow the structure given below:

If I were you, + I would/would not + verb

The correct answer is option (d).

22. 'Pass away' means to die while 'pass the time' means to spend time doing something. So, the word 'away' should be removed from this sentence to correct it.

The correct answer is option (c).

23. The word 'left' shows that the speaker is not in Mumbai. Hence, in the present context, 'reach' would be a better word than 'arrive'. Also, the tense should be simple past and not continuous. So, 'and reached' will be used instead of 'arriving'.

The correct answer is option (b).

24. 'No sooner' is used in combination with the word 'than', which should be used before 'the students' in this sentence.

The correct answer is option (c).

25. 'Nothing but' or 'nothing else but' is a common phrase that will be used here. It means 'without a doubt'. So, 'than' should be replaced by 'but'.

The correct answer is option (c).

26. Instead of the adjective 'tolerable', the adverb 'tolerably' has been used in this sentence, which makes it grammatically incorrect.

The correct answer is option (c).

27. Singular subject takes a singular verb. Since 'increasing mechanisation of life' is a singular subject, it will take 'has' as the verb.

The correct answer is option (b).

28. 'Administration' is a noun. To modify the noun 'ability', the adjective 'administrative' is required.

The correct answer is option (b).

29. Here, the preposition 'for' is incorrect. To show possession, 'of' is used.

The correct answer is option (b).

30. Since the action started in the past and has continued upto the present, the present perfect continuous tense will be used. Thus, It should be 'have been living' instead of 'are living'.

The correct answer is option (b).

31. It should be 'two lakh people'.

The correct answer is option (a).

32. Since Bach is a proper noun, article 'a' should not be used with it.

The correct answer is option (a).

33. 'Lie' means to rest. Therefore, 'lay' is incorrect usage.

The correct answer is option (b).

34. When the entire family is talked about, the surname of the family is preceded by the article 'the'. Here, it should be 'the Guptas'.

The correct answer is option (b).

35. 'Pouncing on' is the correct phrasal verb.

The correct answer is option (c).

36. 'Exactly' and 'like' cannot be used together.

The correct answer is option (b).

37. There is no error in the sentence.

The correct answer is option (d).

38. The event occurred in the last week. Thus, it should be expressed in simple past. 'Left' should be used instead of 'has left'.

The correct answer is option (b).

39. 'To' should be added between 'did' and 'my'.

The correct answer is option (c).

English Language Practice Tests

GENERAL INSTRUCTIONS

1. Each question has 4 responses. Candidate should choose an appropriate response.
2. Every question carries one mark.
3. For every incorrect answer, 1/4th of the marks allotted to the question will be deducted

Practice Test 1

Directions (Q. 1–15): Read the following passages carefully and answer the questions given below.

Passage 1

It is strange that, according to his position in life, an extravagant man is admired or despised. A successful businessman does nothing to increase his popularity by being careful with his money. He is expected to display his success, to have a smart car, an expensive life and be lavish with his hospitality. If he is not so, he is considered mean and his reputation in business may even suffer in consequence. The paradox remains that if he had not been careful with his money in the first place, he would never have achieved his present wealth. Among the low income group, a different set of

values exist. The young clerk, who makes his wife a present of a new dress when he hadn't paid his house rent, is condemned as extravagant. Carefulness with money to the point of meanness is applauded as a virtue. Nothing in his life is considered more worthy than paying his bills. The ideal wife for such a man separates her house keeping money into joyless little piles – so much for rent, for food, for the children's shoes, she is able to face the milkman with equanimity and never knows the guilt of buying something she can't really afford. As for myself, I fall into neither of these categories. If I have money to spare, I can be extravagant, but when, as is usually the case, I am hard up, then I am the meanest man imaginable.

(IPU CET 2015)

1. In the opinion of the writer, a successful businessman

- (a) is more popular if he appears to be doing nothing
- (b) should not bother about his popularity
- (c) must be extravagant before achieving success
- (d) is expected to have expensive tastes

2. The phrase 'lavish with his hospitality' signifies

- (a) miserliness in dealing with his friends
- (b) considerate in spending on guests and strangers
- (c) extravagant in entertaining guests
- (d) indifference in treating his friends and relatives

3. We understand from the passage that

- (a) all mean people are wealthy
- (b) wealthy people are invariably successful
- (c) carefulness generally leads to failure
- (d) thrift may lead to success

4. It seems low paid people should

- (a) not pay their bills promptly
- (b) not keep their creditors waiting
- (c) borrow money to meet their essential needs
- (d) feel guilty if they overspend

5. The word 'paradox' means

- (a) statement based on facts
- (b) that which brings out the inner meaning
- (c) that which is contrary to received opinions
- (d) statement based on the popular opinion

6. Which of the following is opposite in meaning to the word 'applauded' in the passage?

- (a) Humiliated
- (b) Decried
- (c) Cherished
- (d) Suppressed

7. As far as money is concerned, we get the impression that writer

- (a) is incapable of saving anything
- (b) is never inclined to be extravagant

- (c) would like to be considered extravagant
- (d) doesn't often have money to save

8. Which of the following would be the most suitable title for the passage?

- (a) Extravagance Leads to Poverty
- (b) Miserly Habits of the Poor
- (c) Extravagance in the Life of the Rich and the Poor
- (d) Extravagance is Always Condemnable

Passage 2

True, it is the function of the army to maintain law and order in abnormal times. But in normal times, there is another force that compels citizens to obey the laws and to act with due regard to the right of others. The force also protects the lives and the properties of law abiding men. Laws are made to secure the personal safety of its subjects and to prevent murder and crimes of violence. They are made to secure the property of the citizens against theft and damage to protect the rights of communities and costs to carry out their customs and ceremonies, as long as they do not conflict with the rights of others. Now the good citizen, of his own free will, obeys these laws and he takes care that everything he does is done with due regard to the rights and well-being of others. But the bad citizen is only restrained from breaking these laws by fear of the consequences of his actions. And the necessary steps to compel the bad citizen to act as a good citizen are taken by this force. The supreme control of law and order in a state is in the hands of a minister, who is responsible to the State Assembly and acts through the Inspector General of Police.

(IPU CET 2015)**9. The expression 'customs and ceremonies' means**

- (a) fairs and festivals
- (b) habits and traditions
- (c) usual practices and religious rites
- (d) superstitions and formalities

10. A suitable title for the passage would be

- (a) The Function of the Army
- (b) Laws and the People's Rights
- (c) The Fear of the Law and Citizen's Security
- (d) The Functions of the Police

11. According to the writer, which one of the following is not the responsibility of the police?

- (a) To protect the privileges of all citizens
- (b) To check violent activities of citizens
- (c) To ensure peace among citizens by safeguarding individual rights
- (d) To maintain peace during extraordinary Circumstances

12. Out of the following, which one has the opposite meaning to the word 'restrained' in the passage?

- (a) Promoted
- (b) Accelerated
- (c) Intruded
- (d) Inhibited

13. Which of the following is not implied in the passage?

- (a) Law protects those who respect it
- (b) Law ensures people's religious and social rights absolutely and unconditionally
- (c) A criminal is deterred from committing crimes only because of fear of the law
- (d) The forces of law help to transform irresponsible citizens into responsible ones

14. Which of the following reflects the main thrust of the passage?

- (a) It deals with the importance of the army in maintaining law and order
- (b) It highlights the role of the police as superior to that of the army
- (c) It discusses the role of the army and the police in different circumstances
- (d) It points to the responsibility of the minister and the Inspector General of Police

15. "They are made to secure the property of citizens against theft and damage", means that the law

- (a) helps in recovering the stolen property of the citizens
- (b) assist the citizens whose property has been stolen or destroyed

- (c) initiate process against offenders of law
- (d) safeguards people's possessions against being stolen or lost

Directions (Q. 16–21): For each word written in capital letter, choose a word from the given alternatives which is opposite in meaning.

(BBA: SET 2009)

16. ELOQUENT

- (a) elaborate
- (b) short
- (c) illegal
- (d) inarticulate

17. TRANQUIL

- (a) painful
- (b) disturbed
- (c) punishing
- (d) peaceful

18. ACRIMONIOUS

- (a) peaceful
- (b) sarcastic
- (c) incredible
- (d) genuine

19. MEAGRE

- (a) villager
- (b) ample
- (c) danger
- (d) simple

20. BLITHE

- (a) skilled
- (b) morose
- (c) shine
- (d) strong

21. INSUBORDINATE

- (a) obedient
- (b) superior
- (c) boss
- (d) rebellious

Directions (Q. 22–25): Choose the word closest in meaning to the words given in CAPITALS.

(BBA: CBS 2010)

22. FATUOUS

- (a) Brainless
- (b) Fatal
- (c) Sensible
- (d) Tolerable

23. LACONIC

- (a) Milky
- (b) Wicked
- (c) Cheerful
- (d) Precise

24. GROVEL

- (a) Stones
- (b) Crawl
- (c) Ghastly
- (d) Salute

25. NEBULOUS

- (a) Starry
- (b) Porous
- (c) Various
- (d) Vague

Practice Test 2

Directions (Q. 1–7): Read the following passage carefully and answer the questions that follow:

A majority of companies in India are trying to be selective while planning their workforce, compensation and benefit cuts for this year, even as they anticipate a decline in their company's business performance, next year, reveals a new mercer Survey, 'Leading Through Unprecedented Times'.

The survey states that Indian companies are likely to curtail overall hiring, while continuing to hire talent to fill shortages in key skill-sets. Another interesting fact that the survey reveals is that most companies in India still hope to avoid significant workforce reductions. However, it also states that a deep or prolonged economic downturn could force a more drastic action. "Clearly, what the survey indicates is that while workforce reductions will occur in India, there will be hiring which will be selective and skill based, and most companies believe they can avoid significant workforce cuts," express Padma Ravichandar, Country Leader, Mercer Consulting (India). S. Y. Siddiqui, Managing Executive Officer (Admn.), Maruti Suzuki India Limited, says: "Our expansion plans and recruitment intentions continue to remain unaltered. We are specifically looking at strengthening the R & D capability of our company. And in this quest, we have already planned to scale up our manpower requirements for our R & D functions to almost 1,000 employees by 2010–11. The number of engineers hired has shot up from a little less than 300 that we recruited in the beginning of the last year, to around 600 now. Recently the company has recruited a batch of 250 Graduate Engineer Trainees (GETs) too. We have undertaken many initiatives to bring down costs, across operations but neither are we holding back our recruitment activities nor are we handing over pink slips to our employees to cut costs. The current situation does raise a lot of concern but we view it as a short term phenomenon and are confident that India will emerge as a strong economy in the near future."

(BBA: CBS 2009)

- 1. According to the Mercer survey, companies in India anticipate**
 - (a) A rise in business performance
 - (b) A decline in business performance
 - (c) Benefit cuts for their employees
 - (d) Curtailing hiring
- 2. The hiring pattern anticipated in the survey is**
 - (a) Overall workforce reductions
 - (b) Increased recruitment
 - (c) Curtailed hiring with a focus on hiring employees with key skill sets
 - (d) Hiring in the area of R & D
- 3. The tone of the survey is**
 - (a) Pessimistic
 - (b) Optimistic
 - (c) Neutral
 - (d) Guardedly Optimistic
- 4. According to the statement given by S. Y. Siddiqui, Maruti plans to**
 - (a) Hand out plenty of pink slips in the coming year
 - (b) Hire plenty of GETs in the coming year
 - (c) Focus on recruitment in the area of R & D
 - (d) Hold back recruitment activities
- 5. The antonym of the following word appears in the title of the survey.**
 - (a) Customary
 - (b) Economical
 - (c) Honest
 - (d) Expensive
- 6. What is the relationship between the survey report and Siddiqui's statement?**
 - (a) Antithetical
 - (b) Complementary
 - (c) No relationship
 - (d) Contradictory

7. The main point of concern in the passage is

- (a) Business Performance
- (b) Shortage in key skill-sets
- (c) Expansion Plans
- (d) Recruitment Intentions

Directions (Q. 8–9): Complete the following sentences choosing a word from the options given below.

8. Happy is to jovial as ____ is to melancholy.

- (a) exhausted
- (b) sad
- (c) drab
- (d) dull

9. Canine is to dog on ____ is to cat.

- (a) bovine
- (b) feline
- (c) divine
- (d) saline

(BBA: SET 2010)

Directions (Q. 10–11): Choose the correct option.

10. Heart is to cardiac as teaching is to _____.

- (a) academics
- (b) scholarly
- (c) pedagogic
- (d) avuncular

11. His first novel ____ his fame.

- (a) assured
- (b) insured
- (c) ensured
- (d) reassured

(BBA: SET 2010)

Directions (Q. 12–14): In each of the following questions, a word has been written in four different ways out of which only one is correctly spelt. Find the correctly spelt Word:

12.

- (a) Kalidoscope
- (b) Kaleidoscope
- (c) Kalaidoscope
- (d) Kaliedoscope

13.

- (a) Rapprochment
- (b) Rapprochment
- (c) Rapproachment
- (d) Rapprochement

14.

- (a) Strategam
- (b) Strategem
- (c) Stratagem
- (d) Stratagam

(IPU CET 2014)

Directions (Q. 15–18): Rearrange the jumbled parts to produce a proper sequence. Then choose the correct sequence from the options given.

15. It has been established that

- P: Einstein was
- Q: although a great scientist
- R: weak in arithmetic
- S: right from his school days

The correct sequence is:

- (a) QPRS
- (b) SRPQ
- (c) QPSR
- (d) RQPS

16. We have to

- P: as we see it
- Q: speak the truth
- R: there is falsehood and weakness
- S: even if all around us

The correct sequence is:

- (a) RQSP
- (b) RSQP
- (c) QRPS
- (d) QPSR

17. I enclose

P: and the postage
 Q: a postal order
 R: the price of books
 S: which will cover

The correct sequence is:

- (a) QSRP
- (b) RPSQ
- (c) QPSR
- (d) RSQP

18. He was so kind and generous

P: he not only
 Q: made others do so
 R: but also
 S: helped others

The correct sequence is:

- (a) QPRS
- (b) PRSQ
- (c) PSRQ
- (d) RQSP

(BBA: DU JAT 2011)

Directions (Q. 19–23): Choose the meaning of the underlined part of the sentences given below:

19. Contentment makes for happiness.

- (a) is conducive to
- (b) Holds back
- (c) Runs away from
- (d) Sees to

20. I was let into her secret.

- (a) Hidden
- (b) Made acquainted with
- (c) Solved
- (d) Cheated

21. The rebels held out for about a month.

- (a) Offered resistance
- (b) Gave up
- (c) Fought
- (d) Hid

22. When he became rich, he threw over his old friends.

- (a) Thrashed
- (b) Abandoned
- (c) Threw a party
- (d) Hugged

23. I saw through his tricks.

- (a) Transparency
- (b) Detected
- (c) Enjoyed
- (d) Looked

(BBA: SET 2011)

Directions (Q. 24–25): Find the correct substitute for the given phrases from the options given.

24. Animals that eat flesh are

- (a) cannibals
- (b) herbivore
- (c) carnivore
- (d) omnivore

25. Fear of being enclosed in a small closed place is

- (a) claustrophobia
- (b) agoraphobia
- (c) xenophobia
- (d) paranoia

Practice Test 3

Directions (Q. 1–3): Fill in the blanks in the following sentences by selecting the most appropriate alternative from amongst the given choices under each sentence.

1. The police confronted the thief _____ the accusers.

- (a) with
- (b) at
- (c) upon
- (d) to

2. Civilization, in real sense of the term consists not in the _____ but in the deliberate and voluntary _____ of wants.

- (a) increasing ...decreasing
- (b) increment ...decrement
- (c) multiplication... reduction
- (d) hoarding ...dehoarding

3. That rumour has no foundation _____ fact.

- (a) of
- (b) up
- (c) to
- (d) in

(IPU CET 2014)

Directions (Q. 4–8): For each word written in capital letters, choose the word from the given alternative which is the closest in meaning.

4. BLUDGEON

- (a) Explosion
- (b) Club
- (c) Barrel
- (d) Wooden beam

5. VIA

- (a) Over
- (b) Towards
- (c) By way of
- (d) Between

6. SEAR

- (a) To insult
- (b) Thirst
- (c) Predict
- (d) Scorch

7. CONCH

- (a) Part of a saddle
- (b) Brown
- (c) Shell
- (d) Rope

8. OGLE

- (a) Stare at wolfishly
- (b) Scold the wife
- (c) Rub noses affectionately
- (d) Run away

(BBA: SET 2011)

Directions (Q. 9–14): In the following questions, choose the word opposite in meaning to the given word.

9. SERVILITY

- (a) bravery
- (b) prudence
- (c) insolence
- (d) slavery

10. KNOTTY

- (a) involved
- (b) intricate
- (c) easy
- (d) assuming

11. DEARTH

- (a) extravagance
- (b) scarcity
- (c) velocity
- (d) abundance

12. VEHEMENCE

- (a) apathy
- (b) passion
- (c) eagerness
- (d) ascent

13. PLACATE

- (a) antagonize
- (b) pity
- (c) amuse
- (d) embroil

14. PEJORATIVE

- (a) soothing
- (b) appreciative
- (c) smoothing
- (d) critical

(IPU CET 2014)

Directions (Q. 15–17): In each of the following, six sentences are given. The first and the sixth sentences are numbered 1 and 6. Rest of the four sentences labelled P, Q, R and S are not in proper order. Select the correct sequence of the four sentences from the responses given below each question.

15.

- 1: Ashoka was successful
 P: by the cruelty and horrors of war
 Q: he was so disgusted
 R: in his military options
 S: and alone among conquerors
 6: that he renounced it.

The proper sequence should be

- (a) RSQP
- (b) PSQR
- (c) SQPR
- (d) QPRS

16.

- 1: She had understood
 P: so she withdrew herself from the ordinary people
 Q: like a curse to her father's house
 R: that God sent her
 S: from her earliest childhood
 6: and tried to live apart.

The proper sequence should be

- (a) SRQP
- (b) PRQS
- (c) QSPR
- (d) SPQR

17.

- 1: There are people
 P: to be able to say
 Q: not because they enjoy the book
 R: who read a book
 S: but because they want
 6: that they have read it.

The proper sequence should be

- (a) PSQR
- (b) SQPR
- (c) RSPQ
- (d) RQSP

(IPU CET 2015)

Directions (Q. 18–20): In each of the following groups, one word is misspelt. Choose that word.

18.

- (a) intransigent
- (b) innocuous
- (c) incognito
- (d) illicit

19.

- (a) comensurate
- (b) collaborate
- (c) castigate
- (d) corpulent

20.

- (a) caricature
- (b) profusion
- (c) privilege
- (d) benediction

(BBA: CBS 2009)

Directions (Q. 21–25): Read the following passage and answer the questions, choosing the correct answer from among the choices given.

A broad consensus has emerged among experts in India that the government's focus should be on the larger concept of economic development rather than on the narrow, quantitative concept of growth.

This is also a vindication of the fact that “trickle down” and social responsibility cannot be taken as a natural process within the ambit of free market and the political system in the country should execute a well-designed programme for the redistribution of resources. The mammoth loan-waiver scheme, the seemingly successful NREGS and the huge spending on other social sector programmes are classic examples of the government actively involving itself in a planned process of redistribution.

The impetus has come from the democratic forces acting in the country. The first decade and a half of economic reforms had led to a situation of jobless growth and increasing disparities. The public at large reacted sharply to this lopsided, exclusive model of development and the government was forced to introduce various policies to ensure social justice. People gave the green signal to this renewed interest in social spending and the incumbent government was voted back to power in 2009.

It is to be noted that this new “inclusive model” of development does not reject the objective of achieving high economic growth. In fact, it considers economic growth as one of the most important parameters without compromising the wider goals of social justice and environmental protection. The sustainable development paradigm that is emerging in India is a result of a long drawn out process of dialectics. Analysing at the macro level, the Nehruvian concept of planned, centralised economic development changed into a developmental model based on economic growth during the post 1991 reform period and, finally, it has synthesised into a model that takes into account both growth and redistribution. The active participation of civil society, the media, NGOs and environmental activists in the developmental process has forced the government to take care of the environment as well.

At the micro level, the dialectical process of development in India is now heading towards another direction. It has been widely agreed among all sections of society that industrialisation is necessary, at least to a limited extent, in ushering in economic development. The larger question that is emerging now is whether it is necessary to deprive the resources of a small group of people in order to bring in development, which may be beneficial to the public at large in the long run. Is development a zero-sum game, at

least in the short run? Singur and Nandigram are living examples of this debate.

The people have rejected the zero-sum thesis and the focus has suddenly shifted to rehabilitation. The Central government came up with a comprehensive Rehabilitation and Resettlement (R&R) Policy. But the success of industrialisation of rural India lies in the efficacy of implementing and operationalising this policy. Whether the emotional value an Indian attaches to his land can be compensated materially or not is altogether another debate by itself.

The macro-dynamics of the dialectics of development is at a stage today where a new anti-thesis is emerging to counter the huge social spending of the government. The corporate sector has demanded a drastic reduction in fiscal deficit and the recent budget aims at fiscal consolidation. At the micro-level, the focus should be on evolving innovative ways of rehabilitation, prompt compensation and timely implementation.

21. In a free market economy

- (a) Trickle down and social responsibility and both natural by products
- (b) People have equal opportunities to succeed in business
- (c) Trickle down and social responsibility cannot be taken for granted
- (d) There is a narrow, quantitative growth

22. The two adjectives used in the second paragraph of the article to describe the post-reform model of development, are

- (a) Democratic and Jobless
- (b) Jobless and Lopsided
- (c) Lopsided and exclusive
- (d) Exclusive and Increasing

23. The inclusive model of development is based on

- (a) The sustainable development paradigm
- (b) The democratic paradigm
- (c) The economic growth paradigm
- (d) The social justice paradigm

24. The author gives the examples of Singur and Nandigram to illustrate

- (a) The relationship between industrialisation and economic growth
- (b) The difficulty of determining the price of land
- (c) The dialectical process of development
- (d) Development as a zero-sum game in the short run

25. Some of the activities undertaken by the government to ensure social justice are

- (a) Loan waiver, NREGS and spending on social sector programmes
- (b) Loan waivers, NREGS and spending on industries
- (c) NREGS, education and spending on social sector programmes
- (d) Spending on social sector programmes, environmental protection and job opportunities

(BBA: CBS 2010)

ANSWERS AND EXPLANATIONS

Practice Test 1

1. Refer the lines" *A successful businessman..... He is expected to display his success, to have a smart car, an expensive life and be lavish with his hospitality....*" This makes (d) the correct response.
The correct answer is d.
2. The word 'Lavish' indicates extravagance, luxuriousness and sumptuous richness. This makes option (c) the correct response.
The correct answer is c.
3. The lines from the passage "*The paradox remains that if he had not been careful with his money in the first place, he would never have achieved his present wealth*" indicates that it is only by practising economy in their expenditure that the wealthy have become so.
The correct answer is d.
4. As per the passage for people who earn less, carefulness with money is applauded as a virtue.
The correct answer is d.
5. The word 'Paradox' indicates a contradictory proposition or statement.
The correct answer is c.
6. To 'decry' someone is to publicly condemn him/her. Thus, it is the correct antonym of 'Applauded'.
The correct answer is b.
7. The fact that the writer usually did not have enough money can easily be ascertained from the concluding lines of the passage.
The correct answer is d.
8. The passage compares the perceptions with respect to extravagance displayed by the rich and the poor people. This makes option (c) correct. The other options are extremely limited in their scope.
The correct answer is c.
9. In this passage, the words 'customs' and 'ceremonies' indicate the protocols that are followed by people of various communities.
The correct answer is c.
10. The central idea being discussed in the passage is the role played by the police in maintaining law and order in a state.
The correct answer is d.
11. The first line of the passage clearly states that it is the function of the army to maintain peace in abnormal times, that is, situations of emergency or extra ordinary circumstances.
The correct answer is d.
12. "To accelerate' is to increase or enhance speed; while, the word 'restrained' means to slow down.
The correct answer is b.
13. Refer the lines" *They are made to secureto protect the rights of communities and costs to carry out their customs and ceremonies, as long as they do not conflict with the rights of others.....*" It can be inferred from these lines that these provisions are not unconditional.
The correct answer is b.
14. The passage begins by talking about the role of the army and goes on to elucidate the role and responsibilities of the police.
The correct answer is c.
15. The meaning of the phrase is best captured by the last option.
The correct answer is d.
16. *Eloquence* refers to the art of persuasive and powerful speech or writing. *Inarticulate* is the correct antonym as it is used for a person who lacks the ability to express himself.
The correct answer is d.

17. *Tranquil* means calm or peaceful. Hence, *disturbed* is the right antonym.

The correct answer is b.

18. *Acrimonious* refers to angry or bitter speech or behaviour. Hence, *peaceful* is the right antonym.

The correct answer is a.

19. *Meagre* refers to inadequate or limited quantity or quality of something. Hence, *ample*, which means fully sufficient or more than adequate for the purpose or needs, would be the appropriate antonym.

The correct answer is b.

20. *Blithe* indicates happiness and cheerfulness. Hence, *morose*, that is used to indicate gloom and unhappiness would be the correct choice.

The correct answer is b.

21. *Insubordinate* is used for a person who disobeys a superior.

The correct answer is a.

22. *Fatuous* indicates silliness, foolishness and inanity. Hence, *Brainless* would be the best synonym out of the given options.

The correct answer is a.

23. *Laconic* refers to a style of writing or speaking that uses very little words to express a point. It is a brief and succinct manner of communication. *Precise* would be the best synonym from the given options.

The correct answer is d.

24. *Grovel* is used to indicate an attitude of abject humility displayed by lying or crawling with the face downward and the body prostrate. Therefore, of the given options, *Crawl* is the best synonym.

The correct answer is b.

25. *Nebulous* means 'hazy, vague, indistinct, or confused. Hence, *Vague* is the correct response.

The correct answer is d.

Practice Test 2

1. According to the survey, companies in India anticipate a decline in business performance. Refer to the lines, "A majority...company's business performance."

The correct answer is b.

2. The answer can be deduced from the opening lines of the second paragraph. The hiring pattern anticipated is that of curtailed hiring with a focus on hiring employees with key skill sets.

The correct answer is c.

3. The tone of the passage is "guardedly optimistic." The same can be ascertained through the use of phrases like "likely to curtail over all hiring, while continuing to hire talent" and "could force a more drastic action".

The correct answer is d.

4. Refer to the line, "Our expansion plans...capability of our company." This makes option (c) the correct answer."

The correct answer is c.

5. We require an antonym for the word "unprecedented". The correct word is "customary" which means conventional, common or regular.

The correct answer is a.

6. The relation between the survey report and S.Y. Siddiqui's statement is *complementary* as they support each other's argument.

The correct answer is b.

7. The central idea of the passage is to highlight the recruitment plans of corporates in the coming year.

The correct answer is d.

8. *Jovial* and *happy* are synonyms. Similarly, *sad* and *melancholy* are also synonyms.

The correct answer is b.

9. *Canine* is used for anything related to dogs. Similarly, *Feline* is used for cats. *Bovine* is used for cattle and *saline* refers to a salt solution.

The correct answer is b.

10. Just as *cardiac* means something pertaining to the heart, *pedagogic* pertains to the method and practice of teaching. *Avuncular* indicates a friendly and supportive attitude towards people younger to you.

The correct answer is c.

11. To *ensure* is to make sure that something will happen, while, to *assure* is to instil confidence or faith in someone. To *reassure* is to remove any doubts and fears. *Assure* can also mean ensure, but it has other connotations as well. So *ensure* is the better choice. To *insure* means to generate an insurance policy.

The correct answer is c.

12. The correct spelling is 'Kaleidoscope' which refers to a constantly shifting pattern.

The correct answer is b.

13. The correct spelling is 'Rapprochement' which refers to the resumption of peaceful relations between two international entities.

The correct answer is d.

14. 'Stratagem' refers to a tactic or plan designed to outwit an opponent.

The correct answer is c.

15. The use of 'Although' indicates contrast. Hence, the correct sentence shall read "Although a great scientist, Einstein was weak in arithmetic right from his school days."

The correct answer is a.

16. The complete sentence shall be "We have to speak the truth as we see it even if all around us there is falsehood and weakness."

The correct answer is d.

17. The sentence shall read "I enclose a postal order which will cover the price of books."

The correct answer is a.

18. The correlative conjunctions "Not only...but also" have to be used here. The correct sentence will read "He was so kind and generous he not only helped others but also made others do so."

The correct answer is c.

19. 'Make for' means 'to result in something'. 'Conducive' means 'tending to cause or bring about'.

The correct answer is a.

20. 'Let into' means 'to allow (someone) to share a secret'. 'Made acquainted with' is the correct option.

The correct answer is b.

21. To 'Hold out' means 'to continue to resist' in a situation of pressure or distress.

The correct answer is a.

22. The idiomatic meaning of the phrase 'Throw over' is 'to reject' or 'to abandon'.

The correct answer is b.

23. 'To see through' is to correctly detect someone's hidden agenda, motive behind an action.

The correct answer is b.

24. Carnivorous animals are those animals that eat flesh. A *cannibal* is a person who eats human flesh, especially for magical or religious purposes. A *herbivorous* animal is one that feed on plants and an *omnivorous* animal is one that eats both animal and plant foods.

The correct answer is c.

25. Claustrophobia refers to the fear of being enclosed in small spaces *Agoraphobia* is an anxiety disorder characterised by an abnormal fear of being in crowds, public places, or open areas, *Xenophobia* is an unreasonable dislike or prejudice against foreigners or strangers and *paranoia* refers to delusions of persecution, grandeur or jealousy.

The correct answer is a.

Practice Test 3

1. 'To confront with' is to face someone with evidence that incriminates them or proves their wrongdoing. So, the use of 'with' is appropriate.
The correct answer is a.
2. The use of 'but' indicates a contrast of ideas. Option (c) is the best fit for the given blank. Options (a) and (b) are grammatically incorrect.
The correct answer is a.
3. The correct usage is 'foundation in'.
The correct answer is d.
4. The noun "Bludgeon" refers to a short, heavy club.
The correct answer is b.
5. "Via" means, "through or by way of".
The correct answer is c.
6. "To Sear" is to burn or scorch something.
The correct answer is d.
7. 'Conch' is the spiral shell of a tropical marine mollusc, often used as a horn.
The correct answer is c.
8. "To Ogle" is to stare at rudely or flirtatiously.
The correct answer is a.
9. 'Servility' meaning 'slavery', is the opposite of 'insolence' which means 'arrogance' or 'defiance'.
The correct answer is c.
10. 'Knotty' is used for something that is 'complicated' or 'intricate', so its opposite is 'easy'.
The correct answer is c.
11. 'Dearth' means 'paucity or shortfall of something', so its opposite is 'abundance' which means 'plenty' or 'more than enough'.
The correct answer is d.
12. 'Vehemence' means 'eagerness', so its opposite is 'apathy' which means 'lack of interest', 'indifference'.
The correct answer is a.
13. The opposite of 'placate' is 'antagonize'. 'Placate' means 'pacify', 'calm', while 'antagonize' means 'provoke'.
The correct answer is b.
14. 'Pejorative' means 'derogatory', so its opposite is 'appreciative'.
The correct answer is b.
15. The correct sentence is "Asoka was successful in his military options and alone among conquerors he was so disgusted by the cruelty and horrors of war that he renounced it" RSQP is the correct sequence.
The correct answer is a.
16. The correct sentence is "She had understood from her earliest childhood that God sent her like a curse to her father's house, so she withdrew herself from ordinary people and tried to live apart" SRQP is the correct sequence.
The correct answer is a.
17. The correct sentence is "There are people who read a book not because they enjoy the book, but because they want to be able to say that they have read it" RSPQ is the correct sequence.
The correct answer is c.
18. The correct spelling is *innocuous*. It refers to something harmless and innocent.
The correct answer is b.
19. The correct spelling is *commensurate* and it refers to something that corresponds in size, is proportional
The correct answer is a.
20. The correct spelling is *privilege* and it means a special right, immunity, or benefit available to a few.
The correct answer is c.
21. Refer to lines 'this is also vindication trickle down and social responsibility cannot be taken as a natural process' in the first paragraph.
The correct answer is c.

22. Refer to lines 'The public at large reacted sharply to this lopsided, exclusive model.....' in the second paragraph.

The correct answer is c.

23. Refer to lines 'the sustainable development paradigm that is emerging.....' in the third paragraph.

The correct answer is a.

24. Refer to lines 'Is development a zero-sum game, at least in the short run? Singur and Nandigram are living examples' in the fourth paragraph.

The correct answer is d.

25. Refer to lines 'The mammoth loan waiver scheme, the seemingly successful NREGS and the huge spending on other social sector programmes' in the first paragraph.

The correct answer is a.

SECTION 3
QUANTITATIVE APTITUDE

Chapter

4

Quantitative Aptitude Ready Reckoner

INTRODUCTION

Quantitative Aptitude is an integral part of testing for any management entrance examination. This is more so in the case of BBA, which lays a lot of emphasis on this section. The top BBA entrance exams include DU BMS CET, GGSIPU CET, IIM Indore IPM Aptitude Test, SET BBA and NMAT (UG) among others. Exam aspirants are often under the impression that the difficulty level in this section is very high and, therefore, get overwhelmed and make mistakes in the exam. While the difficulty level of this section is comparatively higher than the other sections, strengthening one's fundamentals of the subjects and understanding how to approach this section followed by thorough practice can definitely help an exam aspirant achieve a high score and weightage in these entrance examinations. Let's review the basic concepts tested in this section and assess our learning by practicing the questions that follow.

ALGEBRA

Algebra

A variable along with a constant forms the basis of algebra.

Term

A variable by itself or a constant by itself or a variable in combination with a constant forms a term in algebra. For example, x^3 will be a term, 8 is also a term, $5x^2$ is also a term and so on.

Expression and Equation

When many terms combine together, they form an expression. For example, $x^3 - 5x^2 + 11$ is an expression in variable x . Please note that an expression is different from an equation. While an expression does not include the '=' sign, an equation will always include an '=' sign. Moreover, an expression always has a value while an equation has roots or solution.

Basis of classification

Algebraic expressions can be classified based on the following:

1. **Number of terms:** The first basis of classification of algebraic expressions is the number of terms in the expression. An expression having a single term is called a monomial, for example, $5x^2y$. Please note that the number of variables does not make any difference as long as the term is single. An expression having two terms is called a binomial. An expression having more than two terms is called a polynomial.
2. **Degree of the expression:** Degree is defined as the highest or maximum sum of the powers of all the variables in any term of the expression.

For example, in the expression

$$3x^3 + 2x^2yz - 7y^2 + 5yz - 15x + 17$$

The degree of this expression will be 4 because in the term $2x^2yz$, the power of $x = 2$ + power of $y = 1$ + power of $z = 1$

An expression of degree 1 is called linear.

An expression of degree 2 is called quadratic.

An expression of degree 3 is called cubic and so on.

Important Algebraic Identities

- $a^2 - b^2 = (a + b)(a - b)$
- $(a + b)^2 = a^2 + 2ab + b^2 = (a - b)^2 + 4ab$
- $(a - b)^2 = a^2 - 2ab + b^2 = (a + b)^2 - 4ab$
- $a^2 + b^2 = \frac{(a+b)^2 + (a-b)^2}{2}$
- $(a + b)^2 - (a - b)^2 = 4ab$
- $\frac{(a + b)^2 - (a - b)^2}{4} = ab$
- $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
- $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
- $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
- $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ac)$

Example 1

If $a^2 - b^2 = 18$, what is the value of $(a + b)$ if $(a - b) = 9$?

- (a) 2 (b) 9 (c) 27 (d) None of these

(BBA: CBS 2009)

Solution: We know $a^2 - b^2 = (a + b)(a - b)$

Putting the values, we get

$$\Rightarrow 18 = (a + b)(9) \Rightarrow (a + b) = 2$$

The correct answer is (a).

Equations

Linear equations in one variable

As stated earlier, an expression of degree 1 is called a Linear Equation. In this type of equation, all the variables are raised to the first power only (there are no squares, cubes, etc.). A **linear equation** is any equation that can be written in the form

$$ax + b = 0$$

Where a and b are real numbers and x is a variable.

Simultaneous linear equations

The general form of a pair of linear equations in two variables x and y can be written as

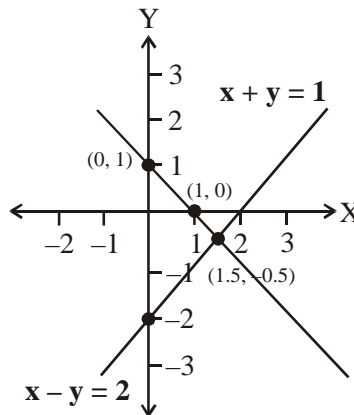
$$a_1x + b_1y + c_1 = 0 \quad (1)$$

$$a_2x + b_2y + c_2 = 0 \quad (2)$$

Condition 1: Unique Solution

If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, then the pair of linear equations has a unique solution.

In this case in the graph of the two linear equations, the lines will intersect at only one point.



The system $x + y = 1$ and $a_2x + b_2y = c_2$ has a unique solution,

Condition 2: Infinite Solution

If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then the pair of linear equations has infinite solutions.

In this case in the graph of the two linear equations, the lines will be coincident to each other. A pair of linear equations, which has a unique or infinite solution are said to be a consistent pair of linear equations.

Condition 3: No solution

If $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, then a pair of linear equations has no solution.

In this case in the graph of the two linear equations, the lines will be parallel to each other.

A pair of linear equations which has no solution is said to be an inconsistent pair of linear equations.

Example 2

A man purchased 40 fruits; apples and oranges for Rs.17. Had he purchased as many oranges as apples and as many apples as oranges, he would have paid Rs.15/-. Find the cost of one pair of an apple and an orange.

- (a) 70 paise (b) 60 paise (c) 80 paise (d) 1 rupee

Solution: Let the number of apples and oranges bought be A and B at the rate of Rs. a and Rs. b respectively.

According to the question,

$$A + B = 40 \quad (1)$$

$$Aa + Bb = 17 \quad (2)$$

$$Ab + Ba = 15 \quad (3)$$

Adding Eq. (2) and Eq. (3), we get

$$A(a + b) + B(a + b) = 32$$

$$\Rightarrow (a + b)(A + B) = 32$$

Using Eq. (1), we have

$$\Rightarrow a + b = \frac{32}{40} = 0.80$$

Hence, the cost of a pair of an apple and an orange is 80 paise.

The correct answer is (c).

Example 3

Mrs Sonia buys Rs. 249.00 worth of candies for the children of a school. For each girl she get a strawberry flavoured candy priced at Rs. 3.30 per candy; each boy receives a chocolate flavoured candy priced at Rs. 2.90 per candy. How many candies of each type did she buy?

- (a) 21, 57 (b) 57, 21 (c) 37, 51 (d) 27, 51

Solution: Let the number of girls be x and the number of boys be y.

According to the question,

$$3.3x + 2.9y = 249$$

Option (b) satisfies this equation.

Quadratic Equations

In these equations, the degree is 2. The standard form of a quadratic equation looks like this:

$$ax^2 + bx + c = 0$$

Roots of a quadratic equation

It is the value of variable x which satisfies the equation, $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-b \pm \sqrt{D}}{2a}$$

Nature of roots

The nature of roots is determined by the value of discriminant, $D = b^2 - 4ac$

1. If $D > 0$ Roots are Real and Unequal
2. If $D = 0$ Roots are Real and Equal
3. If $D < 0$ Roots are Unreal and Complex conjugates



Note

A quadratic equation can also be written as: $x^2 - (\text{Sum of roots})x + \text{Product of roots} = 0$

Example 4

If $x^2 + 3x - 10$ is a factor of $3x^4 + 2x^3 - bx - a + b - 4$, then the closest approximate values of a and b are

- (a) 25, 43 (b) 52, 43 (c) 52, 67 (d) None of the above

Solution

$$x^2 + 3x - 10 = (x + 5)(x - 2)$$

$$\text{Let } p(x) = 3x^4 + 2x^3 - ax^2 + bx - a + b - 4$$

$(x + 5)$ is a factor of $p(x)$.

$$p(-5) = 3(-5)^4 + 2(-5)^3 - a(-5)^2 + b(-5) - a + b - 4 = 0$$

$$\Rightarrow 1875 - 250 - 25a - 5b - a + b - 4 = 0$$

$$\Rightarrow 26a + 4b = 1621 \quad (1)$$

$(x - 2)$ is also a factor of $p(x)$.

$$p(2) = 3(2)^4 + 2(2)^3 - a(2)^2 + b(2) - a + b - 4 = 0$$

$$\Rightarrow 48 + 16 - 4a + 2b - a + b - 4 = 0$$

$$\Rightarrow 5a - 3b = 60 \quad (2)$$

From Eq. (1) and Eq. (2), we get

$$a = 52 \text{ and } b = 67$$

The correct answer is (c).

Example 5

The positive value of m for which the roots of equation $x^2 + 4(m - 2)x + 27 = 0$ are in ratio 1 : 3, is

- (a) 7 (b) 5 (c) 3 (d) 1

(BBA: DU JAT 2012)

Solution: Suppose the roots are x and 3x.

Then, the product of the roots

$$x \times 3x = 27 \Rightarrow 3x^2 = 27 \Rightarrow x = \pm 3$$

Now, the sum of the roots

$$x + 3x = -4(m - 2)$$

$$\Rightarrow 4x = -4(m - 2)$$

$$\Rightarrow x = -m + 2 \Rightarrow m = 2 - x$$

For $x = +3$, $m = -1$; For, $x = -3$, $m = 5$

The correct answer is (b).

Logarithm

$\log_a N = x$ means that $N = a^x$. For example, $\log_{10} 2 = 0.3010$ and so $2 = 100^{.3010}$.

Hence, we can say that with the help of log we can write any number as the power of some other number (called base).



Note

Unless stated otherwise, we assume the base to be 10

Important Formula

- $\log(ab) = \log a + \log b$
- $\log \frac{a}{b} = \log a - \log b$
- $\log(a)^n = n \log a$
- $\log_a b = \frac{\log b}{\log a}$ (to any base)

Example 6

If $\log_4 64 + \log_3 9 = \log_{10} X$, then X is equal to

- (a) 10^5 (b) 10^7 (c) 10^{12} (d) 10^{15}

(BBA: CBS 2009)

Solution:

$$\log_4 64 + \log_3 9 = \log_{10} X$$

$$\log_4 4^3 + \log_3 3^2 = \log_{10} X$$

$$3 + 2 = \log_{10} X$$

$$\log_{10} X = 5 \Rightarrow X = 10^5$$

The correct answer is (a).

Example 7

$$\log_{10} 10 + \log_{10} 10^2 + \dots + \log_{10} 10^n$$

- (a) $n^2 + 1$ (b) $n^2 - 1$ (c) $\frac{n^2 + n}{2} + \frac{n(n+1)}{2}$ (d) $\frac{n^2 + n}{2}$

Solution:

$$\log_{10} 10 + \log_{10} 10^2 + \dots + \log_{10} 10^n = 1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2} = \frac{n^2 + n}{2}$$

The correct answer is (d).

Example 8

If $\log_{13} \log_{21} \left\{ \sqrt{x+21} + \sqrt{x} \right\} = 0$, then find the value of x.

Solution:

$$\log_{13} \log_{21} \left\{ \sqrt{x+21} + \sqrt{x} \right\} = 0$$

$$\Rightarrow \log_{21} \left\{ \sqrt{x+21} + \sqrt{x} \right\} = 13^0$$

$$\Rightarrow \sqrt{x+21} + \sqrt{x} = 21^1$$

$$\Rightarrow \sqrt{x+21} = 21 - \sqrt{x}$$

Squaring both sides, we get

$$\Rightarrow x + 21 = 441 + x - 42\sqrt{x}$$

$$\Rightarrow 42\sqrt{x} = 420 \Rightarrow \sqrt{x} = 10 \Rightarrow x = 100$$

Inequality

Consider the inequality, $x - 2 > 5$

Inequalities usually have many solutions. As in the case of solving equations, there are certain manipulations of the inequality which do not change the solutions. Here is a list of "permissible" manipulations:

Rule

Inequality Rules

1. Adding/subtracting the same number on both sides.

Example: The inequality $x - 2 > 5$ has the same solution as the inequality $x > 7$. (The second inequality was obtained from the first one by adding 2 on both sides.)

2. Switching sides and changing the orientation of the inequality sign.

Example: The inequality $5 - x > 4$ has the same solution as the inequality $4 < 5 - x$. (We have switched sides and turned the ">" into a "<").

3. Multiplying/dividing by the same POSITIVE number on both sides.

Permutation and Combination

Permutation and Combination is a special type of counting and its applications can be observed and verified in real-life situations.

Fundamental principle of counting

The basis of the concepts in permutation and combination is the fundamental principle of counting which in turn comprises the rule of multiplication and the rule of addition. These are listed as follows.

Rule

Rule of Multiplication

If a certain task can be done in m ways and after having done it, another can be done in n ways, then the total number of ways in which the two tasks can be done together is $m \times n$.

Thus, if there are three ways of going from A to B and four ways of going from B to C, then the number of ways of going to C from A via B = $3 \times 4 = 12$ ways.

Rule**Rule of Addition**

If a certain task can be done in m ways and another can be done in n ways, then either of the two tasks can be done in $m + n$ ways.

Thus, when tasks A and B both have to be completed, we multiply, but when either A or B has to be completed, we add.



Note

For AND we multiply (\times) and for OR we add ($+$)

Concept of factorial:

Factorial refers to the multiplication of consecutive numbers starting from 1. Therefore, the factorial of n (denoted as $n!$ or n) refers to the multiplication of n consecutive numbers starting from 1, that is, $1 \times 2 \times 3 \times \dots \times (n - 1) \times n$



Note

$0! = 1$, and $n!$ is defined only for $n \geq 0$

Permutation

While a combination deals only with selection, permutation is selection and arrangement, that is, in permutation, we are not only interested in selecting the things but we also take into consideration the number of possible arrangements of the selected things.

The permutation of n different things taken r at a time is

$${}^n P_r = \frac{n!}{(n-r)!}$$

Following are some scenarios in which the application of permutation is required:

- Arranging the letters of a word
- Finding out different activity sequences
- Developing an order (as of batting)

The concept of permutation is illustrated in the following example.

Important points**1. mnp rule****Rule*****mnp rule***

In certain problems for Permutation, it is better to use the mnp rule than using the formula. It is useful for questions about possible numbers that can be formed using all or some of the digits.

Concept: In this case we can use all the possible values at the first position, then leaving the digit we used in the first place, we can use the remaining digits for the second position and so on. Let's look at the following example to understand this better.

- 2. Permutation** is similar to first choose r objects from available n objects and then to arrange those r objects and so we have ${}^n P_r = r! \times {}^n C_r$
- If n objects are to be placed in a circular arrangement, we have $(n - 1)!$ Possible ways and not $n!$. It is so because in circular we don't have the choice of choosing the end position after we choose the starting position.
- If we are asked about the total number of possible ways in which all the letters of a word can be arranged, then it is equal to $\frac{n!}{(r_1!)(r_2!) \dots}$ where n is the total number of letters in the word and r_1, r_2 etc. show the number of times the letters are repeated (if any).

Important Results

- Number of arrangements (or permutations) of ' n ' different things taking ' n ' things at a time is

$${}^n P_n = \frac{n!}{(n-n)!} = n!$$

- Number of arrangements (or permutations) of ' n ' different things, out of which P_1 are identical and of type 1, P_2 are identical and of type 2 and P_3 are identical and of type 3 = $\frac{n!}{P_1! \times P_2! \times P_3!}$
- Number of arrangements (or permutations) of ' n ' things taking ' r ' things at a time when repetition is allowed = n^r
- When $r!$ (number of arrangements of ' r ' things) is multiplied by ${}^n C_r$ (number of selections of ' r ' things among ' n ' things), we get ${}^n P_r$ (selection and arrangement of ' r ' things among ' n ' things).

Example 9

How many words can be formed with the letters of the word 'EQUATION'?

- (a) $6!$ (b) $7!$ (c) $8!$ (d) $9!$

(BBA: CBS 2009)

Solution: As there are total of 8 different letters so, the total number of possible arrangements are $8!$.

The correct answer is (c).

Example 10

In how many ways can all the letters of the word INDIA be arranged?

Solution: As there are a total of 5 letters, but I is repeated twice. So, the total number of possible arrangements

are $\frac{5!}{2!} = 60$

Example 11

In how many ways can the letters of the word ALPHABET be arranged so that, in all arrangements, all the vowels take the same position?

Solution: There are 8 letters in the word ALPHABET. Out of these 8 letters, there are 3 vowels (A, A and E). Now, if we consider these three vowels to be a single letter, we have $5 + 1 = 6$ letters in the word. These 6 letters can be arranged in $6! = 720$ ways. Now, the 3 vowels can also be arranged in $3! = 6$ ways among themselves. Therefore, the total number of arrangements will be $720 \times 6 = 4320$

Example 12

In how many ways can the letters of the word SANDIP be arranged taking 5 letters at a time?

Solution: You can see here that the order of selection is important. Therefore, it is a permutation problem. Since $n = 6$ and $r = 5$, putting the values in the ${}^n P_r$ formula, we get the total number of arrangements as

$${}^6 P_5 = \frac{6!}{(6-5)!} = \frac{6!}{1!} = 720$$

Combination

Combination would mean selection only, that is, in combination we are only interested in the selection of things and not in their arrangement.

In general, the number of combinations of n different things taken r at a time is given by ${}^n C_r$ where

$${}^n C_r = \frac{n!}{r!(n-r)!}$$

Where $n!$ (read as n factorial) = $n \times (n-1) \times (n-2) \times \dots \times 4 \times 3 \times 2 \times 1$

Following are some typical situations in which combination or selection is used:

- Selecting a team out of the number of available players
- Selecting members for a committee out of available individuals
- Selecting a number of candidates from a pool of candidates
- Selecting a number of objects (like pen, books, hats or shirts) out of available objects

Example 13

In how many ways can 3 hats be selected from 6 available hats?

Solution: Number of available hats = $n = 6$

Number of hats to be selected = $r = 3$

Therefore, the total number of selections will be

$${}^n C_r = {}^6 C_3 = \frac{6!}{3! \times (6-3)!} = \frac{6!}{3! \times 3!} = \frac{720}{6 \times 6} = \frac{720}{36} = 20$$

ARITHMETIC

Average

An average is the central value of a set of numbers. The average of a given number of quantities of the same kind is expressed as:

$$\text{Average} = \frac{\text{Sum of the quantities}}{\text{Number of the quantities}}$$

If we have a large number of observations and each has a different weight associated with it, then the average calculated is called the weighted average.

$$\text{Weighted Average} = \frac{W_1X_1 + W_2X_2 + W_3X_3 + \dots + W_nX_n}{W_1 + W_2 + W_3 + \dots + W_n}$$

Mean

$$\text{Arithmetic Mean} = \frac{X_1 + X_2 + X_3 + \dots + X_n}{n}$$

$$\text{Geometric Mean} = (X_1 \times X_2 \times X_3 \times \dots \times X_n)^{1/n}$$

$$\text{Harmonic Mean} = n \left(\frac{1}{X_1} + \frac{1}{X_2} + \frac{1}{X_3} + \dots + \frac{1}{X_n} \right)$$

For two numbers a and b, Harmonic Mean = $\frac{2ab}{a+b}$

Example 1

In an exam, the average was found to be 50 marks. After deducting computational errors, the marks of 100 candidates had to be change from 90 to 60 each and the average came down to 45 marks. The total number of candidates who took the exam was

- (a) 200 (b) 300 (c) 600 (d) 150

(BBA: CBS 2010)

Solution: Suppose the total number of candidates was x.

According to the question, we have

$$\frac{50x - 90 \times 100 + 60 \times 100}{x} = 45$$

$$\Rightarrow 50x - 3000 = 45x \Rightarrow x = 600$$

The correct answer is (c).

Rule

General Rule:

$AM \geq GM \geq HM$ (Equality holds when all numbers are equal)

If there are only two values, then $GM^2 = AM \times HM$

Example 2

A cricketer's average score in his first 10 matches is 40 and last 5 matches it was 30. If he has played total 15 matches by now, what is his current batting average?

Solution: As, he has played 15 matches and you are given average score for first 10 and last 5 matches, so, you have 2 averages with weights of 10 and 5.

$$\text{So, weighted average} = \frac{10 \times 40 + 5 \times 30}{10 + 5} = 36.66$$

Example 3

The average of 7 consecutive numbers is P. If the next three numbers are also added, the average shall

- (a) remain unchanged (b) increase by 1 (c) increase by 1.5 (d) increase by 2

Solution: The average of 7 consecutive numbers will be the 4th number in the sequence.

Let the 4th number be x.

When the next 3 numbers are also added, the average will be the mean of the 5th and the 6th of the sequence,

$$\text{Average} = \frac{(x+1) + (x+2)}{2} = \frac{2x+3}{2} = x + 1.5$$

Hence, the average shall increase by 1.5.

The correct answer is (c).

Example 4

If the algebraic sum of deviations of 20 observations measured from 23 is 70, the mean of these observations would be

- (a) 24 (b) 25 (c) 26 (d) None of these

Solution: According to the question, we have

$$\text{Mean} = \frac{23 \times 20 + (\text{Sum of deviation})}{20} = \frac{23 \times 20 + 70}{20} = 26.5.$$

The correct answer is (c).

Age Problems Based on Average

The problems on age require understanding of average and linear equations. You need to remember that in such problems you are generally given average age of a group or relation between ages of 2 or more individuals, or groups at 2 or more different point of time. You must find relations between ages at 2 different times and then with the help of linear equation you can solve those problems.

Example 5

Three years ago, the ratio of the ages of a Father and Daughter was 3:1. After another 2 years, their ages will be in the ratio 22:9. Find the ratio of their present ages?

Solution: Let the current age of Father and daughter be x and y respectively.

$$\text{Then you have, } \frac{x-3}{y-3} = 3.$$

$$\text{It gives, } x - 3 = 3(y - 3)$$

$$\frac{x+2}{y+2} = \frac{22}{9}.$$

$$\text{It gives } 9(x + 2) = 22(y + 2),$$

Solving these two equations, we get, x = 42 and y = 16

Percentage

The knowledge of percentage helps us to easily understand and attempt problems in other areas in arithmetic. Also, the understanding of percentages is an important requirement for Data Interpretation (DI) questions, which would require you to calculate percentage values, growth rates and the other percentage changes.

Meaning of percentage

Any value expressed on a base of 100 or over a base of 100 is called percentage, and is represented as % (cent represents the base 100).

A fraction is another way in which the value of a particular percentage can be represented. Therefore, one can say that percentages and fractions are equivalent and can be converted into one another as per the need. As

an example, 25% is same as $\frac{1}{4}$, 33.33% is same as $\frac{1}{3}$, 50% is same as $\frac{1}{2}$ and so on.

- To convert a percentage into a fraction, divide the percentage by 100. For example, 20% is same as $\frac{20}{100} = \frac{1}{5}$.
- Similarly, to convert a fraction into a percentage, multiply the fraction by 100. As an example, $\frac{2}{5} = \left(\frac{2}{5}\right) \times 100 = 40\%$.
- Use the following table for doing conversions of percentage to fraction:

$\frac{1}{1} = 100\%$	$\frac{1}{2} = 50\%$	$\frac{1}{3} = 33.33\%$	$\frac{1}{4} = 25\%$	$\frac{1}{5} = 20\%$
$\frac{1}{6} = 16.67\%$	$\frac{1}{7} = 14.28\%$	$\frac{1}{8} = 12.5\%$	$\frac{1}{9} = 11.11\%$	$\frac{1}{10} = 10\%$



Note

If you double a number, the percentage increase is 100% and not 200%. Similarly, if you triple a number, the percentage increase is 200% and not 300%, and so on.

Example 6

Two fifth of one-third of three-seventh of a number is 15. What is 40% of that number?

- (a) 84 (b) 136 (c) 140 (d) None of these

(BBA: SET 2011)

Solution: Suppose the number is x.

According to the question, we have

$$\frac{2}{5} \times \frac{1}{3} \times \frac{3}{7} \times x = 15$$

$$\Rightarrow \frac{2}{35x} = 15$$

$$\Rightarrow x = \frac{(15 \times 35)}{2}$$

$$\Rightarrow \frac{2}{35x} = 15 \Rightarrow x = \frac{(15 \times 35)}{2}$$

$$40\% \text{ of } x = \frac{40}{100} \times \frac{(15 \times 35)}{2} = 105$$

The correct answer is (d).

Percentage change

- Percentage Change = $\frac{\text{Final value} - \text{Initial value}}{\text{Initial value}} \times 100$
- For two successive changes of $a\%$ and $b\%$,
- Total percentage change = $\left(a + b + \frac{ab}{100}\right)\%$
- If A is $R\%$ more than B, then B is less than A by $\left[\frac{R}{100+R} \times 100\right]\%$.
- If A is $R\%$ less than B, then B is more than A by $\left[\frac{R}{100-R} \times 100\right]\%$.



Note

If you double a number, the percentage increase is 100% and not 200%. Similarly if you triple a number, the percentage increase is 200% and not 300%, and so on.

Percentage increase/decrease

- If the price of a commodity increases by $R\%$, then the reduction in consumption so as not to increase the expenditure is: $\left[\frac{R}{(100+R)} \times 100\right]\%$
- If the price of a commodity decreases by $R\%$, then the increase in consumption so as not to decrease the expenditure is: $\left[\frac{R}{(100-R)} \times 100\right]\%$

Example 7

Wheat is now being sold at Rs. 27 per kg. During last month its cost was Rs. 24 per kg. Find out by how much per cent does a family need to reduce its consumption so as to keep the expenditure fixed.

- (a) 10.2% (b) 12.1% (c) 12.3% (d) 11.1%

Solution: Percentage increase in the price of wheat = $\frac{(27-24)}{24} \times 100 = 12.5\%$

The reduction in consumption so as not to increase the expenditure will be:

$$= \left[\frac{R}{(100+R)} \times 100\right]\% = \frac{12.5}{(100+12.5)} \times 100 = 11.1\%$$

Hence, decrease in consumption = 11.1%

The correct answer is (d).

Example 8

If decreasing 70 by X percent yields the same result as increasing 60 by X percent, then what is X percent of 50?

Solution: According to the question,

$$\frac{70}{100}(100 - X) = \frac{60}{100}(100 + X)$$

$$\Rightarrow 7(100 - X) = 6(100 + X)$$

$$\Rightarrow 13X = 100 \Rightarrow X = 7.69$$

$$\text{Now, } X \text{ percent of } 50 = \frac{X}{100} \times 50 = \frac{X}{2} = \frac{7.69}{2} = 3.84$$

Calculation of increase of population

Let the population of a town be P now and suppose it increases at the rate of $R\%$ per annum, then:

- Population after n years = $P \left(1 + \frac{R}{100}\right)^n$
- Population n years ago = $\frac{P}{\left(1 + \frac{R}{100}\right)^n}$

Calculation of decrease in value (depreciation)

Let the present value of a machine be P . Suppose it depreciates at the rate of $R\%$ per annum. Then:

- Value of the machine after n years = $P \left(1 - \frac{R}{100}\right)^n$
- Value of the machine n years ago = $\frac{P}{\left(1 - \frac{R}{100}\right)^n}$

👉 Important Results

- If a number is first increased by $X\%$ and then this new number is decreased by $X\%$, the net change is always a decrease of $\frac{X^2}{100\%}$.
- If a number A is increased by $X\%$, the new number = $A \times \frac{100 + X}{100}$
- If a number A is decreased by $X\%$, the new number = $A \times \frac{100 - X}{100}$

Example 9

If the salary of Mr. Rajesh increased by 10% after first year and 20% after second year, then what is his final salary after 2 years if initial salary was Rs. 10,000?

Solution: The net percentage change in salary after 2 years can be calculated by successive percentage formula, $a=10$ and $b=20$. So,

$$c = a + b + \frac{ab}{100} = 10 + 20 + \frac{200}{100} = 32$$

So, salary after 2 years is 32% more than the initial amount.

So, it is $10000 (1 + 32\%) = \text{Rs. } 13,200$

Interest

Interest is an additional amount that a person gets against investment of capital. Interest earnings can be of two types: Simple interest (SI) and Compound interest (CI). Let us look at and understand both of them.

Simple interest

The basic formula for Simple interest is

$$SI = \frac{P \times R \times T}{100}$$

Where P is the Principal, R is the rate % per annum and T is the time period (in years) of investment.

Compound interest

Compound interest is calculated on the principal amount and also on the accumulated interest of previous periods. This compounding effect can make a big difference to the total interest payable on a loan.

The following basic formula is used for calculating Compound interest. The formula calculates the amount, using which the interest can be calculated, that is,

$$A = P \left(1 + \frac{R}{100} \right)^n$$

Where A is the amount, P is the Principal, R is the rate % applicable and n is the number of periods.

Compound Interest calculation if interest is payable more than once a year

If interest is paid half-yearly,

$$A = P \left(1 + \frac{R}{100p} \right)^{np}$$

Where p is number of times interest is paid in 1 year and n is number of years. So, if interest is paid semi-annually, quarterly or monthly, the value of p is 2, 4 and 12 respectively.

Example 10

On a sum of money, the simple interest for 2 years is Rs. 660, while the compound interest is Rs. 696.30, the rate of interest being the same in both the cases. The rate of interest is

- (a) 10% (b) 10.5% (c) 12% (d) 11%

(BBA: SET 2009)

Solution: Let the rate of interest for both the cases is R.

We know the ratio of CI and SI for two years,

$$\frac{CI}{SI} = \frac{200 + R}{200} \Rightarrow \frac{696.30}{660} = \frac{200 + R}{200}$$

$$\Rightarrow 696.30 \times 200 = 660 \times 200 + 660R$$

$$\Rightarrow R = 200 \left(\frac{696.30 - 660}{660} \right)$$

$$\Rightarrow R = 200 \times \frac{36.30}{660} \Rightarrow R = 11\%$$

The correct answer is (d).

Important Tips

- In the first period, SI and CI are equal. In all the other periods after the first period, the CI is greater than the SI.
- In simple interest, the total rate of interest applicable is the sum of all the respective rates applicable.
- In compound interest, the total rate of interest applicable is the successive effect of the respective rates given.
- If an amount becomes N times itself in T years at SI, then the required rate of Interest = $\frac{100(N - 1)}{T}\%$
- Difference between compound interest and simple interest
- For Two years, $CI - SI = P \left(\frac{R}{100} \right)^2$
- For Three years, $CI - SI = P \left(\frac{R^2}{100^2} \right) \times \frac{300 + R}{100}$
- Ratio of CI and SI for two years, $\frac{CI}{SI} = \frac{200 + R}{200}$

Example 11

A man earns 6% SI on his deposits in Bank A while he earns 8% SI on his deposits in Bank B. If the total interest he earns is Rs.1800 in three years on an investment of Rs.9000, what is the amount invested at 6%?

(a) Rs.3000

(b) Rs.6000

(c) Rs.4000

(d) Rs.4500

Solution: Let's assume that the man invested Rs. a at 6% in Bank A and Rs. b at 8% in Bank B respectively.

According to the question,

$$a + b = 9000 \quad (1)$$

$$\text{Also, } \frac{a \times 6 \times 3}{100} + \frac{b \times 8 \times 3}{100} = 1800$$

$$\Rightarrow 3a + 4b = 30000 \quad (2)$$

Solving Eq. (1) and Eq. (2), we get

$$a = 6000$$

Hence, the man invested Rs.6000 at 6% in Bank A.

Partnership

In such problems, we have to distribute profit between two or more partners, where each partner has invested his/her time and money in the business. In such problems, profit is distributed in ratio of multiplication of each partner's monetary investment and time.

Example 12

A and B invest in a business in the ratio of 3 : 2. If 5% of the total profit goes to charity and A's share is Rs. 855, the total profit is

- (a) Rs.1425 (b) Rs.1500 (c) Rs.1537.50 (d) Rs.1576

(BBA: SET 2011)

Solution: Given A's share = Rs. 855

$$\text{So, B's share} = \frac{855}{3} \times 2 = \text{Rs. } 570$$

And, (A + B)'s share = Rs. 855 + Rs. 570 = Rs. 1425

Rs. 1425 is 95% of the total profit.

$$\text{Therefore, total profit} = \frac{1425}{95} \times 100 = \text{Rs } 1500$$

The correct answer is (b).

Example 13

A, B and C started a business by investing $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{6}$ th of the capital respectively. After $\frac{1}{3}$ rd of the total time, A withdrew his capital completely and after $\frac{1}{4}$ th of the total time, B withdrew his capital. C kept his capital for the full period. The ratio in which total profit is to be divided amongst the partners is

- (a) 1:2:1 (b) 4:1:4 (c) 2:1:2 (d) 1:2:2

Solution: Let P be the investment for the total time period of T.

$$\text{Profit shares of } A = \frac{P}{2} \times \frac{T}{3}; B = \frac{P}{3} \times \frac{T}{4}; C = \frac{P}{6} \times T$$

Ratio of their profit shares

$$= \frac{P}{2} \times \frac{T}{3} : \frac{P}{3} \times \frac{T}{4} : \frac{P}{6} \times T = 2 : 1 : 2$$

Example 14

Alok started a business with an investment of Rs. 10,000 and 6 months later Rakesh became his partner by investing Rs. 15,000. The profit after 1 year of business was Rs. 2,000. Find the ratio of profits to be distributed among them.

Solution: The profit is shared in ratio of product of their investment and time.

$$\text{So, profit of Alok : Profit of Rakesh} = 10,000 \times 1 : 15,000 \times 0.5 = 4:3$$

Ratios

A ratio is a **comparison** between two or more similar quantities having the same dimensions, and therefore a ratio happens to be a dimensionless quantity.

As an example, when you mention that the speed of two persons A and B is in the ratio 2:3, you do not ask whether the speed is in km/h or m/s, as the ratio is a simple comparison between two similar variables or values.

Ratio and fraction are synonymous yet different entities. When you say that $a:b$ is 2:3, you are talking about the ratio. A ratio is used for comparison purposes, but when you need to find the individual contributions or values, fractions are required for the same.

Therefore, if $a:b$ is 4:3, you understand that for every value of 4 that a gets, b will get a value of 3, and so a gets a value of 4 for every 7 that they get together. This is called **fraction**.

Fraction of a is $\frac{4}{4+3}$, that is, $\frac{4}{7}$, and fraction of B is $\frac{3}{3+4}$, that is, $\frac{3}{7}$.

Properties of Ratios

Some of the basic properties of ratios are listed below:

- If $a : b = c : d$, then $a : b = c : d = (a + c) : (b + d)$
- If $a < b$, then for a positive quantity x , $\frac{a+x}{b+x} > \frac{a}{b}$ and $\frac{a-x}{b-x} < \frac{a}{b}$
- If $a > b$, then for a positive quantity x , $\frac{a+x}{b+x} < \frac{a}{b}$ and $\frac{a-x}{b-x} > \frac{a}{b}$

Example 15

Two alloys of aluminium have different percentages of aluminium in them. The first one weighs 8 kg and the second one weighs 16 kg. One piece each of equal weight was cut off from both the alloys and first piece was alloyed with the second alloy and the second piece alloyed with the first one. As a result, the percentage of aluminium became the same in the resulting two new alloys.

What was the weight of each cut-off piece?

- (a) 3.33 kg (b) 4.67 kg (c) 5.33 kg (d) None of the above

Solution: Here the cut off piece's weight should be such that the alloyed pieces that are created should have the same ratio, weight wise for each of the two alloys.

Therefore, if the weight of the each cut off pieces is x , then $\frac{8-x}{x} = \frac{x}{16-x}$

Now, instead of solving above equation for x , try to use options given to see which one fits the above equation.

Option (c) satisfies the above equation, if we put $x = 5.33$

$$\frac{2.66}{5.33} = \frac{5.33}{10.66} = \frac{1}{2}$$

Hence, The correct answer is (c).

Proportions

If $a : b :: c : d$ or $\frac{a}{b} = \frac{c}{d}$, then

- Alternendo Law: $\frac{a}{c} = \frac{b}{d}$
- Invertendo Law: $\frac{b}{a} = \frac{d}{c}$

- Componendo Law: $\frac{a+b}{b} = \frac{c+d}{d}$
- Dividendo Law: $\frac{a-b}{b} = \frac{c-d}{d}$
- Componendo and Dividendo Law: $\frac{a+b}{a-b} = \frac{c+d}{c-d}$
- If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = k$, then $\frac{a+c+e+\dots}{b+d+f+\dots} = k$

Example 16

If $a : b = 3 : 7$, find the value of $(5a + b) : (4a + 5b)$.

- (a) 15 : 44 (b) 22 : 35 (c) 15 : 49 (d) 22 : 47

(BBA: SET 2009)

Solution: Here we are given that $a : b = 3 : 7$ and we have to find the value of the ratio $(5a + b) : (4a + 5b)$.

In such questions we can find the solution by directly putting the value $a = 3$ and $b = 7$.

$$\text{Therefore, } \frac{5a + b}{4a + 5b} = \frac{5 \times 3 + 7}{4 \times 3 + 5 \times 7} = \frac{22}{47}$$

The correct answer is (d).

Example 17

Ramsukh bhai sells Rasgulla (a popular Indian sweet) at Rs. 15 per kg. A rasgulla is made up of flour and sugar in the ratio 5:3. The ratio of price of sugar and flour is 7:3 (per kg). Thus, he earns 66.66 profit. What is the cost price of sugar?

- (a) Rs. 10/kg (b) Rs. 9/kg (c) Rs. 18/kg (d) Rs. 14/kg

Solution: Let us assume that we have total of 8 kg rasgullas. So, the composition of flour and sugar will be 5 kg and 3 kg, respectively.

Let $3x$ and $7x$ be the cost price of flour and sugar, respectively.

$$\text{Total cost (in Rs.) incurred} = 5 \times 3x + 3 \times 7x = 15x + 21x = 36x$$

According to the question,

$$\text{S.P.} = \left(\frac{1 + 66.66}{100} \right) \times \text{C.P.}$$

$$\Rightarrow 15 \times 8 = \left(\frac{1+2}{3} \right) \times 36x \text{ or } x = 2$$

So, cost of 1 kg sugar = $\text{Rs. } 7x = \text{Rs. } 14$

Alligation Rule

Rule

Alligation Rule

It is the method by using which we can find the required ratio in which we must mix two or more ingredients of different average/price etc. to produce a mixture of the desired average/price etc.

Practically, alligation is a combination of weighted average and ratio.

The ratio of the weight of the two items mixed will be inversely proportional to the deviation of attributes of these two items from the average attribute of the resultant mixture.

$$\frac{W_1}{W_2} = \frac{X_2 - X}{X - X_1}$$

Alligation cross

$$\begin{array}{ccc}
 X_1 & & X_2 \\
 & \diagdown & / \\
 & X & \\
 & / & \diagdown \\
 X_2 - X & : & X - X_1 \\
 \\
 W_1 & : & W_2
 \end{array}$$

Replacement from a Solution

In such problems, you have a solution and you take out some quantity of this solution and replace it by one of the ingredients of the solution (for e.g.- solution is of water and milk, you remove some solution and add either water or milk in its place). Now, let us repeat this process n time.

$$\text{Final amount of ingredient which is not replaced} = \text{Initial volume} \times \left\{ \frac{\text{Volume after removal}}{\text{Volume after replacing}} \right\}^n$$

Similarly, you can also obtain,

$$\text{Final ratio of ingredient not replaced to total} = \text{Initial ratio} \times \left\{ \frac{\text{Volume after removal}}{\text{Volume after replacing}} \right\}^n$$

Successive Replacement

For the case of successive replacement, we have the following formula:

$$\frac{\text{Quantity of milk after } n\text{th replacement}}{\text{Quantity of total mixture}} = (x - yx)^n$$

Where x is the original quantity, y is the quantity that is replaced and n is the number of times the replacement process is carried out.

Example 18

Ram prepares solutions of alcohol in water according to customers' needs. This morning Ram has prepared 27 litres of a 12% alcohol solution and kept it ready in a 27 litre delivery container to be shipped to the customer. Just before delivery, he finds out that the customer had asked for 27 litres of 21% alcohol solution. To prepare what the customer wants; Ram replaces a portion of 12% solution by 39% solution. How many litres of 12% solution are replaced?

Solution: Suppose the quantity of 12% solution replaced is x liters.

$$(27 - x) \times \frac{12}{100} + x \times \frac{39}{100} = 27 \times \frac{21}{100}$$

$x = 9$ liters

Profit and Loss

Profit is what we want to earn from a business. It is simply the extra money we earned over our investment.

$$\text{Profit} = \text{SP} - \text{CP}$$

where SP is the selling price, that is, the price at which the item is sold, and CP is the cost price, that is, the price at which it was originally manufactured or purchased by the seller.

When profit is expressed as a percentage of the CP, it is known as profit %.

Therefore,

$$\text{Profit}\% = \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100$$

Sometimes, the product is sold at a price lower than the CP. Then it is called loss.

Loss can be written as either $(\text{CP} - \text{SP})$ in which case it has a positive sign or $(\text{SP} - \text{CP})$ in which case it will have a negative sign. So, loss = $\text{CP} - \text{SP}$.

$$\text{Loss}\% = \frac{\text{CP} - \text{SP}}{\text{CP}} \times 100$$

 Important Tips

- Profit or Loss percent is always expressed as a percentage of the Cost Price.
- While the mark-up is always calculated as a % of the cost price, discount % is always calculated as a % of the marked price.
- When the CP and SP are either both increased or both decreased by the same %, there is no change in the existing % profit or loss
- If a person sells an item at a profit of $X\%$ and another item at a loss of $X\%$, then the net result will always be a loss to that person of $= \left(\frac{x}{10}\right)^2 \%$
- If two discounts are $A\%$ and $B\%$, then the single equivalent discount $= \left(A+B+\frac{AB}{100}\right)\%$
- If a person wants to make a profit of $A\%$ after giving a discount of $B\%$, then the Selling Price, $SP = CP \times \frac{100+A}{100-B}$

False weights

If an item is claimed to be sold at cost price using false weights, then the overall percentage profit is given by

$$\text{Percentage Profit} = \left(\frac{\text{Claimed weight of item}}{\text{Actual weight of item}} - 1 \right) \times 100$$

Discount

$$\text{Discount} = \text{Marked Price} - \text{Selling Price}$$

$$\text{Discount Percentage} = \frac{\text{Discount}}{\text{Marked Price}} \times 100$$

Successive discounts

When a discount of $a\%$ is followed by another discount of $b\%$, then

$$\text{Total discount} = a + b - \frac{ab}{100}$$

Example 19

A shopkeeper sells a microwave at a discount on its marked price of Rs. 2,500. But in a clearance sale he gives an additional discount of 20% thus selling it at Rs. 1500. Find the first discount.

- (a) 20% (b) 25% (c) 12% (d) 30%

(BBA: SET 2009)

Solution: Suppose the first discount is $x\%$.

According to the question, we have

$$80\% \text{ of } (100 - x)\% \text{ of } 2500 = 1500$$

$$\Rightarrow \frac{4}{5} \times \frac{(100 - x)}{100} \times 2500 = 1500 \Rightarrow x = 25$$

The correct answer is (b).

Arithmetic Progression

When a series is constructed in such a manner that the difference between its consecutive terms is always the same, this same difference is called the common difference. Generally, the first term and the common difference are denoted as a and d , respectively. The terms are shown as T_n .

Basic concepts:

- Nth term of A.P. is, $T_n = a + (n - 1)d$
- Sum of first n terms of series is $S_n = \frac{n}{2} \{2a + (n-1)d\}$ or $S_n = \frac{n}{2}(a+l)$
where l is the last term ($l = a + (n - 1)d$)
- We have a formula for sum of n terms, so if we are asked to find out the sum of intermediate terms like the sum of 11th to 20th term, we have to use the formula for S_n as the required sum is $S_{20} - S_{10}$.
- If we know the number of terms and the last term, it is better to use the second formula for S_n (that is, sum of n terms). It is especially useful for series of natural numbers.
- For two numbers a and b their Arithmetic Mean is, $AM = \frac{a+b}{2}$

Geometric Progression

In this series, the ratio between two consecutive terms remains the same. This ratio is called the common ratio. The series is $a, ar, ar^2, ar^3 \dots ar^n$

Where a and r are the first term and the common ratio, respectively.

Basic concepts:

- Nth term of G.P. is, $T_n = ar^{n-1}$
- Sum of first n terms of series is, $S_n = \frac{a(r^n - 1)}{(r - 1)} = \frac{a(1 - r^n)}{(1 - r)}$
- Sum of first n numbers = $\frac{n(n+1)}{2}$
- Sum of first n odd numbers is $(n)^2$
- Sum of first n even numbers is $n(n + 1)$
- Sum of infinite terms $S_\infty = \frac{a}{(1-r)}$
- Sum of squares of first n natural numbers = $\frac{n(n+1)(2n+1)}{6}$
- Sum of cubes of first n natural numbers = $\left\{ \frac{n(n+1)}{2} \right\}^2$
- For two numbers a and b their Geometric Mean is, $GM = \sqrt{ab}$

Example 20

The sum of two positive numbers is 20. If the geometric mean of these numbers is 20% less than their arithmetic mean, then the difference between the numbers is:

- (a) 16 (b) 12 (c) 8 (d) 4

(BBA: DU JAT 2012)

Solution: Suppose the two numbers are x and y .

According to the question, we have

$$x + y = 20$$

$$\text{Arithmetic mean, } \frac{x+y}{2} = 10$$

Also, from the question,

$$\sqrt{xy} = 10 - 20\% \text{ of } 10$$

$$\Rightarrow \sqrt{xy} = 10 - 2 = 8$$

$$\Rightarrow xy = 64$$

$$\text{Now, } (x - y)^2 = (x + y)^2 - 4xy$$

$$\Rightarrow (x - y)^2 = (20)^2 - 4 \times 64 = 144$$

$$\Rightarrow x - y = 12$$

The correct answer is (b).

Example 21

What is the sum of the following series?

-64, -66, -68, ... , -100

(a) -1458

(b) -1558

(c) -1568

(d) None of the above

Solution: Here, first term, $a = -64$

Common difference, $d = -2$

Last term, $t_n = a + (n - 1)d$

$$-100 = -64 + (n - 1)(-2)$$

On solving, we get

$$n = 19$$

Hence, the sum of 19 terms,

$$S_{19} = \frac{n}{2}(a + l). S_{19} = \frac{19}{2}(-64 - 100) = -1558$$

Time and Work

Work from days

If A can do a piece of work in n days, then A's 1 day's work = $\frac{1}{n}$

Days from work

If A's 1 day's work = $\frac{1}{N}$, then A can finish the work in n days.

Ratio

If A is thrice as good a workman as B, then:

Ratio of work done by A and B = 3 : 1.

Ratio of the time taken by A and B to finish a work = 1 : 3.

 **Important Results**

1. If A can do a work in X days and B can do the same work in Y days, then A and B can together complete the work in = $\frac{XY}{X+Y}$ days
2. If A can do a work in X days, B can do the same work in Y days, and C can do the work in Z days, then A, B and C can together complete the work in = $\frac{XYZ}{XY + XZ + YZ}$ days
3. If A and B can together complete a work in X days and A alone can complete that work in Y days, then B alone can complete that work in = $\frac{XY}{Y-X}$ days

Total work assumption method (LCM method)

Let us take an example to understand total work assumption method:

Example 22

Two pipes A and B can fill a cistern in 24 minutes and 32 minutes respectively. If both the pipes are opened together, then after how many minutes B should be closed so that the tank is full in 18 minutes?

- (a) 6 (b) 8 (c) 10 (d) 12

Solution: Total Unit of work = LCM (Time taken by A and Time taken by B) = LCM (24 and 32) = 96 units

$$\text{A's 1 minute's work} = \frac{96}{24} = 4 \text{ units}$$

$$\text{B's 1 minute's work} = \frac{96}{32} = 3 \text{ units}$$

$$\text{Cistern filled by A in 18 minutes} = 18 \times 4 = 72 \text{ units}$$

$$\text{Units of work left} = 96 - 72 = 24 \text{ units}$$

$$\text{Time taken by pipe B to fill 24 units} = \frac{24}{3} = 8 \text{ minutes}$$

Therefore, pipe B should be closed after 8 minutes.

The correct answer is (b)

Example 23

A can finish a work in 24 days, B in 9 days and C in 12 days. B and C start the work but are forced to leave after 3 days. The remaining work was done by A in -

Solution: Total Unit of work = LCM (Time taken by A, Time taken by B, Time taken by C) = LCM (24,9,12) = 72

$$\text{A's 1 day's work} = \frac{72}{24} = 3 \text{ units}$$

$$B's\ 1\ day's\ work = \frac{72}{9} = 8\ units$$

$$C's\ 1\ day's\ work = \frac{72}{12} = 6\ units$$

Work done by (B + C) in 1 day = (8+6) units = 14 units

Work done by (B + C) in 3 days = $14 \times 3 = 42$ units

Remaining work = (Total work - Work done by B and C in 3 days) = $(72 - 42) = 30$ units

$$\text{Remaining work done by A in } \frac{\text{Remaining work}}{\text{A's 1 day work}} \text{ days} = \frac{30}{3} = 10\ \text{days}$$

Example 24

It takes 6 hours for pump A, used alone, to fill a tank of water. Pump B used alone takes 8 hours to fill the same tank. A, B and another pump C all together fill the tank in 2 hours. How long would pump C take, if used alone, to fill the tank?

(a) 4.8

(b) 6

(c) 5.6

(d) 3

Solution: Let total units to be filled be 24.

Units filled by A in one hour = 4

Units filled by B in one hour = 3

Units filled by A, B and C in one hour = 12

So, units filled by C in one hour = 5

Hence, C can fill the complete tank in $\frac{24}{5} = 4.8$ hours

Time, Speed and Distance

The basic concept of time, speed and distance is the relation between the three variables. The speed of a body is the distance covered by the body per unit time, that is,

$$\text{Speed} = \frac{\text{Distance Covered}}{\text{Time Taken}}$$

Basic concepts

The basic concepts that form the fundamentals of time, speed and distance are as follows:

- In any problem, one has to ensure that speed, distance and time are in the same dimensions. The popular dimensions used for speed in problems are km/h and m/s. If required, one can also convert from one dimension to the other.
- To convert km/h into m/s, multiply km/h by $\frac{5}{18}$ and to convert m/s to km/h, multiply m/s by $\frac{18}{5}$
- Distance covered is directly proportional to the speed if the time of travel is constant. For constant time of travel, $\frac{d_1}{s_1} = \frac{d_2}{s_2}$
- Time taken is inversely proportional to the speed if distance is constant.

For constant distance, $s_1 \times t_1 = s_2 \times t_2$

- Average Speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}}$

Relative speed

Relative speed is defined as the speed of a body with respect to another body. The two possible cases of relative motion are:

1. **Same direction:** If two bodies are moving in the same direction, the relative speed is the difference in their speeds and is always expressed as a positive value. Therefore, if two bodies are moving at x m/s and y m/s, then, Relative speed = $|x - y|$ m/s.
The use of modulus sign indicates that the relative speed will always be positive, irrespective of the values of x and y .
2. **Opposite direction:** If two bodies are moving in the opposite direction, the relative speed is the sum of their speeds. Therefore, if two bodies are moving in the opposite direction at x m/s and y m/s, then Relative speed = $(x + y)$ m/s

Important Results

- To convert km/h into m/s, multiply by $\frac{5}{18}$. Similarly, to convert m/s into km/hr, multiply by $\frac{18}{5}$.
- If a distance is covered at the speed of A km/h and the same distance is then covered at a speed of B km/h, then the net Average Speed = $\frac{2AB}{(A+B)}$
- Time taken by a train to pass a stationary object = $\frac{\text{Length of train}}{\text{speed of train}}$
- If the speed of a boat in still water = A km/h
and, the speed of the river = B km/h,
then the speed of the boat downstream = $(A + B)$ km/h
and the speed of the boat upstream = $(A - B)$ km/h
- If the speed of a boat upstream = U km/h
and, the speed of the boat downstream = D km/h,
then the speed of the boat in still water = $\frac{(U+D)}{2}$ km/h
and the speed of the stream = $\frac{(U-D)}{2}$ km/h

Example 25

Two goods train each 500m long are running in opposite directions on parallel tracks. Their speeds are 45 km/h and 30 km/hr respectively. Find the time taken by the slower train to pass the driver of the faster train.

- (a) 12 sec (b) 24 sec (c) 48 sec (d) 60 sec

(BBA: SET 2010)

Solution: Relative speed = $(45 + 30)$ km/h = 75 km/h

Converting km/h into m/s, we get

$$\text{Relative speed} = 75 \times \frac{5}{18} \text{ m/sec}$$

$$\text{Distance to be covered} = 500 \text{ m}$$

$$\text{Therefore, time taken} = \frac{500}{75 \times 5 / 18} = \frac{500 \times 18}{75 \times 5} = 24 \text{ sec}$$

The correct answer is (b).

Example 26

A train 108 m long moving at a speed of 50 km/h crosses a train 112 m long coming from the opposite direction in 6 seconds. The speed of the second train is

- (a) 48 km/h (b) 54 km/h (c) 66 km/h (d) 82 km/h

Solution: Let the speed of the second train be x km/h.

The length of both the trains = 220 m

$$\text{Now, } 2206 = (50 + x) \times 6$$

$$\Rightarrow 50 + x = 132 \Rightarrow x = 82 \text{ km/h}$$

The correct answer is (d).

Clock

Minute spaces

The face or dial of a watch is a circle whose circumference is divided into 60 equal parts, called minute spaces.

Hour hand and minute hand

- A clock has two hands, the smaller one is called the hour hand or short hand while the larger one is called the minute hand or the long hand.
- Angle traced by the hour hand in 12 hours = 360°
- Angle traced by the minute hand in 60 mins. = 360° .

Basic concepts

- In 60 minutes, the minute hand gains 55 minutes on the hour on the hour hand.
- In every hour, both the hands coincide once.
- The hands are in the same straight line when they are coincident or opposite to each other.
- When the two hands are at right angles, they are 15 minutes spaces apart.
- When the hands are in opposite directions, they are 30 minutes spaces apart.

Example 27

A clock loses 12 minutes every 24 hours. It is set right at 7:25 p.m. on Monday. What will be the time when the clock shows 1:45 p.m. the following day?

- (a) 1:20:35 p.m. (b) 1:35:50 p.m. (c) 1:25:35 p.m. (d) None of these

Solution: The clock is losing 12 minutes every 24 hours.

Hence, by 1:45 p.m. the following day, that is, after 18 hours, the Clock would have lost 9 minutes. And in the next 20 minutes, it would have lost another 10 seconds.

Hence, when the clock showed 1:45 p.m., the actual time would have been 1:35:50 p.m.

NUMBER SYSTEM

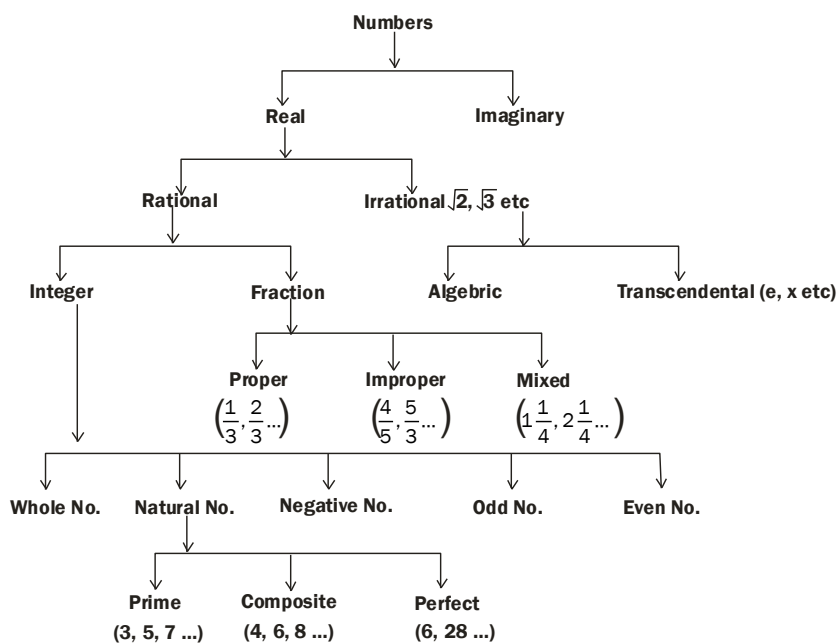
Numbers

Number theory is the study of the set of positive whole numbers

1, 2, 3, 4, 5, 6, 7.....

Which are often called the set of natural numbers. We will especially want to study the relationships between different sorts of numbers. Since ancient times, people have separated the natural numbers into a variety of different types. Here are some familiar and not-so-familiar examples:

Odd	1, 3, 5, 7, 9, 11, 13, 15....
Even	2, 4, 6, 8, 10, 12, 14, 16.....
Square	1, 4, 9, 16, 25, 36.....
Cube	1, 8, 27, 64, 125.....
Prime	2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31...
Composite	4, 6, 8, 9, 10, 12, 14, 16.....



Some Basic Formulae

- Sum of first n numbers = $\frac{n(n+1)}{2}$
- Sum of first n odd numbers = $(n)^2$
- Sum of first n even numbers = $n(n+1)$
- Sum of square of first n numbers = $\frac{n(n+1)(2n+1)}{6}$
- Sum of cube of first n numbers = $\frac{n^2(n+1)^2}{4}$

Simplification

Rule

BODMAS Rule

This rule depicts the correct sequence in which the mathematical operations are to be executed, so as to find out the value of a given expression.

Here:

B = Bracket, O = of, D = Division, M = Multiplication, A = Addition and S = Subtraction

Thus, in simplifying an expression, first of all the brackets must be removed, strictly in the order $()$, $\{\}$ and $[\]$.

After removing the brackets, we must use the following operations strictly in the order:

(i) of (ii) Division (iii) Multiplication (iv) Addition (v) Subtraction.

Divisibility test

Divisibility by 2: A number is divisible by 2, if its unit's digit is 0 or an even number.

Example: 84932 is divisible by 2, while 65935 is not.

Divisibility by 3: A number is divisible by 3, if the sum of its digits is divisible by 3.

Example: 592482 is divisible by 3, since sum of its digits $5 + 9 + 2 + 4 + 8 + 2 = 30$ which is divisible by 3.

Divisibility by 4: A number is divisible by 4, if the number formed by the last two digits is divisible by 4.

Example: 892648 is divisible by 4, since the number formed by the last two digits is 48 divisible by 4.

Divisibility by 5: A number is divisible by 5, if its unit's digit is either 0 or 5.

Example: 20820, 50345, etc.

Divisibility by 6: If the number is divisible by both 2 and 3.

Example: 35256 is clearly divisible by 2. Sum of digits = $3 + 5 + 2 + 5 + 21$, which is divisible by 3. Thus, the given number is divisible by 6.

Divisibility by 7: Double the last digit of the number and subtract it from the remaining leading truncated number. If the result is divisible by 7, then the number is also divisible by 7. Apply this rule over and over again as necessary. Example: 805. Double of 5 is 10. So subtracting 10 from the truncated 80. Now $80 - 10 = 70$. This is divisible by 7, so 805 is divisible by 7 also.

Divisibility by 8: A number is divisible by 8 if the last 3 digits of the number are divisible by 8.

Example: 2016 and 2224 are divisible by 8.

Divisibility by 9: A number is divisible by 9 if the sum of all the digits is divisible by 9.

Divisibility by 10: A number is divisible by 10, if the last digit is 0.

Divisibility by 11: If the difference of the sum of the digits in the odd places and the sum of the digits in the even places is zero or divisible by 11.

Example: 4832718. $[8 + 7 + 3 + 4] - [1 + 2 + 8] = 11$ which is divisible by 11.

Divisibility by 12: All numbers divisible by 3 and 4 are divisible by 12.

For divisibility of other composite numbers: Any number is divisible by a composite number N (where $N = m \times p$) if it is divisible by both m and p. There is a condition that m and p must be co-prime.

Example: any number is divisible by 88 if it is divisible by both 8 and 11. But, not if it is divisible by both 4 and 22.

Example 1

A number G236G0 can be divided by 36 if G is:

- (a) 8 (b) 6 (c) 1 (d) More than one values is possible.

Solution: G 2 3 6 G 0

G could be 0, 2, 4, 6 or 8 for the number to be divisible by 4.

For the number to be divisible by 9, $11 + 2G$ must be divisible by 9.

$$\frac{11+2G}{9} = 1 + \frac{2+2G}{9} = 1 + 2\left(\frac{1+G}{9}\right) \Rightarrow G = 8$$

The correct answer is (a).

How to check whether a given number is prime or not? (For example, check 139 is prime or not?)

Step 1: First find the square of the number which is nearest to that number. We find that 139 is nearest to 144 which is the square of 12.

Step 2: Check all prime numbers between 0 and that number. Hence, we will need to check the numbers between 0–12.

Step 3: If the given number is not divisible by any of the numbers that we are checking then the number must be a prime number.

In the above example, 139 is not divisible by 2, 3, 5, 7, 11; therefore, 139 is a prime number.

Example 2

If two different prime numbers X and Y are greater than 2, then which of the following must be true?

- (a) $X - Y = 23$ (b) $X + Y \neq 87$ (c) Both (a) and (b) (d) None of the above

Solution: As both the prime numbers are greater than 2, both must be odd. The sum of any two odd numbers must be even. Hence, $X + Y \neq 87$.

Rule

Rule of finding Dividend

$$\text{Dividend} = \text{Divisor} \times \text{Quotient} + \text{Remainder}$$

Factors and Multiples

A factor is a number that is able to completely divide a number greater than or equal to it. For example, 2 is a factor of 4 and 3 is a factor of 15, but 2 is not a factor of 15.

On the other hand, a multiple is a number that may be divided by another number a certain number of times without leaving a remainder. So, 4 is a multiple of 2, 15 is a multiple of 3, but 15 is not a multiple of 2 since dividing 15 by 2 will leave a remainder of 1.



Note

Remember that every number is largest factor and smallest multiple of itself

Rule**Factor Foundation Rule**

If a is a factor of b , and b is a factor of c , then a is also a factor of c . For example, 3 is a factor of 9 and 9 is a factor of 81. Therefore, 3 is also a factor of 81.

Prime factorization

Prime factorization is a way to express any number as a product of prime numbers. For example, the prime factorization of 30 is $2 \times 3 \times 5$. Prime factorization is useful in answering questions about divisibility.

Example 3

If the product of the integers a , b , c and d is 3094 and if $1 < a < b < c < d$, what is the product of b and c ?

Solution: On factorisation: $3094 = 2 \times 7 \times 13 \times 17$

According to the question,

Since $1 < a < b < c < d$, $b = 7$ and $c = 13$

Hence, $b \times c = 7 \times 13 = 91$

HCF

We already have an understanding of what is a factor. The Highest common factor or HCF is the highest common factor among all the factors of a set of given numbers. It is also known as the greatest common factor (GCF) or the greatest common divisor.

For example, the HCF of 30 and 45 will be 15, since 15 is the largest number that can evenly divide both 30 and 45.

LCM

The LCM is the least common multiple of any set of given numbers. Least Common Multiple refers to the smallest multiple of two (or more) integers. Multiples will be equal to or larger than the starting integers. The LCM of 6 and 15 is 30 because 30 is the smallest number that both 6 and 15 go into.

How to find the LCM

Let's say you have to find the LCM of 30, 45 and 60

Step I: Factorize each of the three numbers

$$30 = 2 \times 3 \times 5$$

$$45 = 3 \times 3 \times 5 = 3^2 \times 5$$

$$60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$$

Step II: Multiply the highest powers of each digit. So, $\text{LCM} = 2^2 \times 3^2 \times 5 = 180$

 Important Formulae

- Relation between two numbers and their HCF and LCM is
First number \times Second number = HCF \times LCM
- HCF of a fraction = $\frac{\text{HCF of numerators}}{\text{LCM of Denominators}}$
- LCM of a fraction = $\frac{\text{LCM of Numerators}}{\text{HCF of Denominators}}$
- **Application of HCF:** The greatest natural number that will divide x , y and z leaving remainders r_1 , r_2 and r_3 , respectively, is the H.C.F. of $(x - r_1)$, $(y - r_2)$ and $(z - r_3)$
- **Application of LCM:** The smallest natural number that is divisible by x , y and z leaving the same remainder r in each case is the L.C.M. of $(x, y \text{ and } z) + r$

Example 4

A rod is cut into 3 equal parts. The resulting portions are then cut into 12, 18 and 32 equal parts, respectively. If each of the resulting portions has integer length, what is the minimum length of the rod?

Solution: For the total length to be the minimum, the length of each equal part should be the LCM of 12, 18 and 32, that is, 288.

Hence, the required length of the rod = $3 \times 288 = 864$ units

Concept of Last Digit (Cyclicity of Numbers)**Find Units Digit of a^b :**

Given a^b , units place digit of the result depends on units place digit of a and the divisibility of power b . Consider powers of 2, as we know, $2^1 = 2$, $2^2 = 4$, $2^3 = 8$, $2^4 = 16$, $2^5 = 32$, $2^6 = 64$, $2^7 = 128$

The units place digit for powers of 2 repeat in an order: 2, 4, 8, 6. So the "cyclicity" of number 2 is 4 (*that means the pattern repeats after 4 occurrences*) and the cycle pattern is 2, 4, 8, 6. From this, you can see that to find the units place digit of powers of 2, you have to divide the exponent by 4.

Shortcuts to solve problems related to unit's place digit of a^b **1. Case 1: If b is a multiple of 4**

- If a is an even number, that is: 2, 4, 6 or 8, then the units place digit is 6
- If a is an odd number, that is: 1, 3, 7 or 9, then the units place digit is 1

2. Case 2: If b is not a multiple of 4

Let r be the remainder when b is divided by 4, then units place of a^b will be equal to units place of a^r

Cyclicity of numbers upto 9:

Number	1	2	3	4	Cyclicity
2	2	4	8	6	4
3	3	9	7	1	4

Number	¹	²	³	⁴	Cyclicity
4	4	6	4	6	2
5	5	5	5	5	1
6	6	6	6	6	1
7	7	9	3	1	4
8	8	4	2	6	4
9	9	1	9	1	2

Let us take some examples to understand it clearly.

1. The last digit for $(163)^{11}$ is the same as that of 3^{11} , that is, $3^{4 \times 2 + 3}$ which is the same as the last digit for 3^3 , that is, last digit for 27 and so our last digit for $(163)^{11}$ is 7.
2. Last digit for $(29)^{19}$ is the same as that of $9^{19} = 9^{2 \times 9 + 1}$ = the same as the last digit for $9^1 = 9$.

Example 5

The last digit in the expansion of $(41)^n - 1$ when n is any positive integer is

- (a) 2 (b) 0 (c) 1 (d) None of these

(BBA: CBS 2010)

Solution: For any positive integer n, the last digit of $(41)^n = 1$

Therefore, last digit in the expansion of $(41)^n - 1 = 1 - 1 = 0$

The correct answer is (b).

PROBABILITY AND SET THEORY

Probability

Probability is defined as the chance of happening of an event and is a measure of the likelihood that an event will occur. It can be described in terms of a numerical measure and this number, between 0 and 1 (where 0 indicates impossibility and 1 indicates certainty), we call probability. Thus, the higher the probability of an event, the more certain we are about the happening of that event.

In examples and problems where the event is described, the basis of doing the problem happens to be the classical definition of probability, which says:

Probability of an event E, denoted by P(E) is

$$P(E) = \frac{\text{Number of Favourable Outcomes}}{\text{Total Number of Outcomes}}$$

Where the favorable number of outcomes or cases is as defined in the problem under the given set of conditions and the total number of outcomes or cases is the number of ways of doing the task without any condition being applicable.

Basic Definitions

Scope: Probability is always defined for the future.

Random experiment: A random experiment is an experiment, trial, or observation that can be repeated numerous times under the same conditions. The outcome of an individual random experiment must be

independent and identically distributed. It must in no way be affected by any previous outcome and cannot be predicted with certainty. Moreover, we know the possible outcomes of the experiment. But, we don't know which particular outcome will follow. Three most common random experiments are:

1. Tossing a coin
2. Throwing a Dice
3. Picking a card from a pack of 52 cards

Sample space: The total number of ways in which an event can happen is called the sample space of the event.

- **Sample space for toss of coins:**

Tossing a coin: two elements (H or T)

Tossing two coins: two elements \times two elements = four elements (HT, TH, TT, HH)

Tossing three coins: two elements \times two elements \times two elements = eight elements

(HHH, HHT, HTH, THH, TTT, TTH, THT, HTT)

- **Sample space for throwing one or more dice:**

Throw a dice: six elements (1, 2, 3, 4, 5, 6)

Throw two dice: 36 elements

[(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)]

Event

It is a subset of a sample space. Conceptually, it is the phenomena whose probability we are interested in finding.

The range of probability of any event: As the number of favourable outcomes cannot be greater than the total number of outcomes, therefore, $0 \leq P(E) \leq 1$, that is, probability of any event will always lie between 0 and 1.



Note

If the probability of an event happening is n , then the probability of this event not happening is $(1 - n)$

Probability for composite events

If A and B are 2 events then,

$P(A)$ = probability of happening of event A

$P(B)$ = probability of happening of event B

$P(A \cup B)$ = probability of happening of event A or B (only A or only B or both simultaneously)

$P(A \cap B)$ = probability of happening of event A and B simultaneously

Mutually exclusive events

Those events which can't occur simultaneously. If A and B are mutually exclusive events,

$$\text{then } P(A \cup B) = P(A) + P(B)$$

Non-mutually exclusive events

Those events which can occur simultaneously. If A and B are non- mutually exclusive events,

$$\text{then } P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

In this case we need to subtract $P(A \cap B)$ to avoid double counting

Important Formulae

- For Mutually exclusive events, $P(A \cap B) = 0$
- It is not given in a problem whether the events are mutually exclusive or not. We have to interpret the language to know it. For example-
 - (a) If A and B are events of 2 students passing in an exam, then A and B are non-mutually exclusive. It is because both A and B can pass together in the exam.
 - (b) If A and B are events of 2 students being the toppers (assuming no possibility of tie) then A and B must be mutually exclusive events.

Independent events

If happening of one event (say A) does not affect the happening of another event (say B), then A and B are said to be independent events.

Dependent events

If happening of one event (say A) affects the happening of another event (say B), then A and B are dependent events.

If A and B are independent events, $P(A \cap B) = P(A) \times P(B)$

If A and B are dependent events, $P(A \cap B) = P(A) \times P(B / A) = P(B) \times P(A / B)$

Example 1

For two events A and B, $P(A) = 0.6$, $P(B) = 0.3$, $P(A \cup B) = 0.9$. Events A and B are

(a) Independent (b) Mutually Exclusive (c) Exhaustive (d) Independent and Exhaustive

(BBA: DU JAT 2011)

Solution: We know that, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$\Rightarrow 0.9 = 0.6 + 0.3 - P(A \cap B) \Rightarrow P(A \cap B) = 0$$

Hence events A and B are mutually exclusive.

The correct answer is (b).

Conditional Probability

When A and B are dependent events, then $P(A / B)$ denotes the probability of the happening of event A when B has already occurred. Similarly, $P(B / A)$ denotes the probability of the happening of B when A has already occurred.

 Important tips

- For Mutually exclusive events and non-mutually exclusive independent events, we must use the concept of AND and OR as discussed in Permutations and Combinations.
- In conditional probability questions (that is, non-mutually exclusive dependent events), most of the questions are framed in a manner in which $P(A/B)$ is given and $P(B/A)$ is to be calculated. So, we first find $P(A \cap B)$ by using $P(A/B)$ in such cases and then use it to find $P(B/A)$.

Example 2

Two trains P and Q are scheduled to reach New Delhi railway station at 10.00 AM. The probability that train P and train Q will be late is $\frac{7}{9}$ and $\frac{11}{27}$ respectively. The probability that train Q will be late, given that train P is late, is $\frac{8}{9}$. Find the probability that neither train will be late on a particular day.

Solution: Probability that train P will be late = $P(P) = \frac{7}{9}$

Probability that train Q will be late = $P(Q) = \frac{11}{27}$

Probability of Q will be late in case P is late

$$= P(Q/P) = \frac{P(P \cap Q)}{P(P)} \quad [\text{Using conditional probability}]$$

$$\Rightarrow \frac{7}{9} \times \frac{8}{9} = P(P \cap Q) \Rightarrow P(P \cap Q) = \frac{56}{81}$$

Probability of either P or Q or both being late

$$= P(P) + P(Q) - P(P \cap Q) = \frac{7}{9} + \frac{11}{27} - \frac{56}{81} = \frac{40}{81}$$

Hence, the probability that neither of the trains will be late = $1 - \frac{40}{81} = \frac{41}{81}$

Bayes' Theorem

Bayes' theorem is a direct application of conditional probabilities. This theorem is used to find the conditional probability of an event $P(A | B)$, say, when the "reverse" conditional probability $P(B | A)$ is the probability that is known.

Let A_1, A_2, \dots, A_n be a set of mutually exclusive events that together form the sample space S. Let B be any event from the same sample space, such that $P(B) > 0$. Then,

$$P(A_k/B) = \frac{P(A_k \cap B)}{P(A_1)P(B/A_1) + P(A_2)P(B/A_2) + \dots + P(A_n)P(B/A_n)}$$



Note

Invoking the fact that $P(A_k \cap B) = P(A_k)P(B/A_k)$, Baye's theorem can also be expressed as

$$P(A_k/B) = \frac{P(A_k)P(B/A_k)}{P(A_1)P(B/A_1) + P(A_2)P(B/A_2) + \dots + P(A_n)P(B/A_n)}$$

Example 3

A survey was conducted to test relative aptitudes in quantitative and logical reasoning of MBA applicants. It is perceived (prior to the survey) that 80 percent of MBA applicants are extremely good in logical reasoning, while only 20 percent are extremely good in quantitative aptitude. Further, it is believed that those with strong quantitative knowledge are also sound in data interpretation, with conditional probability as high as 0.87. However, some MBA applicants who are extremely good in logical reasoning can be also good in data interpretation, with conditional probability 0.15. An applicant surveyed is found to be strong in data interpretation. Find the probability that the applicant is also strong in quantitative aptitude.

Solution: Using Baye's Theorem:

$$P(LR) = 0.8; P(QA) = 0.2; P(DI/QA) = 0.87; P(DI/LR) = 0.15$$

Therefore, probability that an applicant is good in Data interpretation given that he is good in Quantitative aptitude

$$P(QA/LR) = \frac{P(QA) \times P(DI/QA)}{P(QA) \times P(DI/QA) + P(LR) \times P(DI/LR)}$$

$$P(QA/LR) = \frac{0.2 \times 0.87}{0.2 \times 0.87 + 0.8 \times 0.15} \approx 0.6$$

Example 4

Suppose there are 4 bags. Bag 1 contains 1 black and $a^2 - 6a + 9$ red balls, bag 2 contains 3 black and $a^2 - 6a + 7$ red balls, bag 3 contains 5 black and $a^2 - 6a + 5$ red balls and bag 4 contains 7 black and $a^2 - 6a + 3$ red balls. A ball is drawn at random from a randomly chosen bag. What is the maximum value of probability that the selected ball is black?

Solution

	Red Ball	Black Ball
Bag 1	$a^2 - 6a + 9$	1
Bag 2	$a^2 - 6a + 7$	3
Bag 3	$a^2 - 6a + 5$	5
Bag 4	$a^2 - 6a + 3$	7

Required Probability

$$= \frac{1}{4} \times \left(\frac{1}{a^2 - 6a + 9} \right) + \frac{1}{4} \times \left(\frac{3}{a^2 - 6a + 9} \right) + \frac{1}{4} \times \left(\frac{5}{a^2 - 6a + 5} \right) + \frac{1}{4} \times \left(\frac{7}{a^2 - 6a + 3} \right)$$

$$= \frac{4}{a^2 - 6a + 10}$$

Set Theory

Set

It is a collection of well-defined objects which are related to each other by some logic.

Important points

- The **Number** of distinct elements of a set is called the **Cardinal Number** of the Set denoted by n .
- If the Cardinal number of a Set is n , the number of **Subsets** of the Set is 2^n . Out of the total Subsets, one will be an improper Subset and the remaining $(2^n - 1)$ subsets will be proper.
- If $A \cap B$ is a **Null Set**, then A and B are called **Disjoint Sets**.
- For 2 given sets A and B,

$$n(A \cup B) = n(A) + n(B) \text{ if A and B are disjoint sets.}$$

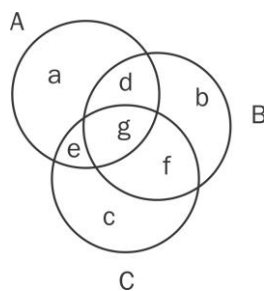
Otherwise, if A and B are not disjoint,

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

- For 3 sets A, B and C

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$$

Representing it in a Venn diagram, we get



Symbols a to g represent different regions as following:

a = Only A

b = Only B

c = Only C

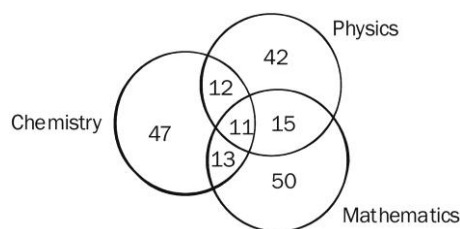
d = Both A and B but not C

e = Both A and C but not B

f = Both B and C not A

g = All A, B and C (that is, $A \cap B \cap C$)

Directions for examples 5 to 7: The diagram given below shows the number of students who got distinction in three subjects out of 500 students. Study the diagram carefully and answer the questions that follow.



Example 5

What is the percentage of students who got distinction in only two subjects?

- (a) 8% (b) 9% (c) 10% (d) 12%

Solution: Percentage of students who got distinction in only two subjects

$$= \frac{12+13+15}{500} \times 100 = 8\%$$

The correct answer is (a).

Example 6

What is the percentage of students who got distinction?

- (a) 28% (b) 35% (c) 38% (d) 40%

Solution: Percentage of students who got distinction

$$= \frac{47+42+50+12+13+15+11}{500} \times 100 = 38\%$$

The correct answer is (c).

Example 7

The percentage of students with distinction marks in mathematics is

- (a) 17.8% (b) 18.6% (c) 19.2% (d) 20.6%

Solution: The percentage of students with distinction marks in mathematics

$$= \frac{13+11+15+50}{500} \times 100 = 17.8\%$$

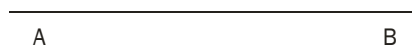
The correct answer is (a).

GEOMETRY**Basic Concepts****Geometry**

Geometry is a branch of Mathematics that deals with measurement of various parameters of geometric figures. The concept of geometry is based, to a large extent, on the understanding of the formulae and their applications. Therefore, it is very important to know the formulae for solving the problems in geometry.

Lines

A **line** is a one-dimensional figure. It only has length but no width or thickness. It can be extended indefinitely in both directions; thus, a line is infinite. A finite line, that is, a line having two end points is called a **line segment**. It is named after its end points, such as line AB below





Note

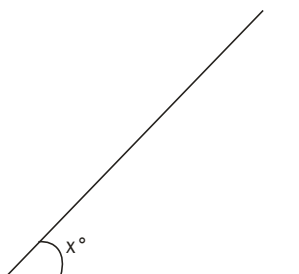
Remember that the shortest distance between any two points is always a straight line.

Properties

- Three or more points are said to be **collinear** if they lie on a line, otherwise they are said to be non-collinear.
- Two or more lines are said to be **coplanar** if they lie in the same plane, otherwise they are said to be **non-coplanar**.
- A line, which intersects two or more given coplanar lines in distinct points, is called a **transversal** of the given lines.
- A line which is perpendicular to a line segment, that is, intersects at 90° and passes through the mid-point of the segment is called the perpendicular bisector of the segment.
- Every point on the perpendicular bisector of a segment is equidistant from the two endpoints of the segment.
- If two lines are perpendicular to the same line then they are parallel to each other.
- Lines which are parallel to the same line are parallel to each other.

Angles

An **angle** (\angle) is formed when two lines meet at a point. This meeting point is called the **vertex**. Angles are measured in degrees ($^\circ$)



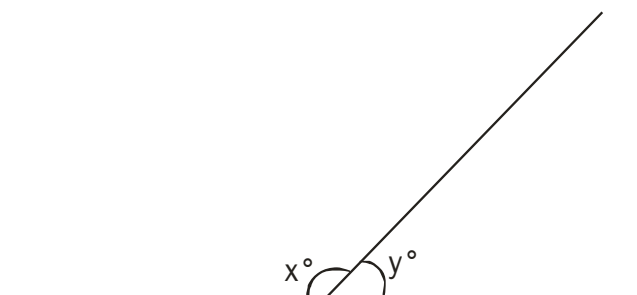
An **acute angle** measures between 0° and 90° .

A **right angle** measures exactly 90° .

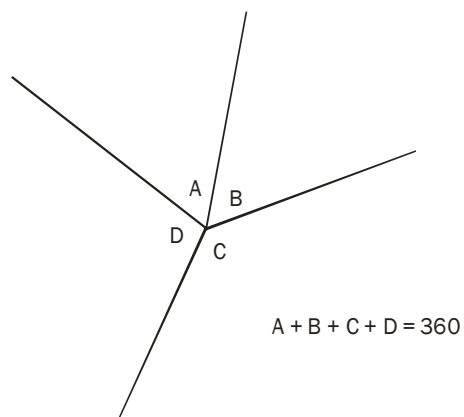
An **obtuse angle** measures between 90° and 180° .

An angle of 180° is a **straight line**.

The sum of measures of the angles on a straight line is always 180° .



In the above figure $\angle x + \angle y = 180^\circ$



Note

The sum of measures of an angle around a point is always 360° .

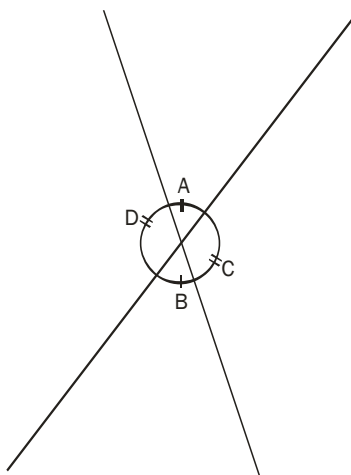
Two angles are **congruent** if their measures are equal

Supplementary angles add up to 180°

Complementary angles add up to 90°

Intersecting Lines

When two lines intersect each other, the opposite angles have the same measure and are called **vertical angles**.



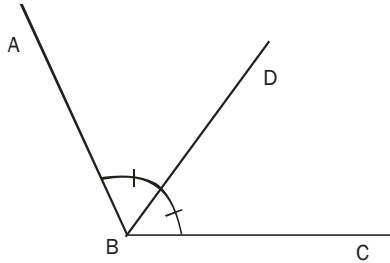
In the above figure, $\angle A = \angle B$ and, $\angle C = \angle D$



Note

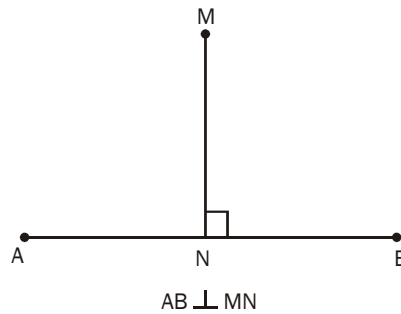
When two lines intersect, the opposite angles are always equal.

A line bisects an angle if it divides the angle into two equal parts.



In the above figure, the line BD bisects the Angle ABC. Thus $\angle ABD = \angle CBD$

Perpendicular Lines

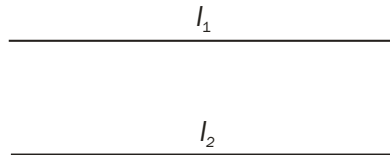


When two lines intersect at a 90° angle, they are called perpendicular.

In the above figure, line segment AB is perpendicular to line segment MN.

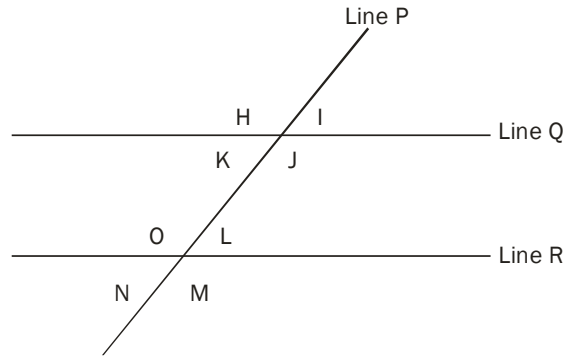
Parallel Lines

Parallel lines are two lines that lie in the same plane but never intersect one another.



Lines l_1 and l_2 above are said to be parallel and are denoted as $l_1 \parallel l_2$.

If two parallel lines intersect with a third line (called a **transversal**), each of the parallel lines will intersect the third line at the same angle, that is, all acute angles will be equal, all obtuse angles will be equal and any acute angle will be supplementary to any obtuse angle.



Thus, in the above figure $\angle H = \angle J = \angle O = \angle M$

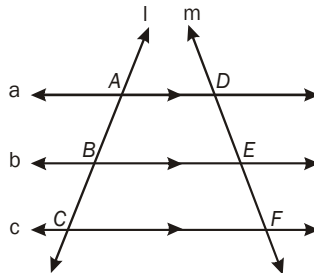
$$\angle I = \angle K = \angle L = \angle N$$

$$\angle H + \angle I = \angle K + \angle J = \angle O + \angle L = \angle N + \angle M = 180^\circ$$

Proportionality Theorem

The ratio of intercepts made by three parallel lines on a transversal is equal to the ratio of the corresponding intercepts made on any other transversal by the same parallel lines.

If line $a \parallel b \parallel c$, and lines l and m are two transversals, then

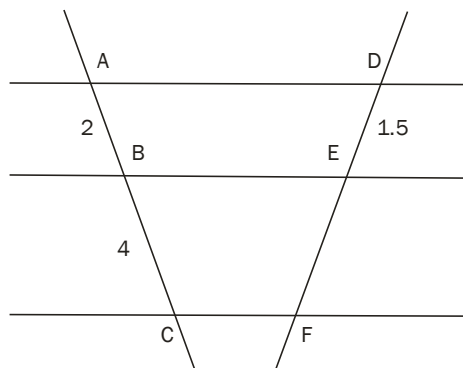


$$\frac{AB}{BC} = \frac{DE}{EF}$$

Example 1

Three parallel lines are cut by two transversals as shown in the given figure. If $AB = 2$ cm, $BC = 4$ cm and $DE = 1.5$ cm then the length of EF is:

- (a) 2 cm (b) 3 cm (c) 3.5 cm (d) 4 cm



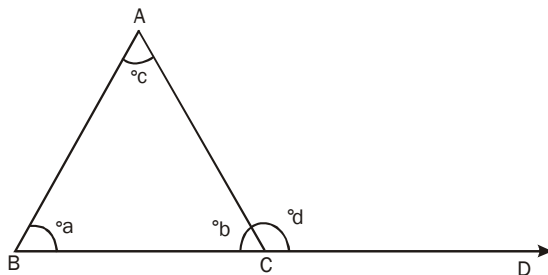
Solution: Using basic proportionality theorem, we get

$$\frac{AB}{BC} = \frac{DE}{EF} \Rightarrow \frac{2}{4} = \frac{1.5}{EF} \text{ or } EF = 3 \text{ cm}$$

The correct answer is (b).

Triangles

A **triangle** is a closed figure with three straight sides and three angles. It is denoted by the symbol Δ . The sum of interior angles of a triangle is always 180° . Also, the measure of each exterior angle of a triangle is equal to the sum of interior opposite angles.



Thus, in the above figure $\angle a + \angle b + \angle c = 180^\circ$, and $\angle a + \angle c = \angle d$

Length of sides of a triangle

The length of any one side of a triangle is less than the sum of lengths of the other two sides and greater than the difference between the lengths of the other two sides.

Area and perimeter of a triangle

$$\text{Area of a triangle} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

Perimeter of a triangle = Sum of lengths of its sides

$$\text{Area of an equilateral triangle with side } a = \frac{\sqrt{3}}{4} a^2$$

Example 2

There is a triangular building (ABC) located in the heart of Jaipur, the Pink City. The length of the one wall in east (BC) direction is 397 feet. If the length of south wall (AB) is perfect cube, the length of southwest wall (AC) is a power of three, and the length of wall in southwest (AC) is thrice the length of side AB, determine the perimeter of this triangular building.

Solution

The perimeter $P = AB + BC + CA$

Where $BC = 397$, $AC = 3^n$, $AB = a^3$

$$\text{So, } P = 397 + 3^n + a^3$$

Also, $AC = 3AB$

$$3^n = 3 a^3$$

$$3^{n-1} = a^3$$

$$\text{So, } P = 397 + 3^n + 3^{n-1}$$

$$P - 397 = 3^{n-1}(3+1)$$

$$P - 397 = 3^{n-1} \times 4$$

This means (P - 397) should be a multiple of 3 and 4 simultaneously.

Checking the options, only D satisfies.

Classification of triangles

Classification of Triangles			
Based on Sides	Scalene Triangle None of the three sides is equal.	Isosceles Triangle At least two sides are equal.	Equilateral Triangle All the three sides are equal and all the angles are equal to 60° .
Based on Angles	Right Triangle Any one angle of a triangle is a right angle, that is, 90°	Acute Triangle All the three angles of a triangle are acute, that is, less than 90°	Obtuse Triangle If anyone angle of a triangle is obtuse, that is, greater than 90°

Some basic definitions

Altitude (height) of a triangle:

The perpendicular drawn from the vertex of a triangle to the opposite side is called the **altitude** of the triangle.

Median of a triangle:

The line drawn from a vertex of a triangle to the opposite side such that it bisects the side is called the **median** of the triangle. A median bisects the area of the triangle.

Orthocenter:

The point of intersection of the three altitudes of a triangle is called the orthocenter. The angle made by any side at the orthocenter = $180^\circ -$ the opposite angle to the side.

Centroid:

The point of intersection of the three medians of a triangle is called the centroid. The centroid divides each median in the ratio 2 : 1.

Circumcentre:

The point of intersection of the perpendicular bisectors of the sides of a triangle is called the circumcentre.

Incentre:

The point of intersection of the angle bisectors of a triangle is called the incentre.

- Angle bisector divides the opposite sides in the ratio of remaining sides

$$\text{Example: } \frac{BD}{DC} = \frac{AB}{AC} = \frac{c}{b}$$

- Incentre divides the angle bisectors in the ratio
(b + c) : a, (c + a) : b and (a + b) : c

Congruency of triangles

Two triangles are **congruent** if the sides and angles of one triangle are equal to the corresponding sides and angles of the other triangle.

- SAS Congruence rule:** Two triangles are congruent if two sides and the included angle of one triangle are equal to the sides and the included angle of the other triangle.

- ASA Congruence rule:** Two triangles are congruent if two angles and the included side of one triangle are equal to two angles and the included side of another triangle.
- AAS Congruence rule:** Two triangles are congruent if any two pairs of angles and one pair of corresponding sides are equal.
- SSS Congruence rule:** If three sides of one triangle are equal to the three sides of another triangle, then the two triangles are congruent.
- RHS Congruence rule:** If in two right triangles, the hypotenuse and one side of the triangle are equal to the hypotenuse and one side of the other triangle, then the two triangles are congruent.

Similarity of triangles

For a given correspondence between two triangles, if the corresponding angles are congruent and their corresponding sides are in proportion, then the two triangles are said to be similar. Similarity is denoted by \sim .

- AAA Similarity:** For a given correspondence between two triangles, if the two angles of one triangle are congruent to the corresponding two angles of the other triangle, then the two triangles are similar.
- SSS Similarity:** If the corresponding sides of two triangles are proportional, their corresponding angles are equal and hence the triangles are similar.
- SAS Similarity:** If one angle of a triangle is equal to one angle of the other and the sides including these angles are proportional, the triangles are similar.

Properties of similar triangles

- If two triangles are similar, Ratio of sides = Ratio of height = Ratio of Median = Ratio of angle bisectors = Ratio of in radii = Ratio of circumradii.

If $\triangle ABC \sim \triangle PQR$

$$\frac{AB}{PQ} = \frac{AD}{PS} = \frac{BE}{QT}$$

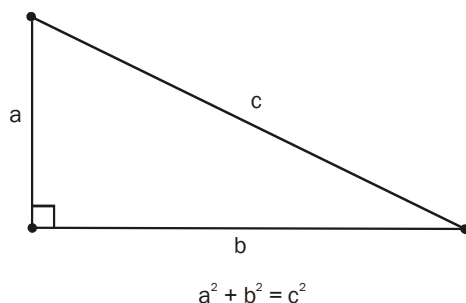
- The ratio of the areas of two similar triangles is equal to the ratio of the squares of the corresponding sides.

If $\triangle ABC \sim \triangle PQR$, the

$$\frac{Ar(ABC)}{Ar(PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2$$

Pythagoras Theorem

Pythagoras theorem applies only to right triangles and states that in a right triangle the square of the hypotenuse (the longest side) is equal to the sum of the squares of the other two sides.



Important Concepts Related to Triangles

1. The largest angle in a triangle lies opposite to the longest side, the second largest angle lies opposite the second longest side and the smallest angle lies opposite the shortest side.
2. If two triangles are similar, their corresponding sides are in same proportion and corresponding angles are same
3. If two triangles are congruent, their corresponding angles have the same measure and corresponding sides have same length.

Example 3

In quadrilateral PQRS, PQ = 5 units, QR = 17 units, RS = 5 units, and PS = 9 units. The length of the diagonal QS can be:

- (a) > 10 and < 12 (b) > 12 and < 14 (c) > 14 and < 16 (d) Cannot be determined

Solution: In a triangle, the sum of the two sides is always greater than the third side.

In triangle PSQ,

$$QS < PQ + PS \Rightarrow QS < 5 + 9$$

$$\Rightarrow QS < 14 \quad (1)$$

Also, the difference between any two sides is less than the third side.

In triangle QRS,

$$QS > QR - RS \Rightarrow QS > 17 - 5$$

$$\Rightarrow QS > 12 \quad (2)$$

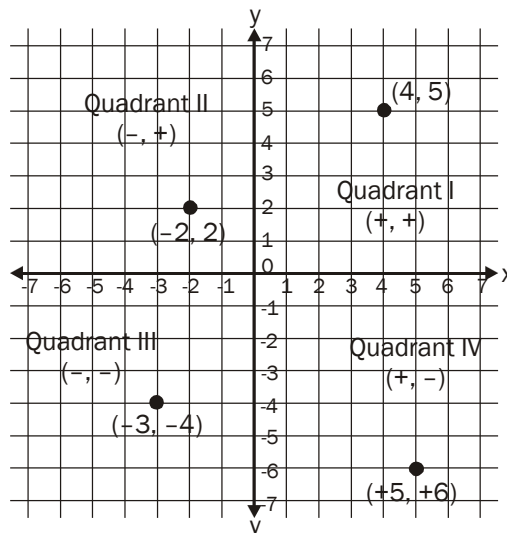
Combining inequalities (1) and (2), we get,

$$12 < QS < 14$$

The correct answer is (b).

Coordinate Geometry

Coordinate Geometry requires us to work with the rectangular coordinate system. In a plane, two perpendicular number lines are drawn. The horizontal one is called the x-axis and the vertical one is called the y-axis. The point of intersection of the two axes is called the Origin and is denoted by O.



Any point in the coordinate plane can be specified by the location of its x-coordinate and y-coordinate. Thus, if a point is specified as (2,3), this means that it lies at a distance of 2 units to the right of the y-axis and 3 units above the x-axis.

Distance formula

The distance between any two points (x_1, y_1) and (x_2, y_2) on the coordinate plane can be calculated using the Distance formula,

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Mid-point formula

The mid-point of a line connecting two points (x_1, y_1) and (x_2, y_2) can be calculated using the formula,

$$\text{Mid-point} = \left[\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right]$$

Slope of a line

Slope is the inclination of a line with reference to the x-axis. It is denoted by m and calculated as,

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

- If a line is slanting up from left to right, then its slope is positive.
- If a line is slanting down from left to right, then its slope is negative.
- If a line is parallel to the x-axis, its slope is zero.
- If a line is parallel to the y-axis, its slope is undefined.
- Two parallel lines have the same slope
- The slopes of two perpendicular lines are negative reciprocals of each other. So, if the slope of line A is 3, the slope of line B which is perpendicular to line A will be $-\frac{1}{3}$

Intercepts

- The x-intercept is the x-coordinate of the point where a line intersects the x-axis
- The y-intercept is the y-coordinate of the point where a line intersects the y-axis

Equation of a line

The equation of a line is simply the relation between its x and y-coordinates for any given point on the line. All points on the line will basically satisfy this relation.

The equation of a line is written as,

$$y = mx + c$$

Where m is the slope and c is the y-intercept of the line.

Thus, to find the equation of a line, you have to know the value of its slope and y-intercept.

MENSURATION

Quadrilaterals

A **quadrilateral** is a figure enclosed by four sides. The sum of interior angles of a quadrilateral is always 360° .

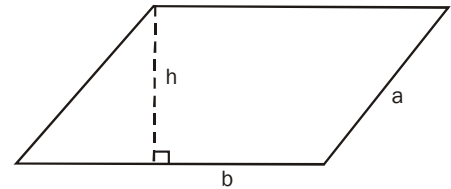
Types of Quadrilaterals

Parallelogram

A **Parallelogram** is a quadrilateral whose opposite sides are equal and parallel.

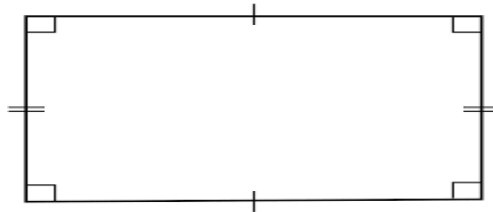
Properties:

- Opposite sides are parallel and equal.
- Opposite angles are equal.
- Diagonals bisect each other.
- Sum of any two adjacent angles is 180° .
- Each diagonal divides the parallelogram into two triangles of equal area.
- Area of a parallelogram = $b \times h$
- Perimeter of a parallelogram = $2(a + b)$



Rectangle

A parallelogram, in which each angle is a right angle, that is, 90° is called a **rectangle**.



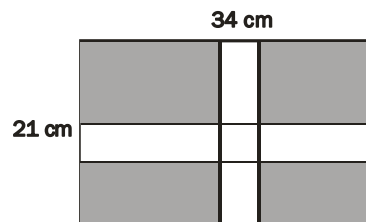
Properties:

- Opposite sides are parallel and equal.
- Each angle is equal to 90° .
- Diagonals are equal and bisect each other.
- Area of a rectangle = Length \times Breadth
- Perimeter of a rectangle = $2(\text{Length} + \text{Breadth})$

Example 1

In an engineering college there is a rectangular garden of dimensions 34 m by 21 m. Two mutually perpendicular walking corridors of 4 m width have been made in a central part and flowers have been grown in the rest of the garden. Find the area under the flowers.

Solution



Area of the garden = $34 \times 21 = 714$ sq m

Area covered by the corridors = $(4 \times 34) + (4 \times 21) - (4 \times 4) = 136 + 84 - 16 = 204$ sq. m

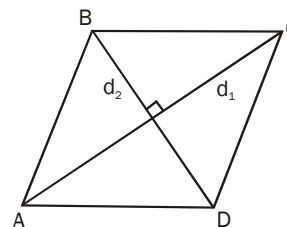
Hence, the area under the flowers (shaded portion) = $714 - 204 = 510$ sq. m

Rhombus

A **Rhombus** is a parallelogram whose all sides are equal.

Properties:

- Opposite sides are parallel.
- All sides are equal.
- Opposite angles are equal.
- Diagonals bisect each other at right angle.
- Area of a rhombus = $\frac{1}{2}(d_1 \times d_2)$
- Perimeter of a rhombus = $4s$ (where s is the measure of each side)
- Side of a rhombus = $\frac{1}{2}\sqrt{d_1^2 + d_2^2}$

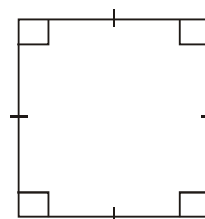


Square

A **square** is basically a rectangle with all sides equal.

Properties:

- All sides are equal and opposite sides are parallel.
- All angles are 90° .
- The diagonals are equal and bisect each other at right angle
- Area of a square = s^2 (side squared)
- Perimeter of a square = $4s$ (4 times side)

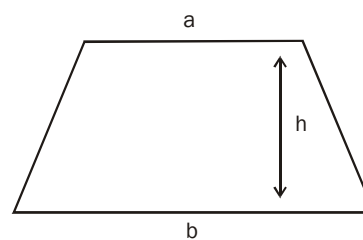


Trapezium

A **trapezium** is a quadrilateral whose any two sides are parallel.

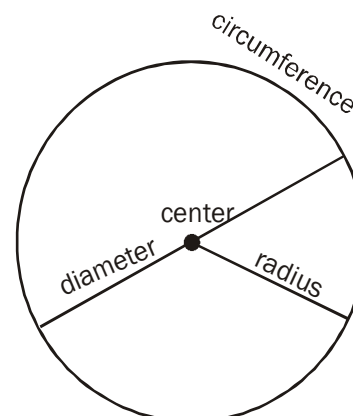
Properties:

- The segment joining the mid-points of the non-parallel sides is called the median of the trapezium.
- Median = $\frac{1}{2}$ × sum of the parallel sides
- Area of a trapezium = $\frac{1}{2}$ (Sum of parallel sides) × Height
- That is, area of a trapezium = $\frac{1}{2}(a + b)h$



Circles

Technically a **circle** is the set of all points in a plane which are equidistant from a certain point, called the center of the circle and the fixed distance is called the radius.



Important concepts with relation to Circles

Chord: A chord is a segment whose end points lie on the circle

Diameter

The diameter is the line segment connecting two points on the circle that passes through the center of the circle. The diameter is the longest chord in a circle.

Radius: The distance between the center of a circle and any point on the circle is called the radius. It is basically the half of the diameter.

Circumference: The distance around the outer boundary of a circle is called its Circumference. It is the same as the perimeter of the circle.

Circumference, $C = 2\pi r$

Area of a circle, $A = \pi r^2$

Secant: A secant is a line, which intersects the circle at two distinct points.

Tangent: A tangent is a line that touches the circle at any one point on its circumference. A line drawn tangent to a circle is perpendicular to the radius at the point of tangency.

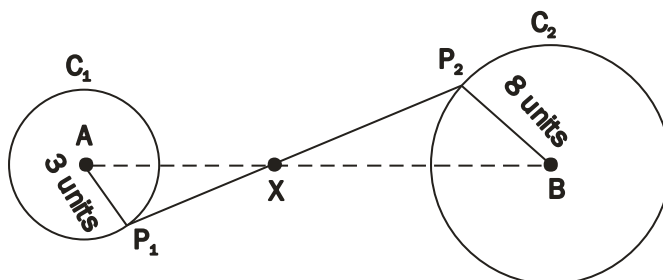
Arc: An arc is a portion of the circumference of a circle. An arc that is exactly half the length of the circumference is called a semicircle.

Key Points to remember

- If a triangle is inscribed within a circle with the diameter of the circle as one of its sides, it will always be a right-angled triangle.
- The perpendicular from the center of the circle to a chord bisects the chord.
- Equal chords of a circle are equidistant from the centre.
- Equal chords of a circle subtend equal angles at the centre.
- Angles in the same segment of a circle are equal.
- An angle in a semicircle is a right angle.
- The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- The length of tangents drawn from an external point to a circle is equal.
- The angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.
- A triangle drawn inside a circle whose one side is the diameter of the circle is always a right triangle.
- When a square is inscribed in a circle, the diagonal of the square is the same as the diameter of the circle.
- When a circle is inscribed in a square, the diameter of the circle is the same as the side of the square.

Example 2

There are two circles C_1 and C_2 of radii 3 and 8 units respectively. The common internal tangent, T , touches the circles at points P_1 and P_2 respectively. The line joining the centers of the circles intersects T at X . The distance of X from the center of the smaller circle is 5 units. What is the length of the line segment P_1P_2 ?

(a) ≤ 13 (b) > 13 and ≤ 14 (c) > 14 and ≤ 15 (d) > 15 **Solution**

Using Pythagoras theorem in triangle AXP_1 , we get

$$P_1X^2 = 5^2 - 3^2 = 4^2 \Rightarrow P_1X = 4$$

The triangles AXP_1 and BXP_2 are similar. So,

$$\frac{AP_1}{P_1X} = \frac{BP_2}{P_2X} \Rightarrow \frac{3}{4} = \frac{8}{P_2X} \Rightarrow P_2X = \frac{32}{3} = 10.67$$

$$P_1X + P_2X = 4 + 10.67$$

$$P_1P_2 = 14.67$$

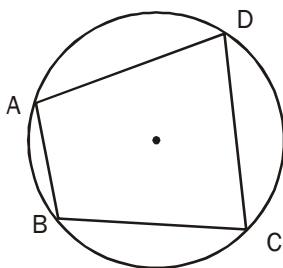
Hence, the length of line segment P_1P_2 lies between 14 and 15, that is, $14 < P_1P_2 \leq 15$.

The correct answer is (c).

Cyclic Quadrilateral

If all the four vertices of a quadrilateral lie on a circle, then the quadrilateral is said to be a cyclic quadrilateral.

The sum of either pair of the opposite angles of a cyclic quadrilateral is 180° .

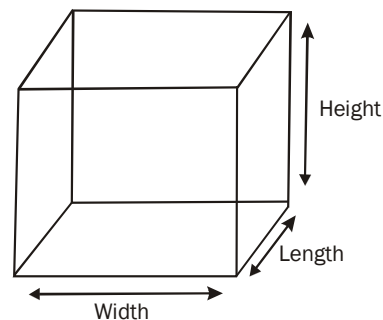


That is, $A + C = 180^\circ$ and $B + D = 180^\circ$

Conversely, if the sum of any pair of opposite angles of quadrilateral is 180° , then the quadrilateral must be cyclic.

3-Dimensional Figures

All the figures you looked at so far had only two dimensions. However, there are some 3-dimensional figures that you should know about as well.



Cube

Volume of a cube with side $a = a^3$

Total surface area = $6a^2$

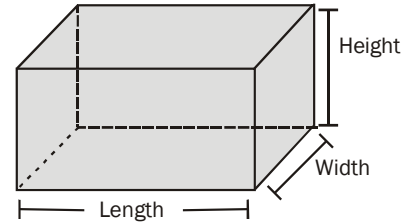
Diagonal of a cube = $a\sqrt{3}$

Cuboid

Volume = $l \times b \times h$

Total surface area = $2(lb + bh + lh)$

Diagonal = $\sqrt{l^2 + b^2 + h^2}$

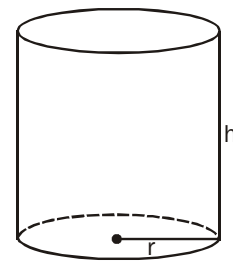


Cylinder

Volume = $\pi r^2 h$

Curved surface area = $2\pi r h$

Total surface area = $2\pi r(r + h)$



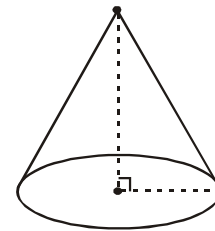
Cone

Volume = $\frac{1}{3} \pi r^2 h$

Curved surface area = $\pi r l$

Total surface area = $\pi r(r + l)$

Slant height, $l = \sqrt{r^2 + h^2}$



Example 3

Your friend's cap is in the shape of right circular cone of base radius 14 cm and height 26.5 cm. What is the approximate area of the sheet required to make 7 such caps?

Solution: Radius of the cap = 14 cm

Height of the cap = 26.5 cm

Slant height = $\sqrt{14^2 + 26.5^2} = 30$ cm approx.

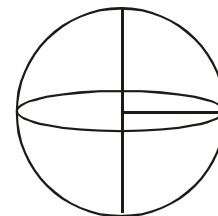
Surface area of the cap = $\pi r l = \frac{22}{7} \times 14 \times 30 = 1320$ sq.cm

Hence, the required area = $7 \times 1320 = 9240$ sq cm

Sphere

Volume = $\frac{4}{3} \pi r^3$

Surface area = $4\pi r^2$



Hemi sphere

$$\text{Volume} = \frac{2}{3} \pi r^2 h$$

$$\text{Surface area} = 2\pi r^2$$

$$\text{Total surface area} = 3\pi r^2$$

**Example 4**

A copper wire is bent in the shape of a square, enclosing an area of 272.25 sq. cm. If the same wire is bent in the form of a circle, find the radius of the circle.

- (a) 10.5 cm (b) 5.5 cm (c) 12.5 cm (d) 27.5 cm

(BBA: SET 2009)

Solution: Area of square = 272.25 sq.cm

Therefore, the side of square = $\sqrt{272.25}$ cm = 16.5 cm

So, circumference of the circle so formed by bending = 4×16.5

$$2\pi R = 66 \Rightarrow 2 \times \frac{22}{7} \times R = 66 \Rightarrow R = 10.5 \text{ cm}$$

The correct answer is (a).

Example 5

A solid metal cylinder of 10 cm height and 14 cm diameter is melted and re-cast into two cones in the proportion of 3:4 (volume), keeping the height 10 cm. What would be the percentage change in the flat surface area before and after?

Solution: Volume of the cylinder = $\pi r^2 h$ and Flat surface area = $2\pi r^2$

Volumes of two cones are $\frac{1}{3} \pi r_1^2 h$ and $\frac{1}{3} \pi r_2^2 h$ (as height of the cones are same as cylinder)

Combined flat surface area of two cones = $\pi r_1^2 + \pi r_2^2$

$$\text{Given, } \frac{1}{3} \pi r_1^2 h + \frac{1}{3} \pi r_2^2 h = \pi r^2 h$$

$$\text{Or, } \pi r_1^2 + \pi r_2^2 = 3\pi r^2$$

Therefore, increase in flat surface area

$$= \frac{\pi r_1^2 + \pi r_2^2 - 2\pi r^2}{2\pi r^2} = \frac{3\pi r^2 - 2\pi r^2}{2\pi r^2} = \frac{1}{2} = 50\%$$

Frustum of a right circular cone

A **frustum** may be formed from a right circular cone by cutting off the tip of the cone with a cut perpendicular to the height, forming a lower base and an upper base that are circular and parallel. The problem can be generalized to the other cones and n-sided pyramids but for the moment consider the right circular cone.

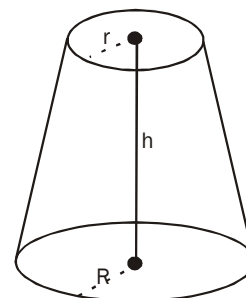
Let **h** be the height, **R** the radius of the lower base, and **r** the radius of the upper base. One picture of the frustum is the following.

Volume, $V = \frac{\pi h}{3} (R^2 + Rr + r^2)$

Curved surface area, $A = \pi(R + r)l$

Where Slant Height, $l = \sqrt{h^2 + (R^2 - r^2)}$

Total surface area = Curved surface area + Area of top + Area of bottom



Example 6

66 cubic centimeters of silver is drawn into a wire of 1 mm diameter. The length of the wire in metres will be:

- (a) 84 (b) 90 (c) 168 (d) 336

Solution: Let the length of the wire be x mm.

So, according to the condition,

$$\pi \left(\frac{1}{2}\right)^2 \times x = 66000$$

$$\Rightarrow \frac{22}{7} \times \frac{1}{4} \times x = 66000$$

$$\Rightarrow x = 84,000 \text{ mm}$$

Therefore, the length of the wire is 84 meters.

The correct answer is (a).

TRIGONOMETRY

Trigonometry is a branch of mathematics, related to geometry that studies the relationships between the sides of triangles and their angles. In trigonometry you will be primarily dealing with six trigonometric ratios as given below:

1. $\sin = \frac{\text{Perpendicular}}{\text{Hypotenuse}} = \frac{P}{H}$

2. $\cos = \frac{\text{Base}}{\text{Hypotenuse}} = \frac{B}{H}$

3. $\tan = \frac{\text{Perpendicular}}{\text{Base}} = \frac{P}{B}$

4. $\text{cosec (reciprocal of sin)} = \frac{\text{Hypotenuse}}{\text{Perpendicular}} = \frac{H}{P}$

5. $\sec \text{ (reciprocal of cos)} = \frac{\text{Hypotenuse}}{\text{Base}} = \frac{H}{B}$

6. $\cot \text{ (reciprocal of tan)} = \frac{\text{Base}}{\text{Perpendicular}} = \frac{B}{P}$

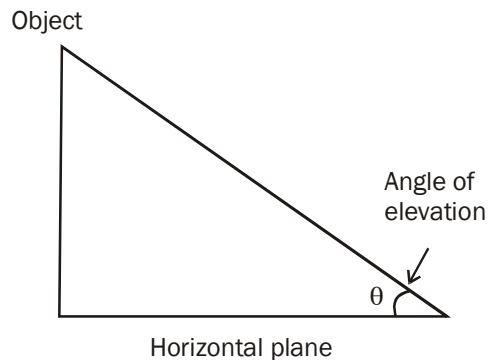
Values of Trigonometric Ratios

Ratio/Angle	0°	30°	45°	60°	90°	120°	135°	150°	180°
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	-1

Ratio/Angle	0°	30°	45°	60°	90°	120°	135°	150°	180°
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0
cot	∞	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	$-\frac{1}{\sqrt{3}}$	-1	$-\sqrt{3}$	∞
sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	∞	-2	$-\sqrt{2}$	$-\frac{2}{\sqrt{3}}$	-1
cos	∞	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	∞

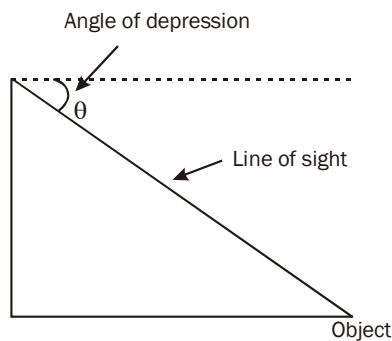
Angle of Elevation

This is the angle formed between the horizontal plane and the line of sight and when you look upward at an object.



Angle of Depression

This is the angle formed between the horizontal line and the observer's line of sight, when you look down at an object.

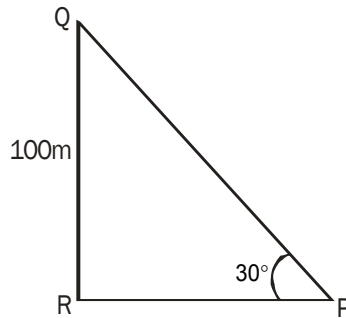


Example 1

From a point P on a level ground, the angle of elevation on the top of the tower is 30 degree. If the tower is 100m high, the distance of the point P from the foot of the tower is

- (a) 149 m (b) 156 m (c) 173 m (d) 200 m

(BBA: SET 2011)

Solution

Let R be the foot of the tower.

$$\tan 30^\circ = \frac{QR}{RP}$$

$$\Rightarrow \frac{100}{RP} = \frac{1}{\sqrt{3}} \Rightarrow RP = 100\sqrt{3} = 173 \text{ m}$$

The correct answer is (c).

Example 2

Two poles, of height 2 meters and 3 meters, are 5 meters apart. What is the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite?

Solution: In triangle BCD, we have

$$\frac{BF}{BC} = \frac{h}{3} \quad (1)$$

In triangle CAB, we have

$$\frac{CF}{CB} = \frac{h}{2} \quad (2)$$

Adding Eq. (1) and Eq. (2), we get

$$\frac{BF}{BC} + \frac{CF}{CB} = \frac{h}{3} + \frac{h}{2} \Rightarrow \frac{BF + FC}{BC} = \frac{h}{3} + \frac{h}{2}$$

Now, $BF + FC = BC$

$$\text{Hence, } \frac{h}{3} + \frac{h}{2} = 1 \Rightarrow h = 1.2 \text{ meters}$$

HIGHER MATHEMATICS

Your preparation should focus on the concepts of mathematics that are assessed in all entrance examinations. Questions based on Higher Mathematics are restricted to the Delhi University BMS CET and their number is very less. Hence, it is recommended that you don't spend a lot of time on this section. Revise the basics and if you are confident with respect to the question asked, give it a shot.

Sets

A set is a well-defined collection of objects. The concept of set serves as a fundamental part of the present day mathematics. Today this concept is being used in almost every branch of mathematics. Sets are used to define the concepts of relations and functions. The study of geometry, sequences, probability, etc. requires the knowledge of sets.

We give below a few more examples of sets used particularly in mathematics, viz.

N : Set of all natural numbers

Z : Set of all integers

Q : Set of all rational numbers

R : Set of real numbers

Z⁺ : Set of positive integers

Q⁺ : Set of positive rational numbers, and

R⁺ : Set of positive real numbers.

There are two methods of representing a set:

1. Roster or tabular form: In roster form, all the elements of a set are listed, the elements are being separated by commas and are enclosed within braces { }. For example, the set of all even positive integers less than 7 is described in roster form as {2, 4, 6}.
2. SET builder form: In SET builder form, all the elements of a set possess a single common property which is not possessed by any element outside the set. For example, denoting the set {a, e, i, o, u} by V, we write

$$V = \{x: x \text{ is a vowel in English alphabet}\}$$

Example 1

Write the set $A = \{1, 4, 9, 16, 25, 36 \dots\}$ in set builder form.

Solution: We may write the set A as

$$A = \{x: x \text{ is the square of a natural number}\}$$

Alternatively, we can write $A = \{x: x = n^2, \text{ where } n \in \mathbf{N}\}$

The empty set

A set which does not contain any element is called the *empty set* or the *null set* or the *void set*. The empty set is denoted by the symbol ϕ or { }.

Finite and infinite sets

A set which is empty or consists of a definite number of elements is called *finite* otherwise, the set is called *infinite*.

Equal sets

Two sets A and B are said to be *equal* if they have exactly the same elements and we write $A = B$. Otherwise, the sets are said to be *unequal* and we write $A \neq B$.

Subsets

A set A is said to be a subset of a set B if every element of A is also an element of B.

In other words, $A \subset B$ if whenever $a \in A$, then $a \in B$.

Power set

The collection of all subsets of a set A is called the *power set* of A. It is denoted by $P(A)$. In $P(A)$, every element is a set.

Thus, as in above, if $A = \{1, 2\}$, then

$$P(A) = \{\phi, (1), (2), (1, 2)\}$$

Also, note that $n[P(A)] = 4 = 2^2$

In general, if A is a set with $n(A) = m$, then it can be shown that $n[P(A)] = 2^m$

Universal set

A universal set is the collection of all objects in a particular context or theory. All other sets in that framework constitute subsets of the universal set, which is denoted as an uppercase italic letter U. The objects themselves are known as elements or members of U.

Venn diagrams

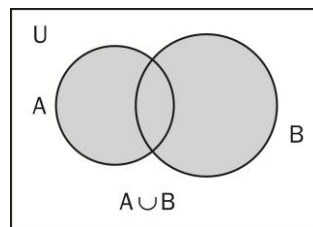
Most of the relationships between sets can be represented by means of diagrams which are known as *Venn diagrams*. In Venn diagrams, the elements of the sets are written in their respective circles.

Operations on sets

Union of sets

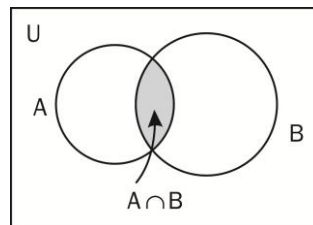
The union of two sets A and B is the set C which consists of all those elements which are either in A or in B (including those which are in both). In symbols, we write.

$$A \cup B = \{x : x \in A \text{ or } x \in B\}$$



Intersection of sets

The intersection of two sets A and B is the set of all those elements which belong to both A and B. Symbolically, we write $A \cap B = \{x : x \in A \text{ and } x \in B\}$



If A and B are two sets such that $A \cap B = \phi$, then A and B are called *disjoint sets*.

Difference of sets

The difference of the sets A and B in this order is the set of elements which belong to A but not to B. Symbolically, we write $A - B$ and read as “A minus B”.

Example 2

Let $A = \{1, 2, 3, 4, 5, 6, 7\}$, $B = \{2, 4, 6, 8\}$. Find $A - B$ and $B - A$.

Solution: We have, $A - B = \{1, 3, 5, 7\}$, since the elements 1, 3, 5, 7 belong to A but not to B and $B - A = \{8\}$, since the element 8 belongs to B and not to A.

Complement of a set

Let U be the universal set and A a subset of U. Then the complement of A is the set of all elements of U which are not the elements of A. Symbolically, we write \bar{A} to denote the complement of A with respect to U. Thus,

$$\bar{A} = \{x : x \in U \text{ and } x \notin A\}. \text{ Obviously } \bar{A} = U - A$$

Example 3

Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$ and $A = \{1, 3, 5, 7\}$. Find \bar{A} .

Solution: We note that 2, 4, 6, 8, 9, 10, 11, 12 are the only elements of U which do not belong to A.

$$\text{Hence } \bar{A} = \{2, 4, 6, 8, 9, 10, 11, 12\}.$$

Some properties of complement sets

1. Complement laws:

$$(a) A \cup A' = U$$

$$(b) A \cap A' = \phi$$

2. De Morgan's law:

$$(a) (A \cup B)' = A' \cap B'$$

$$(b) (A \cap B)' = A' \cup B'$$

3. Law of double complementation:

$$(A')' = A$$

4. Laws of empty set and universal set

$$\phi' = U \text{ and } U' = \phi.$$

Union and intersection of two sets

Let A and B be finite sets. If $A \cap B = \phi$, then

$$(i) n(A \cup B) = n(A) + n(B)$$

In general, if A and B are finite sets, then

$$(ii) n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

If A, B and C are finite sets, then

$$(iii) n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$$

Example 4

In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice.

Solution: Let U denote the set of surveyed students and P denote the set of students taking apple juice and Q denote the set of students taking orange juice. Then

$$n(U) = 400, n(P) = 100, n(Q) = 150 \text{ and } n(P \cap Q) = 75$$

$$\begin{aligned} \text{Now } n(P' \cap Q') &= n(P \cup Q)' \\ &= n(U) - n(P \cup Q) \\ &= n(U) - n(P) - n(Q) + n(P \cap Q) \\ &= 400 - 100 - 150 + 75 = 225 \end{aligned}$$

Hence, 225 students were taking neither apple juice nor orange juice.

Relations and Functions

This section deals with linking pair of elements from two sets and then introduce relations between the two elements in the pair.

Cartesian products of sets

Given two non-empty sets A and B , the set of all ordered pairs (x, y) , where $x \in A$ and $y \in B$ is called Cartesian product of A and B ; symbolically, we write

$$A \times B = \{(x, y) \mid x \in A \text{ and } y \in B\}$$

If $A = \{1, 2, 3\}$ and $B = \{5, 6\}$, then

$$A \times B = \{(1, 5), (2, 5), (3, 5), (1, 6), (2, 6), (3, 6)\} \text{ and } B \times A = \{(5, 1), (5, 2), (5, 3), (6, 1), (6, 2), (6, 3)\}$$

- (i) Two ordered pairs are equal, if and only if the corresponding first elements are equal and the second elements are also equal, that is, $(x, y) = (u, v)$ if and only if $x = u, y = v$.
- (ii) If $n(A) = p$ and $n(B) = q$, then $n(A \times B) = p \times q$.
- (iii) $A \times A \times A = \{(a, b, c) : a, b, c \in A\}$. Here (a, b, c) is called an ordered triplet.

Relations

A Relation R from a non-empty set A to a non-empty set B is a subset of the Cartesian product set $A \times B$. The subset is derived by describing a relationship between the first element and the second element of the ordered pairs in $A \times B$.

The set of all first elements in a relation R , is called the domain of the relation R , and the set of all second elements called images, is called the range of R .

For example, the set $R = \{(1, 2), (-2, 3), (6, 3)\}$ is a relation; the domain of $R = \{1, -2, 6\}$ and the range of $R = \{2, 3\}$.

- (i) A relation may be represented either by the Roster form or by the set builder form, or by an arrow diagram which is a visual representation of a relation.
- (ii) If $n(A) = p, n(B) = q$; then the $n(A \times B) = pq$ and the total number of possible relations from the set A to set $B = 2^{pq}$.

Types of relations

1. A relation R in a set A is called *empty relation*, if no element of A is related to any element of A , that is, $R = \phi \subset A \times A$.
2. A relation R in a set A is called *universal relation*, if each element of A is related to every element of A , that is, $R = A \times A$.
3. A relation R in a set A is called
 - (i) *reflexive*, if $(a, a) \in R$, for every $a \in A$,
 - (ii) *symmetric*, if $(a_1, a_2) \in R$ implies that $(a_2, a_1) \in R$, for all $a_1, a_2 \in A$.
 - (iii) *transitive*, if $(a_1, a_2) \in R$ and $(a_2, a_3) \in R$ implies that $(a_1, a_3) \in R$, for all $a_1, a_2, a_3 \in A$.
4. A relation R in a set A is said to be an *equivalence relation* if R is reflexive, symmetric and transitive.

Example 5

Show that the relation R in the set \mathbf{Z} of integers given by

$R = \{(a, b) : 2 \text{ divides } a - b\}$ is an equivalence relation.

Solution: R is reflexive, as 2 divides $(a - a)$ for all $a \in \mathbf{Z}$. Further, if $(a, b) \in R$, then 2 divides $a - b$. Therefore, 2 divides $b - a$. Hence, $(b, a) \in R$, which shows that R is symmetric. Similarly, if $(a, b) \in R$ and $(b, c) \in R$, then $a - b$ and $b - c$ are divisible by 2. Now, $a - c = (a - b) + (b - c)$ is even (Why?). So, $(a - c)$ is divisible by 2. This shows that R is transitive. Thus, R is an equivalence relation in \mathbf{Z} .

Functions

A relation f from a set A to a set B is said to be **function** if every element of set A has one and only one image in set B . In other words, a function f is a relation such that no two pairs in the relation has the same first element. The notation $f: X \rightarrow Y$ means that f is a function from X to Y . X is called the **domain** of f and Y is called the **co-domain** of f .

The set of all values of $f(x)$ taken together is called the **range of f** or image of X under f . Symbolically, range of $f = \{y \in Y \mid y = f(x), \text{ for some } x \text{ in } X\}$

A function which has either \mathbf{R} or one of its subsets as its range, is called a real valued function. Further, if its domain is also either \mathbf{R} or a subset of \mathbf{R} , it is called a real function.

Example 6

Let $A = \{1, 2, 3\}$ and $B = \{5, 7, 9\}$. Determine

- (i) $A \times B$; (ii) $B \times A$; (iii) Is $A \times B = B \times A$? (iv) Is $n(A \times B) = n(B \times A)$?

Solution: Since $A = \{1, 2, 3\}$ and $B = \{5, 7, 9\}$. Therefore,

(i) $A \times B = \{(1, 5), (1, 7), (1, 9), (2, 5), (2, 7), (2, 9), (3, 5), (3, 7), (3, 9)\}$

(ii) $B \times A = \{(5, 1), (5, 2), (5, 3), (7, 1), (7, 2), (7, 3), (9, 1), (9, 2), (9, 3)\}$

(iii) No, $A \times B \neq B \times A$. Since $A \times B$ and $B \times A$ do not have exactly the same ordered pairs.

(iv) $n(A \times B) = n(A) \times n(B) = 3 \times 3 = 9$

$n(B \times A) = n(B) \times n(A) = 3 \times 3 = 9$

Hence $n(A \times B) = n(B \times A)$

Example 7

Find the domain and range of the relation R given by

$$R = \{(x, y): y = x + \frac{6}{x} ; \text{ where } x, y \in \mathbf{N} \text{ and } x < 6\}.$$

Solution: When $x = 1$, $y = 7 \in \mathbf{N}$, so $(1, 7) \in R$.

Again for, $x = 2$, $y = 2 + \frac{6}{2} = 2 + 3 = 5 \in \mathbf{N}$, so $(2, 5) \in R$.

Again for $x = 3$, $y = 3 + \frac{6}{3} = 3 + 2 = 5 \in \mathbf{N}$, $(3, 5) \in R$.

Similarly, for $x = 4$, $y = 4 + \frac{6}{4} \notin \mathbf{N}$ and for $x = 5$, $y = 5 + \frac{6}{5} \notin \mathbf{N}$

Thus $R = \{(1, 7), (2, 5), (3, 5)\}$, where Domain of $R = \{1, 2, 3\}$

Range of $R = \{7, 5\}$

Example 8

Find the range of the following functions given by $\frac{|x-5|}{x-5}$.

$$\text{Solution: } f(x) = \frac{|x-5|}{x-5} = \begin{cases} \frac{x-5}{x-5} = 1, & x > 5 \\ -\frac{(x-5)}{x-5} = -1, & x < 5 \end{cases}$$

Thus, the range of $\frac{|x-5|}{x-5} = \{1, -1\}$

Example 9

The domain of the function f defined by $f(x) = \frac{1}{\sqrt{x-|x|}}$ is

- (a) \mathbf{R} (b) \mathbf{R}^+ (c) \mathbf{R}^- (d) None of these

Solution: Given that $f(x) = \frac{1}{\sqrt{x-|x|}}$

$$\text{where } x-|x| = \begin{cases} x-x=0 & \text{if } x \geq 0 \\ 2x & \text{if } x < 0 \end{cases}$$

Thus $\frac{1}{\sqrt{x-|x|}}$ is not defined for any $x \in \mathbf{R}$.

Hence f is not defined for any $x \in \mathbf{R}$, that is, domain of f is none of the given options.

The correct answer is (d).

Types of functions

In this section, we would like to study different types of functions. Consider the functions f_1 , f_2 , f_3 and f_4 given by the following diagrams.

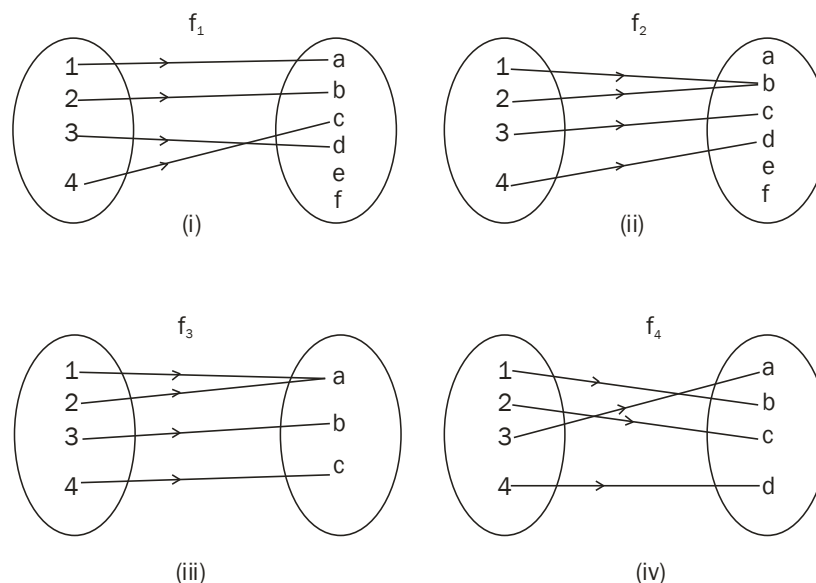


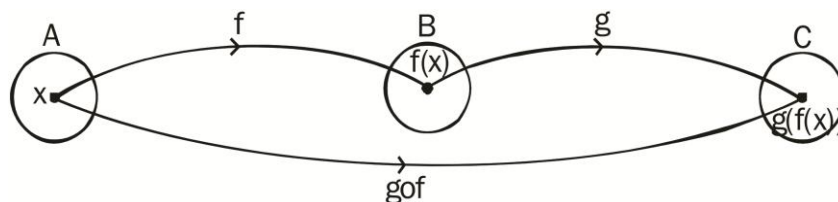
Fig. 1.2 (i) to (iv)

1. A function $f: X \rightarrow Y$ is defined to be *one-one* (or *injective*), if the images of distinct elements of X under f are distinct, that is, for every $x_1, x_2 \in X$, $f(x_1) = f(x_2)$ implies $x_1 = x_2$. Otherwise, f is called *many-one*. The function f_1 and f_4 in Fig 1.2 (i) and (iv) are one-one and the function f_2 and f_3 in Fig 1.2 (ii) and (iii) are many-one.
2. A function $f: X \rightarrow Y$ is said to be *onto* (or *surjective*), if every element of Y is the image of some element of X under f , that is, for every $y \in Y$, there exists an element x in X such that $f(x) = y$. The function f_3 and f_4 in Fig 1.2 (iii), (iv) are onto and the function f_1 in Fig 1.2 (i) is not onto as elements e, f in X_2 are not the image of any element in X_1 under f_1 .
Note: $f: X \rightarrow Y$ is onto if and only if $\text{Range of } f = Y$.
3. A function $f: X \rightarrow Y$ is said to be *one-one and onto* (or *bijective*), if f is both one-one and onto. The function f_4 in Fig 1.2 (iv) is one-one and onto.

Composition of functions and invertible function

Let $f: A \rightarrow B$ and $g: B \rightarrow C$ be two functions. Then the composition of f and g , denoted by $g \circ f$, is defined as the function $g \circ f: A \rightarrow C$ given by

$$g \circ f(x) = g(f(x)), \quad \forall x \in A.$$



Example 10

Find $g \circ f$ and $f \circ g$, if $f: \mathbf{R} \rightarrow \mathbf{R}$ and $g: \mathbf{R} \rightarrow \mathbf{R}$ are given by $f(x) = \cos x$ and $g(x) = 4x^2$.

Solution: We have $g \circ f(x) = g(f(x)) = g(\cos x) = 4(\cos x)^2 = 4 \cos^2 x$.

Similarly, $f \circ g(x) = f(g(x)) = f(4x^2) = \cos(4x^2)$.

Inverse of a function

A function $f: X \rightarrow Y$ is defined to be *invertible*, if there exists a function $g: Y \rightarrow X$ such that $gof = I_X$ and $fog = I_Y$. The function g is called the *inverse of f* and is denoted by f^{-1} .

Thus, if f is invertible, then f must be one-one and onto and conversely, if f is one-one and onto, then f must be invertible.

Example 11

Let $f: \mathbf{N} \rightarrow Y$ be a function defined as $f(x) = 5x + 3$, where, $Y = \{y \rightarrow \mathbf{N} : y = 5x + 3 \text{ for some } x \rightarrow \mathbf{N}\}$. Show that f is invertible. Find the inverse.

Solution: Consider an arbitrary element y of Y . By the definition of Y , $y = 5x + 3$, for some x in the domain \mathbf{N} .

This shows that $x = \frac{(y-3)}{5}$. Define $g: Y \rightarrow \mathbf{N}$ by $g(y) = \frac{(y-3)}{5}$.

Now, $gof(x) = g(f(x)) = g(5x+3) = \frac{(5x+3-3)}{5} = x$ and

$$fog(y) = f(g(y)) = f\left(\frac{(y-3)}{5}\right) = \frac{5(y-3)}{5} + 3 = y - 3 + 3 = y.$$

This shows that $gof = I_N$ and $fog = I_Y$, which implies that f is invertible and g is the inverse of f .

Matrix

A *matrix* is an ordered rectangular array of numbers or functions. The numbers or functions are called the elements or the entries of the matrix. We denote matrices by capital letters. The following are some examples of matrices:

$$A = \begin{bmatrix} -1 & 4 \\ 0 & \sqrt{5} \\ 6 & 3 \end{bmatrix}, B = \begin{bmatrix} 3+i & 2 & -\frac{1}{2} \\ 1.5 & -5 & 3 \\ \sqrt{3} & 1 & \frac{5}{7} \end{bmatrix}, C = \begin{bmatrix} 5+x & x^3 & 2 \\ \cos x & \sin x + 2 & \sec x \end{bmatrix}$$

In the above examples, the horizontal lines of elements are said to constitute, **rows** of the matrix and the vertical lines of elements are said to constitute, **columns** of the matrix. Thus A has 3 rows and 2 columns, B has 3 rows and 3 columns while C has 2 rows and 3 columns.

Order of a matrix

A matrix having m rows and n columns is called a matrix of *order* $m \times n$ or simply $m \times n$ matrix (read as an m by n matrix). So, referring to the above examples of matrices, we have A as 3×2 matrix, B as 3×3 matrix and C as 2×3 matrix. We observe that A has $3 \times 2 = 6$ elements, B and C have 9 and 6 elements, respectively.

In general, an $m \times n$ matrix has the following rectangular array:

$$\begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1j} & \cdots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \cdots & a_{2j} & \cdots & a_{2n} \\ \vdots & \vdots & \vdots & & \vdots & & \vdots \\ a_{i1} & a_{i2} & a_{i3} & \cdots & a_{ij} & \cdots & a_{in} \\ \vdots & \vdots & \vdots & & \vdots & & \vdots \\ a_{m1} & a_{m2} & a_{m3} & \cdots & a_{mj} & \cdots & a_{mn} \end{bmatrix}_{m \times n}$$

Or, $A = [a_{ij}]_{m \times n}, 1 \leq i \leq m, 1 \leq j \leq n \quad i, j \in \mathbb{N}$

Example 12

Construct a 3×2 matrix whose elements are given by $a_{ij} = \frac{1}{2}|i - 2j|$.

Solution: In general, 3×2 matrix is given by $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix}$

Now $a_{ij} = \frac{1}{2}|i - 2j|, i = 1, 2, 3$ and $j = 1, 2$.

Therefore $a_{11} = \frac{1}{2}|1 - 2 \times 1| = \frac{1}{2}$ $a_{12} = \frac{1}{2}|1 - 2 \times 2| = \frac{3}{2}$

$a_{21} = \frac{1}{2}|2 - 2 \times 1| = 0$ $a_{22} = \frac{1}{2}|2 - 2 \times 2| = 1$

$a_{31} = \frac{1}{2}|3 - 2 \times 1| = \frac{1}{2}$ $a_{32} = \frac{1}{2}|3 - 2 \times 2| = \frac{1}{2}$

Hence the required matrix is given by $A = \begin{bmatrix} \frac{1}{2} & \frac{3}{2} \\ 0 & 1 \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$

Equality of matrices

Two matrices $A = [a_{ij}]$ and $B = [b_{ij}]$ are said to be equal if

- (a) They are of the same order
- (b) Each element of A is equal to the corresponding element of B, that is $a_{ij} = b_{ij}$ for all i and j .

Example 13

Find the values of $a, b, c,$ and d from the following equation:

$$\begin{bmatrix} 2a + b & a - 2b \\ 5c - d & 4c + 3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$$

Solution: By equality of two matrices, equating the corresponding elements, we get

$$2a + b = 4 \quad 5c - d = 11$$

$$a - 2b = -3 \quad 4c + 3d = 24$$

Solving these equations, we get

$$a = 1, b = 2, c = 3 \text{ and } d = 4$$

Operations on matrices**Addition of matrices**

The sum of two matrices is a matrix obtained by adding the corresponding elements of the given matrices. Furthermore, the two matrices have to be of the same order. In general, if $A = [a_{ij}]$ and $B = [b_{ij}]$ are two matrices

of the same order, say $m \times n$. Then, the sum of the two matrices A and B is *defined* as a matrix $C = [c_{ij}]_{m \times n}$, where $c_{ij} = a_{ij} + b_{ij}$, for all possible values of i and j .

Example 14

$$\text{Given } A = \begin{bmatrix} 2\sqrt{3} & 2 & -2 \\ 4 & 6 & 0 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & \sqrt{5} & 1 \\ -2 & 3 & \frac{1}{2} \end{bmatrix}, \text{ find } A + B$$

Since A, B are of the same order 2×3 . Therefore, addition of A and B is defined and is given by

$$A + B = \begin{bmatrix} 2+2\sqrt{3} & 2+\sqrt{5} & 1-2 \\ 4-2 & 6+3 & 0+\frac{1}{2} \end{bmatrix} = \begin{bmatrix} 2+2\sqrt{3} & 2+\sqrt{5} & -1 \\ 2 & 9 & \frac{1}{2} \end{bmatrix}$$

Multiplication of a matrix by a scalar

In general, we may define *multiplication of a matrix* by a scalar as follows: if $A = [a_{ij}]_{m \times n}$ is a matrix and k is a scalar, then kA is another matrix which is obtained by multiplying each element of A by the scalar k .

In other words, $kA = k [a_{ij}]_{m \times n} = [k(a_{ij})]_{m \times n}$, that is, $(i, j)^{\text{th}}$ element of kA is ka_{ij} for all possible values of i and j .

$$\text{For example, if } A = \begin{bmatrix} 3 & 1 & 1.5 \\ \sqrt{5} & 7 & -3 \\ 2 & 0 & 5 \end{bmatrix}, \text{ then } 4A = 4 \begin{bmatrix} 3 & 1 & 1.5 \\ \sqrt{5} & 7 & -3 \\ 2 & 0 & 5 \end{bmatrix} = \begin{bmatrix} 12 & 4 & 6 \\ 4\sqrt{5} & 28 & -12 \\ 8 & 0 & 20 \end{bmatrix}$$

Negative of a matrix

The negative of a matrix is denoted by $-A$. We define $-A = (-1)A$.

Difference of matrices

If $A = [a_{ij}]$, $B = [b_{ij}]$ are two matrices of the same order, say $m \times n$, then difference $A - B$ is defined as a matrix $D = [d_{ij}]$, where $d_{ij} = a_{ij} - b_{ij}$, for all value of i and j . In other words, $D = A - B = A + (-1)B$, that is sum of the matrix A and the matrix $-B$.

Example 15

$$\text{If } A = \begin{bmatrix} 2 & 4 & 6 \\ 4 & 6 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & -1 & 3 \\ -1 & 0 & 2 \end{bmatrix}, \text{ then find } A - B.$$

$$\begin{aligned} \text{Solution: We have } A - B &= \begin{bmatrix} 2 & 4 & 6 \\ 4 & 6 & 2 \end{bmatrix} + \begin{bmatrix} -3 & 1 & -3 \\ 1 & 0 & -2 \end{bmatrix} \\ &= \begin{bmatrix} 2-3 & 4+1 & 6-3 \\ 4+1 & 6+0 & 2-2 \end{bmatrix} = \begin{bmatrix} -1 & 5 & 3 \\ 5 & 6 & 0 \end{bmatrix} \end{aligned}$$

Multiplication of matrices

The *product* of two matrices A and B is *defined* if the number of columns of A is equal to the number of rows of B. Let $A = [a_{ij}]$ be an $m \times n$ matrix and $B = [b_{jk}]$ be an $n \times p$ matrix. Then the product of the matrices A and B is the matrix C of order $m \times p$.

To get the $(i, k)^{\text{th}}$ element c_{ik} of the matrix C, we take the i^{th} row of A and k^{th} column of B, multiply them elementwise and take the sum of all these products. In other words, if $A = [a_{ij}]_{m \times n}$, $B = [b_{jk}]_{n \times p}$, then the i^{th} row of A is $[a_{i1} \ a_{i2} \ \dots \ a_{in}]$ and the k^{th} column of B is

$$\begin{bmatrix} b_{1k} \\ b_{2k} \\ \vdots \\ b_{nk} \end{bmatrix}, \text{ then } c_{ik} = a_{i1}b_{1k} + a_{i2}b_{2k} + a_{i3}b_{3k} + \dots + a_{in}b_{nk} = \sum_{j=1}^n a_{ij}b_{jk}.$$

The matrix $C = [C_{ik}]_{m \times p}$ is the product of A and B.

Example 16

If $A = \begin{bmatrix} 2 & -2 & 3 \\ -4 & 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$, then find AB, BA. Show that $AB \neq BA$.

Solution: Since A is a 2×3 matrix and B is 3×2 matrix. Hence AB and BA are both defined and are matrices of order 2×2 and 3×3 , respectively. Note that

$$AB = \begin{bmatrix} 2 & -2 & 3 \\ -4 & 1 & 5 \end{bmatrix} \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix} = \begin{bmatrix} 2-4+9 & 8-10+18 \\ -4+2+15 & -16+5+30 \end{bmatrix} = \begin{bmatrix} 7 & 16 \\ 13 & 19 \end{bmatrix}$$

$$\text{And } BA = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix} \begin{bmatrix} 2 & -2 & 3 \\ -4 & 1 & 5 \end{bmatrix} = \begin{bmatrix} 2-16 & -2+4 & 3+20 \\ 4-20 & -4+5 & 6+25 \\ 6-24 & -6+6 & 9+30 \end{bmatrix} = \begin{bmatrix} -14 & 2 & 23 \\ -16 & 1 & 31 \\ -18 & 0 & 39 \end{bmatrix}$$

Clearly $AB \neq BA$

Determinant

To every square matrix $A = [a_{ij}]$ of order n , we can associate a number (real or complex) called determinant of the square matrix A, where $a_{ij} = (i, j)$ th element of A.

This may be thought of as a function which associates each square matrix with a unique number (real or complex). If M is the set of square matrices, K is the set of numbers (real or complex) and $f: M \rightarrow K$ is defined by $f(A) = k$, where $A \in M$ and $k \in K$, then $f(A)$ is called the determinant of A. It is also denoted by $|A|$ or $\det A$ or Δ .

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then determinant of A is written as $|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = \det(A)$

Remarks

- (a) For matrix A, $|A|$ is read as determinant of A and not modulus of A.
- (b) Only square matrices have determinants.

Determinant of a matrix of order one

Let $A = [a]$ be the matrix of order 1, then determinant of A is defined to be equal to a

Determinant of a matrix of order two

Let $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ be a matrix of order 2×2 , then the determinant of A is defined as:

$$\det(A) = |A| = \Delta = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} = a_{11}a_{22} - a_{21}a_{12}$$

Determinant of a matrix of order 3×3

Determinant of a matrix of order three can be determined by expressing it in terms of second order determinants. This is known as expansion of a determinant along a row (or a column). There are six ways of expanding a determinant of order 3 corresponding to each of three rows (R_1 , R_2 and R_3) and three columns (C_1 , C_2 and C_3) giving the same value as shown below.

Consider the determinant of square matrix $A = [a_{ij}]_{3 \times 3}$

$$\text{That is, } |A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

The expansion of determinant of A, that is, $|A|$ written as sum of all three terms given by:

$$\det A = |A| = (-1)^{1+1} a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} + (-1)^{1+2} a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + (-1)^{1+3} a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

$$\begin{aligned} |A| &= a_{11}(a_{22}a_{33} - a_{32}a_{23}) - a_{12}(a_{21}a_{33} - a_{31}a_{23}) + a_{13}(a_{21}a_{32} - a_{31}a_{22}) \\ &= a_{11}a_{22}a_{33} - a_{11}a_{32}a_{23} - a_{12}a_{21}a_{33} + a_{12}a_{31}a_{23} + a_{13}a_{21}a_{32} - a_{13}a_{31}a_{22} \end{aligned} \quad (1)$$

Example 17

$$\text{Evaluate } \Delta = \begin{vmatrix} 0 & -\sin\alpha & -\cos\alpha \\ \sin\alpha & 0 & -\sin\beta \\ \cos\alpha & \sin\beta & 0 \end{vmatrix}$$

Solution: Expanding along R_1 , we get

$$\begin{aligned} \Delta &= 0 \begin{vmatrix} \sin\alpha & -\sin\beta \\ \cos\alpha & 0 \end{vmatrix} + \sin\alpha \begin{vmatrix} \sin\alpha & -\sin\beta \\ \cos\alpha & 0 \end{vmatrix} - \cos\alpha \begin{vmatrix} \sin\alpha & 0 \\ \cos\alpha & \sin\beta \end{vmatrix} \\ &= 0 + \sin\alpha(0 + \sin\beta\cos\alpha) - \cos\alpha(\sin\alpha\sin\beta - 0) = \sin\alpha\sin\beta\cos\alpha - \cos\alpha\sin\alpha\sin\beta = 0 \end{aligned}$$

Properties of determinants

1. The value of the determinant remains unchanged if its rows and columns are interchanged.
2. If any two rows (or columns) of a determinant are interchanged, then sign of determinant changes.
3. If any two rows (or columns) of a determinant are identical (all corresponding elements are same), then value of determinant is zero.
4. If each element of a row (or a column) of a determinant is multiplied by a constant k , then its value gets multiplied by k .

Area of a triangle

In earlier classes, we have studied that the area of a triangle whose vertices are (x_1, y_1) , (x_2, y_2) and (x_3, y_3) , is given by the expression $\frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$.

Now expression can be written in the form of a determinant as

$$\Delta = \frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} \quad (1)$$



Note

1. Since area is a positive quantity, we always take the absolute value of the determinant in (1).
2. If area is given, use both positive and negative values of the determinant for calculation.
3. The area of the triangle formed by three collinear points is zero.

Example 18

Find the area of the triangle whose vertices are (4, 9), (-5, 3) and (6, 2).

Solution: The area of triangle is given by

$$\begin{aligned} \Delta &= \frac{1}{2} \begin{vmatrix} 4 & 9 & 1 \\ -5 & 3 & 1 \\ 6 & 2 & 1 \end{vmatrix} = \frac{1}{2} [4(3-2) - 9(-5-6) + 1(-10-18)] \\ &= \frac{1}{2} (4 + 99 - 28) = \frac{75}{2} \end{aligned}$$

Example 19

Find the equation of the line joining A(2, 4) and B (0, 0) using determinants and find k if D(k, 0) is a point such that area of triangle ABD is 4 sq units.

Solution: Let P (x, y) be any point on AB. Then, area of triangle ABP is zero.

$$\text{So } \frac{1}{2} \begin{vmatrix} 0 & 0 & 1 \\ 2 & 4 & 1 \\ x & y & 1 \end{vmatrix} = 0$$

This gives $\frac{1}{2}(2y - 4x) = 0 \Rightarrow 2y - 4x = 0 \Rightarrow y = 2x$, which is the equation of required line AB.

Also, since the area of the triangle ABD is 4 sq. units, we have

$$\frac{1}{2} \begin{vmatrix} 2 & 4 & 1 \\ 0 & 0 & 1 \\ k & 0 & 1 \end{vmatrix} = \pm 4$$

This gives, $\frac{-4k}{2} = \pm 4$, i.e., $k = \mp 2$

Minors and cofactors

Minor of an element a_{ij} of a determinant is the determinant obtained by deleting its i th row and j th column in which element a_{ij} lies. Minor of an element a_{ij} is denoted by M_{ij} . Minor of an element of a determinant of order n ($n \geq 2$) is a determinant of order $n - 1$. Cofactor of an element a_{ij} , denoted by A_{ij} is defined by $A_{ij} = (-1)^{i+j} M_{ij}$, where M_{ij} is minor of a_{ij} .

Example 20

Find minors and cofactors of the elements of the determinant $\begin{vmatrix} 3 & -4 & 6 \\ 7 & 0 & 5 \\ 2 & 6 & -8 \end{vmatrix}$

Solution: We have $M_{11} = \begin{vmatrix} 0 & 5 \\ 6 & -8 \end{vmatrix} = 0 - 30 = -30$; $A_{11} = (-1)^{1+1}(-30) = -30$

$$M_{12} = \begin{vmatrix} 7 & 5 \\ 2 & -8 \end{vmatrix} = -56 - 10 = -66; \quad A_{12} = (-1)^{1+2}(-66) = 66$$

$$M_{13} = \begin{vmatrix} 7 & 0 \\ 2 & 6 \end{vmatrix} = 42 - 0 = 42; \quad A_{13} = (-1)^{1+3}(42) = 42$$

$$M_{21} = \begin{vmatrix} -4 & 6 \\ 6 & -8 \end{vmatrix} = 32 - 26 = 6; \quad A_{21} = (-1)^{2+1}(6) = -6$$

$$M_{22} = \begin{vmatrix} 3 & 6 \\ 2 & -8 \end{vmatrix} = -24 - 12 = -36; \quad A_{22} = (-1)^{2+2}(-36) = -36$$

$$M_{23} = \begin{vmatrix} 3 & -4 \\ 2 & 6 \end{vmatrix} = 18 + 8 = 26; \quad A_{23} = (-1)^{2+3}(26) = -26$$

$$M_{31} = \begin{vmatrix} -4 & 6 \\ 0 & 5 \end{vmatrix} = -20 - 0 = -20; \quad A_{31} = (-1)^{3+1}(-20) = -20$$

$$M_{32} = \begin{vmatrix} 3 & 6 \\ 7 & 5 \end{vmatrix} = 15 - 42 = -27; \quad A_{32} = (-1)^{3+2}(-27) = 27$$

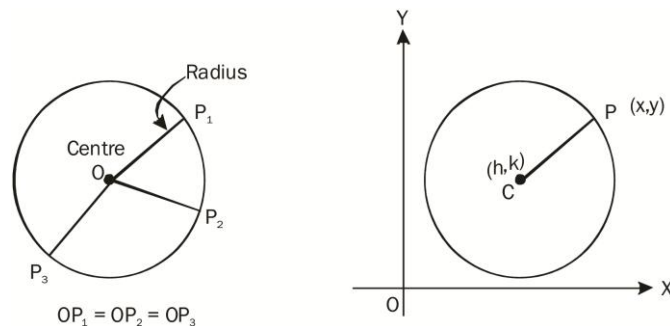
$$M_{33} = \begin{vmatrix} 3 & -4 \\ 7 & 0 \end{vmatrix} = 0 + 28 = 28; \quad A_{33} = (-1)^{3+3}(28) = 28$$

Conic Sections

In this section, we shall study about some curves, viz., circles, ellipses, parabolas and hyperbolas. These curves are in fact, known as *conic sections*.

Circle

A circle is the set of all points in a plane that are equidistant from a fixed point in the plane. The fixed point is called the *centre of the circle* and the distance from the centre to a point on the circle is called the *radius* of the circle



The equation of the circle with centre at (h, k) and radius r is given by:

$$(x - h)^2 + (y - k)^2 = r^2$$

Example 21

Find the equation of the circle with centre $(-2, 3)$ and radius 5.

Solution: Here $h = -2$, $k = 3$ and $r = 5$.

Therefore, the equation of the required circle is $(x + 2)^2 + (y - 3)^2 = 25$

Example 22

Find the centre and the radius of the circle $x^2 + y^2 + 10x + 8y - 8 = 0$

Solution: The given equation is $(x^2 + 10x) + (y^2 + 8y) = 8$

Now, completing the squares within the parenthesis, we get

$$(x^2 + 10x + 25) + (y^2 + 8y + 16) = 8 + 25 + 16$$

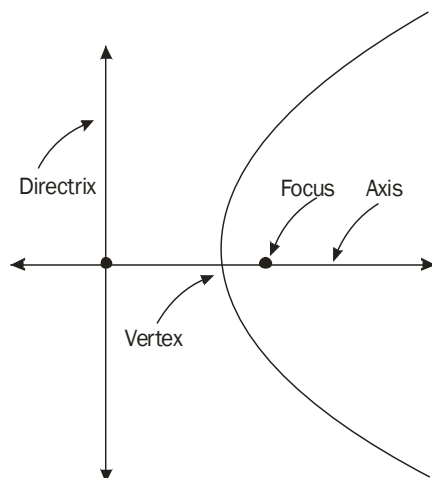
$$(x + 5)^2 + (y + 4)^2 = 49$$

$$\{x - (-5)\}^2 + \{y - (-4)\}^2 = 7^2$$

Therefore, the given circle has centre at $(-5, -4)$ and radius 7.

Parabola

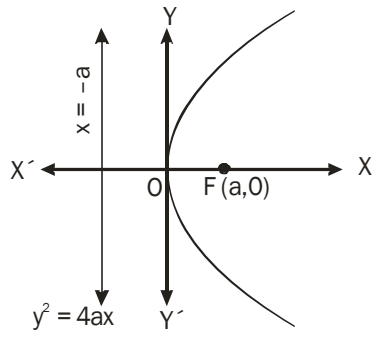
A parabola is the set of all points in a plane that are equidistant from a fixed line and a fixed point (not on the line) in the plane. The fixed line is called the *directrix* of the parabola and the fixed point F is called the *focus*.



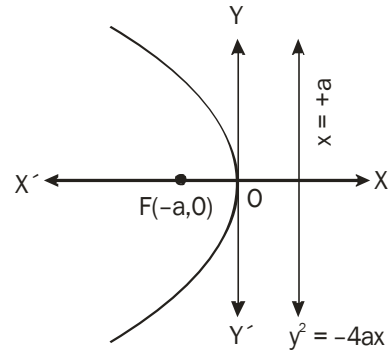
A line through the focus and perpendicular to the *directrix* is called the *axis* of the parabola. The point of intersection of parabola with the axis is called the *vertex* of the parabola.

Standard equations of parabola

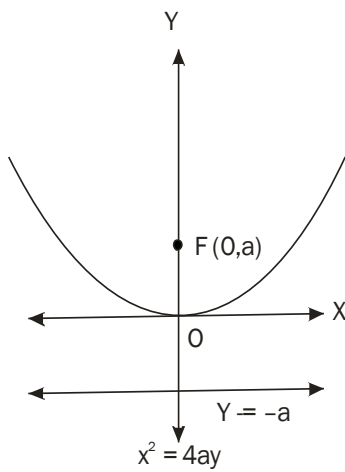
The equation of a *parabola* is simplest if the vertex is at the origin and the axis of symmetry is along the x-axis or y-axis. The four possible such orientations of parabola are shown in the figures below:



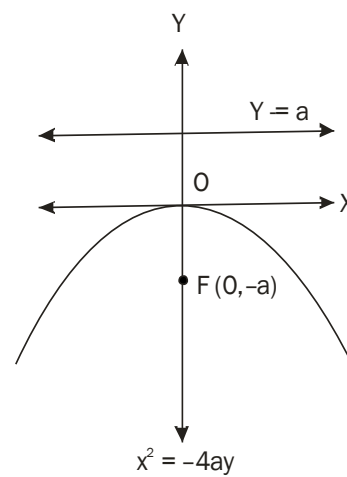
(a)



(b)



(c)

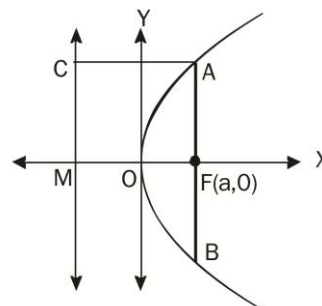
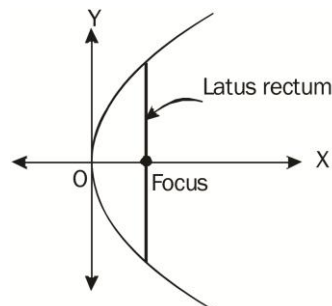


(d)

Latus rectum

Latus rectum of a parabola is a line segment perpendicular to the axis of the parabola, through the focus and whose end points lie on the parabola.

Length of the latus rectum = $4a$



Example 23

Find the coordinates of the focus, axis, the equation of the directrix and latus rectum of the parabola $y^2 = 16x$.

Solution: The given equation involves y^2 , so the axis of symmetry is along the x-axis.

The coefficient of x is positive, so the parabola opens to the right.

Comparing with the given equation $y^2 = 4ax$, we find that $a = 4$.

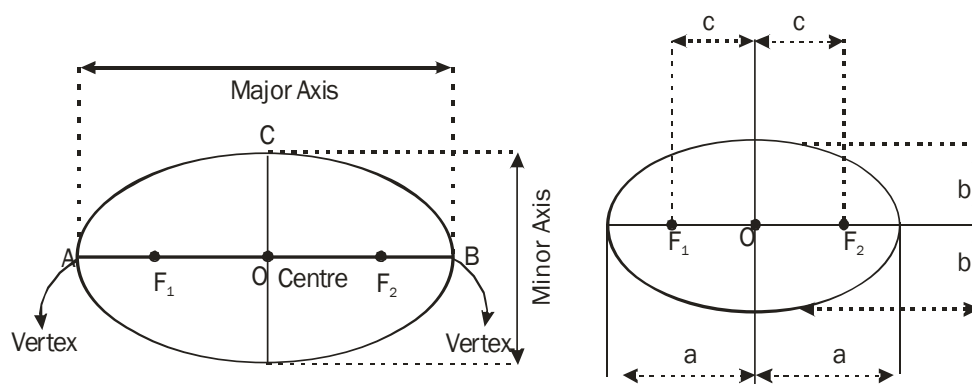
Thus, the focus of the parabola is $(4, 0)$ and the equation of the directrix of the parabola is $x = -4$.

Length of the latus rectum is $4a = 4 \times 4 = 16$

Ellipse

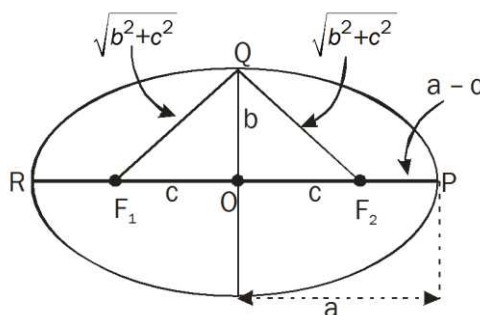
An *ellipse* is the set of all points in a plane, the sum of whose distances from two fixed points in the plane is a constant.

The two fixed points are called the *foci* (plural of 'focus') of the ellipse. The midpoint of the line segment joining the foci is called the *centre* of the ellipse. The line segment through the foci of the ellipse is called the *major axis* and the line segment through the centre and perpendicular to the major axis is called the *minor axis*. The end points of the major axis are called the *vertices* of the ellipse



We denote the length of the major axis by $2a$, the length of the minor axis by $2b$ and the distance between the foci by $2c$. Thus, the length of the semi major axis is a and semi-minor axis is b .

Relationship between semi-major axis, semi-minor axis and the distance of the focus from the centre of the ellipse



By the definition of ellipse, we have

$$2\sqrt{b^2 + c^2} = 2a, \text{ i.e., } a = \sqrt{b^2 + c^2}$$

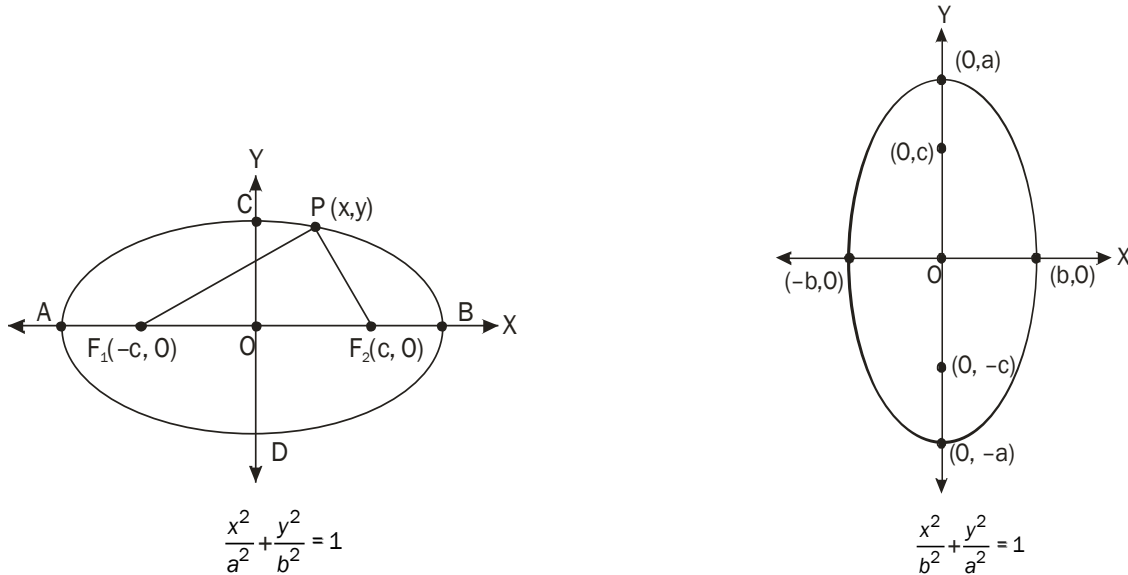
$$\text{Or } a^2 = b^2 + c^2, \text{ i.e., } c = \sqrt{a^2 - b^2}$$

Eccentricity

The eccentricity of an ellipse is the ratio of the distances from the centre of the ellipse to one of the foci and to one of the vertices of the ellipse (eccentricity is denoted by e), that is, $e = \frac{c}{a}$.

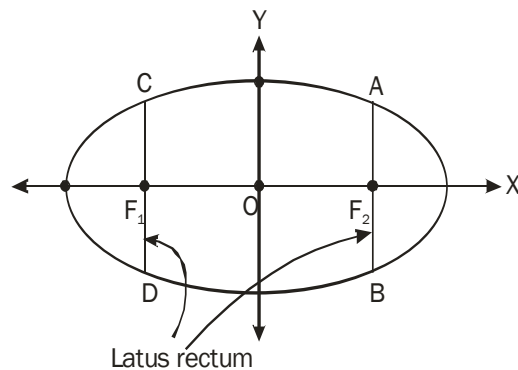
Standard equations of an ellipse

The equation of an ellipse is simplest if the centre of the ellipse is at the origin and the foci are on the x-axis or y-axis. The two such possible orientations are shown in the figure below:



Latus rectum

Latus rectum of an ellipse is a line segment perpendicular to the major axis through any of the foci and whose end points lie on the ellipse.



The length of the latus rectum is $\frac{2b^2}{a}$.

Example 24

Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the

latus rectum of the ellipse $\frac{x^2}{36} + \frac{y^2}{9} = 1$

Solution: Since denominator of $\frac{x^2}{36}$ is larger than the denominator of $\frac{y^2}{9}$, the major axis is along the x-axis.

Comparing the given equation with $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, we get $a = 6$ and $b = 3$.

$$\text{Also } c = \sqrt{a^2 + b^2} = \sqrt{36 + 9} = \sqrt{45} = 3\sqrt{5}$$

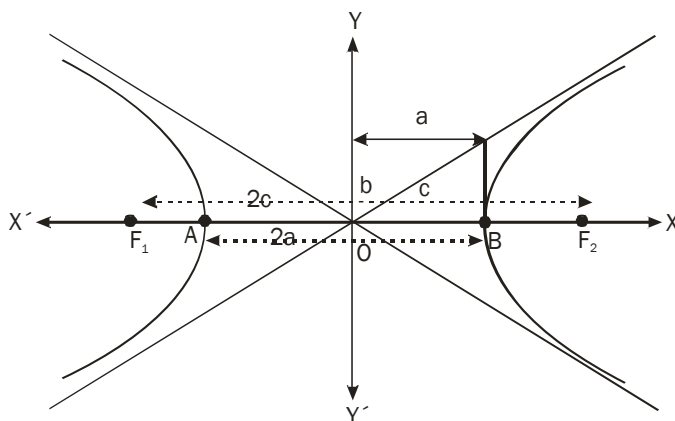
Therefore, the coordinates of the foci are $(-3\sqrt{5}, 0)$ and $(3\sqrt{5}, 0)$, vertices are $(-6, 0)$ and $(6, 0)$. Length of the major axis is 12 units length of the minor axis $2b$ is 6 units and the eccentricity is $\frac{3\sqrt{5}}{6} = \frac{\sqrt{5}}{2}$ and latus

$$\text{rectum is } \frac{2b^2}{a} = \frac{18}{6} = 3.$$

Hyperbola

A hyperbola is the set of all points in a plane, the difference of whose distances from two fixed points in the plane is a constant.

The two fixed points are called the foci of the hyperbola. The mid-point of the line segment joining the foci is called the *centre of the hyperbola*. The line through the foci is called the *transverse axis* and the line through the centre and perpendicular to the transverse axis is called the *conjugate axis*. The points at which the hyperbola intersects the transverse axis are called the *vertices of the hyperbola*.



We denote the distance between the two foci by $2c$, the distance between two vertices (the length of the transverse axis) by $2a$ and we define the quantity b as $b = \sqrt{c^2 - a^2}$.

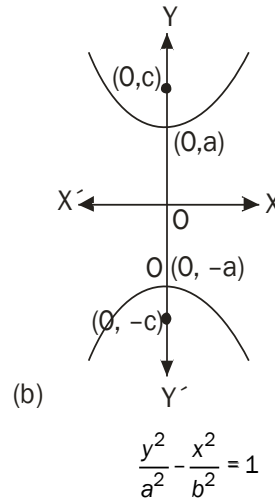
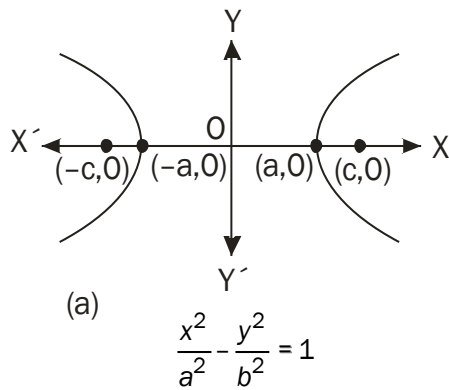
Also, $2b$ is the length of the conjugate axis.

Eccentricity

Just like an ellipse, the ratio $e = \frac{c}{a}$ is called the *eccentricity of the hyperbola*. Since $c \geq a$, the eccentricity is never less than one.

Standard equation of hyperbola

The equation of a hyperbola is simplest if the centre of the hyperbola is at the origin and the foci are on the x-axis or y-axis. The two such possible orientations are shown in the figure below:



Note

A hyperbola in which $a = b$ is called an *equilateral hyperbola*.

Latus rectum

Latus rectum of hyperbola is a line segment perpendicular to the transverse axis through any of the foci and whose end points lie on the hyperbola.

As in ellipse, it is easy to show that the length of the latus rectum in hyperbola is $\frac{2b^2}{a}$.

Example 25

Find the coordinates of the foci and the vertices, the eccentricity, the length of the latus rectum of the hyperbolas: $\frac{x^2}{36} - \frac{y^2}{64} = 1$.

Solution: Comparing the equation $\frac{x^2}{36} - \frac{y^2}{64} = 1$ with the standard equation $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

Here, $a = 6$, $b = 8$ and $c = \sqrt{a^2 + b^2} = \sqrt{36 + 64} = 10$

Therefore, the coordinates of the foci are $(\pm 10, 0)$ and that of vertices are $(\pm 6, 0)$. Also,

The eccentricity $e = \frac{c}{a} = \frac{10}{6} = \frac{5}{3}$. The latus rectum $= \frac{2b^2}{a} = \frac{128}{3}$

Limits

Properties

if $\lim_{x \rightarrow a} f(x) = l$ and $\lim_{x \rightarrow a} g(x) = m$, then

$$1. \quad \lim_{x \rightarrow a} [f(x) \pm g(x)] = l \pm m$$

$$2. \quad \lim_{x \rightarrow a} [f(x) \cdot g(x)] = l \cdot m$$

$$3. \lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{l}{m} \text{ where } m \neq 0$$

$$4. \lim_{x \rightarrow a} c \cdot f(x) = c \cdot l$$

$$5. \lim_{x \rightarrow a} \frac{1}{f(x)} = \frac{1}{l} \text{ where } l \neq 0$$

Limits formulae

$$1. \lim_{x \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e$$

$$2. \lim_{x \rightarrow \infty} (1 + \frac{1}{n})^{\frac{1}{n}} = e$$

$$3. \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$4. \lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$$

$$5. \lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$$

$$6. \lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$$

$$7. \lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln a$$

Example 26

The value of $\lim_{x \rightarrow 0^+} \frac{e^{1/x} - 1}{e^{1/x} + 1}$, $x \neq 0$, is:

(a) 0

(b) -1

(c) 1

(d) None of these

(BBA: DU JAT 2012)

Solution: Let $\frac{1}{x} = h$

If $x \rightarrow 0$, then $h \rightarrow \infty$

$$\lim_{x \rightarrow 0} \frac{e^{1/x} - 1}{e^{1/x} + 1} = \lim_{h \rightarrow \infty} \frac{e^h - 1}{e^h + 1} = \lim_{h \rightarrow \infty} \frac{e^h \left(1 - \frac{1}{e^h}\right)}{e^h \left(1 + \frac{1}{e^h}\right)} = \lim_{h \rightarrow \infty} \frac{1 - \frac{1}{e^h}}{1 + \frac{1}{e^h}} = \frac{1 - 0}{1 + 0} = 1 \quad \left(\text{Since } \lim_{h \rightarrow \infty} \frac{1}{e^h} = 0\right)$$

The correct answer is (c).

Continuity and Differentiability

Continuity of a function at a point

Let f be a real function on a subset of the real numbers and let c be a point in the domain of f . Then f is continuous at c if

$$\lim_{x \rightarrow c} f(x) = f(c)$$

More elaborately, if the left hand limit, right hand limit and the value of the function at $x = c$ exist and are equal to each other, that is,

$$\lim_{x \rightarrow c^-} f(x) = f(c) = \lim_{x \rightarrow c^+} f(x)$$

then f is said to be continuous at $x = c$.

Continuity in an interval

1. f is said to be continuous in an open interval (a, b) if it is continuous at every point in this interval.
2. f is said to be continuous in the closed interval $[a, b]$ if
 - f is continuous in (a, b)
 - $\lim_{x \rightarrow a^+} f(x) = f(a)$
 - $\lim_{x \rightarrow b^-} f(x) = f(b)$

Geometrical meaning of continuity

1. Function f will be continuous at $x = c$ if there is no break in the graph of the function at the point $(c, f(c))$.
2. In an interval, function is said to be continuous if there is no break in the graph of the function in the entire interval.

Discontinuity

The function f will be discontinuous at $x = a$ in any of the following cases:

1. $\lim_{x \rightarrow a^-} f(x)$ and $\lim_{x \rightarrow a^+} f(x)$ exist but are not equal.
2. $\lim_{x \rightarrow a^-} f(x)$ and $\lim_{x \rightarrow a^+} f(x)$ exist and are equal but not equal to $f(a)$.
3. $f(a)$ is not defined.

Continuity of some of the common functions

Function $f(x)$	Interval in which f is continuous
<ol style="list-style-type: none"> 1. The constant function, i.e. $f(x) = c$ 2. The identity function, i.e. $f(x) = x$ 3. The polynomial function, i.e. $f(x) = a_0x^n + a_1x^{n-1} + \dots + a_{n-1}x + a_n$ 	\mathbf{R}
4. $ x - a $	$(-\infty, \infty)$
5. x^{-n} , n is a positive integer	$(-\infty, \infty) - \{0\}$
6. $\frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are polynomials in x	$\mathbf{R} - \{x : q(x) = 0\}$
7. $\sin x, \cos x$	\mathbf{R}
8. $\tan x, \sec x$	$\mathbf{R} - \{(2n+1)\frac{\pi}{2} : n \in \mathbf{Z}\}$
9. $\cot x, \operatorname{cosec} x$	$\mathbf{R} - \{n\pi : n \in \mathbf{Z}\}$
10. e^x	\mathbf{R}
11. $\log x$	$(0, \infty)$
12. The inverse trigonometric functions, that is, $\sin^{-1} x, \cos^{-1} x$ etc.	In their respective domains

Continuity of composite functions

Let f and g be real valued functions such that $(f \circ g)$ is defined at a . If g is continuous at a and f is continuous at $g(a)$, then $(f \circ g)$ is continuous at a .

Example 27

Find the value of the constant k so that the function f defined below is continuous at $x = 0$, where

$$f(x) = \begin{cases} \frac{1 - \cos 4x}{8x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$$

Solution: It is given that the function f is continuous at $x = 0$. Therefore,

$$\lim_{x \rightarrow 0} f(x) = f(0) \Rightarrow \lim_{x \rightarrow 0} \frac{1 - \cos 4x}{8x^2} = k \Rightarrow \lim_{x \rightarrow 0} \frac{2 \sin^2 2x}{8x^2} = k \Rightarrow \lim_{x \rightarrow 0} \left(\frac{\sin 2x}{2x} \right)^2 = k \Rightarrow k = 1$$

Thus, f is continuous at $x = 0$ if $k = 1$

Example 28

$$\text{If } f(x) = \begin{cases} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2}, & x \neq 2 \\ k, & x = 2 \end{cases}$$

is continuous at $x = 2$, find the value of k .

Solution: Given $f(2) = k$.

$$\text{Now, } \lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2} \frac{x^3 + x^2 - 16x + 20}{(x-2)^2} = \lim_{x \rightarrow 2} \frac{(x-5)(x-2)^2}{(x-2)^2} = \lim_{x \rightarrow 2} (x-5) = 7$$

As f is continuous at $x = 2$, we have $\lim_{x \rightarrow 2} f(x) = f(2) \Rightarrow k = 7$

Differentiability

The function defined by $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$, wherever the limit exists, is defined to be the derivative of f at

x . In other words, we say that a function f is differentiable at a point c in its domain if both $\lim_{h \rightarrow 0^-} \frac{f(c+h) - f(c)}{h}$,

called left hand derivative, denoted by $Lf'(c)$, and $\lim_{h \rightarrow 0^+} \frac{f(c+h) - f(c)}{h}$, called right hand derivative, denoted by

$Rf'(c)$, are finite and equal.

1. The function $y = f(x)$ is said to be differentiable in an open interval (a, b) if it is differentiable at every point of (a, b) .
2. The function $y = f(x)$ is said to be differentiable in the closed interval $[a, b]$ if $Rf'(a)$ and $Lf'(b)$ exist and $f'(x)$ exists for every point of (a, b) .
3. Every differentiable function is continuous, but the converse is not true.

Derivatives

Basic properties and formulas

- $(cf)' = cf'(x)$
- $(f \pm g)' = f'(x) + g'(x)$

Product rule

- $(f \cdot g)' = f' \cdot g + f \cdot g'$

Quotient rule

- $\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}$

Power rule

- $\frac{d}{dx}(x^n) = nx^{n-1}$

Chain rule

- $\frac{d}{dx}(f(g(x))) = f'(g(x))g'(x)$

Common derivatives

- | | |
|--|--|
| • $\frac{d}{dx}(\sin x) = \cos x$ | • $\frac{d}{dx}(\cos x) = -\sin x$ |
| • $\frac{d}{dx}(\tan x) = \frac{1}{\cos^2 x} = \sec^2 x$ | • $\frac{d}{dx}(\sec x) = \sec x \tan x$ |
| • $\frac{d}{dx}(c) = 0$ | • $\frac{d}{dx}(x) = 1$ |
| • $\frac{d}{dx}(a^x) = a^x \ln a$ | • $\frac{d}{dx}(e^x) = e^x$ |
| • $\frac{d}{dx}(\ln x) = \frac{1}{x}, x > 0$ | • $\frac{d}{dx}(\ln x) = \frac{1}{x}, x \neq 0$ |
| • $\frac{d}{dx}(\log_a x) = \frac{1}{x \ln a}, x > 0$ | |

Example 29

If $y = \frac{1}{1+x^{n-m} + x^{p-m}} + \frac{1}{1+x^{m-n} + x^{p-n}} + \frac{1}{1+x^{m-p} + x^{n-p}}$, $\frac{dy}{dx}$ is

- (a) x^{n-p-1} (b) 0 (c) x^{n-m-1} (d) x^{m-p-1}

(BBA: CBS 2010)

Solution: Multiplying the numerator and denominator of first, second and third term with x^m , x^n and x^p respectively, we get

$$y = \frac{x^m}{x^m + x^n + x^p} + \frac{x^n}{x^n + x^m + x^p} + \frac{x^p}{x^p + x^m + x^n} = \frac{x^m + x^n + x^p}{x^m + x^n + x^p} = 1$$

$$\Rightarrow y = 1 \Rightarrow \frac{dy}{dx} = 0$$

The correct answer is (b).

Integrals

Basic formulas

- $\int x^n dx = \frac{1}{n+1} x^{n+1} + C$
- $\int \frac{1}{x} dx = \ln|x| + C$
- $\int c dx = cx + C$
- $\int x dx = \frac{1}{2} x^2 + C$
- $\int x^2 dx = \frac{1}{3} x^3 + C$
- $\int \frac{1}{x^2} dx = -\frac{1}{x} + C$
- $\int \sec x dx = \ln|\tan x + \sec x| + C$
- $\int \sin^2 x dx = \frac{1}{2}(x - \sin x \cos x) + C$
- $\int \cos^2 x dx = \frac{1}{2}(x + \sin x \cos x) + C$
- $\int \sec^2 x dx = \tan x + C$
- $\int e^x dx = e^x + C$
- $\int b^x dx = \frac{1}{\ln b} b^x$
- $\int \sin x dx = -\cos x + C$
- $\int \cos x dx = \sin x + C$
- $\int \tan x dx = \ln|\sec x| + C$
- $\int \sqrt{x} dx = \frac{2}{3} x\sqrt{x} + C$
- $\int \frac{1}{\sqrt{x}} dx = 2\sqrt{x} + C$
- $\int \tan^2 x dx = \tan x - x + C$

Example 30

The value of $\int_1^4 |x-3| dx$ is

- (a) $\frac{-3}{2}$ (b) $\frac{3}{2}$ (c) $\frac{9}{2}$ (d) $\frac{5}{2}$

(BBA: DU JAT 2012)

Solution: $f(x) = |x-3|$

$$f(x) = \begin{cases} 3-x; & x \leq 3 \\ x-3; & x > 3 \end{cases}$$

$$\int_1^4 |x-3| dx = \int_1^3 (3-x) dx + \int_3^4 (x-3) dx$$

$$= \left[3x - \frac{x^2}{2} \right]_1^3 + \left[\frac{x^2}{2} - 3x \right]_3^4 = \left[\left(9 - \frac{9}{2} \right) - \left(3 - \frac{1}{2} \right) \right] + \left[\left(\frac{4^2}{2} - 12 \right) - \left(\frac{9}{2} - 9 \right) \right] = 2 + \frac{1}{2} = \frac{5}{2}$$

The correct answer is (d).

DATA SUFFICIENCY

The questions based on data sufficiency do not require you to find the exact answer. They require you to determine whether the statements provided in the question contain enough information for answering it.

There is a great chance that in the exam, you will see at least 5 questions from this topic. That means, you should spend some time getting familiar with these types of questions.

We have seen that a majority of the aspirants try guess work to solve these data sufficiency questions. This is not the right approach. Instead of guessing, we should use certain tips and tricks to solve these questions.

Question Format

Data sufficiency sets consist of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements is sufficient to answer the question. Read both the statements and give the answer.

- (a) If the data in statement I alone is sufficient to answer the question, while the data in statement II alone is not sufficient to answer the question
- (b) If the data in statement II alone is sufficient to answer the question, while the data in statement I alone is not sufficient to answer the question
- (c) If the data in both statements I and II together is necessary to answer the question
- (d) If the data either in statement I alone or in statement II alone is sufficient to answer the question
- (e) If the data given in both statements I and II together is not sufficient to answer the question

Steps in Solving Data Sufficiency Questions

- Read the **given** problem. Don't assume anything except universal facts.
- **Treat both the statements separately.**
- Take the first statement and combine it with the main statement. Try to find the answer.
- If you are unable to find the answer using the first step then take the second statement and combine it with the main statement and try to find the answer.
- If you are unable to find the answer using the second statement then add both statements with the main statement and try to find the answer.
- If even now you can't find answer, simply tick 'both the statements are insufficient'.

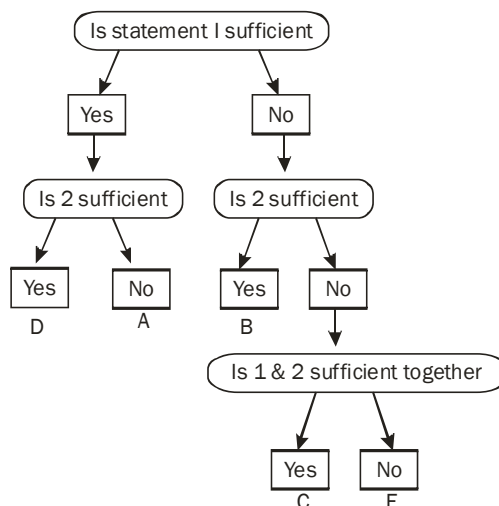


Figure: Steps to solve Data Sufficiency questions

Example 1

This question consists of a question and two statements numbered I and II. Decide whether the data given in the statements are sufficient to answer the question.

What is the 57th number in a series of numbers?

- I. Each number in the series is three more than the preceding number.
- II. The tenth number in the series is 29.
 - (a) The data in Statement I alone is sufficient to answer the question while the data in Statement II alone is not sufficient to answer the question.
 - (b) The data in Statement II alone is sufficient to answer the question, while the data in Statement I alone is not sufficient to answer the question.
 - (c) If the data either in Statement I or Statement II alone are sufficient to answer the question.
 - (d) If the data in both Statements I and II together is necessary to answer the question.

Solution: From statement I alone: We get the common difference but nothing can be said about the 57th term.

From statement II alone: We get the 10th term but nothing can be said about the 57th term as we do not know the common difference.

Combining statements I and II: We can find the common difference and the first term of the series. Hence, the 57th number can be calculated.

Example 2

Bags I, II and III together have ten balls. If each bag contains at least one ball, how many balls does each bag have? Decide whether the data given in the statements are sufficient to answer the question.

Statement (1): Bag I contains five balls more than bag III.

Statement (2): Bag II contains half as many balls as bag I

- (a) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
- (b) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
- (c) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question asked.
- (d) EACH statement ALONE is sufficient to answer the question asked.

Solution: Let the number of balls in bag I, II and III be x , y and z respectively.

$$x + y + z = 10 \quad (1)$$

From statement (1): $x - z = 5 \quad (2)$

We cannot get unique solution from Eq. (i) and (ii). Therefore, statement (1) alone is not sufficient.

From statement (2): $y = \frac{1}{2}x \quad (3)$

We cannot get unique solution from Eq. (1) and Eq. (3).

Therefore, statement (2) alone is not sufficient.

Solving Eqs. (1), (2) and (3), we get

$$x = 6, y = 3 \text{ and } z = 1.$$

Hence, both statements (1) and (2) together are sufficient to answer the question.

Quantitative Aptitude Practice Tests

GENERAL INSTRUCTIONS

1. Each question has 4 responses. Candidate should choose an appropriate response.
2. Every question carries one mark.
3. For every incorrect answer, 1/4th of the marks allotted to the question will be deducted.

Practice Test 1

1. **A and B both travel through a distance of 20 kms. A travels at the speed of 8 kmph for half the distance and the remaining at 12 kmph; while B travels at a uniform speed to 10 kmph. When B reaches the destination, how far is A behind?**
(a) 1000 m
(b) 800 m
(c) 750 m
(d) 500 m
(BBA: SET 2009)
2. **The angle of elevation of the top of a tower from two horizontal points at distances of a and b from the tower are α & $(90^\circ - \alpha)$ respectively. The height of the tower will be**
(a) ab
(b) \sqrt{ab}
(c) $\frac{\sqrt{a}}{b}$
(d) $\frac{\sqrt{b}}{a}$
(BBA: CBS 2010)

3. Three taps A, B and C can fill a tank in 12, 15 and 20 hours respectively. If A is open all time and B and C are open for one hour each alternately, the tank will be full in

(a) 6 hours
 (b) $6\frac{2}{3}$ hours
 (c) 5 hours
 (d) 7 hours

(BBA: SET 2010)

4. If x, y, z are three natural numbers in arithmetic progression and $x + y + z = 21$ then the possible number of values of the ordered triplet (x, y, z) is

(a) 13
 (b) 14
 (c) 15
 (d) 12

(BBA: DU JAT 2011)

5. A trader mixes 26 kg of rice at Rs. 20 per kg with 30 kg of rice of other variety at Rs. 36 per kg and sells the mixture at Rs. 30 per kg. His profit percent is

(a) no profit no loss
 (b) 5%
 (c) 10%
 (d) 8%

(BBA: SET 2011)

6. The circumference of a circle is 100 cm. The side of the square inscribed in the circle is

(a) $\frac{\sqrt{2}}{\pi} 50$
 (b) $\frac{\pi}{\sqrt{2}} 50$
 (c) $\frac{\sqrt{2}}{\pi} 100$
 (d) $\frac{\pi}{\sqrt{2}} 100$

(BBA: CBS 2009)

7. After replacing an old member by a new member, it was found that the average age of five members of a club is the same as it was 3 years ago. What is the difference between the ages of the replaced and the new member?

(a) 2 years
 (b) 4 years
 (c) 8 years
 (d) 15 years

(BBA: SET 2010)

8. If $a^2 + b^2 = 7ab$ then

(a) $\log(a + b) = \log a + \log b$
 (b) $\log\left(\frac{a+b}{2}\right) = \frac{1}{3}[\log a + \log b]$
 (c) $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}[\log a + \log b]$
 (d) $\log(3(a + b)) = 2(\log a + \log b)$

(BBA: DU JAT 2011)

9. A, B, and C start at the same time in the same direction to run around a circular stadium. A complete a round in 252 sec., B in 308 sec., C in 198 sec., all starting at the same point. After what time will they meet again at the starting point?

(a) 26 min. 18 sec.
 (b) 42 min. 36 sec.
 (c) 45 min.
 (d) 46 min. 12 sec.

(BBA: SET 2011)

10. If the line $x + y = c$ is a tangent to the circle $x^2 + y^2 + 4x - 6y + 9 = 0$, the possible values of c are:

(a) $1 \pm \sqrt{2}$
 (b) $1 \pm 2\sqrt{2}$
 (c) $\pm 2\sqrt{2}$
 (d) $\pm \sqrt{2}$

(BBA: DU JAT 2012)

11. David got two and a half times as many marks in English as in history. If the total marks in two subjects are 140, then the marks obtained by him in English is

- (a) 40
- (b) 75
- (c) 90
- (d) 100

(BBA: SET 2011)

12. Solve
$$\frac{\left\{ \left(\frac{1}{3} \right)^{-3} - \left(\frac{1}{2} \right)^{-3} \right\}}{\left(\frac{1}{4} \right)^{-3}}$$

- (a) $\frac{19}{64}$
- (b) $\frac{27}{16}$
- (c) $\frac{64}{19}$
- (d) $\frac{16}{25}$

(BBA: CBS 2009)

13. If a circle and a square have the same area then,

- (a) The circumference of circle is equal to the perimeter of square
- (b) The circumference of circle is equal to the times the perimeter of the square
- (c) The circumference of circle is less than perimeter of square
- (d) The circumference of circle is greater than perimeter of square

(BBA: SET 2011)

14. In an entrance test comprising of 100 questions, a student scores 6 marks for every correct answer and loses 2 marks for every wrong answer. If a student attempted 90 questions and scores 356 marks, then the number of questions answered correctly are:

- (a) 67
- (b) 68
- (c) 70
- (d) 71

(BBA: DU JAT 2012)

15. The expression $5^{2n} - 2^{3n}$ has a factor

- (a) 3
- (b) 7
- (c) 10
- (d) 17

(BBA: CBS 2010)

16. In an examination 20% candidates fail in English, 25% in Mathematics and 10% in both. If 2600 candidates pass in both the subjects, find the total number of candidates appearing in the examination.

- (a) 3000
- (b) 3500
- (c) 4000
- (d) 4500

(BBA: SET 2010)

17. Consider the following two statements about the function $f(x) = |x|$.

- P: $f(x)$ is continuous for all real values of x
- Q: $f(x)$ is differentiable for all real values of x

- (a) P is true and Q is false
- (b) P is false and Q is true
- (c) Both P and Q are true
- (d) Both P and Q are false

(BBA: DU JAT 2012)

18. The multiplicative inverse of $-\frac{1}{18}$ is

- (a) 0
- (b) 1
- (c) $\frac{1}{18}$
- (d) -18

(BBA: CBS 2009)

19. A random variable X, taking values 0, 1, 2 has the following probability distribution

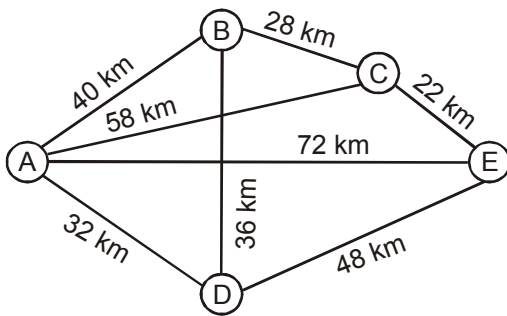
$$P(X) = \begin{cases} K & \text{if } X = 0 \\ 2K & \text{if } X = 1 \\ 3K & \text{if } X = 2 \end{cases}$$

for some number K. What is the value of K?

- (a) $\frac{1}{6}$
- (b) $\frac{1}{3}$
- (c) 1
- (d) $\frac{1}{5}$

(BBA: DU JAT 2012)

Directions (Q. 20–22): The figure below is a geometrical presentation of a route map. Refer to this diagram and answer the questions that follow.



(BBA: CBS 2009)

20. By what distance is the straight line joining journey from A to E shorter than via D.

- (a) 10 km
- (b) 8 km
- (c) 12 km
- (d) 6 km

21. If one drives from city A to city E via C only, with a speed of 40 km per hour, how much time will it take to reach E?

- (a) 1 hr 20 mins
- (b) 2 hr 40 mins
- (c) 2 hrs
- (d) 1 hr 35 mins

22. A man makes a round trip from A, via B, C, E and D in 5 hours. He completes his journey upto E in 3 hours. What should be his speed after E to complete the journey in stipulated time?

- (a) 35 km/hr
- (b) 40 km/hr
- (c) 38 km/hr
- (d) 32 km/hr

23. A sum of Rs. 2,236 is divided among A, B and C such that A receives 25% more than C and C receives 25% less than B. What is A's share in the amount?

- (a) Rs. 640
- (b) Rs. 780
- (c) Rs. 860
- (d) Rs. 890

(BBA: CBS 2010)

24. If $x \propto yz$ and $y \propto xz$ then

- (a) $z \propto ay$
- (b) $z \propto \frac{y}{x}$
- (c) z is constant
- (d) $z \propto \frac{x}{y}$

(BBA: DU JAT 2011)

Directions (Q. 25–30): The table below shows the unit sales of the TT950 motorcycle in six European countries over a six month period. These motorcycles are imported into each country by a main dealer. Use this information to answer the questions.

Motorcycle Sales (Model TT950)							
Country	Jan	Feb	Mar	Apr	May	Jun	Total
Germany	34	47	45	54	56	60	296
UK	40	44	6	47	47	46	260
France	37	32	32	32	34	33	200
Belgium	14	14	14	16	17	14	89
Spain	29	29	28	31	29	31	177
Italy	22	24	24	26	25	23	144
Total	176	190	179	206	208	207	1166

(BBA: CBS 2009)

25. What percentage of the overall total was sold to the German importer?

- (a) 22.0
- (b) 25.4
- (c) 25.8
- (d) 24.1

26. What percentage of the overall total was sold in May?

- (a) 24.1
- (b) 25.6
- (c) 27.1
- (d) 17.9

27. Which month showed the biggest increase in total sales from the previous month?

- (a) Feb
- (b) Mar
- (c) Apr
- (d) May

28. What percentage of the monthly total was sold to the biggest importer in February?

- (a) 24.7
- (b) 23.1
- (c) 36.5
- (d) 51.1

29. What is the average number of units per month imported into Italy over the first four months of the year?

- (a) 22
- (b) 23
- (c) 24
- (d) 25

30. What percentage of total imports is accounted for by the three smallest importers?

- (a) 37.1
- (b) 40.0
- (c) 36.6
- (d) 35.1

Practice Test 2

1. A and B together can do a piece of work in 30 days. A having worked for 16 days, B finishes the remaining work alone in 44 days. In how many days shall B finish the whole work alone?

(a) 30 days
(b) 40 days
(c) 60 days
(d) 70 days

(BBA: SET 2010)

2. Amrita and Sanya distribute Rs. 100 each in charity. Amrita distributes money to 5 more people than Sanya and Sanya gives each Rs. 1 more than Amrita. How many people are recipients of the charity?

(a) 45
(b) 60
(c) 70
(d) None of the above

(BBA: DU JAT 2011)

3. A 3 digit number is to be formed using digits 1, 2, 3 and 4 with repetition. What is the probability that it is divisible by 4?

(a) $\frac{1}{4}$
(b) $\frac{1}{4^2}$
(c) $\frac{1}{4^3}$
(d) $\frac{1}{4^4}$

(BBA: DU JAT 2012)

4. If the length of a rectangle increases by 10% and the breadth of that rectangle decreases by 12% then the % change in area is

(a) 3%
(b) 3.2%
(c) 4.6%
(d) 4%

(BBA: CBS 2009)

5. 60 kg of an alloy of A is mixed with 100 kg of an alloy of B. If alloy A has lead and tin in the ratio 3 : 2 and alloy B has tin and copper in the ratio 1 : 4, then the amount of tin in the new alloy is

(a) 36 kg
(b) 44 kg
(c) 53 kg
(d) 80 kg

(BBA: SET 2011)

6. If the circles $(x + 3)^2 + (y - 2)^2 = 10$ and $(x - 6)^2 + (y + 1)^2 = r^2$ touches externally, then the value of r^2 is:

(a) 10
(b) 20
(c) 40
(d) 90

(BBA: DU JAT 2012)

7. On an average my income for 15 days is Rs. 7. The average for the first 5 days was Rs. 6 and the average for the last 9 days was Rs. 8. What was the income on the sixth day?

(a) Rs. 4
(b) Rs. 2
(c) Rs. 3
(d) Rs. 5

(BBA: SET 2009)

8. The value of $2^{\log_3 5} - 5^{\log_3 2}$ is

(a) 0
(b) 1
(c) 2
(d) 3

(BBA: DU JAT 2011)

9. By how much is the three-fifth of 350 greater than the four-seventh of 210?

(a) 95
(b) 110
(c) 120
(d) None of these

(BBA: SET 2011)

10. What is the value of n if $(3^{2n+4})^2 \times 3^4 = 1$

- (a) 3
- (b) -3
- (c) 12
- (d) -12

(BBA: CBS 2009)

11. A rectangular courtyard 3.78 meters long and 5.25 meters wide is to be paved exactly by square tiles, all of the same size. What is the largest size of the tile which could be used for this purpose?

- (a) 14 cm
- (b) 21 cm
- (c) 42 cm
- (d) None of these.

(BBA: SET 2011)

12. The number of real values of k satisfying the

equation $(1, k) \begin{pmatrix} 3k & 4 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ k \end{pmatrix} = 11$ is:

- (a) 0
- (b) 1
- (c) 2
- (d) 3

(BBA: DU JAT 2012)

13. The number of words that can be made from the word IMPORTANT in which both the T's are not together is

- (a) $9! - 8!$
- (b) $\frac{9!}{2!} - 8!$
- (c) $\frac{9!}{2!} - \frac{8!}{2!}$
- (d) $9! - \frac{8!}{2!}$

(BBA: DU JAT 2011)

14. If $a^x = b$, $b^y = c$ and $c^z = a$, then the value of xyz is:

- (a) 0
- (b) 1
- (c) $\frac{1}{abc}$
- (d) abc

(BBA: SET 2010)

15. The real number x when added to its inverse gives the minimum value of the sum at x equal to

- (a) 1
- (b) 2
- (c) -2
- (d) -1

(BBA: CBS 2010)

16. Sheela began building a picket fence by planting stakes in a row. The stakes were evenly spaced. After planting 20 stakes, she measured the length of the row and found that the row was 57 meter long. She continued the row by planting another 20 stakes, and then measured the length of the entire row. How many meters long was the row of stakes Sheela had planted?

- (a) 104
- (b) 117
- (c) 148
- (d) 120

(BBA: DU JAT 2012)

17. What is the possible number of reflexive relations on a set of 4 elements?

- (a) 2^4
- (b) 2^8
- (c) 2^{12}
- (d) 2^{16}

(BBA: DU JAT 2012)

18. Three consecutive positive even numbers are such that thrice that first number exceeds double the third by 2, the third number is

- (a) 10
- (b) 14
- (c) 16
- (d) 12

(BBA: CBS 2009)

19. $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{4^x - 9^x}$ is

- (a) $\frac{1}{2}$
 (b) $-\frac{1}{2}$
 (c) 1
 (d) -1

(BBA: DU JAT 2011)

20. If a, b, c are three successive terms of a geometric series of positive real numbers and $x > 0$, $\log_a x$, $\log_c x$ are in

- (a) A.P.
 (b) G.P.
 (c) H.P.
 (d) None of these

(BBA: CBS 2010)

21. Three children, X, Y and Z of a business tycoon inherit his property worth crores of rupees. Out of the total amount, Rs. 200 crores were donated to charity. The remaining amount was divided among X, Y and Z in the ratio 2 : 3 : 4. If Y's share is Rs. 300 crores, what was the business tycoon's property worth?

- (a) Rs.1500 crores
 (b) Rs. 2000 crores
 (c) Rs. 1650 crores
 (d) None of the above

(BBA: CBS 2009)

Directions (Q. 22–26): Each question is followed by two statements I and II. Answer each question using the following instruction.

Choose (a): If the question can be answered by one of the statements alone and not by the other.

Choose (b): If the question can be answered by using both the statements together, but cannot be answered by using either statement alone.

Choose (c): If the question can be answered by using either statement alone.

Choose (d): If the question cannot be answered even by using both statements together.

(BBA: CBS 2010)

22. What are the values of X and Y?

- I. Y is an even integer, X is an odd integer and X is greater than Y.
 II. Product of X and Y is 30.

23. Two friends, F1 and F2, bought oranges from wholesale dealer. How many oranges did they buy?

- I. F1 bought one-half the number of oranges that F2 bought.
 II. The wholesale dealer had a stock of 500 oranges.

24. What will be the time for downloading software?

- I. Transfer rate is 7 kilobytes per second.
 II. The size of the software is 6.7 megabytes.

25. 99. Is country A's GDP higher than country B's GDP?

- I. GDPs of the countries A and B have grown over the past five years at compounded annual rates of 4% and 7% respectively.
 II. Five years ago, GDP of country A was higher than that of country B.

26. Is n odd?

- I. n is divisible by 3, 5, 7 and 9
 II. $0 < n < 400$

Directions (Q.27–30): Answer the questions based on the following information.

A health-drink company's R&D department is trying to make various diet formulations, which can be used for certain specific purpose. It is considering a choice of 5 alternative ingredients (O, P, Q, R and S), which can be used in different proportion in the formulations. The table below gives the composition of these ingredients. The cost per unit of each of these ingredients is O: 150, P: 50, Q: 200, R: 500, S: 100.

Ingredient	Composition			
	Carbohydrate %	Protein %	Fat %	Minerals %
O	50	30	10	10
P	80	20	0	0
Q	10	30	50	10
R	5	50	40	5
S	45	50	0	5

(BBA: DU JAT 2011)

27. In what proportion P, Q and S should be mixed to make a diet having at least 60 % carbohydrate at the lowest per unit cost?
- (a) 2 : 1 : 3
 - (b) 4 : 1 : 2
 - (c) 2 : 1 : 4
 - (d) 4 : 1 : 1
28. For recuperating patients, the doctor recommended a diet containing 10% minerals and at least 30% proteins. In how many different ways can we prepare this diet by mixing at least two ingredients?
- (a) One
 - (b) Two
 - (c) Three
 - (d) Four
29. Which among the following is the formulation having the lowest cost per unit for a diet having 10% fat and at least 30% protein? The diet has to be formed by mixing two ingredients.
- (a) P and Q
 - (b) P and S
 - (c) P and R
 - (d) Q and S
30. The company is planning to launch a balanced diet required for growth needs of adolescent children. This diet must contain at least 30% each of protein and carbohydrate, no more than 25% fat and at least 5% minerals. Which one of the following combination of equally mixed ingredients is feasible?
- (a) O and P
 - (b) R and S
 - (c) P and S
 - (d) O and S

Practice Test 3

1. The length of shadow of a vertical pole on the horizontal ground $\sqrt{3}$ times of its height, then the angle of elevation of sun is

(a) 15°
 (b) 30°
 (c) 45°
 (d) 60°

(BBA: CBS 2010)

2. Mr. Sood wants to put up fencing on two sides of his rectangular yard and erect walls on other two sides which measure 20 feet each. If the yard has an area of 700 square feet, how many feet of fencing does he need?

(a) 60
 (b) 50
 (c) 70
 (d) 80

(BBA: CBS 2009)

3. If a fair die is rolled twice, then the conditional probability that the number 2 has appeared at least once, given that the sum of the numbers is 7, is:

(a) $\frac{1}{5}$
 (b) $\frac{1}{6}$
 (c) $\frac{1}{4}$
 (d) $\frac{1}{3}$

(BBA: DU JAT 2012)

4. Two numbers are in the ratio of 11 : 13. If 12 be subtracted from each, the remainders are in the ratio 7 : 9. Find out the numbers.

(a) 33 and 39
 (b) 37 and 39
 (c) 44 and 52
 (d) 22 and 26

(BBA: SET 2011)

5. If $\log_{0.1} x^2 > \log_{0.1} 25$ then x is:

(a) $(-\infty, -5)$
 (b) $(-5, 5)$
 (c) $(-\infty, -5) \cup (5, \infty)$
 (d) $(5, \infty)$

(BBA: DU JAT 2012)

6. Typist A can type a sheet in 5 minutes, typist B in 6 minutes and typist C in 8 minutes. The average number of sheets typed per hour per typist is:

(a) 9.83 sheets
 (b) 9.49 sheets
 (c) 8.84 sheets
 (d) None of these

(BBA: SET 2009)

7. Which of the following is true

(a) $7^{3^2} = (7^3)^2$
 (b) $7^{3^2} > (7^3)^2$
 (c) $7^{3^2} < (7^3)^2$
 (d) None of the above

(BBA: CBS 2009)

8. A shopkeeper sells a badminton racket, whose marked price is Rs. 30, at a discount of 15% and gives a shuttle cock costing Rs. 1.50 free with each racket. Even then he makes a profit of 20%. His cost price per racket is:

(a) Rs. 19.75
 (b) Rs. 20
 (c) Rs. 21
 (d) Rs. 21.25

(BBA: SET 2010)

9. In view of the present global financial crisis the Finance Minister decided to slash the excise duties to boost demand and propel economic growth. The excise duty on cement was reduced by 30% of its present amount to boost the spending in the infrastructure. What should be the percentage increase in the consumption of cement in order that the revenue of the government is unchanged?

- (a) $41\frac{5}{7}\%$
 (b) $42\frac{3}{7}\%$
 (c) $41\frac{6}{7}\%$
 (d) $42\frac{6}{7}\%$

(BBA: DU JAT 2012)

10. If two sets A and B are defined as

$$A = \left\{ (x, y) \mid y = \frac{1}{x}, 0 \neq x \in \mathbb{R} \right\} \text{ and}$$

$$B = \left\{ (x, y) \mid y = -x, x \in \mathbb{R} \right\}, \text{ then}$$

- (a) $A \cap B = A$
 (b) $A \cap B = B$
 (c) $A \cap B = \phi$
 (d) None of these

(BBA: DU JAT 2012)

11. X and Y are two variable quantities. The corresponding values of X and Y are given below:

X:	3	6	9	12	24
Y:	24	12	8	6	3

Then the relationship between X and Y is given by (where ' \propto ' stands for proportionality.):

- (a) $X + Y \propto X - Y$
 (b) $X + Y \propto \frac{1}{X - Y}$
 (c) $X \propto Y$
 (d) $X \propto \frac{1}{Y}$

(BBA: CBS 2010)

12. Four different electronic devices make a beep after every 30 minutes, 1 hour, 1.5 hours and 1 hour 45 minutes respectively. All the devices beeped together at 12 noon. They will again beep together at

- (a) 12 midnight
 (b) 3 a.m.
 (c) 6 a.m.
 (d) 9 a.m.

(BBA: SET 2011)

13. The number of marble slabs of size 20 cm × 30 cm required to pave in the floor of the square room of side 3 metres, is

- (a) 100
 (b) 150
 (c) 225
 (d) 250

(BBA: SET 2011)

14. If $(a - b)$ is 6 more than $(c + d)$ and $(a + b)$ is 3 less than $(c - d)$, then $(a - c)$ is:

- (a) 0.5
 (b) 1
 (c) 1.5
 (d) None of these

(BBA: SET 2011)

15. Palna is home for abandoned, homeless and destitute children, located in Old Delhi. On Monday, Palna housed 55 children. By Friday, exactly $\frac{1}{5}$ of the girls and $\frac{1}{4}$ of the boys had been adopted. No new child was brought to the orphanage during the period. What is the greatest possible number of children that could have been adopted from Palna between Monday and Friday?

- (a) 20
 (b) 13
 (c) 14
 (d) 11

(BBA: DU JAT 2012)

16. P and Q are the two positive integers such that $PQ = 64$. Which of the following cannot be the value of $P + Q$.

- (a) 20
- (b) 65
- (c) 16
- (d) 35

(BBA: CBS 2009)

17. The function $f(x) = |x|$, $-1 \leq x \leq 2$ is

- (a) Neither continuous nor differentiable at origin
- (b) Continuous but not differentiable at origin
- (c) Continuous and differentiable at all points on the given interval
- (d) None of these

(BBA: CBS 2010)

18. The value of $1^3 + 2^3 + 3^3 + \dots + n^3$

- (a) $\frac{n(n+1)(2n+1)}{6}$
- (b) $\left[\frac{n(n+1)}{2}\right]^3$
- (c) $[1 + 2 + \dots + n]^2$
- (d) $[1^2 + 2^2 + \dots + n^2]^2$

(BBA: CBS 2010)

19. The sum of ${}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_n$ is

- (a) n^n
- (b) $n!$
- (c) 2^n
- (d) $2n!$

(BBA: CBS 2010)

20. A sells a bicycle to B at a profit of 30% and B sells it to C at a loss of 20%. If C pays Rs. 520/- for it, at what price did A buy?

- (a) Rs. 500/-
- (b) Rs. 520/-
- (c) Rs. 540/-
- (d) Rs. 580/-

(BBA: CBS 2009)

21. The difference between compound interest and simple interest for 3 years at the rate of 25% p.a. is Rs. 143. What is the principal amount?

- (a) Rs. 700
- (b) Rs. 706
- (c) Rs. 704
- (d) Rs. 709

(BBA: CBS 2010)

Directions (Q.22–27): Each question is followed by two statements P and Q. Answer each question using the following instructions.

Mark 1: If the question can be answered by using both statements together but not by either statement alone.

Mark 2: If the question cannot be answered on the basis of the two statements.

Mark 3: If the question can be answered by using either of the statements alone

Mark 4: If the question can be answered by using one of the statements alone but not by using the other statement alone.

(BBA: DU JAT 2011)

22. Rajesh bought shares of a company on a certain day and sold them the next day. While buying and selling, he had to pay to the broker one percent of the transaction value of the shares as brokerage. What was the profit earned by him per rupee spent on buying the shares?

P: The sale price per share was 1.05 times that of its purchase price.

Q: The number of shares purchased was 100.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

23. How many people are watching TV programme X?

P: Number of people watching TV programme Y is 1,000 and number of people watching both the programmes X and Y, is 100.

Q: Number of people watching either X or Y or both is 1500.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

24. Consider three real numbers A, B and C. Is C the smallest of these numbers?

P: A is greater than at least one of B and C.

Q: B is greater than at least one of A and C.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

25. Ramesh has decided to take a non-stop flight from Delhi to No-man's land in South America. He is scheduled to leave Delhi at 5 am, Indian Standard Time on December 25, 2010. What is the local time at No-man's-land when he reaches there?

P: The average speed of the plane is 700 km/hr.

Q: The flight distance is 10,500 km.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

26. There are two straight lines in the X-Y plane with equations

$$aX + bY = c \text{ and } dX + eY = f$$

Do the two straight lines intersect?

P: a, b, c, d, e and f are distinct real numbers.

Q: c and f are non-zero.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

27. Triangle PQR has angle PRQ equal to 90°. What is the value of PR + RQ?

P: Diameter of the inscribed circle of the triangle PQR is equal to 10 cm.

Q: Diameter of the circumscribed circle of the triangle PQR is equal to 18 cm.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Directions (Q. 28–30): Answer the questions based on the following information. Data on the 468 students, who took an examination in Chemistry, Physics and Mathematics is as follows:

Passed in all the subjects	197
Failed in all the subjects	70
Failed in Chemistry	170
Failed in Physics	210
Failed in Mathematics	192
Passed in Chemistry only	64
Passed in Physics only	51
Passed in Mathematics only	46

(BBA: DU JAT 2012)

28. How many failed in Chemistry only?

- (a) 84
- (b) 49
- (c) 3
- (d) 100

29. How many failed in one subject only?

- (a) 40
- (b) 161
- (c) 237
- (d) 70

30. How many passed in at least one subject?

- (a) 197
- (b) 398
- (c) 70
- (d) 271

ANSWERS AND EXPLANATIONS

Practice Test 1

1. The time taken by B to cover the distance of 20 km at a uniform speed of 10 km/hr will be 2 hours.

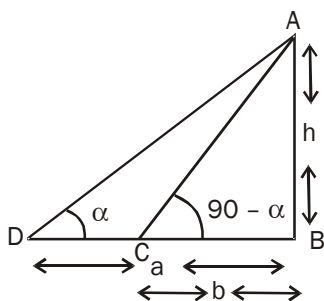
Total distance covered by A in 2 hours

$$= 10 + 12 \left(2 - \frac{10}{8} \right) = 19 \text{ km}$$

Hence, A is 1 km that is 1000 m behind of B.

The correct answer is a.

2.



In $\triangle ABC$,

$$\tan(90 - \alpha) = \frac{h}{b} \quad (1)$$

In $\triangle ABD$,

$$\tan \alpha = \frac{h}{a} \quad (2)$$

Using Eq. (1) and Eq. (2) we get,

$$\Rightarrow \cot \alpha = \frac{h}{b} \text{ or } \frac{1}{\tan \alpha} = \frac{h}{b} \Rightarrow \frac{a}{h} = \frac{h}{b}$$

$$\Rightarrow h = \sqrt{ab}$$

The correct answer is b.

3. Suppose the total units to be completed is LCM of (12, 15, 20) = 60 units

Thus, in 1 hour A will fill 5 units, B will fill 4 units and C will fill 3 units.

According to the question, A is always working. Thus, in the first hour A will work with B and in next hour it will work with C.

The part of the tank filled in the first hour
= 5 + 4 = 9 units

The part of the tank filled in next hour
= 5 + 3 = 8 units

In 2 hours, total part of the tank filled
= 9 + 8 = 17 units

So, in 6 hours, 51 units must be filled.

In next hour that is 7th hour tank must be filled as 51 + 9 = 60 units.

The correct answer is d.

4. Given that x, y and z are in AP, so,

$$x = y - d$$

$$z = y + d$$

Where 'd' is the common difference.

$$x + y + z = 21$$

$$\Rightarrow 3y = 21 \Rightarrow y = 7$$

The value of 'd' could be 0, 1, 2, 3, 4, 5, 6 and 7.

Therefore, total 13 ordered pairs are possible.

The correct answer is a.

5. The total cost of the first type of Rice

$$= \text{Rs. } 26 \times 20 = \text{Rs. } 520$$

The total cost of the second type of Rice

$$= \text{Rs. } 30 \times 36 = \text{Rs. } 1080$$

Therefore, the net cost

$$= \text{Rs. } 520 + \text{Rs. } 1080 = \text{Rs. } 1600$$

Net selling price = Rs. 30 × 56 = Rs. 1680

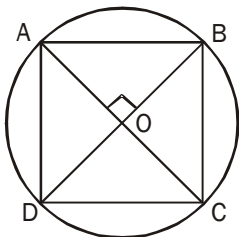
$$\text{Profit percentage} = \frac{80}{1600} \times 100 = 5\%$$

The correct answer is b.

6. Circumference = 100 cm

$$\Rightarrow \pi \times d = 100$$

$$\text{or } d = \frac{100}{\pi} \text{ cm}$$



The diameter of the circle will be equal to the diagonals of the square.

$$\text{Diagonal of square} = \frac{100}{\pi} \text{ cm}$$

$$\text{Side} = \frac{\text{Diagonal}}{\sqrt{2}}$$

$$\text{Side} = \frac{100}{\sqrt{2} \pi} = \frac{50\sqrt{2}}{\pi} \text{ cm}$$

The correct answer is a.

7. Suppose the average age of 5 members, 3 years ago is n years.

Therefore, the total age of the 5 members 3 years ago = $5n$

The total age of the 5 members after 3 years = $(5n + 15)$

Now, by replacing the old member with the new member.

The difference between the ages

$$= 5n + 15 - 5n = 15 \text{ years}$$

The correct answer is d.

8. $a^2 + b^2 = 7ab$

Adding $2ab$ both the sides, we get

$$\Rightarrow a^2 + b^2 + 2ab = 9ab$$

$$\Rightarrow (a + b)^2 = 9ab$$

$$\Rightarrow \left(\frac{a+b}{3}\right)^2 = ab$$

Taking log on both the sides, we get

$$\log\left(\frac{a+b}{3}\right)^2 = \log ab$$

$$\Rightarrow \log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$$

The correct answer is c.

9. The time taken by A, B and C to meet again at the starting point will be LCM of 252, 308 and 198.

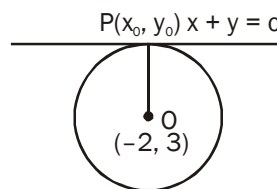
LCM (252, 308 and 198)

$$= 4 \times 7 \times 9 \times 11 \text{ sec} = 2772 \text{ sec}$$

$$= 46 \text{ min } 12 \text{ sec}$$

The correct answer is d.

- 10.



The equation of the circle is

$$x^2 + y^2 + 4x - 6y + 9 = 0$$

$$\Rightarrow (x + 2)^2 + (y - 3)^2 = 4$$

Therefore, the centre of the circle is $(-2, 3)$ and the radius is 2.

Now let $x + y = c$, touches the circle at the point $P(x_0, y_0)$.

Slope of tangent $x + y = c$ is -1 .

Slope of radius $OP = 1$

$$\Rightarrow \frac{y_0 - 3}{x_0 + 2} = 1$$

$$\Rightarrow y_0 - x_0 = 5$$

$$\Rightarrow y_0 = x_0 + 5 \quad (1)$$

Now,

$$(x + 2)^2 + (y - 3)^2 = 4$$

$$\Rightarrow (x_0 + 2)^2 + (x_0 + 5 - 3)^2 = 4$$

$$\Rightarrow 2(x_0 + 2)^2 = 4$$

$$\Rightarrow (x_0 + 2)^2 = 2$$

$$\Rightarrow x_0 + 2 = \pm\sqrt{2}$$

$$x_0 = -2 \pm \sqrt{2}$$

Hence $x + y = c$ is touching the circle at two points

$$(-2 + \sqrt{2}, 3 + \sqrt{2}) \text{ and } (-2 - \sqrt{2}, 3 - \sqrt{2})$$

$$c = x_0 + y_0$$

$$= -2 + \sqrt{2} + 3 + \sqrt{2} \text{ or } -2 - \sqrt{2} + 3 - \sqrt{2}$$

$$= 1 + 2\sqrt{2} \text{ or } 1 - 2\sqrt{2}$$

$$= 1 \pm 2\sqrt{2}$$

The correct answer is b.

- 11.** Suppose the marks obtained by David in History is 'x', so the marks obtained by him in English will be $2.5x$

According to the question,

$$x + 2.5x = 140$$

$$\Rightarrow 3.5x = 140 \Rightarrow x = 40$$

Therefore, Marks obtained in English

$$= 40 \times 2.5 = 100$$

The correct answer is d.

$$\mathbf{12.} \frac{\left(\frac{1}{3}\right)^{-3} - \left(\frac{1}{2}\right)^{-3}}{\left(\frac{1}{4}\right)^{-3}} = \frac{3^3 - 2^3}{4^3}$$

$$= \frac{27 - 8}{64} = \frac{19}{64}$$

The correct answer is a.

- 13.** Suppose the radius of the circle is r and the side of the square is s .

Now, according to the question,

$$\pi r^2 = s^2$$

$$s = \sqrt{\pi} r$$

The perimeter of the square

$$= 4s = 4\sqrt{\pi} r = 7.088r \text{ (approx.)}$$

And, the circumference of the circle

$$= 2\pi r = 6.28r \text{ (approx.)}$$

Therefore, the circumference of the circle is less than the perimeter of the square.

The correct answer is c.

- 14.** Suppose the number of the questions answered correctly is x and the number of the questions answered incorrectly is y .

According to the question,

$$x + y = 90 \quad (1)$$

$$6x - 2y = 356$$

$$\Rightarrow 3x - y = 178 \quad (2)$$

Now, solving Eq. (1) and Eq. (2), we get

$$x = 67, y = 23$$

So, the number of questions answered correctly is 67.

The correct answer is a.

$$\mathbf{15.} 5^{2n} - 2^{3n} = 25^n - 8^n$$

Using $n = 1, 2$ and so on, we can conclude that the expression is divisible by 17.

The correct answer is d.

- 16.** The number of the candidates who failed in English only

$$= (20 - 10)\% = 10\%$$

The number of the candidates who failed in Mathematics only

$$= (25 - 10)\% = 15\%$$

The total number of the candidates who failed in at least one subject

$$= (10 + 15 + 10)\% = 35\%$$

The total number of the candidates who passed in both the subject

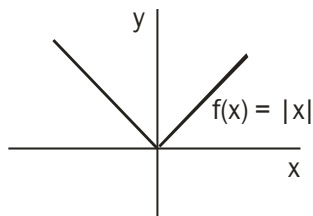
$$= (100 - 35)\% = 65\%$$

$$\Rightarrow 65\% = 2600$$

$$\Rightarrow 100\% = 4000$$

The correct answer is c.

17. The graph of the function $f(x) = |x|$ is drawn below



Looking at the above figure, we conclude that $f(x) = |x|$ is continuous at every point on its domain \mathbb{R} .

But it is not differentiable at $x = 0$.

The correct answer is a.

18. Multiplicative inverse of $-\frac{1}{18} = -\frac{1}{\frac{1}{18}} = -18$

The correct answer is d.

- 19.

X	0	1	2
P(X)	K	2K	3K

X is random variable taking values 0, 1, 2

$$P(0) + P(1) + P(2) = 1$$

$$\Rightarrow K + 2K + 3K = 1$$

$$\Rightarrow K = \frac{1}{6}$$

The correct answer is a.

20. The distance between A and E via D

$$= 32 + 48 = 80 \text{ km}$$

Journey directly from A to E = 72 km

Journey directly from A to E is 8 km shorter than journey from A to E via D.

The correct answer is b.

21. The distance travelled from A to E via C

$$= 58 + 22 = 80 \text{ km}$$

$$\text{Time taken} = \frac{80}{40} = 2 \text{ hours}$$

The correct answer is c.

22. According to the question, he has to travel from E to A via D in 2 hours.

$$\text{Distance} = (48 + 32) \text{ km} = 80 \text{ km}$$

$$\text{Speed} = \frac{80}{2} = 40 \text{ km/hour}$$

The correct answer is b.

23. Suppose B receives Rs. 100.

Then, according to the question C receives = Rs. 75 and A receives Rs. 1.25×75

$$\Rightarrow \text{A's share} = \frac{1.25 \times 75}{(1.25 \times 75 + 175)} \times 2236$$

$$= \text{Rs. } 780$$

The correct answer is b.

24. Suppose the constant of proportionality is k.

$$x = k \times yz, \text{ and } y = k \times xz$$

Multiplying above two equations, we get

$$k^2 z^2 = 1 \text{ and } z = \frac{1}{k}$$

Therefore, we can conclude that z is a constant.

The correct answer is c.

25. The required percentage = $\frac{296}{1166} \times 100$

$$= 25.38 \approx 25.4\%$$

The correct answer is b.

26. The required percentage = $\frac{208}{1166} \times 100$

$$= 17.83 \approx 17.9$$

The correct answer is d.

- 27.

Month	Feb	Mar	Apr	May	June
Increase	8%	-5.7%	15.08	1%	-0.5%

April showed the biggest increase.

The correct answer is c.

28. The biggest importer is Germany

The required percentage

$$= \frac{47}{190} \times 100 = 24.7\%$$

The correct answer is a.

29. The number of units imported by Italy in the first four months = $22 + 24 + 24 + 26 = 96$

The required average = $\frac{96}{4} = 24$ units

The correct answer is c.

30. The three smallest importers are Belgium, Spain and Italy. They together import $(89 + 177 + 144) = 410$ units

The required percentage

$$= \frac{410}{1166} \times 100 = 35.1\%$$

The correct answer is d.

Practice Test 2

1. Suppose the time taken by A alone to complete the work is a days, and the time taken by B alone to complete the work is b days.

According to the question,

$$\Rightarrow \frac{1}{a} + \frac{1}{b} = \frac{1}{30} \text{ and } \frac{16}{a} + \frac{44}{b} = 1$$

Now, solving these two equations, we get

$$b = 60 \text{ days.}$$

The correct answer is c.

2. Suppose Sanya distributes money to n people, therefore, Anita distributes money to $(n + 5)$ people.

Suppose the amount distributed by Anita to each is x , therefore, the amount distributed by Sanya to each will be $(x + 1)$.

According to the question,

$$\Rightarrow n(x + 1) = x(n + 5)$$

$$\Rightarrow n = 5x$$

$$\text{Also, } n(x + 1) = 100$$

$$\Rightarrow 5x^2 + 5x - 100 = 0$$

$$\Rightarrow x = 4$$

$$\text{Total number of recipients} = 2n + 5 = 45$$

The correct answer is a.

3. For any number to be divisible by 4, the number formed by the last two digits must be divisible by 4.

That is, the last 2 digits must be 12, 24, 32, 44

The hundred digit of the number can be filled in 4 ways.

$$\text{Total numbers divisible by 4} = 4 \times 4 = 16$$

$$\text{Probability} = \frac{16}{4 \times 4 \times 4} = \frac{1}{4}$$

The correct answer is a.

4. Suppose the length is ' l ' units and the breadth is ' b ' units.

$$\text{Area} = lb \text{ sq. units.}$$

$$\text{New area} = l \left(1 + \frac{10}{100} \right) \times b \left(1 - \frac{12}{100} \right)$$

$$= \frac{11}{10} \times \frac{88}{100} lb \text{ sq. units}$$

$$= \frac{968}{1000} lb \text{ sq. units}$$

Change in the area

$$= \left(1 - \frac{968}{1000} \right) lb = \frac{32}{1000} lb = 3.2\%$$

The correct answer is b.

5. The amount of Tin in the first alloy

$$= \frac{2}{5} \times 60 = 24 \text{ kg}$$

The amount of Tin in the second alloy

$$= \frac{1}{5} \times 100 = 20 \text{ kg}$$

Total quantity of Tin in new alloy

$$= 24 \text{ kg} + 20 \text{ kg} = 44 \text{ kg}$$

The correct answer is b.

6. The equation of the first circle is

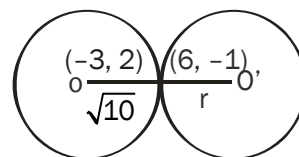
$$(x + 3)^2 + (y - 2)^2 = 10$$

Therefore, the centre and the radius of the first circle are $(-3, 2)$ and $\sqrt{10}$ respectively.

The equation of the second circle is

$$(x - 6)^2 + (y + 1)^2 = r^2$$

Therefore, the centre and the radius of the second circle are $(6, -1)$ and r respectively.



Now

$$\begin{aligned}
 OO' &= \sqrt{10} + r \\
 \Rightarrow \sqrt{(6+3)^2 + (2+1)^2} &= \sqrt{10} + r \\
 \Rightarrow 3\sqrt{10} &= \sqrt{10} + r \\
 r &= 2\sqrt{10} \Rightarrow r^2 = 40
 \end{aligned}$$

The correct answer is c.

7. Suppose the income on the sixth day is Rs. x
According to the question,
 $5 \times 6 + x + 9 \times 8 = 15 \times 7$
 $\Rightarrow x = 3$

The correct answer is c.

8. As $a^{\log_x b} = b^{\log_x a}$
 $2^{\log_3 5} = 5^{\log_3 2}$
 $\Rightarrow 2^{\log_3 5} - 5^{\log_3 2} = 0$

The correct answer is a.

9. Three-fifth of 350 = $\frac{3}{5} \times 350 = 210$
Four-seventh of 210 = $\frac{4}{7} \times 210 = 120$
Required difference = $210 - 120 = 90$.

The correct answer is d.

10. $(3^{2n+4})^2 \times 3^4 = 1$
 $\Rightarrow 3^{4n+8} \times 3^4 = 1 \quad \left[(x^m)^n = x^{m \times n} \right]$
 $\Rightarrow 3^{4n+12} = 1 \quad \left[x^m \times x^n = x^{m+n} \right]$
 $\Rightarrow 4n + 12 = 0 \quad \left[x^0 = 1 \right]$
 $\Rightarrow n = -3$

The correct answer is b.

11. The length of the courtyard = 3.78 meters
The width of the courtyard = 5.25 meters
The largest size of the square tile will be the HCF of 3.78 m and 5.25 m.
Hence, HCF (3.78 and 5.25) = 0.21 m
= 21 cm

The correct answer is b.

12. $\begin{bmatrix} 1 & k \\ -2 & 1 \end{bmatrix} \begin{bmatrix} 3k & +4 \\ -2 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ k \end{bmatrix} = 11$
 $\Rightarrow \begin{bmatrix} 3k-2k & 4+k \\ 3k-2k & 4+k \end{bmatrix} \begin{bmatrix} 1 \\ k \end{bmatrix} = 11$
 $\Rightarrow 3k - 2k + 4k + k^2 = 11$
 $\Rightarrow k^2 + 5k - 11 = 0$

It is a quadratic equation with positive discriminant.

Hence, two real values of k will exist.

The correct answer is c.

13. The number of words that can be made from the word 'IMPORTANT' = $\frac{9!}{7!}$

When both the T's are together, then the number of words = 8!

Therefore, the total number of words possible = $\frac{9!}{7!} - 8!$.

The correct answer is b.

14. $a^x = b$, $b^y = c$ and $c^z = a$

Taking 'log' on both the sides of the given equations, we get

$x \log a = \log b$, $y \log b = \log c$ and $z \log c = \log a$

$$\Rightarrow xyz = \frac{\log b}{\log a} \times \frac{\log c}{\log b} \times \frac{\log a}{\log c} = 1$$

The correct answer is b.

15. Suppose the required number is x.

$$\Rightarrow x + \frac{1}{x}$$

Now, looking at the options we find that for $x = -2$, the minimum value is -2.5 .

The correct answer is c.

16. The first stake does not need any space. Hence, whatever will be the number of stakes, the number of spaces between the first and the last stake will be one less than the total number of stakes.

In first 20 stakes there will be 19 spaces.

$$\text{The length of each space} = \frac{57}{19} = 3 \text{ m}$$

And in another 20 stakes there will be 20 spaces.

Therefore, the length of row of stakes
 $= 57 + 20 \times 3 = 117$ m

The correct answer is b.

- 17.** We know that the possible number of reflexive relations on a set of 'n' elements $= 2^{n^2-n}$

For $n = 4$, possible number of reflexive relations will be

$$= 2^{4^2-4} = 2^{12}$$

The correct answer is c.

- 18.** Suppose the three positive consecutive even numbers are $x, x + 2$ and $x + 4$.

According to the question,

$$3x = 2(x + 4) + 2$$

$$\Rightarrow 3x = 2x + 8 + 2$$

$$\Rightarrow 3x = 2x + 10$$

$$\Rightarrow x = 10$$

The third number is $x + 4 = 14$

The correct answer is b.

- 19.** $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{4^x - 9^x} = \lim_{x \rightarrow 0} \frac{3^x - 2^x}{2^{2x} - 3^{2x}}$

$$= \lim_{x \rightarrow 0} \frac{3^x - 2^x}{(2^x - 3^x)(2^x + 3^x)}$$

$$= \lim_{x \rightarrow 0} \frac{-1}{(2^x + 3^x)} = -\frac{1}{2}$$

The correct answer is b.

- 20.** Let us assume

$$a = p, b = pr^1 \text{ and } c = pr^2$$

Now, $\log_a x, \log_b x$ and $\log_c x$ can be written as

$\log_p x, \log_{pr} x, \log_{pr^2} x$ are in HP.

$$\Rightarrow \frac{1}{\log_p x}, \frac{1}{\log_{pr} x}, \frac{1}{\log_{pr^2} x} \text{ are in AP.}$$

$$\Rightarrow \log_p, \log_{pr}, \log_{pr^2} \text{ are in AP}$$

$$\Rightarrow \log p, (\log p + \log r) + (\log p + 2\log r) \text{ are in AP.}$$

where $\log r$ is the common difference.

Thus, it is proved that $\log_a x, \log_c x$ are in HP.

The correct answer is c.

- 21.** Suppose the property is of worth Rs x crore.

Given that y 's share = Rs. 300 crores

According to the question,

$$(x - 200) \times \frac{3}{(2 + 3 + 4)} = 300$$

$$\Rightarrow (x - 200) \times \frac{1}{3} = 300$$

$$\Rightarrow x = 900 + 200$$

Therefore, the total worth of property = Rs. 1100 crores.

The correct answer is d.

- 22.** Using statement I alone and statement II alone we cannot answer the question as there is no unique value.

But looking at the option we can find that the only one case (15, 2) satisfies the given condition if both the statements are used together.

The correct answer is b.

- 23.** Using statement I alone and statement II alone the question cannot be answered. Even by using both the statements together we cannot answer the question as the total number of mangoes bought from the dealer is not known.

The correct answer is d.

- 24.** Using either statement alone the question cannot be answered. But by using both the statements together we can answer the question as:

$$\text{Time taken} = \frac{6.7 \times 1024 \text{ bytes}}{7 \times 1024 \text{ bytes / sec}}$$

The correct answer is b.

- 25.** Using either statement alone the question cannot be answered. Even by using both the statements together we cannot answer the question.

The correct answer is d.

- 26.** Using statement I alone we cannot answer the question

$$\text{LCM of } (3, 5, 7, 9) = 315$$

Thus, n would be multiple of 315 that is odd or even. So, no unique value is obtained.

Using statement II alone we cannot answer the question as again there is no unique value.

But using both the statements together we can answer the question as there is only one case possible that is 315.

The correct answer is b.

Common Solution for questions 27 to 30:

Suppose the one unit of each of these ingredients is 100 g.

27. Carbohydrate content = $\frac{80 \times 4 + 10 + 45}{6}$

$$= \frac{375}{6} \text{ that is more than } 60\%.$$

$$\text{Total cost} = 50 \times 4 + 200 + 100 = \text{Rs. } 500$$

Therefore, the cost per unit

$$= \frac{500}{6} = \text{Rs. } 83.33$$

The correct answer is d.

- 28.** The diet can be prepared in only one way by mixing ingredients O and Q.

The correct answer is a.

- 29.** The condition of 10% fats and at least 30% proteins is satisfied only by mixing the ingredients Q and S.

The correct answer is d.

- 30.** By combining O and S in equal proportions, we get

$$\text{Carbohydrates} = \frac{50 + 45}{2} = 47.5\%$$

$$\text{Proteins} = \frac{30 + 50}{2} = 40\%$$

$$\text{Minerals} = \frac{10 + 5}{2} = 7.5\%$$

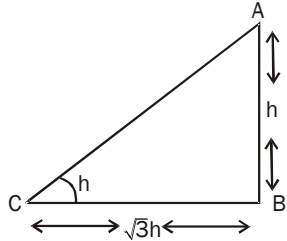
$$\text{Fats} = \frac{10}{2} = 5\%$$

Hence, all the conditions are satisfied.

The correct answer is d.

Practice Test 3

1.

In $\triangle ABC$,

$$\tan \theta = \frac{h}{h\sqrt{3}} = \frac{1}{\sqrt{3}} = \tan 30^\circ$$

$$\Rightarrow \theta = 30^\circ$$

The correct answer is b.

2. One side of the rectangle = 20 feet

Area = 700 square feet

$$\text{Other side} = \frac{700}{20} = 35 \text{ feet.}$$

Therefore, the length of the fencing
= $35 \times 2 = 70$ feet

The correct answer is c.

3. A = Event that 2 has appeared at least once

$$A = \{(2,1) (2,2) (2,3) (2,4) (2,5) (2,6) (1,2) (3,2) (4,2) (5,2) (6,2)\}$$

$$P(A) = \frac{11}{36}$$

B = Event that the sum of the numbers is 7

$$B = \{(1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1)\}$$

$$P(B) = \frac{6}{36}$$

$$(A \cap B) = \{(2,5), (5,2)\}$$

$$P(A \cap B) = \frac{2}{36}$$

$$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{2/36}{6/36} = \frac{1}{3}$$

The correct answer is d.4. Suppose the two numbers are $11x$ and $13x$.

According to the question,

$$\frac{11x - 12}{13x - 12} = \frac{7}{9}$$

$$\Rightarrow 99x - 108 = 91x - 84$$

$$\Rightarrow 8x = 24$$

$$\Rightarrow x = 3$$

Hence, the numbers are 33 and 39.

The correct answer is a.5. $\log_{0.1} x^2 > \log_{0.1} 25$

$$x^2 < 25$$

$$\Rightarrow x^2 - 25 < 0$$

$$x < 5 \text{ and } x > -5$$

$$x = (-5, 5)$$

The correct answer is b.

6. The total number of sheets typed in one hour by A, B and C together is given by

$$= \frac{60}{5} + \frac{60}{6} + \frac{60}{8} = 12 + 10 + 7.5 = 29.5$$

Hence, the average number of sheets typed per hour per typist = $\frac{29.5}{3} = 9.83$

The correct answer is a.7. $7^{3^2} = 7^{3 \times 3} = 7^9$

$$(7^3)^2 = 7^{3 \times 2} = 7^6$$

Therefore, $7^9 > 7^6$

$$\text{So, } 7^{3^2} > (7^3)^2$$

The correct answer is b.8. Discount given = $30 \times 0.15 = \text{Rs. } 4.50$

Selling price of the badminton racket

$$= 30 - 4.50 = \text{Rs. } 25.50$$

Worth of the shuttlecock = Rs. 1.50

Then, actual SP = $25.50 - 1.50 = \text{Rs. } 24$

Hence, the CP of the badminton racket

$$= \frac{24}{1.20} = \text{Rs. } 20$$

The correct answer is b.

9. Decrease in the excise duty = 30%

The percentage increase in the consumption so that revenue of the government is unchanged

$$= \frac{30}{100 - 30} \times 100 = 42\frac{6}{7}\%$$

The correct answer is d.

10. For $\{k_1, k_2, k_3, \dots, k_n\} \in \mathbb{R}$

$$A = \left\{ \left(k_1, \frac{1}{k_1} \right), \left(k_2, \frac{1}{k_2} \right), \left(k_3, \frac{1}{k_3} \right), \dots, \left(k_n, \frac{1}{k_n} \right) \right\}$$

$$B = \{(k_1, -k_1), (k_2, -k_2), (k_3, -k_3), \dots, (k_n, -k_n), \dots\}$$

Looking at A and B we conclude that there is no common ordered pair in A and B.

$$A \cap B = \phi$$

The correct answer is c.

11. Looking at the values of X and Y we conclude that the value of Y decreases on increasing the value of x. Therefore, X is inversely proportional to Y.

The correct answer is d.

12. The device beeps after 30, 60, 90 and 105 minutes respectively. If they beeped together at 12 noon. Then they will beep together again after number of minutes which is LCM of 30, 60, 90 and 105.

$$\begin{aligned} \text{LCM (30, 60, 90 and 105)} \\ = 1260 \text{ minutes} = 21 \text{ hours} \end{aligned}$$

So, they will beep together again after 21 hours from 12 noon, that is, at 9 am.

The correct answer is d.

13. The area of floor of the square room

$$= 3 \text{ m} \times 3 \text{ m} = 9 \text{ m}^2$$

The area of square tiles

$$= 20 \text{ cm} \times 30 \text{ cm} = 600 \text{ cm}^2$$

Therefore, the number of tiles required

$$= \frac{9 \text{ m}^2}{600 \text{ cm}^2} = 150 \text{ tiles}$$

The correct answer is b.

14. According to the question,

$$a - b = c + d + 6 \quad (1)$$

$$\text{and, } a + b + 3 = c - d \quad (2)$$

Adding Eq. (1) and Eq. (2), we get

$$2a + 3 = 2c + 6$$

$$\Rightarrow 2a - 2c = 3$$

$$\Rightarrow a - c = 1.5$$

The correct answer is c.

15. Suppose the number of housed boys = x

Then, the number of housed girls = 55 - x

Therefore, the number of adopted children

$$\begin{aligned} &= \frac{x}{4} + \frac{55-x}{5} \\ &= \frac{x+220}{20} = \frac{x}{20} + 11 \end{aligned}$$

Now there are two possible value of x, which are 20 and 40, for which the number of adopted children will be integer.

For x = 40, the number of adopted children will be maximum which is $\frac{40}{20} + 11 = 13$

The correct answer is b.

16. $P \times Q = 64$

Possible values of P and Q are (1, 64) (2, 32) (4, 16) (8, 8).

P + Q cannot be equal to 35.

The correct answer is d.

17. The function $f(x) = |x|$, $-1 \leq x \leq 2$ is continuous but not differentiable at the origin.

The correct answer is b.

18. $1^3 + 2^3 + 3^3 + \dots + n^3 = \sum n^3 = \left[\frac{n(n+1)}{2} \right]^2$

The correct answer is c.

19. ${}^n C_0 + {}^n C_1 + {}^n C_2 + \dots + {}^n C_n = 2^n$

The correct answer is c.

20. Suppose A bought the bicycle for Rs x

According to the question,

$$x \left(1 + \frac{30}{100} \right) \left(1 - \frac{20}{100} \right) = 520$$

$$\Rightarrow x \times \frac{13}{10} \times \frac{8}{10} = 520$$

$$\Rightarrow x = \frac{520 \times 10 \times 10}{8 \times 13} = 500$$

The correct answer is a.

21. We know the formula for the difference between compound interest and simple interest for 3 years is given by

$$CI_3 - SI_3 = \frac{PR^3}{100^3} + \frac{3PR^2}{100^2}$$

$$\Rightarrow 143 = \frac{P \times (25)^3}{(100)^3} + \frac{3 \times P \times (25)^2}{(100)^2} = \frac{P}{64} + \frac{3P}{16}$$

$$\Rightarrow 143 = \frac{13P}{64}$$

$$\Rightarrow P = 11 \times 64 = \text{Rs. } 704$$

The correct answer is c.

22. From Statement P:

Suppose Rajesh bought the shares for Rs. 100.

Then, the net cost incurred
= 100 + 1 = Rs. 101

And, the selling price of the shares
= 1.05 × 100 = Rs. 105

Hence, the net revenue
= 105 - 1.05 = Rs. 103.95

Profit = Rs. 2.95

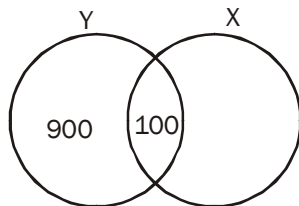
$$\text{Profit earned per rupee} = \text{Rs. } \frac{2.95}{101}$$

From Statement Q:

As there is no information about C.P. and S.P., we cannot answer the question using statement Q alone.

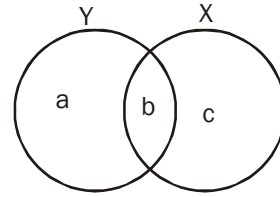
The correct answer is d.

23. From Statement P:



As we don't have any information about the number of people watching program X alone, we cannot answer the question using the statement P alone.

From Statement Q:



$$a + b + c = 1500$$

We cannot answer the question using statement Q alone also.

Combining statements P and Q:

The number of people watching TV program X is 100 + 500, that is, 600.

The correct answer is a.

24. From Statement P:

We can conclude that A is not the smallest. But as no other information is given, we cannot answer the question using statement P alone.

From Statement Q:

We can conclude that B is not the smallest. But as no other information is given, we cannot answer the question using statement Q alone.

Combining statements P and Q:

As both A and B are not the smallest, we can conclude that C is the smallest.

The correct answer is a.

25. From Statement P:

As only the average speed is given and no other information is given, we cannot answer the question using statement P alone.

From Statement Q:

As only the flight distance is given and no other information is given, we cannot answer the question using statement Q alone.

Combining statements P and Q:

$$\text{Time taken is } \frac{10500}{700} = 15 \text{ hr}$$

As there is no relationship between the time zone of the two regions, we cannot answer the question even by using both the statements together.

The correct answer is b.

26. The two lines will intersect only if $\frac{-a}{b} \neq \frac{-d}{e}$

From Statement P:

As there is no information about the values of a , b , d and e , we cannot answer the question using statement P alone.

From Statement Q:

Again we cannot answer the question using statement P alone.

Combining statements P and Q:

We cannot establish any specific relationship between a , b , d and e and hence we cannot answer the question even by using both the statements together.

The correct answer is b.

27. **From Statement P:**

As diameter = 10 cm

Radius = 5 cm

As no other information is given, we cannot answer the question using statement P alone.

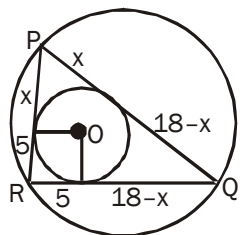
From Statement Q:

The hypotenuse of the right-angled triangle is the diameter of the circumscribed circle.

Therefore, diameter, $D = 18$ cm

As no other information is given, we cannot answer the question using statement Q alone.

Combining statements P and Q:



From the figure above, we have

$$PR + RQ = 5 + x + 5 + 18 - x = 28$$

In $\triangle PRQ$, applying Pythagoras theorem, we get

$$(x + 5)^2 + (23 - x)^2 = 18^2$$

Solving the above equation, we get

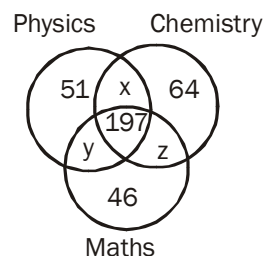
$$x = -5 \text{ and } x = 23$$

But none of these values satisfies the above equation.

Thus, we can infer that no such triangle is possible, even though the mathematical value of the sum of PR and RQ can be determined.

The correct answer is a.

Common solution for questions 28 to 30:



Failed in all subject = 70

Passed in at least one subject

$$= 468 - 70 = 398$$

Therefore, from the Venn diagram, we have

$$x + y + z + 51 + 64 + 46 + 197 = 398$$

$$\Rightarrow x + y + z = 40$$

28. Now failed in Chemistry

$$= 51 + y + 46 + 70 = 170$$

$$\Rightarrow y = 3$$

Failed in Chemistry only = 3

The correct answer is c.

29. Failed in one subject only means passed in only two subjects = $x + y + z = 40$

The correct answer is a.

30. The total number of students = 468

The number of students failed in all subject = 70

Passed in at least one subject

$$= 468 - 70 = 398$$

The correct answer is b.

SECTION 4
ANALYTICAL AND LOGICAL REASONING

Chapter

6

Analytical and Logical Reasoning Ready Reckoner

INTRODUCTION

This section is dedicated to preparation for Analytical and Logical Reasoning section of BBA/BBS/BMS Entrance exams. Questions based on arrangement, blood relations, directions, series, odd one out, coding decoding, analogy, cubes, assumption-based questions, syllogisms, Venn diagrams and so on are the topics that feature in this section.

SERIES

Series and analogies are designed to measure a student's ability to find logical patterns, which may be based on simple mathematical and logical rules and properties.

Number Series

A Sequence of numbers is given, where one needs to identify the pattern between the numbers. This pattern needs to be applied in the series to find out the missing number. There can be infinite ways to create a series, but all the numbers within a series should have the same relationship between them.



Note

Due to the various patterns that can be used to create a number series, this can often prove to be a difficult and time-consuming question type. To solve problems on number series, one should be familiar with the basics of numbers, that is, multiplication tables, squares, cubes, powers, factorials, etc.

Based on addition

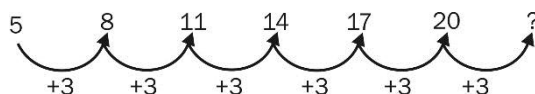
In this type of series, specific numbers based on some pattern are added to get the next number.

Example 1

Find the next term of the series given below:

5, 8, 11, 14, 17, 20, ?

Solution: The solution of the series is as follows:



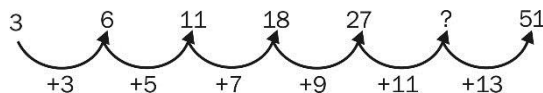
The number in place of ? should be: $20 + 3 = 23$.

Example 2

Find the next term of the series given below:

3, 6, 11, 18, 27, ?, 51

Solution: The solution of the series is as follows:



The number in place of ? should be $27 + 11 = 38$.

Based on difference:

This is the most basic and common form of series. It is based on the difference between consecutive terms of the series which can be either constant or based on a Mathematical pattern of its own. If the numbers obtained after the first level of subtraction do not show any pattern among them, take the difference of these numbers. The numbers obtained after the second level of subtraction may now show a pattern. Continue this process till a pattern is observed. Occasionally, the difference between the terms may be based on special numbers such as prime numbers, factorials, powers or roots.

Example 3

336, 305, 268, 227, 184, ?

The difference between the 1st and 2nd term is $336 - 305 = 31$

The difference between the 2nd and 3rd term is $305 - 268 = 37$

The difference between the 3rd and 4th term is $268 - 227 = 41$

The difference between the 4th and 5th term is $227 - 184 = 43$

The difference between any 2 consecutive terms is all consecutive prime numbers.

Therefore the 6th term must be $184 - 47 = 137$

Example 4

1, 3, 6, 10, 15, ?

The difference between consecutive terms is 2, 3, 4, 5 and therefore, the 6th term must be $15 + 6 = 21$

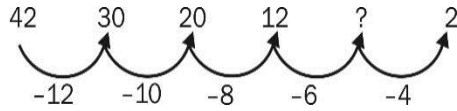
The above series can also be seen as 1, (1 + 2), (1 + 2 + 3), (1 + 2 + 3 + 4) and so on which again tells us that there could be multiple logic used to form the same series.

Example 5

Find the next term of the series given below:

42, 30, 20, 12, ?, 2

Solution: The solution of the series is as follows:



The number in place of ? should be $12 - 6 = 6$

Based on product:

A product-based series is one where the pattern is identified by a process of multiplication or division. Common patterns used in these problems are powers, factorials and multiples. A feature of such problems is that the value of consecutive terms increases/decreases quite sharply. However, first level subtraction may often help in identifying the underlying pattern.

The series based on product can be further classified into the following types:

1. **Product:** The series may be based on simple application of factors or multiples.

Example 6

6, 15, 35, 77, ?

Solution: The 1st term is 2×3 , the 2nd term is 3×5 , the 3rd term is 5×7 and the 4th term is 7×11 , that is, the series is the product of consecutive prime numbers.

The next term will be $11 \times 13 = 143$

Example 7

6, 3, 3, 4.5, 9, ?

Solution: The 2nd term can be written as 1st term $\times 0.5$, the 3rd term can be written as 2nd term $\times 1$, the 4th term can be written as 3rd term $\times 1.5$ and so on.

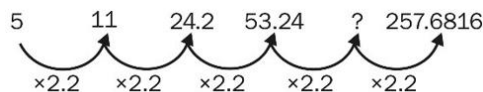
Required value will be $9 \times 2.5 = 22.5$

Example 8

Find the next term of the series given below:

5, 11, 24.2, 53.24, ?, 257.6816

Solution: The solution of the series is as follows:



The number in place of ? should be $53.24 \times 2.2 = 117.128$.

2. **Power:** In power-based problems, the increase in the value of consecutive terms will be higher as compared to pure product based problems.

Example 9

2, 6, 30, 230, ?

Solution: The given series can be written as $(1^1 + 1)$, $(2^2 + 2)$, $(3^3 + 3)$, $(4^4 + 4)$

Required answer will be $5^5 + 5 = 3130$

Prime number series

This series is based on a prime number followed by its consecutive prime numbers and one number is missing in that series.

Example 10

Find the next term of the series given below:

5, 7, 11, 13, 17, 19, ?

Solution: Given series is the series of prime numbers starting from 5. So, the required number is the succeeding prime number of 19, which is 23.

Square/Cube series

In this type of series, each number is a perfect square/cube of a particular number pattern.

Example 11

Find the next term of the series given below:

49, 121, 169, ?, 361

Solution: The solution of the series is as follows:

$$\begin{array}{ccccc}
 49 & 121 & 169 & ? & 361 \\
 \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
 7^2 & 11^2 & 13^2 & 17^2 & 19^2
 \end{array}$$

The number in place of ? should be $17^2 \Rightarrow 17 \times 17 = 289$

Example 12

Find the next term of the series given below:

8, 64, 216, ?, 1000

Solution: The solution of the series is as follows:

$$\begin{array}{ccccc}
 8 & 64 & 216 & ? & 1000 \\
 \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
 2^3 & 4^3 & 6^3 & 8^3 & 10^3
 \end{array}$$

The number in place of ? should be $8^3 \Rightarrow 8 \times 8 \times 8 = 512$

Arithmetic series

If the difference between a term and its preceding term is constant throughout the series, then this series is known as arithmetic series. In this series, the first term is represented by 'a', the common difference by 'd' ($d = a_{n+1} - a_n$) and T_n ($T_n = a + (n - 1)d$) represents its n^{th} term.

Example 13

Find the next term of the series given below:

4, 10, 16, 22, 28, ?

Solution: This is an increasing series. Here, $d = 10 - 4 = 16 - 10 = 6$

So, the required term = $28 + 6 = 34$ or $[4 + (5 \times 6)] = 34$

Example 14

Find the next term of the series given below:

17, 15, 13, ?, 9, 7

Solution: The given series is a decreasing series.

Here, $d = (15 - 17) = (13 - 15) = -2$

So, the required term = $13 + (-2) = 11$

Geometric series

If the ratio of any term and its preceding term is constant throughout the series, then this series is known as geometric series. In this series, the first term is represented by 'a', the common ratio by 'r' ($r = a_{n+1} \div a_n$) and n^{th} term by T_n ($T_n = ar^{(n-1)}$).

Example 15

Find the next term of the series given below:

16, 8, 4, 2, 1, ?

Solution: $r = 8 \div 16 = 4 \div 8 = \frac{1}{2}$

So, the required term = $1 \times \frac{1}{2} = \frac{1}{2}$

Fibonacci series

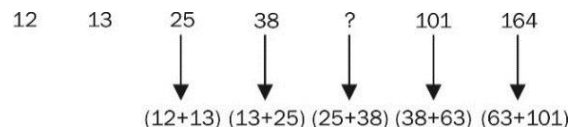
In this type of series, the next number is the addition of two previous numbers.

Example 16

Find the next term of the series given below:

12, 13, 25, 38, ?, 101, 164

Solution: The solution of the series is as follows:



The number in place of ? should be $25 + 38 = 63$

Alternating series

An alternating series is a combination of two or more series. Each series can have different patterns applied to it and then combined to form a series. In a combination of 2 or more series, alternate terms follow the same pattern.

Example 17

3, 4, 7, 9, 11, 14, 15, ?

Solution: As can be observed, there are 2 different series, one with a constant difference of 4 (terms being 3, 7, 11 and 15) and the other with a constant difference of 5 (4, 9, 14...). The answer therefore will be the next term of the 2nd series mentioned, that is, 19.

Example 18

Identify the missing number:

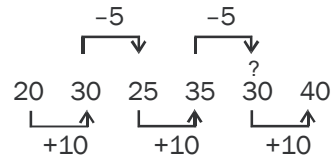
20, 30, 25, 35, ?, 40

(a) 45

(b) 35

(c) 25

(d) 30

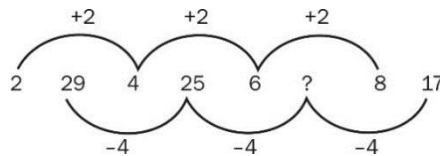
(BBA: CBS 2009)**Solution:**

So, 30 will be in place of ‘?’.

The correct answer is (d).**Example 19**

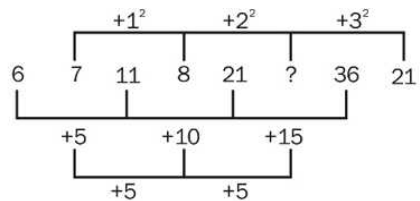
Find the next term of the series given below:

2, 29, 4, 25, 6, ?, 8, 17

Solution: The solution of the series is as follows:The number in place of ? should be: $25 - 4 = 21$ **Example 20**

Find the next term of the series given below:

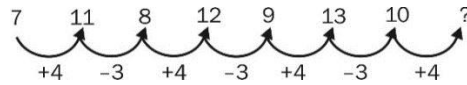
6, 7, 11, 8, 21, ?, 36, 21

Solution: The solution of the series is as follows:The number in place of ? should be $8 + 2^2 = 12$.**Example 21**

Find the next term of the series given below:

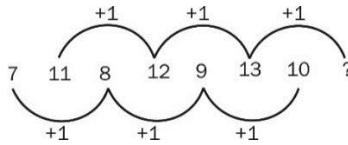
7, 11, 8, 12, 9, 13, 10, ?

Solution: The solution of the series is as follows:



The number in place of ? should be $10 + 4 = 14$

or



Letter Series

A Letter series generally uses the position of a letter in the alphabet or some other property of letters such as vowels/consonants, etc. In questions on letters, one should replace the letter by its corresponding position in the alphabet thereby making the pattern simpler to understand. Like number series, a letter series can also have alternating patterns.

In the alphabet test, questions are based on the 26 letters of the English alphabet, which are as follows:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Out of these 26 letters, there are five vowels and 21 constants:

1. **Vowels:** A, E, I, O, U
2. **Consonants:** B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z

To solve the questions based on alphabet, you need to remember the positioning of letters from left to right and vice-versa.

The position of alphabet from left to right is as follows:

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

The position of alphabet from right to left is as follows:

Position	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Always remember the concept of EJOTY, which helps you to find the position of a letter. EJOTY indicates the letter position in multiples of 5.

Alphabet	E	J	O	T	Y
Position	5	10	15	20	25

Always remember the concept of VQLGB, which helps you to find the position of a letter in the reverse order. VQLGB indicates the letter position in multiples of 5.

Alphabet	V	Q	L	G	B
Position	5	10	15	20	25

Example 22

E G I K: F I L O:: F H J L: ?

(a) J G M P

(b) J G P M

(c) G J M P

(d) G J P M

(BBA: SET 2010)

Solution: The pattern here is that the alphabetical position number is increased by 1, 2, 3 and 4 respectively. Hence the term at the position (?) will be G J M P.

The correct answer is (c).

Alphanumeric Series

These include a combination of alphabets, numbers and symbols. Questions can be asked individually or as part of a group question.

Example 23

Find the missing term. 1k1, 1M3, 1Q7, 1S9

Solution: The position of each alphabet is K: 11, M: 13, Q: 17, S: 19

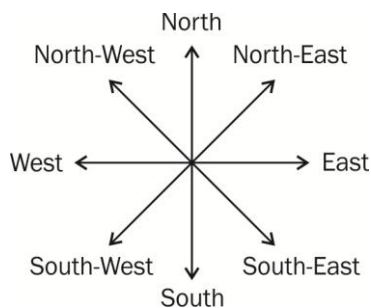
We can see that the numbers on the side of the letter when taken together represent the position of the letter in the alphabet. Also, the numbers are consecutive prime numbers starting from 11.

Hence, the next term should correspond to the next prime number, that is, 23. The letter at the 23rd position of the alphabet is W and, therefore, the next term should be 2W3.

DIRECTIONS

Direction sense problems are another category of the problems asked. The ability of the students to understand directions is tested in these types of problems.

The following figure shows the directions and sub-directions:



Concepts

- Directions on a place are universal and depend on geography. East is the direction from which you can observe sunrise at that place. The only point to remember in the West will be directly behind the East, North to the left hand side while facing East and South to the right hand side.
- If we follow our own convention taking East in whichever way, the others would automatically get decided. West is behind East. North to the left hand side while facing East and South to the right hand side.



Note

We should try to use East, West, and North and South as per actual Geography. For convenience, it's better to use front (like North), back (like South), right (like East) and left (like West)

3. Another point to know is Clockwise and Anticlockwise. Clockwise will always be as per the movement of the Clock while Anticlockwise is the exact opposite of the way the hands of a clock move. Many a times, left and right will be used instead of Clockwise and Anticlockwise.
4. Rotation or turn by a particular angle is also an aspect that needs to be known. Generally, students are comfortable while dealing with turns of 90 degrees or its multiples but make mistakes when the angle is 45 degrees or 135 degrees. Understanding the above is simple.

Let us take an example of a turn of 135 degrees. When a turn of 135 degrees is to be effected, it can be taken as 90 degrees and a further 45 degrees. Similarly, if a turn of 45 degrees is to be effected, it can be seen as half of a 90 degree turn.



Note

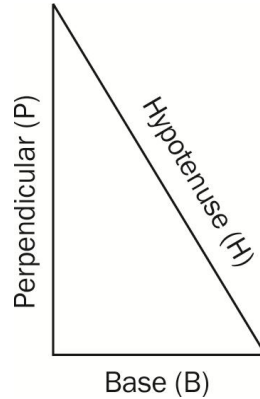
Right turn means 90° turn in clockwise direction & Left turn means 90° turn in anti-clockwise direction

Important Tips

1. **North-East direction:** If we have to start a question from this, we must take it exactly 45° from both the North and East directions. But, in our solution, any point which is between North and East is the North-East direction. For example, a point which is 30° and 60° from the North and East, respectively is also North-East direction
 Same is applicable for North-West, South-East, and South-West directions
2. **Use of Pythagoras Theorem**
 Many questions in directions need to find the distance between 2 points. For this, we need to use the Pythagoras theorem.
 According to it, if a and b are length of base and perpendicular of a right triangle, then the length of its hypotenuse (side opposite to right angle) is $\sqrt{a^2 + b^2}$
3. For problems, we may have to find:
 - (a) Only distance between 2 points – use of Pythagoras theorem
 - (b) Only direction of new position after some travelling with respect to starting point
 - (c) Both distance and direction of a new position with respect to the original position
4. In a Circular movement, going right means moving in an anti-clockwise direction and going left means moving in a clockwise direction
5. Many times, questions were asked where we have to check for directions in which the hands (minute or hour or both) of a clock are pointing after some time when initial time and initial direction is given. In such questions we need to remember, minute hand travels 360° in 1 hour, that is, 60 minutes. The hour hand travels only 30° in 1 hour, that is, 60 minutes. Both the hands travel in the clockwise direction.

To find the shortest distance covered between the starting point and the end point, you need to use the Pythagoras formula, that is, $H^2 = B^2 + P^2$, where H denotes Hypotenuse, B denotes Base and P denotes Perpendicular.

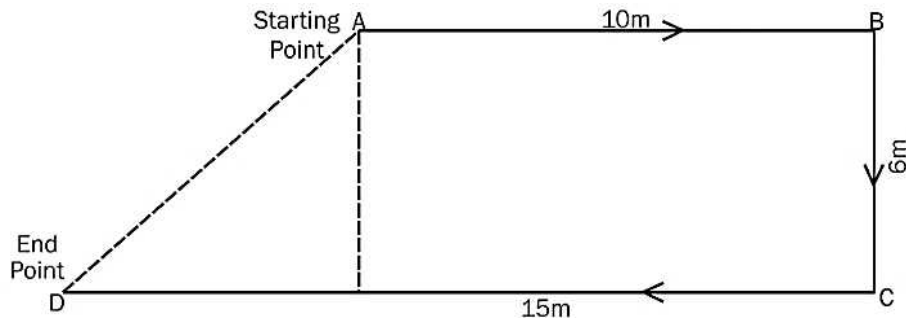
The following figure shows the concept of Pythagoras formula:



Example 1

A man runs 10 m east, and then he turns right and runs 6 m and further turns right and runs 15 m. How far is he from the starting point?

Solution



Here, $P = 6$ m; $B = (15 - 10)$ m = 5 m; $H = ?$

According to the Pythagoras theorem,

$$H^2 = B^2 + P^2; H^2 = (5)^2 + (6)^2; H^2 = 25 + 36 = 61; H = \sqrt{61}$$

Thus, the required distance = $\sqrt{61}$ m

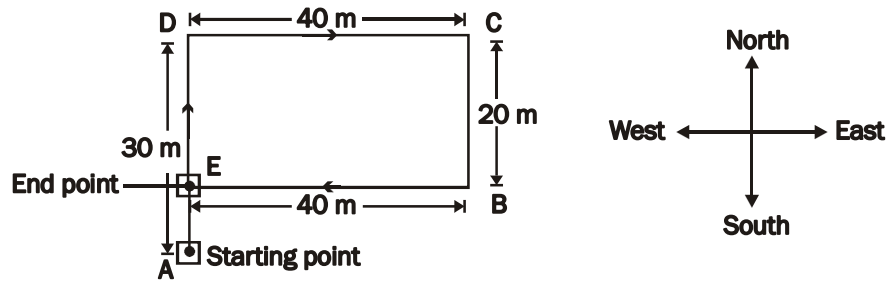
Example 2

Arjun goes 30 m North, then turns right and walks 40 m, then again turns right and walks 20 m, then again turns right and walks 40 m. How many metres is he from his original position?

- (a) 9 (b) 10 (c) 20 (d) 40

(IPU CET-2014)

Solution: According to the given information the direction graph can be drawn as



Distance between starting point and end point.

$$AE = AD - DE \quad [\because DE = CB]$$

$$AE = 30 - 20 = 10 \text{ m.}$$

So, option (b) is correct.

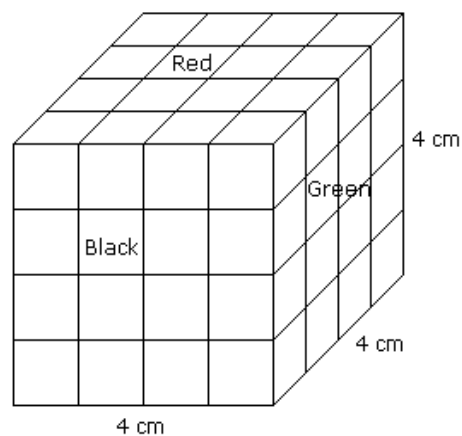
CUBE

Basic Concepts

- There are six faces in a cube.
- Length, breadth and height of a cube are equal.
- The number of unit cubes in a cube = $(\text{Side})^3$
- The number of unit cube in cuboid = $(l \times b \times h)$

Coloured Cube

Let us consider a cube whose sides are 4 cm each is painted black, red and green on pairs of opposite faces. It is then cut into small cubes of each side 1 cm.



Total number of small cubes

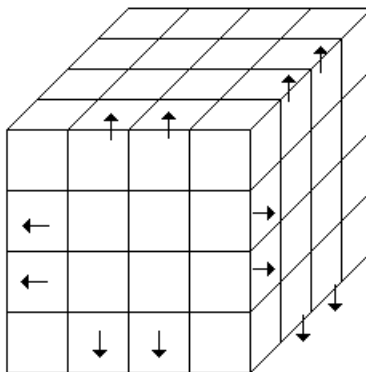
$$\text{Total number of small cubes} = (\text{sides})^3 = (4)^3 = 64$$

Number of small cubes with three faces painted

Looking at the figure above it is clear that the small cubes having three faces coloured are present only at the corners of the big cube.

Therefore, the required number of such cubes is always 8, because there are total 8 corners.

Number of small cubes with two faces painted



Looking at the above figure it is clear that there are 4 small cubes at each edge out of which 2 are at the corners which have all the three faces painted and 2 cubes are left with two faces painted.

As the total number of edges in a cube are 12.

Hence, the number of small cubes with two faces coloured = $12 \times 2 = 24$

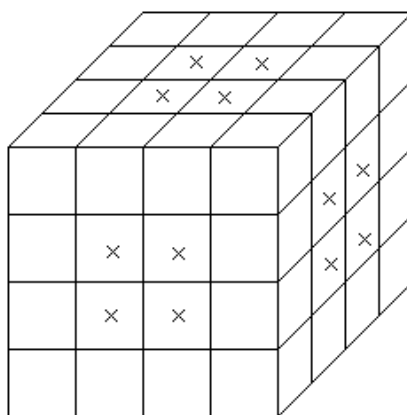


Note

Number of small cubes with two faces coloured = $(x - 2) \times$ Number of edges

$$\text{where } x = \frac{\text{side of big cube}}{\text{side of small cube}}$$

Number of small cubes with one face painted



Looking at the above figure it is clear that the cubes with only one face painted are the cubes present at the centre of each face of the cube.

Since there are 6 faces in a cube and there are 4 small cubes with one face painted at each face, therefore in all there will be $6 \times 4 = 24$ such small cubes with one face painted.



Note

Number of small cubes with one face coloured = $(x - 2)^2 \times 6$

$$\text{where } x = \frac{\text{side of big cube}}{\text{side of small cube}}$$

Number of small cubes with no faces painted

Number of small cubes with no faces painted = $(x - 2)^3 = (4 - 2)^3$ [Here $x = \frac{4}{1} = 4$] = 8



Note

Number of small cubes with no faces coloured = $(x - 2)^3$

$$\text{where } x = \frac{\text{side of big cube}}{\text{side of small cube}}$$

BLOOD RELATION

In **Blood Relation problems**, information is provided about people and their relations using which the reasoning has to be done. Blood relation problems can be categorized into some specific types which we will learn as a part of this topic but before doing so there are a few concepts in Blood Relation problems that need to be understood.

1. A family tree is always drawn vertical with people in the same generation being shown at the same level.
2. In Blood relation problems, the gender of a person cannot be arrived at using the name if only the first alphabet such as A, B, C, etc. is given, and it has to be reasoned out.
3. In the English language, Uncle could mean any of the following:
 - (a) Father's brother: elder or younger
 - (b) Mother's brother: elder or younger
 - (c) Father's sister's husband: elder or younger
 - (d) Mother's sister's husband: elder or younger
4. The same will be true for the relation, aunt also.
5. The differentiating factor is that relations from the Father's side are called Paternal and relations from the Mother's side are called Maternal. For example, Maternal Grandfather would mean Mother's Father.
6. In Blood Relation problems, a couple would mean two people of the opposite gender married to each other.
7. Husband and Wife are called Spouses of each other. In the informal language, they are also called better halves of each other.
8. Children of the same parents are called siblings. We need to understand that the word siblings can be used in different ways.
 - (a) If someone says, "we are 3 siblings," it indicates that there are 3 children including the speaker.
 - (b) If someone says, "I have 3 siblings," it means that the speaker has in all 3 brothers or sisters combined making a total of 4 children.



Note

Sibling is used for both brother and sister.

9. An unmarried man is called a Bachelor while an unmarried woman is called a Spinster.
10. All relations due to marriage to someone are called relations-in-law. For example, Brother-in-law can mean someone's sister's husband or for a man it could also mean wife's brother.
11. While children of the same parents are called siblings as indicated in the details above, a child, one of whose parents is a sibling of one of the parents of another child will be called cousins of each other.



Note

In Blood relation problems, it is important to understand the question from the reference point of view.

Types of Blood Relations Problems

Type 1: set based

The first type of problem is in the form of a set of information that needs to be compiled and then the questions answered. This type will usually have 3 to 4 questions to be answered as per the given data.

Type 2: introduction based

These questions are asked as stand-alone ones about a person introducing some other person to another person. So, here we have 3 people

1. The person who is giving the introduction.
2. The person whose introduction is given.
3. The person to whom introduction is given.

Importance of keywords

1. In such cases, the keywords "I, me and my" are used for the first person. (As discussed above)
2. The keywords "he, his, she and her" are used for the second person. (As discussed above)
3. The keywords "you, your" are used for the third person (As discussed above)

Example 1

Pointing to a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man?

- (a) Mother (b) Daughter (c) Sister (d) Grandmother

(BBA: CBS 2009)

Solution: In such questions, the right strategy is to either start with reference to the person speaking or about whom the person is speaking. Both are used in answering the questions depending on the ease of using any one of them. In many questions, we also use the strategy of starting from either ends and then joining the data to get to the required answer.

Let us try to attempt the given example.

Woman is the only daughter of man's grandmother. So the woman is the mother of the man.

The correct answer is (a).

Example 2

Looking at the photograph of a boy, a man said, “His Father’s Mother’s only son is the Father-in-law of my wife”. How is the boy in the photograph related to the man?

Solution

In such questions, the right strategy is to either start with reference to the person speaking or about whom the person is speaking. Both are used in answering the questions depending on the ease of using any one of them. In many questions, we also use the strategy of starting from either ends and then joining the data to get to the required answer.

Let us try to attempt the given example.

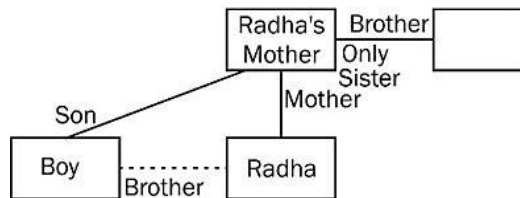
The boy’s father’s mother’s only son is the boy’s father. The man says that the boy’s father is the father-in-law of his wife, that is, the boy’s father must also be his father. The answer to the question will depend on whether the man in question, who is the speaker, has any brother or not. If he does not have any brother, then the boy in the photograph is the man himself or the boy in the photograph could be the man’s brother.

The correct answer to the question cannot be determined using the given data.

Example 3

Pointing to a boy playing cricket in the ground, Sohan said to Radha, “He is your mother’s brother’s only sister’s son”. How is the boy related to Radha?

Solution



Radha’s mother’s brother =Rohan’s maternal uncle

Radha’s maternal uncle’s only sister= Radha’s mother only

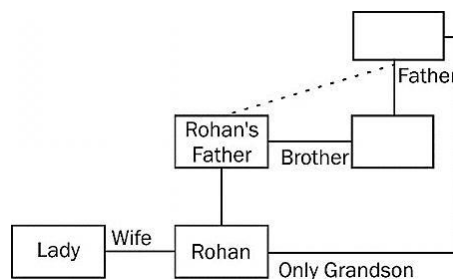
Radha’s mother’s son = Radha’s brother

Therefore, the boy being pointed at is the brother of Radha.

Example 4

Pointing to a lady in the picture, Rohan said “She is the wife of my father’s brother’s father’s only grandson”. How is the lady related to Rohan?

Solution:



Rohan’s father’s brother = Rohan’s uncle

Rohan’s uncle’s father = Rohan’s grandfather

Rohan’s grandfather’s only grandson = Rohan only

Therefore, the lady being pointed at is the wife of Rohan.

Type 3: symbol based

In these types of questions, symbols and codes including +, ÷, =, *, ×, @, ®, - etc. are used for representing relationship between two persons. You need to analyse the codes and symbols and answer the questions accordingly. It can be understood better by the following example:

Example 5

If $A + B$ means A is the Father of B and $B \times C$ means B is the sister of C

(i) Which among the following is definitely true?

- (a) C is the brother of B. (b) C is the daughter of A.
(c) A is the Father of C. (d) None of These.

Solution: In the question given, we do not know the gender of C and therefore both options A as well as option B cannot be said to be definitely true. But irrespective of the gender, A has to be the Father of C.

The correct answer is (c).

(ii) If $A + B$ means A is the Mother of B and $B \times C$ means B is the sister of C. $C * D$ means C is daughter of D.

Then $A + B \times C * D$ means

- (a) D is the brother of C. (b) D is the Husband of A.
(c) A is the Son of A. (d) None of These.

Solution: In such question, we start from beginning, that is, we first see $(A+B)$ so, we know A is mother of B. Now we see $(B \times C)$. So, B is sister of C and by $C * D$ we know, C is daughter of D. So, B and C are both daughters of both A and D. A is their mother. So, D must be their father and husband of A.

The correct answer is (d).

Example 6

Use the information given below to solve the questions that follow.

$A = B$: A is the father of B.

$A \times B$: A is the mother of B.

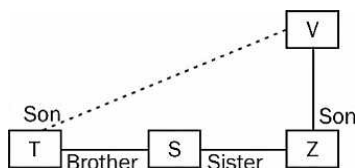
$A * B$: A is the sister of B.

$A + B$: A is the brother of B.

$A - B$: A is the son of B.

$A \div B$: A is the daughter of B.

In the expression, $T + S * Z - V$, how is T related to V?

Solution

$T + S = T$ is the brother of S

$S * Z = S$ is the sister of Z

$Z - V = Z$ is the son of V

Therefore, it can be concluded that V is the father of T, S, and Z, T and Z are the sons and S is the daughter of V. Therefore, we can say that T is the son of V.

CODING AND DECODING

In **Coding Decoding problems**, a word is given in a coded form. The student has to understand the basis of coding, that is, decode the given word and on the same basis do the coding for another given word. Coding Decoding problems can also be categorized into certain types and we will try to look at each one of them.

Concepts and Types of Problems:

Type 1:

A word is given in a coded form and another word is required to be coded on the same basis. The basis of coding the original word can be further categorized. Let's understand some of the popular bases on which coding is done.

(a) The alphabets of the original word are shifted by certain places in the series.

Example 1

If APPLE is coded as BQQMF, then how will MANGO be coded in the same language?

Solution: We can see that the basis is shifting of each alphabet by 1. Therefore, MANGO will be coded as NBOHP.

The basis need not be +1. It can be -1 as in the following example:

Example 2

If APPLE is coded as ZOOKD, then how will MANGO be coded in the same language?

Solution: MANGO will be coded as LZMFN as the basis of coding is -1.

The Basis could also be an increment or decrement of +1 or -1

Example 3

If APPLE is coded as BRSPJ, then how will MANGO be coded in the same language?

Solution: The differences will be 0, 1, 2 and so on. MANGO will be coded as NCQKT.



Note

Coding in a problem can be done in the reverse direction or a combination of forward and reverse directions. In both cases, examples of questions in the forward direction will be equally applicable.

(b) The alphabets of the original word used in a certain order as the basis of coding.

Example

- If MANGO is coded as OGNAM, then APPLE will be coded as ELPPA
- If MANGO is coded as AMNOG then APPLE will be coded as PAPEL

Notice that while the middle alphabet remains the same, the others are taken in pairs and exchanged.

Example

- If MANGO is coded as OGMAN, then APPLE will be coded as EALPP
- If DECIDE is coded as EDICED, then DIRECT will be coded as IDERTC

(c) Examples where Reverse Equivalent of the alphabets are used.

A B C D E F G H I J K L M
Z Y X W V U T S R Q O N

The reverse alphabet for A is Z, that for B is Y and so on

Example

- If USED is coded as FHWV then EQUAL will be coded as VJFZO

(d) Examples where the position of the alphabet is used.

Example

- If TUBE is coded as 202125, then CYCLE is coded 3253125

(e) A new language

Let us look at an example

“Ma La Ke” means we are sad

“La Min Se” means Sad is joy

“Min Kab ma” means joy we must

Which word in the language means ‘are’?

If we compare statements 1 and 2, then ‘La’ stands for ‘sad’. Similarly, if we compare statements 1 and 3, then ‘Ma’ means ‘we’ and if we compare statements 2 and 3, then ‘Min’ means ‘joy’.

Therefore, ‘Ke’ in the language means ‘are’.



Note

A question like the one above is also formed using digits instead of words as the basis for coding.

Directions for examples 4 to 5: Go through the information given below and answer the questions that follow:

LETTER	E	R	C	F	L	N	H	K	P	T	A	S	G
CODE	%	3	2	5	@	7	#	6	1	8	4	%	9

- If the first letter is a vowel and the last letter is a consonant, both are to be coded as ©
- If the first letter is a consonant and the last letter is a vowel, both are to be coded as 0
- If the first letter as well as the last letter are vowels, both are to be coded as the code of the last letter.

Example 4

N F R S C A

(a) 753%20

(b) 053%24

(c) 0232%0

(d) 053%20

Solution: The code for NFRSCA is 053%20.

Hence, the correct answer is (d).

Example 5

ARFTHE

- (a) %358#% (b) 4358#% (c) 4358#4 (d) %385#%

Solution: The code for ARFTHE is 0358#%.

Hence, the correct answer is (a).

Type 3: Letter arrangement

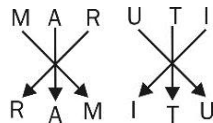
As the name suggests, in this type of coding, the position of letters gets twisted or mixed up.

Example 6

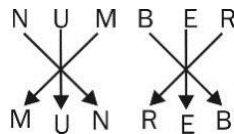
In a certain code, 'MARUTI' is written as 'RAMITU'. How is 'NUMBER' written in that code?

- (a) MUNBER (b) UMNREB (c) MUNREB (d) MUBNRE

Solution: The pattern is given below:



In same manner, 'NUMBER' is written as:



Thus, the correct answer is given by option (c).

Type 4: coding based on numbers

In this type of coding, the letters of a word or a word is replaced by a number by applying some specific pattern.

Example 7

In a certain code, RAMAN is coded as 18113114. How is ROHIT written in that code?

Solution: The logic followed is given below:

The code of RAMAN is written as:

Alphabet:	R	A	M	A	N
Position:	18	1	13	1	14

Combining the numbers, the code becomes 18113114.

In the same manner, ROHIT will be written as:

Alphabet:	R	O	H	I	T
Position:	18	15	8	9	20

After combining the numbers, the code for ROHIT becomes 18158920.

ARRANGEMENT

Basic Concepts

Arrangement refers to placing the people or objects in a well-defined pattern or order. An arrangement problem can be Linear, Circular or Tabular.

Linear Arrangement

Any arrangement which has a well-defined beginning and end is a **linear arrangement**. It may be of three types:

1. To arrange people or objects in a straight line (Row Arrangement).
2. To arrange events etc. on the basis of time (Chronological).
3. To arrange people in other ways (such as on the basis of Age, position, height, etc.)



Note

In each of the cases mentioned above, we can see that we can easily find the beginning and ending, that is, the first and the last position. These are also called **extreme positions**.

The first case is the most common, that is, arrangement of people in a row:

In a Linear Arrangement problem, items can be arranged either facing you or away from you. One can take either of the two cases but one must try to always follow a particular case for all problems depending on convenience. Now, for convenience, it is better if one can consider the items in the arrangement looking in the same direction as you.

Example 1

4 boys, Amit, Sumit, Rajesh and Suresh are standing in a straight line looking in the same direction as, you, the Reader of the text. If each one is represented by their names, the arrangement will look as follows:

Amit Sumit Rajesh Suresh

Let us now try to answer the following questions.

- (i) Which person is third from the left of the arrangement?

Solution: When we are answering a question like the one above, we will always face the arrangement starting with Amit and: therefore, Rajesh will be the third person counting from the left end of the arrangement.

- (ii) Which person is to the immediate right of Rajesh?

Solution: Does Rajesh's right also refer to your right? Absolutely. The person to the immediate right of Rajesh is, hence, Suresh.

 **Important Points**

1. B is 2 places to the right of A means, it would be like A X B. This can also be written as B is second to the right of A.
2. There are 2 people between A and B and will be shown as A X X B or as B X X A because in this case right or left is not specified.
3. In an arrangement, A is placed after B. This means A can have any position that is placed after B starting from the left. Many students by default take the statement as immediately after which is not true.
4. Another word used for 'before' is preceding while another word used for 'after' is follows.
5. A, B and C are Doctor, Engineer and Lawyer, not necessarily in the same order. We would come across such statements very frequently in reasoning problems. What it indicates is that we are not sure which person belongs to which profession. It needs to be logically concluded and arrived at. But there are questions or part of questions in which we come across statements such as A, B and C are Doctor, Engineer and Lawyer respectively which indicates that their professions are in the same order.

Some points to remember before beginning to solve the question sets.

1. Comprehension is an important part of all reasoning problems. Many a times, students are not able to solve a problem because of their inability to comprehend whatever is being said.
2. While attempting a Reasoning problem, please try to do your work neatly and in an organized manner. It will help you to get to the solution easily.
3. Information compiled must be at one place and not scattered.

Let a given final arrangement be as follows:

Santro/Indica Ritz Zen Santro/Indica Alto

Now, what if the question asks about the exact position of the Santro or the Indica? We will not be able to answer the question uniquely. Such a problem set where all values or information is not definitely determined is called a **Non-Deterministic Set**.

The answer to the above question will be **"cannot be determined"** which is a popular answer choice in reasoning.



Note

There is a difference between answer choices **"None of These"** and **"Cannot be Determined"**. Answer choice **"None of These"** means there is a unique answer but it is not amongst the choices provided while **"Cannot be Determined"** means the answer to the question asked cannot be uniquely determined.

What if we add a third statement which says Indica is between the Zen and the Alto. Now, using the additional data provided, we can definitely say that there will be a unique arrangement.

Santro Ritz Zen Indica Alto

Such a set where all values are uniquely determined is called a **Deterministic Set**.



Note

Sometimes, additional data is provided in the questions in certain sets like the one above. Students make the mistake of taking up the additional data to solve the entire set. Please remember, data provided in a question cannot be used for other questions until and unless it is clearly mentioned in the problem.

Example 2

There are five houses P, Q, R, S and T. P is right of Q and T is left of R and right of P. Q is right of S.

Which house is in the middle?

- (a) P (b) Q (c) T (d) R

Solution: The order of the houses is S – Q – P – T – R.

Hence, the house which is in the middle is P.

The correct answer is (a).

Directions for examples 3 to 5: Study the information below and answer the questions based on it:

- i. There are 5 persons in a group – P, Q, R, S and T.
- ii. In this group, there is one badminton player, one chess player and one tennis player.
- iii. P and S are unmarried ladies who do not play any games.
- iv. No lady is either a chess player or a badminton player.
- v. There is one married couple in this group of which T is the husband.
- vi. Q is the brother of R and is neither a chess player nor a tennis player.

Example 3

Which of the following groups has only ladies?

- (a) PQR (b) QRS (c) RST (d) None of the above

Example 4

Who is the tennis player?

- (a) Q (b) R (c) S (d) T

Example 5

Who is the wife of T?

- (a) P (b) S (c) Q (d) R

Solution: The given information can be tabulated as:

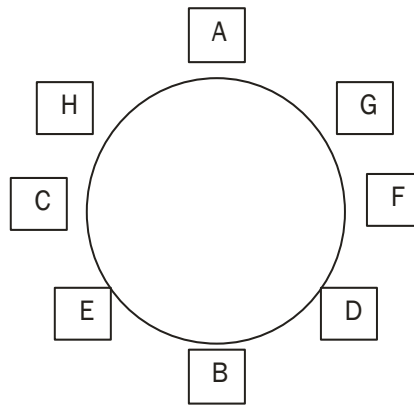
Person	Sex	Sport	Marital Status
P	F		Unmarried
Q	M	Badminton	
R	F	Tennis	Married (Wife)
S	F		Unmarried
T	M	Chess	Married (Husband)

3. As per the table, (d) is the correct answer.
4. As per the table, (b) is the correct answer.
5. As per the table, (d) is the correct answer.

Circular Arrangement

Unlike Linear arrangement wherein every position is unique by itself, in **Circular Arrangement** questions all the positions are identical. Therefore, in Circular arrangement questions, the position of an individual depends on the neighbours to the left and the right.

Usually, in such questions 6 or 8 people are arranged in a circle. Unless mentioned otherwise, we must try to take positions that are diagonally opposite so that the problem can be easily solved. Also, conditions given in Circular arrangement questions can be with reference to the right or left of people or with reference to clockwise and anti-clockwise movement. There are some additional aspects that must be taken care of in a circular arrangement question.



If the Question says, 'how many people are seated between A and D then?' the correct answer is either **2 or 4** or the correct answer is **Cannot be Determined** because the question does not specify the direction in which the counting has to be done.

What if the Question asks about the number of people seated between H and D? In this case, we will not have 2 answers because the number of people seated between D and H is 3 when counted from either direction. From this, we can definitely conclude that the number of positions between 2 diagonally opposite positions will be the same on either side. Let us see how information such as this can be utilized.

Directions for examples 6 to 10: Study the information carefully and answer the following questions:

Eight friends – Romil, Ramesh, Rakesh, Rohit, Rahul, Abhijit, Abhishek and Anil—are sitting around a circular table, not necessarily in the same order. Four of them face inside while others face outside. They belong to eight different cities – Bhopal, Patna, Kolkata, Delhi, Gwalior, Bengaluru, Chennai and Rajkot, but not necessarily in the same order.

Abhijit faces the Centre and sits third to the right of Rakesh. Rohit belongs to Kolkata and faces the person who belongs to Bengaluru. Abhishek sits third to the right of Ramesh, who stays in Bhopal. The persons who belong to Delhi and Gwalior face the same direction (inside or outside). Rahul sits between the person who belongs to Kolkata and the one from Rajkot respectively. Romil belongs to Gwalior and Rakesh belongs to Patna. The person who belongs to Chennai faces outward and is an immediate neighbor of Rajkot. Anil is an immediate neighbor of the persons who belong to Gwalior and Chennai. Rahul is at the immediate left of Rohit.

Example 6

Who belongs to Bengaluru?

- (a) Romil (b) Rohit (c) Anil (d) Abhishek

Example 7

Who are the immediate neighbors of Romil?

- (a) Romesh and Rakesh (b) Rahul and Rohit (c) Anil and Ramesh (d) Abhishek and Rahul

Example 8

Which of the following pairs is correct?

- (a) Romil – Bhopal (b) Anil – Bengaluru (c) Rohit – Delhi (d) Abhijeet – Delhi

Example 9

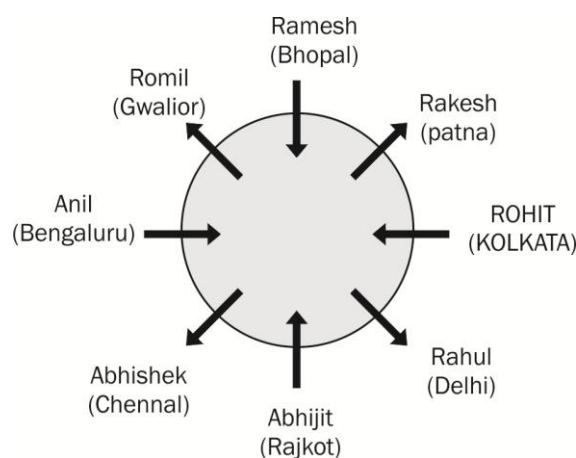
What is the position of Ramesh with respect to Rahul?

- (a) Third to the right (b) Fourth to the left (c) Fifth to the right (d) Second to the right

Example 10

If Rohit and Anil interchange their positions and similarly, Abhijit and Rakesh interchange their positions, then what is the position of Romil with respect to Rakesh?

- (a) Third to the left (b) Third to the right (c) Second to the left (d) Immediate left

Solutions

6. Anil belongs to Bengaluru.

The correct answer is (c).

7. Anil and Ramesh are immediate neighbors of Romil.

The correct answer is (b).

8. Among the given options, pair 'Anil – Bengaluru' is correct.

The correct answer is (b).

9. Ramesh is third to the right of Rahul.

The correct answer is (a).

10. After the interchange, Romil is the second to the left of Rakesh.

The correct answer is (c).

Tabular Arrangement

In **Tabular Arrangement**, mostly more than two pieces of information are given about each member/object. We make a table of $m \times n$ size,

Where

m is number of rows = Number of people or objects,

n = Number of information about each member/object

In this case we make a table and try to complete it with the given data. For each member, we put the information in a row. The only thing we need to focus on is whether new information is about the person/object that we have already put in the table or about a new person/object. If it is about a new person, only then do we go further and put it into a new row.

Example 11

Five children, Aman, Bimal, Celina, Deepak and Eshita treated each other at different Outlets in the city to celebrate their results. The treats were at Sarvana Bhavan, McDonald's, Haldiram's, Bikanerwala and Dosa Plaza, not in any particular order. Each of these places specializes in exactly one of the items, Chicken, Lassi, Dosa, Shakes and Coffee, but not in any particular order and is located at Balliwala, Chowk, Bus Stand, Sabzi Mandi and Nashville Road, again, not in any particular order. Further conditions are as under:

1. Celina treated with Lassi but neither at Haldiram's nor at Dosa Plaza.
2. Bikanerwala specializes in Shakes and is located at Balliwala.
3. Eshita treated with Coffee at Nashville Road.
4. Neither Bimal nor Deepak treated with Dosa.
5. The Outlet at Chowk is known for its Lassi.
6. Sarvana Bhavan is located at Sabzi Mandi and is famous for Dosa.
7. Deepak gave the treat at Haldiram's.

How to solve such cases

As we have to arrange the treats by 5 friends. About each treat, we have four pieces of information: name of the person giving the treat, name of the restaurant, location of the restaurant and the dish. So, we will make a table with five rows and four columns.

In the first row, we can feed the information about Celina being treated with Lassi.

Celina	X Haldiram's X Dosa plaza	Lassi	
--------	------------------------------	-------	--

For the second piece of information, we need to analyse whether or not it could be about the information we have already fed in the table. As for the information that we have in the table, we don't know the name of the restaurant. But we know it can be any one from the remaining three which can be there (that is, Sarvana Bhavan, McDonald's, and Bikanerwala). So, it may or may not be about the same. But, the dish that the restaurant is famous for is shakes while the information we have in the first entry is Lassi. So, these two must be different; hence, we can feed this information in the second row.

Celina	X Haldiram's X Dosa plaza	Lassi	
	Bikanerwala	Shakes	Balliwala

Similarly, we can take decisions for the remaining pieces of information too.

Students are advised to complete this table before moving further.

Directions for examples 12 to 17: Read the following passage and solve the questions based on it.

- a. Six Indian professors from six different institutions (Jupiter, Mars, Mercury, Neptune, Pluto, Uranus) went to China to attend an international conference on "Sustainability and Innovation in Management: A Global Scenario" and they stayed in six successive rooms on the second floor of a hotel (201–206).
- b. Each of them has published papers in a number of journals and has donated to a number of institutions last year.
- c. The professor in room no. 202 has published in twice as many journals as the professor who donated to 8 institutions last year.
- d. The professor from Uranus and the professor in room number 206 together published in a total of 40 journals.
- e. The professor from Jupiter published in 8 journals less than the professor from Pluto but donated to 10 more institutions last year.
- f. Four times the number of 4 journal publications by the professor in room number 204 is lesser than the number of institutions to which he donated last year.
- g. The professor in room number 203 published in 12 journals and donated to 8 institutions last year.
- h. The professor who published in 16 journals donated to 24 institutions last year.
- i. The professor in room number 205 published in 8 journals and donated to 2 institutions less than the professor from Mercury last year. The Mercury professor is staying in an odd numbered room.
- j. The Mars professor is staying two rooms ahead of the Pluto professor who is staying two rooms ahead of the Mercury professor in ascending order of room numbers.
- k. The professors from Mercury and Jupiter do not stay in room number 206.

Example 12

In which room is the Mars professor staying?

- (a) Room number 201 (b) Room number 203 (c) Room number 205 (d) None of the above

Example 13

How many institutions did the Jupiter professor donate to last year?

- (a) 8 (b) 3 (c) 18 (d) 24

Example 14

The professor of which institute is staying in room number 206?

- (a) Jupiter (b) Uranus (c) Mercury (d) Neptune

Example 15

The professor of which institute donated to 24 institutions last year?

- (a) Jupiter (b) Uranus (c) Mercury (d) Neptune

Example 16

The professor of which institute published in the maximum number of journals?

- (a) Jupiter (b) Uranus (c) Neptune (d) Mars

Example 17

In how many journals did the Jupiter professor publish?

- (a) 8 (b) 4 (c) 12 (d) 20

Solutions: The given information can be tabulated as following:

Room No	Institutions	No. of Journals	No. of Institutions donated
201	Mercury		
202	Uranus	24	
203	Pluto	12	8
204	Jupiter	4	18
205	Mars	8	
206	Neptune	16	24

12. The professor from Mars is staying in room number 205.
The correct answer is (c).
13. The professor from Jupiter has donated to 18 institutions.
The correct answer is (c).
14. The professor from Neptune is staying in room no. 206.
The correct answer is (d).
15. The professor from Neptune donated to 24 institutions last year.
The correct answer is (d).
16. The professor from Uranus published in the maximum number of journals.
The correct answer is (b).
17. The professor from Jupiter published 4 journals.
The correct answer is (b).

CLOCKS

Minute Spaces

The face or dial of watch is a circle whose circumference is divided into 60 equal parts, called minute spaces.

The Hour Hand and the Minute Hand

A clock has two hands, the smaller one is called the **hour hand** or the **short hand** while the larger one is called the **minute hand** or the **long hand**.

 **Important Tips**

1. In 60 minutes, the minute hand gains 55 minutes on the hour on the hour hand.
2. In every hour, both the hands coincide once.
3. The hands are in the same straight line when they are coincident or opposite to each other.
4. When the two hands are at right angles, they are 15 minute spaces apart.
5. When the hands are in opposite directions, they are 30 minute spaces apart.
6. Angle traced by hour hand in 12 hours = 360° .
7. Angle traced by minute hand in 60 min. = 360° .
8. If a watch or a clock indicates 8.15, when the correct time is 8, it is said to be 15 minutes **too fast**. On the other hand, if it indicates 7.45, when the correct time is 8, it is said to be 15 minutes **too slow**.

Example 1

The reflex angle between the hands of a clock at 10.25 is:

- (a) 180° (b) 192.5° (c) 195° (d) 197.5°

Solution: Angle traced by hour hand in $\frac{125}{12}$ hours = $\frac{360}{12} \times \frac{125}{12} = 312.5^\circ$

Angle traced by the minute hand in 25 mins = $\frac{360}{60} \times 25 = 150^\circ$

Reflex angle = $360^\circ - (312.5^\circ - 150^\circ) = 197.5^\circ$

The correct answer is (d).

CALENDAR**Odd Days**

We are supposed to find the day of the week on a given date. For this, we use the concept of 'odd days'. In a given period, the number of days more than the complete weeks are called **odd days**.

Leap Year

- Every year divisible by 4 is a leap year, if it is not a century.
- Every 4th century is a leap year and no other century is a leap year.
- A leap year has 366 days.

Examples

- Each of the years 1948, 2004, 1676, and so on is a leap year.
- Each of the years 400, 800, 1200, 1600, 2000, and so on is a leap year.
- None of the years 2001, 2002, 2003, 2005, 1800, 2100 is a leap year.

Ordinary Year

The year which is not a leap year is called an ordinary year. An ordinary year has 365 days.

Counting of Odd Days

- 1 ordinary year = 365 days = (52 weeks + 1 day.)

So, 1 ordinary year has 1 odd day.

- Leap year = 366 days = (52 weeks + 2 days)

So, 1 leap year has 2 odd days.

- 100 years = 76 ordinary years + 24 leap years = $(76 \times 1 + 24 \times 2)$ odd days = 124 odd days.

= (17 weeks + days) \equiv 4 odd days.

Number of odd days in 100 years = 4.

Number of odd days in 200 years = $(4 \times 2) \equiv 0$ odd days.

Number of odd days in 300 years = $(4 \times 3) \equiv 1$ odd day.

Number of odd days in 400 years = $(4 \times 4 + 1) \equiv 0$ odd day.

Similarly, each one of 800 years, 1200 years, 1600 years, 2000 years etc. has 0 odd days.

- Day of the Week Related to Odd Days:

No. of Days	0	1	2	3	4	5	6
Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Example 1

What was the day of the week on 1st April, 1901?

- (a) Sunday (b) Monday (c) Wednesday (d) Saturday

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Solution: 1 April, 1901 = (1900 years + Period from 1.1.1901 to 1.4.1991)

Odd days in 1600 years = 0

Odd days in 300 years = 1

Jan Feb March April

$(31 + 28 + 31 + 1) = 91$ days

91 days = (13 weeks) = 0 odd day

Total number of odd days = $(0 + 1 + 0) = 1$ odd day.

Given day is Monday.

The correct answer is (b).

Example 2

What was the day of the week on 28th May, 2006?

- (a) Thursday (b) Friday (c) Saturday (d) Sunday

Solution: 28 May, 2006 = (2005 years + Period from 1.1.2006 to 28.5.2006)

Odd days in 1600 years = 0

Odd days in 400 years = 0

5 years = (4 ordinary years + 1 leap year) = $(4 \times 1 + 1 \times 2) \equiv 6$ odd days

Jan Feb March April May

$(31 + 28 + 31 + 30 + 28) = 148$ days

148 days = (21 weeks + 1 day) $\equiv 1$ odd day.

Total number of odd days = $(0 + 0 + 6 + 1) = 7 \equiv 0$ odd day.

Given day is Sunday.

The correct answer is (a).

SYLLOGISM

Basic Concepts

Logic, which derives from the Ancient Greek word, *logike* refers to the systematic study of the various kinds of arguments. A valid argument is one where there is a logical, rational correlation between the assumptions made in the argument and the conclusions derived.

Logic is primarily of two types:

- Deductive logic
- Inductive logic

Logical Reasoning (LR) is an integral part of competitive exams. It aims to measure a candidate's ability to draw logical conclusions based on statements or arguments, and to identify the strengths and weaknesses of those arguments. It is important to keep in mind that the statements and assumptions in logical reasoning might defy your expectations rooted in the real world. For instance: Eating a lot makes you lose weight; Rahul has lost weight; Rahul eats a lot.

This goes against the knowledge that eating a lot leads to obesity, but within the limits of logical reasoning, this is a valid argument.

Deductive logic, also known as the "from the top down" approach, starts with a general idea and works down to the details. A hypothesis is generally formed using a syllogism, or a three-stepped argument.

A syllogism is a deductive argument relating two premises and a conclusion, all of which are quantified propositions joining concepts by using words such as 'some' and 'all'. Deductive logic is used to derive conclusions from premises where the truth of the conclusion must always be contained in the truth of the premise.

For example:

1. All students are wise
2. Ravi is a student
3. Therefore, Ravi is wise

This is deductive logic.

Some characteristics of deductive logic:

1. It is a valid argument
2. Nothing can further strengthen the argument, that is, no statement can make the conclusion more valid
3. Another way of looking at deductive logic is that when a 'specific' conclusion is derived from a set of general statements, it is known as deductive logic.

In the previous example, if we alter the sequence of sentences, that is,

1. Ravi is a student
2. Ravi is wise
3. All students are wise

The conclusion that all students are wise is not necessarily valid. However, it is not necessarily invalid. There is a probability of this conclusion being true. This is known as Inductive logic.

Some characteristics of inductive logic:

- The conclusion cannot be said to be either totally valid or invalid
- Addition of certain other premises may make the conclusion either more valid or invalid
- When a general conclusion is derived from a set of specific statements that is known as Inductive logic.

Deductive Logic

The premises in deductive logic can either be affirmative or negative and can also be universal or particular. Thus, we have basically four types of premises as summarized below:

	Affirmative	Negative
Universal	All A are B	No A is B
Particular	Some A are B	Some A are not B

Let us understand each of the four statements in their entirety:

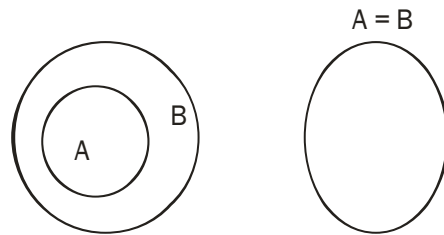
The best method of solving Syllogism based problems is through Venn Diagrams. A Venn diagram is an illustration of the relationships between data sets. It shows the various ways in which data interacts with each other.

All A are B

This statement means that there is no A which is not B. This means the whole circle representing A lies within the circle representing B.

One of the most common mistakes made in interpreting this statement is that there are certain B which are not A. This is false reasoning. It is just a possibility that there are certain B that are not A but we cannot be sure of it. It is quite possible that the entire set of A and B overlap with each other.

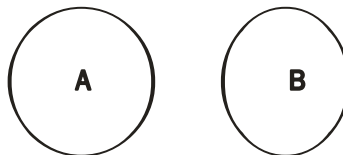
There are two possible Venn diagrams for this statement:



Hence, the conclusion that can be drawn is: Some B are A.

No A is B

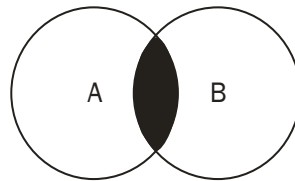
This statement is the simplest and has just one interpretation, that is, the two sets of A and B are disjointed or do not overlap. This means that circles representing A and B does not intersect at all.



Thus, we can conclude that no A is a B and also that no B is A.

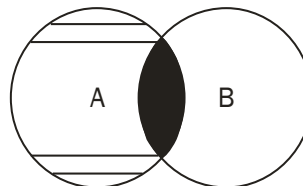
Some A are B

The meaning of this statement is that there is at least one A which is B. This indicates that some part of the circle represented by A is within the circle represented by B. There are four possible Venn diagrams for this statement:

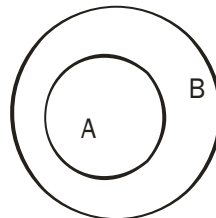


This type of statement presents three possible scenarios:

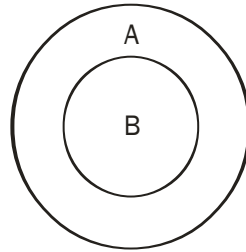
1. Some A are B also indicates that – Some A are not B



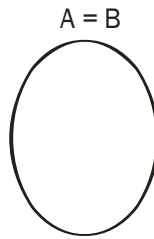
2. Some A are B also indicates that – All A are B.



3. Some A are B also indicates that – All B are A.



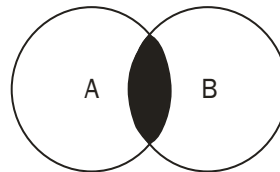
4. Some A are B also indicates that – All A are B and All B are A.



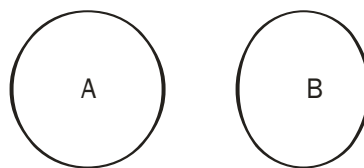
Some A are not B

Again, here all that we know is that there is at least one A which is not a B. This means that some portion of circle A has no intersection with circle B while the remaining portion of circle A is uncertain

1. Some A are not B also indicates that – Some A are B.



2. Some A are not B also indicates that – No A is B.



Statements	Correct Conclusion	Commonly made wrong conclusions
All A are B	Some B are A	All B are A
No A is B	No B is A	_____
Some A are B	Some B are A	Some A are not B
Some A are not B	_____	Some A are B Some B are not A

Now, let us consider few questions.

Example 1

Given below are six statements followed by sets of three. You are to mark the option in which the statements are most logically related.

- A. An ostrich lays eggs.
- B. All birds lay eggs.
- C. Some birds can fly.
- D. An ostrich cannot fly.
- E. An ostrich is a bird.
- F. An ostrich cannot swim.

- (a) BEA (b) ABE (c) DEC (d) ECB

(BBA: DU JAT 2012)

Solution: Only BEA is a logically correct option. All birds lay eggs talks about a property of the general category of birds. Since ostrich belongs to that category according to the statement, BEA follows.

The correct answer is (a).

Directions for examples 2 to 11: In each of the following questions, three statements are given and these statements are followed by two conclusions, numbered (I) and (II). You have to take the given three statements to be true even if they seem to be at variance with commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

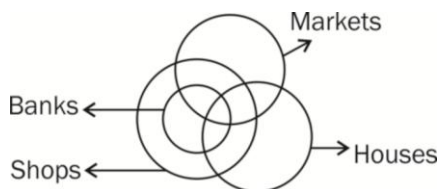
Example 2

Statements: All banks are shops.
Some houses are shops.
Some houses are miracles.

Conclusions: I. Some miracles are shops is a possibility.
II. Some banks are houses is a possibility.

- (a) If only conclusion I follows. (b) If only conclusions II follows.
- (c) If either conclusion I or II follows. (d) If neither conclusion I nor II follows.
- (e) If both conclusion I and II follow

Solution: The possible diagram for the given statements:



From the above diagram:
Conclusion I is affirmative.

Conclusion II is affirmative.

Therefore, both I and II follow.

The correct answer is (e).

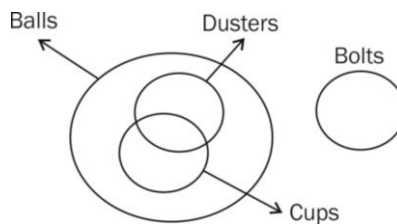
Example 3

Statements: Some cups are not bolts.
All dusters are balls.
All cups are balls.

Conclusions: I. All bolts are cups.
II. Some dusters are cups is a possibility.

- (a) If only conclusion I follows.
- (b) If only conclusions II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusion I and II follow.

Solution: The basic diagram for the following statements is:



From the above diagram, conclusion I does not follow and conclusion II follows. Hence, only II follows.

The correct answer is (b).

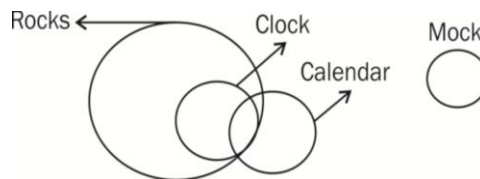
Example 4

Statements: All clocks are rocks.
No calendar is a mock.
Some clocks are calendars.

Conclusions: I. No clock is a mock.
II. Some rocks are clocks

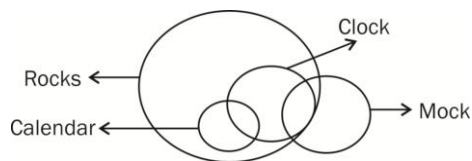
- (a) If only conclusion I follows.
- (b) If only conclusions II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusion I and II follow.

Solution: The basic diagram for the given statements is:



From the above diagram, conclusion I follows.

Hence, let's try to draw an alternate diagram:



From this conclusion 1 is negated.

Conclusion II follows in both cases.

The correct answer is (b).

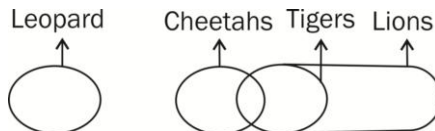
Example 5

Statements: No leopard is a cheetah.
Some cheetahs are tigers.
All tigers are lions.

Conclusions: I. Some leopards are not tigers.
II. All leopards are tigers.

- (a) If only conclusion I follows.
- (b) If only conclusions II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusion I and II follow.

Solution: The basic diagram for the given statement is:

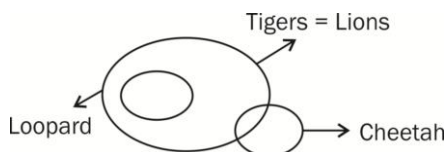


In the above diagram

Conclusion I follows

Conclusion II follows

Since conclusion I, negative follows; let's try to negate it by drawing an alternate diagram:



The correct answer is (c).

Example 6

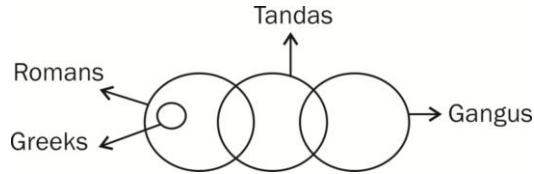
Statements: All Greeks are Romans.
Some Romans are Tandas.
Some Gangus are Tandas.

Conclusions: I. Some Romans are Tandas.
II. All Greeks are Gangus.

- (a) If only conclusion I follows.
- (c) If either conclusion I or II follows.
- (e) If both conclusion I and II follow.

- (b) If only conclusions II follows.
- (d) If neither conclusion I nor II follows.

Solution:



In the above diagram, conclusion I affirmative follows. Conclusion II, affirmative doesn't follow. Hence, only I follows.

The correct answer is (a).

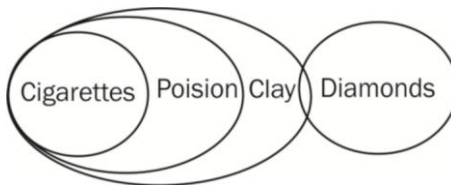
Example 7

Statements: All cigarettes are poison.
All poison are clay.
Some clay are diamonds.

Conclusions: I. Some diamonds being cigarettes and poison is a possibility.
II. All cigarettes being clay is a possibility.

- (a) If only conclusion I follows.
- (b) If only conclusion II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusions I and II follow.

Solution: The basic diagram for the given statement is:



The correct answer is (e).

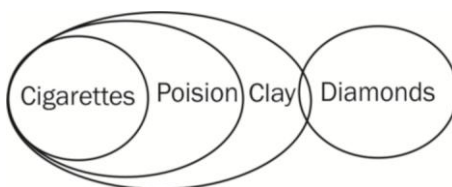
Example 8

Statements: All cigarettes are poison.
All poison are clay.
Some clay are diamonds.

Conclusions: I. All clay being both cigarettes and poison is a possibility.
II. Some clay are not diamonds.

- (a) If only conclusion I follows.
- (b) If only conclusion II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusions I and II follow.

Solution: The basic diagram for the given statement is:



The correct answer is (a).

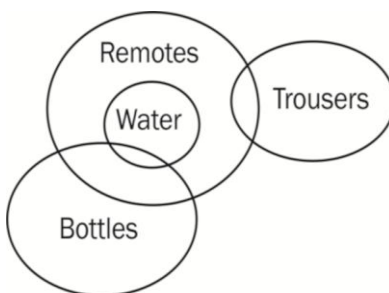
Example 9

Statements: Some remotes are trousers.
 Some water are bottles.
 All water are remotes.

Conclusions: I. Some remotes being bottles is a possibility.
 II. All trousers not being bottles is a possibility.

- (a) If only conclusion I follows.
- (b) If only conclusion II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusions I and II follow.

Solution:



The correct answer is (a).

Example 10

Statements: All windows are doors.
 No door is wall.

Conclusions: I. No window is wall.
 II. No wall is door.

- (a) If only conclusion I follows.
- (b) Only conclusion II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) Both I and II follow.

Solution: Since both the premises are universal and one premise is negative, the conclusion must be universal negative. Hence, both the conclusions follow.

The correct answer is (e).

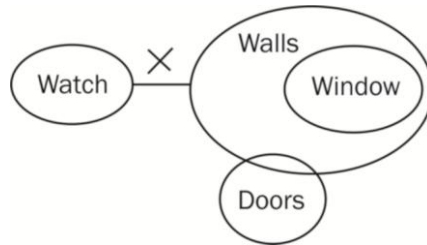
Example 11

Statements: No watch is walls.
 All windows are walls.
 Some doors are walls.

Conclusions: I. Only windows can be watch.
 II. Some walls being watch is a possibility.

- (a) If only conclusion I follows.
- (b) If only conclusion II follows.
- (c) If either conclusion I or II follows.
- (d) If neither conclusion I nor II follows.
- (e) If both conclusions I and II follow.

Solution:



The correct answer is (d).

CRITICAL REASONING

Basic Concepts

Critical reasoning is a process. It involves conceptualization, analysis and application of objective, rational reasoning in order to arrive at conclusions. Simply put, Reasoning = Valid Logical Argument

To be skilled in critical thinking is to be able to deconstruct one’s thinking into individual arguments, analyze each one on its individual merit, assess its validity and improve upon it. The first step in this process is gaining an understanding of the elements of reasoning.

In Inferential reasoning, we are given an argument (a short paragraph) and asked to answer questions based on it. Let us first define an argument.

Arguments constitute the basis of conversation. They are combinations of facts, data, information, opinion that aim to modify the perspective of the other person.

All arguments follow a structure, which may either be deliberate or may be discovered through analysis.

At its simplest, an argument is a simple set of three things:

1. **FACTS**, which are also referred to as premise in logic. A premise (or premises) of an argument is something that is presented as being true. Although it is not proven, its truth is assumed in the given scenario.

Premises: *The people in this city are mad.*

I am 5 feet tall

Identifying premises:

Premise is generally preceded by words like

Because	In view of
Since	Given that

2. **CONCLUSION** is the final result which an argument arrives at. It is the statement/claim which you want to convince the other person about. A conclusion is drawn from the premises. These act as the support for the conclusion and reinforce the argument in its favor.

In the statement, 'I can participate in the Miss India pageant because I am 6 feet ', the part 'I can participate in the Miss India pageant' is the conclusion or result.

A useful way of spotting a conclusion is to identify its construction. It can be presented as an advice or strong recommendation, stating a preferable course of action. It may also be persuasive in its construction, highlighting the desirability of a particular decision, as compared to another.

Identifying a conclusion:

- Look for conclusion either at the beginning or at the end of the passage
- Trigger words that signal a conclusion are:

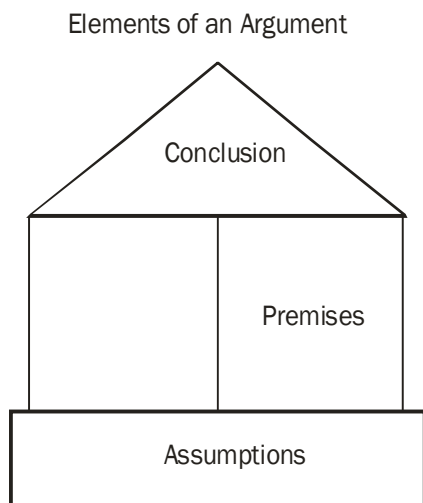
Therefore	Thus
So	Hence
Implies	Indicates

- Look for statements that cannot stand alone

1. Or, look for facts that are part of the argument

3. **ASSUMPTION**, the third and the most critical part of our argument. An assumption is an unstated premise that supports the conclusion. Both premise and assumption are unquestionable facts but the assumption, unlike the premise, is not explicitly stated and needs to be deciphered. Assumption is something that is taken for granted in the context of a statement. For instance, 'All kids are happy when they get new gadgets. Vicky will be thrilled when he gets the new mobile phone.' In this, the assumption is that Vicky is a kid. Without this assumption, the argument will make no sense

Visually, an argument looks like this:



It can be said that the conclusion rests on the pillars or is supported by the pillars of premises, which in turn, take shape from the foundation of assumptions.

Therefore, an analysis of an argument consists of:

1. Ability to identify the premises and the conclusion which they reiterate.
2. Ability to spot the unstated links in the argument while moving from facts to conclusions or vice-versa. It is these links that identify the underlying assumptions in the argument.

Critical Reasoning questions can be broadly divided into certain categories:

1. Identify the assumption
2. Identify the conclusion (Inference/conclusion)
3. Strengthen/Weaken the argument
4. Miscellaneous question types

Identify the Assumptions

Questions with statements and assumptions are common in the logical reasoning section of entrance examinations. An assumption question asks you to identify an unstated premise of the passage. As you read the passage, try and identify a gap in the underlying argument. The gap can only be closed by stating out aloud what is now being assumed. The assumptions made can be of different types.

1. Casual Assumptions
2. Analogy assumptions
3. Statistical Assumptions

Casual assumptions

Casual assumptions take an effect and suggest a cause for it. Whenever you come across a cause being suggested for an effect, ask whether there might be an alternative for it.

Analogy assumptions

An argument by analogy compares one situation with another, ignoring the question of whether the two situations are in fact comparable. Hence, whenever you see comparisons ask yourself whether it is actually possible.

Statistical assumptions

A statistical assumption uses statistics to prove its point. Whenever you see statistics, always question whether the statistics given are of a representative sample.

Let us consider a few examples.

Example 1

Statement: A big retail store was attacked by vegetable vendors in Amritsar.

Assumptions:

- i. The store has affected the livelihood of local vegetable vendors.
- ii. The store is built in thickly populated areas.

Consider the statement and decide which of the given assumption is implicit.

Solution: The answer to this will be the first assumption, because the store is affecting the vendors, which causes the attack. Assumption ii is irrelevant because nothing is mentioned regarding the location of the store.

Example 2

Statement: "Please switch off the mobile phones while you are in the theatre", a notice outside a theatre.

Assumption:

- i. Every viewer who enters the theatre keeps mobile phones.
- ii. Switched on mobile phones might distract the performers.

Consider the statement and decide which of the given assumption is implicit.

Solution: In this, assumption ii is implied by the given statement.

Identify the Conclusions

A **conclusion** is what one is trying to convince the other person of. It is an interpretation or inference that is drawn based on an analysis of the evidence or facts available.

At times conclusions will be missing from the arguments. A series of facts along with unstated hidden assumptions will lead to the final statement that you must supply. Sound arguments are linear in that you can easily predict in what direction the facts are heading. You may also consider the conclusion as an inference. You are inferring the conclusion from specific statements and associated assumptions.

Usually, a conclusion is introduced by words that describe a judgment or opinion such as: *conclude that, contend that, believe that, hypothesize that* or *clearly*. A recommendation given by the author also constitutes the conclusion.

Example 3

1. The Indian team lost the match yesterday. The team management **should** do so and so.
2. The Indian team lost the match yesterday. It is **recommended** that the team management take strong action in the form of the following measures.

Conclusion conjunctions help us identify the **conclusion**, which normally appears AFTER such words as *therefore, thus, consequently, hence, so etc...*

Example: Rahul is tired. **Hence**, he will go off to sleep as soon as he reaches home.

To reach to a conclusion think only about the information given in the statement. There is no need to use, assume anything else or add any further or extra information from outside but the established facts that cannot be denied like the Sun always rises in the East, a day consists of 24 hours etc.

Example 4

In the following question, a statement is followed by two Conclusions I and II.

Give answer

- (a) if only Conclusion I follows
- (b) if only Conclusion II follows
- (c) if either I or II follows
- (d) if neither I nor II follows

Statement: Young Girls are prepared to pay any price to look like their favorite actress/model in order to gain popularity

Conclusion

- I. Young girls have a lot of money these days.
- II. Looking like famous actresses/models makes one more popular.

Solution: It can be concluded from the statement that since girls want to be popular and liked by all, they are willing to pay any price to look like famous personalities. Whether they have access to resources, in terms of money, is not addressed by the argument. Hence, only Conclusion II follows.

Example 5

Read the passage and answer the questions that follow:

The organization encourages its managers to interact regularly, without an identified agenda and provides platforms to conduct stimulating and unobstructed exchange of ideas on a vast range of topics affecting society and the organization. There is no hierarchy in these meetings and it is very common to find a sales manager questioning the MD on some corporate policy or established processes.

Based on the information provided in the passage, it can be inferred that:

- (a) The organization is highly concerned with promoting establishing hierarchy and fostering an environment of obedience.
- (b) The organization believes in open communication and dialogue without degenerating into a position based exercise of authority
- (c) The company MD is a very spiritual person who regularly attends satsangs
- (d) The company had some employee-management conflicts in the past and has adopted this technique to avoid such conflicts in the future.

Solution: The passage mentions that designations are forgotten during the meeting and even a sales manager can question the MD on company policies. Option (a) contradicts the idea presented in the passage. Option (c) is outside the scope of the passage. There is no mention of the organizations ulterior motives or conflict in the past. Thus, option (d) also stands negated. The correct answer choice is (b)

In conclusion-based questions it is important to first identify what is known and what is outside the scope of our knowledge. (Arguments like the ones that discuss percentages and then begin discussing actual numbers in the answers etc...should be watched out for). Only the option that can be proved true, based on the premises, can be the conclusion.

Strengthen/Weaken Argument

Strong Argument: Statements that reinforce/ build on the idea discussed through the use of reasons, facts, and examples.

Weak Argument: Statements that present data, facts, reasoning that either contradicts or dilutes the argument presented are known as weak arguments. They can be personal or judgmental in nature.

How to identify an argument as strong or weak?

Strong Arguments	Weak Arguments
Present opinions that are connected with the central idea being argued.	Present opinions that are unrelated or vaguely connected to the subject.
Provides facts, data, information that is relevant and supportive of the subject	They are not supported by facts or reason. They might also present facts or data in relation to a minor/marginal aspect of the argument
Are logical and coherent in their construction and presentation	Are not logical or coherent in their construct

For example, if you are writing a persuasive note to your mother to try to convince her to give you more pocket money, which of these two arguments do you think will be more effective?

1. If you gave me more pocket money, I will be able to buy more clothes.
2. If you gave me more pocket money, I will be able to purchase more reference books for the upcoming examinations

The second argument is definitely the stronger one as the reasoning used to support it is likely to garner greater support from your mother.

Strengthening an argument

The key to strengthening an argument is finding the answer choice that reinforces the premises or the central assumption in some way. This can be done in two ways–

1. First, the assumption might be rephrased and presented as an answer choice. In this case, it becomes a strong argument.
2. Second, the correct answer can be a validation of the assumption through the citing of a study, survey or any other relevant piece of additional evidence that makes the assumption more likely to be true.

Essentially, any information that fills the gap present in the logic of the argument with extra information (that supports the conclusion made in the argument) strengthens it.

Weakening an argument

Finding a statement that weakens an argument follows the same process, only backwards.

1. First, any statement that rebuts the assumption shall weaken the argument.
2. Second, Data, information, reasoning, facts etc... that disprove or challenge the assumptions or premises used in the argument shall weaken it.

Let us apply this concept to a few questions:

Example 6

Media are not just passive channels of information. Not only do they supply the stuff of thought, but they also shape the process of thought. And what the Internet seems to be doing is chipping away our capacity for concentration.

Which of the following, if true, would most strengthen the argument presented above?

- (a) Nietzsche was forced to use a typewriter when he started losing his vision. After he mastered the machine, he could type with his eyes closed. It was later found that under the effect of the machine, Nietzsche's prose "changed from arguments to aphorisms, from thoughts to puns, from rhetoric to telegram style".
- (b) One of the effects of the timekeeping instruments has been that we have started deciding on our daily activities based on the clock and not based on our senses.
- (c) Studies have shown that the essay writing skills of an average 15 – 20 year old, who spends a lot of time browsing the Internet, is comparable to what it was among the average 15–20 year old, throughout the 1980s and the 1990s.
- (d) A recent study has shown that the number of people who fall asleep while reading a printed book has increased in the last five years.

Solution: The argument states that the media we use shapes our thought. It relates the increase in electronic media to the decrease in people's concentration. Any argument that strengthens it should reinforce the point discussed above. Options B and C are not related to the argument. Option D is not correct because falling asleep while reading a printed book does not mean that concentration levels have decreased all around. Thus, option A is the correct answer.

Example 7

Which of the following, if true, would most weaken the argument presented in the previous question?

- (a) Nietzsche was forced to use a typewriter when he started losing his vision. After he mastered the machine, he could type with his eyes closed. It was later found that under the effect of the machine, Nietzsche's prose "changed from arguments to aphorisms, from thoughts to puns, from rhetoric to telegram style".
- (b) One of the effects of the timekeeping instruments has been that we have started deciding on our daily activities based on the clock and not based on our senses.

- (c) Studies have shown that the essay writing skills of an average 15 – 20 year old, who spends a lot of time browsing the Internet, is comparable to what it was among the average 15–20 year old, throughout the 1980s and the 1990s.
- (d) The ability of the younger judges, who have grown up with ready access to Internet, to judge complex and intricate cases, has, on an average, become better as compared to what it was for judges of comparable age profile during the 1920s.

Solution: Option (d) directly weakens the argument by showing that the internet has not compromised the ability of younger judges.

Example 8

Should the Government restrict use of electricity for each household depending upon the requirement?

Arguments:

- I. Yes, this will help government tide over the problem of inadequate generation of electricity.
 - II. No, every citizen has the right to consume electricity, as per their requirement as they pay for using electricity.
 - III. No, the Govt. does not have the machinery to put such a restriction on use of electricity.
- (a) Only I is strong (b) Only II is strong
(c) Only I and II are strong (d) Only II and III are strong

Solution: Insufficient production is the core issue and restricting the use will help in managing that. Hence argument I is strong. Argument II is also strong because every citizen pays the bill based on their consumption and restricting the supply will cause a lot of inconvenience. However argument III is not strong because it is assumed that there are constraints on the government side to implement the restrictions.

The correct answer is (c).

Example 9

Indigenous tribes living near Amazon forests are cutting down trees to cover their basic needs, thus severely affecting the ecological balance in the area. Which of the following will be an effective step to control the situation?

- (a) All the tribes living near the Amazon rainforests should be forced to shift to urban areas of the country.
- (b) The tribes should be allowed to continue doing so as they cut down trees for their basic needs and not for commercial purposes.
- (c) The tribes near the Amazon should be provided other sources to earn their living.
- (d) Both (a) and (b)

Solution

The other sources of livelihood should be devised which would reduce forestation and provide tribes with better livelihood.

The correct answer is (c).

Example 10

One of the main reasons behind the lack of applicants for teachers' training/degree programs is that teachers have not experienced any improvement in working conditions and their salaries have not kept pace with salaries in other professions. Which of the following can be inferred from the given paragraph?

- (a) Very tough entrance exam is also one of the reasons behind plunging number of applicants for teachers' training programmes.
- (b) In the years to come, the schools would face a crunch in terms of availability of qualified teachers

- (c) Training programmes for other professions are also as good as teachers' training programmes.
- (d) Number of applicants for teachers training programmes will improve if the salaries in other professions are reduced.

Solution: From the given information it is clear that the schools would face a crunch in terms of availability of qualified teachers in the years to come.

The correct answer is (b).

Example 11

The project of the road construction (work) has crossed its first deadline as far as pre-monsoon road works are concerned. In the major city, the road works are given great emphasis and these are the places where road work has been completed.

Which of the following can be concluded from the statements given above?

- (a) They start the work of the road and one has to go through a lot of tiresome paperwork before starting the repair work which delays the whole work of the road.
- (b) It takes several hours while travelling via these roads.
- (c) The work of the roads is going on.
- (d) They will start the road works well in advance.

Solution

It is clearly mentioned that the project of road construction has crossed its first deadline. Therefore, Option (d) is not correct. The Conclusion – the work of the road is going on is true.

The correct answer is (c).

Example 12

Today's high school students spend too much time thinking about trivial and distracting matters such as fashion. Additionally, they often dress inappropriately on school grounds. Rather than spending time writing another detailed dress policy, we should make school uniforms mandatory. If students were required to wear uniforms, it would increase a sense of community and harmony in our schools and it would instill a sense of discipline in our students. Another positive effect would be that teachers and administrators would no longer have to act as clothing police, freeing them up to focus on more important issues. This paragraph best supports the statement that:

- (a) inappropriate clothing leads to failing grades.
- (b) students who wear school uniforms get into better colleges.
- (c) teachers and administrators spend at least 25% of their time enforcing the dress code.
- (d) school uniforms should be compulsory for high school students

Solution: As per the data, school uniforms should be compulsory for high school students.

The correct answer is (d).

Example 13

To improve the employment situation in India, there is a need to recast the present educational system towards implementation of scientific discoveries in daily life.

Which of the following is/are implicit in the above statement?

- (a) The students after completing such education may be able to earn their livelihood.
- (b) This may bring meaning of education in the minds of the youth.

- (c) The state may earn more revenue as more and more people will engage themselves in self-employment.
- (d) Both (a) and (b) are implicit

Solution: The students after completing such education may be able to earn their livelihood.

The correct answer is (a).

Example 14

It is popularly believed that teachers are more or less indifferent about the microcomputer technology. This assumption is false, or at least outdated. A survey recently conducted indicated that 80 percent of the 7,000 surveyed teachers revealed a high level of interest in microcomputers.

Among the following statements which would most weaken the above argument if proved to be true?

- (a) There was no attempt made in the survey to ascertain whether the surveyed teachers had any previous exposure to microcomputers.
- (b) Teachers interested in microcomputer technology were more likely to complete and return the questionnaires than others.
- (c) Irrespective of their subject area, their expertise and their teaching experience questionnaires were received by the teachers.
- (d) After the survey results were tabulated, there have been many developments in the applications of microcomputer technology.

Solution: This statement will weaken the argument, Teachers interested in microcomputer technology were more likely to complete and return the questionnaires than others.

The correct answer is (b).

Example 15

Global Financial Integrity has highlighted that India was among the top 10 nations in terms of illicit outflows, with an outgo of \$123 billion in the decade to 2010. Which of the following courses of action should best be taken?

- (a) There should be a single global standard for automatic exchange of financial account information by various countries.
- (b) A Special Investigation Team should be made to probe black money.
- (c) The currency of the country should be changed.
- (d) The governments should join hands to tackle terrorism.

Solution: The action taken should be: there should be a single global standard for automatic exchange of financial account information by various countries.

The correct answer is (a).

Analogies

An **analogy literally means 'Drawing a comparison in order to show a similarity in some respect'**. An analogy basically uses a relationship between two (or more) elements to show similar relationship among another set of elements. So, these questions **aim to test overall logical understanding of the candidates and how coherently they understand the different kinds of relationships among various elements.**

There are various types of relationships which are used in analogy-based questions. Below is one such list which shows the various relationships with one example each:

Type	Example	Type	Example	Type	Example
Country & Currency	Japan: Yen	Animal/thing & Sound	Crow: Caw; Rain: Patter	Unit & Part	Pen: Nib; Blade: Fan; Book: Chapter
Instrument & Measurement	Ammeter: Current	Unit & Class	Cup: Crockery	Universal Pair	Chair: Table; Door: Window
Quantity & Unit	Power: Watt	Unit & Home	Cow: Byre	Study & Topic	Cardiology: Heart
Unit & Group	Fish: Shoal	Game & Venue	Skating: Rink; Cricket: Pitch	Word & Extreme	Quarrel: War; Speak: Shout
Animal & Baby	Deer: Fawn	Worker & Tool	Tailor: Needle; Sculptor: Chisel	Word & Synonym	Solicit: Request
Male & Female	Wizard: Witch	Tool & Action	Pen: Action	Word & Antonym	Chaos: Peace
Animal & Movement	Eagle: Swoop	Product & raw material	Oil: Seed; Metal; Ore	Worker & Working place	Actor: Stage; Mechanic: Garage

Let's explore the various types of questions based on Analogy that are asked and the right way to solve them:

Types of analogy:

- 1. Completing analogous pair.** Such questions give relationship between a pair; first element of second pair is given and we have to find the second element of second pair based on similar relationship given by first pair.

Example 1

Lyric: Song :: Drama: ?

- (a) Dialogue (b) Sonnet (c) Verse (d) Words

Solution: Here, first pair is Lyric: **Song** and the second pair is "Drama?" The "::" sign means that the first pair and the second pair share similar relationship. '**Lyrics**' are used for expression in a song. Similarly, Dialogues are critical for a drama.

- 2. Simple Analogy.** In such questions a simple statement is given where a relationship is given and we're asked the second element for the term given in question, like the example below:

Example 2

Birth is to Dirge as Marriage is to....?

- (a) Wedding (b) Gifts (c) Commitment (d) Alimony

Solution: Birth refers to the beginning of something while a dirge is a sad, mournful lament signifying the passing away of someone. Similarly, Marriage indicates the beginning of a relationship while alimony is the money given to the spouse/s at the time of divorce. This makes option D the correct answer.

- 3. Choosing the analogous pair:** In such questions, a pair is given in the question and we've to find a suitable pair from the options given that resembles the similar relationship as in the question like the examples below:

Example 3

Borrow: Steal

- (a) Enter: Trespass (b) Tell: Speak (c) Ask: Beg (d) Hit: Kill

Solution: Here, for both 'borrowing' and 'stealing' we take someone else's thing. The only difference being that the first thing we take is with the permission of another while second thing is taken without the permission of another. Similarly, among all the options, we see this option is seen in 'Enter: Trespass' where we 'enter' after taking permit while '**trespassing**' is done without any permit whatsoever.

- 4. Multiple word analogy:** These are the type of questions discussed above with the only difference being that here three elements are given in a pair instead of two and we have to select the suitable option.

Example 4

Match the items in column I with those in column II. Choose the correct answer combination given below.

I		II	
1. As deaf as		5. gall	
2. As bitter as		6. an eel	
3. As unpredictable as		7. a post	
4. AS slippery as		8. the weather	
(a)	(b)	(c)	(d)
1-7	1-7	1-8	1-5
2-6	2-5	2-6	2-7
3-8	3-8	3-5	3-6
4-5	4-6	4-7	4-8

Solution: Gall means bile (noun). It also means something bitter to endure or a bitterness of spirit. Only option 'b' provides this combination.

The correct answer is (b).

Directions for examples 5 to 7: Each question below consists of a related pair of words or phrases, followed by four pairs of words or phrases labelled a through d. Select the pair that best expresses the relationship similar to that expressed in the original pair.

Example 5

Nuance: Subtle

- (a) Pun: Sarcastic (b) Fib: Honest (c) Inquiry: Discreet (d) Hint: Indirect

Solution: 'Nuance' is a subtle difference in or shade of meaning, expression, or sound. And a 'hint' is an indirect suggestion. 'Pun' is a humorous play on words; it may or may not be sarcastic. 'Fib' is to tell a lie, which is the opposite of being honest. 'Inquiry' and 'discreet' are not related in any way.

The correct answer is (d).

Example 6

Arena: Conflict

- (a) Mirage: Reality (b) Forum: Discussion (c) Asylum: Pursuit (d) Utopia: Place

Solution: An 'arena' is an area of activity. Just as a 'conflict' may occur in an arena, similarly a 'discussion' is held in a 'forum'. 'Mirage' and 'reality' are antonyms. 'Asylum' and 'pursuit' have no relation. 'Utopia' is an ideally perfect place.

The correct answer is (b).

Example 7

Hierarchy: Ranked

(a) Equation: Solved (b) Critique: Biased (c) Chronology: Sequential (d) Infinity: Fixed

Solution: Just as each element is ranked in a 'hierarchy', similarly each element is sequential in a 'chronology'. An 'equation' is meant to be solved. A 'critique' may or may not be biased. There exists no relation between 'infinity' and 'fixed'.

The correct answer is (c).

Example 8

Fill in the blanks with the correct alternative.

Caw is to crows asis to cows.

(a) bleat (b) snort (c) low (d) bellow

Solution: 'Caw' is the hoarse raucous sound that is characteristic of a crow and 'below' is the roar of a large animal, such as a bull. So, bellow aptly fits in the blank.

The correct answer is (d).

Directions for examples 9 to 11: Fill in the blanks with the most appropriate word.

Example 9

_____ is to constitution as prologue is to

- | | |
|-----------------|-------------|
| 1. Independence | A. Eulogy |
| 2. Law | B. Write |
| 3. Preamble | C. Play |
| 4. Amendment | D. Epilogue |

(a) 3C (b) 1D (c) 4A (d) 4D

Solution: 'Preamble' means a preliminary or preparatory statement or an introduction; 'Prologue' means a separate introductory section of a literary, dramatic, or musical work. 'Independence' is an unrelated term here. 'Laws' are there in the constitution, but it doesn't give an analogy with 'prologue'. 'Amendment' is addition to or rectification of an existing thing. 'Eulogy' is a statement of praise for someone. 'Epilogue' is a summary or a short note, which comes at the end of an article.

The correct answer is (a).

Example 10

_____ is to horse as bray is to _____.

- | | |
|-----------|-----------|
| 1. Drive | A. Relay |
| 2. Hoof | B. Pony |
| 3. Neigh | C. Wagon |
| 4. Saddle | D. Donkey |

(a) 1D (b) 1A (c) 3C (d) 3D

Solution: 'Neigh' is the name for horse's voice, while a donkey's voice is called 'bray'. 'Hoof' is the name of distal part of an animal's legs (e.g., horse, cow, buffalo, etc.). 'Saddle' is the cushioned seat kept on animal's back for comfortable ride. 'Pony' is the calf of a horse. 'Wagon' is a wheeled carriage that can be drawn by horse or a rail engine.

The correct answer is (d).

Example 11

_____ is to distance as kilogram is to_____.

- | | |
|-----------|-----------|
| 1. Far | A. heavy |
| 2. Meter | B. Ounce |
| 3. Europe | C. Weight |
| 4. Travel | D. Noise |

(a) 2A

(b) 2B

(c) 2C

(d) 1A

Solution: 'Meter' is a unit to measure distance; 'kilogram' is the unit for measuring weight. Other options are unrelated

The correct answer is (c).

Chapter

7

Analytical and Logical Reasoning Practice Tests

GENERAL INSTRUCTIONS

1. Each question has 4 responses. Candidate should choose an appropriate response.
2. Every question carries one mark.
3. For every incorrect answer, 1/4th of the marks allotted to the question will be deducted.

Practice Test 1

Directions (Q. 1–3): In the following questions, there are four options. Find out the one that is correct in verification of the given statement.

(IPU CET 2014)

1. Escalators help in

- (a) vertical movement only
- (b) horizontal movement only
- (c) vertical and horizontal movement
- (d) circular movement only

2. Which one of the following is always associated with 'Justice'?

- (a) Hypocrisy
- (b) Magnanimity
- (c) Legitimate
- (d) Diminutiveness

3. Which one of the following is always in the 'Sentiment'?

- (a) Cruelty
- (b) Insight
- (c) Neutrality
- (d) Emotion

4. Statements:

All teachers are educated. Educated people are humble.

Conclusion:

All teachers are humble.

- (a) Conclusion is correct
- (b) Conclusion is wrong
- (c) Conclusion is inconsistent with the statements
- (d) Conclusion is neither right nor wrong

(BBA: SET 2009)

5. 'D' is the son of 'J' who is son of 'F' and 'P' is the daughter of 'R'. If 'N' is the sister of 'P' and daughter of 'J' what is 'J' 's relationship with 'R'?

- (a) Husband
- (b) Brother
- (c) Father
- (d) Uncle

(IPU CET 2014)

Directions (Q. 6): In the following question there is a series. The one term is missing in the series. Find out the missing term.

6. A, D, G, J, M, P, ?

- (a) Q
- (b) R
- (c) T
- (d) S

(IPU CET 2015)

7. 7 January 1992 was Tuesday. What day of the week will it be on the same date after 5 years, that is, on 7 January 1997?

- (a) Tuesday
- (b) Wednesday
- (c) Friday
- (d) Saturday

(BBA: SET 2010)

8. From his house Deepak went 25 km to North. Then, he turned West and covered 15 km. Then, turned South and covered 10 km. Finally, turning to East, he covered 15 km. In which direction is he from his house?

- (a) North
- (b) South
- (c) West
- (d) East

(IPU CET 2015)

9. If 20 pineapples and 25 guavas cost as much as 25 pineapples and 20 guavas. How do you compare the costs of two?

- (a) Guavas are costly than pineapples
- (b) Pineapples are costly than guavas
- (c) Pineapples are as costly as guavas
- (d) None of the above

(IPU CET 2015)

Directions (Q. 10–11): In a certain code language

- (i) 'Pic vic nic' means 'winter is cold';
- (ii) 'to nic re' means 'summer is hot';
- (iii) 're pic too' means 'winter and summer';
- (iv) 'vic tho pa' means 'nights are cold';

10. Which word in that language means 'Summer'?

- (a) nic
- (b) re
- (c) to
- (d) pic

11. To find the answer to the above question, which of the following statements is superfluous?

- (a) only (ii)
- (b) only (iv)
- (c) Both (i) and (iv)
- (d) neither (i) nor (iv)

(BBA: CBS 2009)

12. What degree of angle is made by the hands of clock at 10: 35?

- (a) $72\frac{1}{2}^\circ$
- (b) $97\frac{1}{2}^\circ$
- (c) $107\frac{1}{2}^\circ$
- (d) $117\frac{1}{2}^\circ$

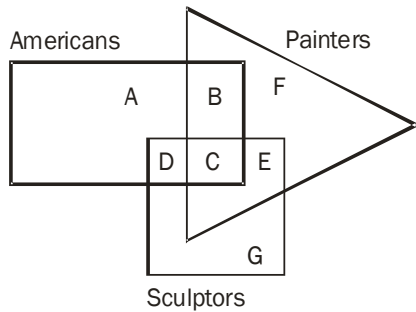
(IPU CET 2015)

13. X introduces Y saying, "He is the husband of the grand daughter of the father of my father". How is Y related to X?

- (a) Brother
- (b) Nephew
- (c) Son-in-law
- (d) Brother-in-law

(BBA: SET 2009)

Directions (Q.14–17): The rectangle, square and triangle refer to Americans, Sculptors and painters respectively. Different regions of the diagram, representing different combinations of the above three characteristics are lettered from 'A' through 'G'. Read the statements of the questions given below and write down the letter of the region which represents the given statement.



(BBA: SET 2011)

14. Americans who are painters but not sculptors

- (a) B
- (b) C
- (c) D
- (d) A

15. Non-Americans who are painters and Sculptors

- (a) C
- (b) E
- (c) F
- (d) G

16. Americans who are sculptors as well as painters

- (a) A
- (b) C
- (c) D
- (d) E

17. Non-American Sculptors who are not Painters

- (a) D
- (b) C
- (c) E
- (d) G

Directions (Q. 18–21): Six girls are sitting in a circle facing to the centre of the circle. They are P, Q, R, S, T and V. T is not between Q and S but someone else is there. P is next to the left of V. R is 4th to the right of P.

(BBA: DU JAT 2011)

18. Which of the following statements is not true?

- (a) S is just next to the right of R
- (b) T is just next to the right of V
- (c) R is second to the left of T
- (d) P is second to the right of R

19. If P and R interchange their positions then which of the following pair will sit together?

- (a) RT
- (b) PV
- (c) VR
- (d) QV

20. What is the position of T?

- (a) Just next to the right of Q
- (b) Second to the left of P
- (c) Between Q and R
- (d) To the immediate right of V

21. Which one is sitting just right to T?

- (a) P
- (b) T
- (c) R
- (d) S/Q

Directions (Q. 22–25): Read the following information carefully and choose the right answer:

Seven people J, K, L, M, N, O and P are standing in a single file line, facing an information booth. The first person is closest to the booth. N is somewhere ahead of O. There is exactly one person standing between L and P. M is immediately behind J. O is behind both K and M.

(BBA: CBS 2009)

22. If M and L are fourth and fifth in line respectively, which of the following must be true?

- (a) K is first
- (b) N is first
- (c) O is sixth
- (d) O is seventh

23. In the sequence worked out for Ques. 22 which of the following may not be true?

- (a) P is last
- (b) K is first
- (c) N is second
- (d) M is second

24. In the sequence worked out for Ques. 22 what is the position of J.

- (a) 4th
- (b) 6th
- (c) 2nd
- (d) None of the above

25. If J is standing immediately behind P, then which of the following must be true?

- (a) J is fifth
- (b) L is first
- (c) L is second
- (d) O is seventh

Practice Test 2

Directions (Q. 1–2): In each of the following questions, two statements numbered I and II are given. There may be a cause and effect relationship between the two statements. These two statements may be the effects of the same cause or of independent causes. These statements may be independent causes without having any relationship. Read both the statements in each question and mark your answer.

(BBA: DU JAT 2011)

1. Statements:

- I. The prices of petrol and diesel in the domestic market have remained unchanged for the past few months.
- II. The crude oil prices in the international market have gone up substantially in the last few months.
- (a) Statement I is the cause and statement II is its effect
- (b) Statement II is the cause and statement I is its effect
- (c) Both the statements I and II are independent causes
- (d) Both the statements I and II are effects of independent causes

2. Statements:

- I. The private medical colleges have increased the tuition fee in the current year by 200 per cent over the last year's fee to meet the expenses.
- II. The Government medical colleges have not increased their fee in spite of price escalation.
- (a) Statement I is the cause and statement II is its effect
- (b) Statement II is the cause and statement I is its effect
- (c) Both the statements I and II are independent causes
- (d) Both the statements I and II are effects of independent causes

Directions (Q. 3–4): In the following question find out the most suitable answer.

3. You are being sent for an intensive efficiency improvement training programme, but you are not interested in going for it. What will you do?

- (a) Proceed for the training, keeping your interest aside
- (b) Inform your boss to send someone else for the training
- (c) Go for the training, but you will spend most of the time by moving here and there
- (d) Try on finding excuses for avoiding the training

(IPU CET 2015)

4. You have been invited to join as a member of an interview Board for selecting a suitable candidate for a vacancy. After the commencement of the interview, you find that one of the candidates is your close relative. What will you do?

- (a) Continue with interviews and show no favour to relative
- (b) Show slight favour
- (c) You will stay neutral and take only ethical decision
- (d) Just keep quiet and do nothing

(IPU CET 2015)

Directions (Q. 5–6): (M, N, O and P are all different individuals)

- I. M is the daughter of N.
- II. N is the son of O.
- III. O is the father of P.

(BBA: SET 2009)

5. Among the following statements, which is true?

- (a) O is the uncle of M.
- (b) P and N are brothers.
- (c) M is the daughter of P.
- (d) If B is the daughter of N, then M and B are sisters.

6. If B is the son of N and B has one brother, D, then

- I. M is the sister of D.
- II. D and N are brothers.
- III. O is the grandfather of D.
- (a) I only
- (b) II only
- (c) III only
- (d) I and III only

7. Find the missing term

60, 40, 55, 45, 50, ?

- (a) 45
- (b) 50
- (c) 55
- (d) 60

(BBA: CBS 2010)

8. Three days after day after tomorrow will be Wednesday. If today is 21st, what will be the day and date day before yesterday?

- (a) Wednesday 18th
- (b) Wednesday 19th
- (c) Thursday 19th
- (d) Thursday 20th

(BBA: SET 2009)

9. If ZIP = 198 and ZAP = 246, then how will you code VIP?

- (a) 174
- (b) 222
- (c) 888
- (d) 990

(IPU CET 2015)

10. In a code language, TUTORIAL is written as DODNGLCF and DANCE is written as YCJMZ, how can EDUCATION be written in that code?

- (a) ZYMODCLNJ
- (b) ZYOMCDLNJ
- (c) ZYOMDCLNJ
- (d) ZYOTNLCMD

(IPU CET 2015)

11. One morning Udai and Vishal were talking to each other face to face (at a crossing. If Vishal's shadow was exactly to the left of Udai, which direction was Udai facing?

- (a) East
- (b) West
- (c) North
- (d) South

(BBA: SET 2011)

12. Y is in the East of X which is in the North of Z. If P is in the South of Z, then in which direction of Y, is P?

- (a) North
- (b) South
- (c) South-East
- (d) None of these

(BBA: SET 2011)

Directions (Q. 13–15): Which one of the four interchanges in signs and numbers would make the equation correct?

(BBA: SET 2010)

13. $3 + 5 - 2 = 4$

- (a) + and -, 2 and 3
- (b) + and -, 2 and 5
- (c) + and -, 3 and 5
- (d) None of these

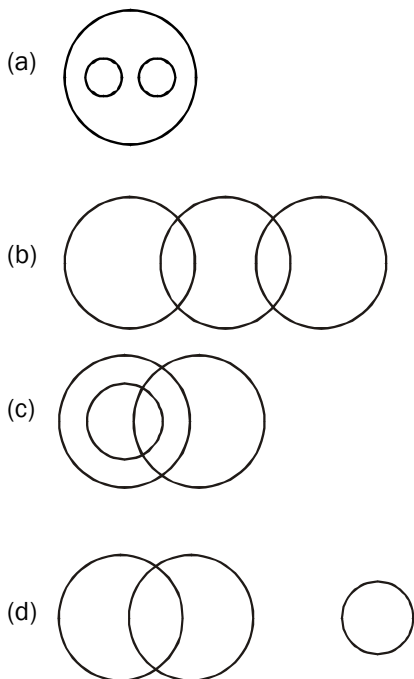
14. $6 \times 4 + 2 = 16$

- (a) + and \times , 2 and 4
- (b) + and \times , 2 and 6
- (c) + and \times , 4 and 6
- (d) None of these

15. $(3 / 4) + 2 + 2$

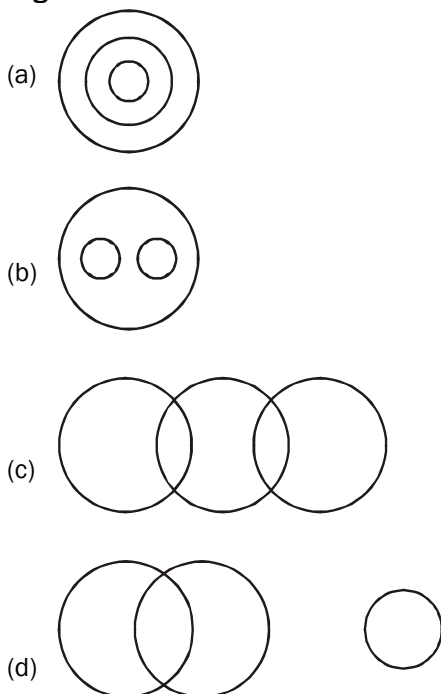
- (a) + and /, 2 and 3
- (b) + and /, 2 and 4
- (c) + and /, 3 and 4
- (d) None of these

16. Which of the following diagrams correctly represents elephants, wolves and Animals



(BBA: CBS 2009)

17. Which of the following diagrams correctly illustrates the relationship among carrots, vegetables and food?



(BBA: CBS 2009)

Directions (Q. 18–20): Following are the criteria laid down for selection of the trainees for summer internship at a bank.

The candidate must

- I. Have passed graduation with minimum 55% marks in aggregate.
- II. Have completed 19 years of age in case of females and 21 years of age in case of males on or before 31-3-2012 but not more than 25 years in either case.
- III. Have passed at least 50% marks in the selection test.
- IV. Money deposit of Rs. 40,000 along with the application form if the candidate has passed graduation with less than 60% marks but definitely with more than 55% marks.
- V. However, if the candidate has secured more than 80% marks at graduation, the money deposit is Rs. 25,000. If the candidate has secured more than 60% but below 80%, the deposit amount is Rs. 30,000.
- VI. If the candidate is son/daughter of a serving employee of the bank, the amount of deposit would be one-third of that applicable to others, keeping the merit criteria same.
- VII. If the candidate satisfies the criteria I, II and III but can pay only 3/4th of the applicable deposit amount, he/she may be provisionally selected.
- VIII. If the candidate satisfies the criteria I, II and III but can pay only 1/2 of the applicable deposit amount, the case may be referred to the Manager (recruitment).
- IX. If the candidate satisfies the criteria I, II and has secured above 45% marks but below 50% marks in the selection test, his/her case may be referred to the Manager (recruitment).

Based on the above list of criteria, decide which of the following courses of action should be taken in case of the candidates whose description is provided in the following questions. The information is provided as on 31-3-2012.

Mark answer (a) if the candidate is to be selected
 Mark answer (b) if the candidate is to be provisionally selected

Mark answer (c) if the candidate should be referred to the Manager (recruitment)

Mark answer (d) if the candidate cannot be selected

(BBA: DU JAT 2012)

18. Prem Kumar, the son of the teacher, has passed B.A. with 82% of marks and secured 67% marks in the selection test. He was born on 12 July, 1989. He can pay maximum of Rs.14,000 as deposit.

19. Lata Jain, the daughter of Cashier in the bank, was born on 19 October, 1992 and has passed B.Sc. with 62% of marks and secured 49% marks in the selection test. She can pay maximum of Rs.10,000 as deposit.

20. Rohit, the son of a staff member of the bank, has passed B.A with 56% of marks and secured 57% marks in the selection test. He was born on 12 January, 1987. He can pay maximum of Rs.8,000 as deposit.

21. In a row of six, R is the third from X, V is neighbor to S and X and X is fourth from Y and has Z as his neighbor. Who are at the extreme ends in the row?

- (a) ZY
- (b) XY
- (c) RY
- (d) RX

(BBA: SET 2010)

Directions (Q. 22–25): Study the following information carefully to answer the given questions.

A, B, C, D, E, F, G and H are seated in straight line facing North. C sits fourth to left of G. D sits second to right of G. Only two people sit between D and A. B and F are immediate neighbours of each other. B is not an immediate neighbour of A. H is not an immediate neighbour of D.

(IPU CET 2015)

22. Who amongst the following sits third to the right of C?

- (a) B
- (b) F
- (c) A
- (d) E

23. Which of the following represents persons seated at the two extreme ends of the line?

- (a) C, D
- (b) A, B
- (c) B, G
- (d) D, H

24. What is the position of H with respect to F?

- (a) Third to the left
- (b) Immediate right
- (c) Second to right
- (d) Fourth to left

25. How many persons are seated between A and E?

- (a) One
- (b) Two
- (c) Three
- (d) Four

Practice Test 3

Directions (Q. 1–2): Choose the option which most weakens the argument given below:

1. Nations do not compete with each other the way corporations do.

- (a) Trade deficit is a sign of national strength; profits are a sign of corporate strength.
- (b) Increase in Human Development Index improves national standing; increase in market share improves corporate standing.
- (c) Climate change negotiations lead to global improvement; CSR initiatives lead to image improvement
- (d) Nations go to war to capture territory; corporate contend against each other to capture market share.

(BBA: SET 2010)

2. "Sheetal can go to watch a movie if husband Ravi agrees to stay back". Based on the above statement, which of the following is a logical conclusion?

- (a) There is good understanding between the husband and wife.
- (b) If Ravi agreed to stay back it means that he has watched the movie.
- (c) Ravi will stay back so that Sheetal can watch the movie.
- (d) If Ravi did not agree to stay back, then, Sheetal will not go to watch a movie.

(BBA: SET 2010)

Directions (Q.3–4): In each of the questions below, assumptions are numbered I, II, III. You have to consider the statement and the assumptions and choose the group which is implicit in the context of given statement.

(BBA: DU JAT 2011)

3. Statement:

"Wanted a three bedroom flat in Noida for immediate possession" – an advertisement in newspaper

Assumptions:

- I. Flats are available in Noida.

- II. Some people will respond to the advertisement.
 - III. It is a practice to give such an advertisement.
- (a) All are implicit
 - (b) Only II is implicit
 - (c) Both I and II are implicit
 - (d) Both II and III are implicit

4. Statement:

Delink degree with jobs. Then, boys will think twice before joining college.

Assumptions:

- I. Boys join colleges for getting jobs.
 - II. A degree is of no use for getting a job.
 - III. Girls do not try for jobs.
- (a) Only I is implicit
 - (b) All are implicit
 - (c) Both I and III are implicit
 - (d) Only III is implicit

5. A man said to a lady, "the son of your only brother is the brother of my wife" What is the relationship between the man and the lady?

- (a) Mother
- (b) Sister-in-law
- (c) Sister of father-in-law
- (d) Maternal aunt

(BBA: SET 2009)

6. Find out the missing number in the fourth column. Numbers in each column follow the same rule:

3	5	6	10
2	4	3	2
1	2	1	2
6	40	18	?

- (a) 20
- (b) 30
- (c) 40
- (d) 60

(BBA: SET 2010)

7. Radha moves towards South-East to a distance of 7 km, then she moves towards West and travels a distance of 14 km. From here she moves towards North-West for a distance of 7 km and finally she moves to a distance of 4 km towards east. How far is she now from the starting point?

- (a) 3 km
- (b) 4 km
- (c) 10 km
- (d) 11 km

(BBA: SET 2011)

8. Which of the following is a leap year?

- (a) 1982
- (b) 1978
- (c) 1704
- (d) 1945

(IPU CET 2014)

9. Introducing a man, a woman said, "His wife is the only daughter of my mother." How is the woman related with the man?

- (a) Sister-in-Law
- (b) Wife
- (c) Aunt
- (d) Mother-in-law

(IPU CET 2015)

Directions (Q. 10–16): Read the following passage carefully and choose the best answer.

In a game exactly six inverted cups stand side by side in a straight line and each has exactly one ball hidden under it. The cups are numbered consecutively 1 through 6. Each of the ball is painted a single solid color. The colors of the balls are green, magenta, orange, purple, red and yellow. The balls have been hidden under the cups in a manner that conforms to the following conditions:

The purple ball must be hidden under a lower-numbered cup than the orange ball.

The red ball must be hidden under a cup immediately adjacent to the cup under which the magenta ball is hidden. The green ball must be hidden under cup 5.

(BBA: CBS 2009)

10. Which of the following could be the colors of the balls under the cups, in order from 1 through 6?

- (a) Green, Yellow, Magenta, Red, Orange, Purple
- (b) Magenta, Green, Purple, Red, Orange, Yellow
- (c) Magenta, Red, Purple, Yellow Green, Orange
- (d) Orange, Yellow, Red, Magenta, Green, Purple

11. If the magenta ball is under cup 4, the red ball must be under cup

- (a) 1
- (b) 2
- (c) 3
- (d) 5

12. A ball of which of the following colors could be under cup 6?

- (a) Green
- (b) Magenta
- (c) Purple
- (d) Yellow

13. If the purple ball is under cup 4, the orange ball must be under cup

- (a) 1
- (b) 2
- (c) 3
- (d) 6

14. Which of the following must be true?

- (a) The green ball is under a lower numbered cup than the yellow ball
- (b) The orange ball is under a lower numbered cup than the green ball
- (c) The purple ball is under a lower numbered cup than the green ball
- (d) The purple ball is under a lower numbered cup than the red ball

15. If the orange ball is under cup 2, balls of which of the following colors could be under cups immediately adjacent to each other?

- (a) Green and magenta
- (b) Green and purple
- (c) Orange and yellow
- (d) Purple and red

16. If the magenta ball is under cup 1, balls of which of the following colors must be under cups immediately adjacent to each other?

- (a) Green and Orange
- (b) Green and Yellow
- (c) Purple and Red
- (d) Purple and Yellow

Directions (Q. 17): In each of the following questions there is a series. The one term is missing in the series. Find out the missing term.

17. 24, 72, 36, 108, 54, ?

- (a) 145
- (b) 162
- (c) 158
- (d) 165

(IPU CET 2015)

18. In a certain code DOCUMENTS is written as VDPENRSMD. How is ADVERTISE written in the same code?

- (a) FWESDRHS
- (b) FWENSSHRD
- (c) FWESFMLD
- (d) BEDFSDRHS

(BBA: SET 2010)

Directions (Q. 19–20): In each question below are given two statements followed by several conclusions. You have to take the two given statements to be true, even if they seem to be at variance from commonly known facts and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly facts.

(BBA: CBS 2010)

19. Statement:

- I. All drivers are mechanics.
- II. All mechanics are cleaners.

Conclusions:

- I. All cleaners are drivers.
- II. Some drivers are mechanics.
- III. All drivers are cleaners
- IV. Some cleaners are mechanics.

- (a) (I), (II), (III) and (IV) follows
- (b) Only (II), (III) and (IV) follow
- (c) Only (III) and (IV) follow
- (d) Only (II) and (III) follow

20. Statements:

- I. Some doctors are engineers.
- II. All engineers are lawyers.

Conclusions:

- I. Some lawyers are doctors.
- II. All engineers are doctors.
- III. Some doctors are lawyers.
- IV. Some engineers are lawyers.

- (a) (I), (III) and (IV) follows
- (b) Only (III) and (IV) follow
- (c) Only (I), (II) and (IV) follow
- (d) Only (II), (III) and (IV) follow

21. A, B, C, D and E distribute some cards among themselves in a manner that A gets one less than B, C gets 5 more than D, E gets 3 more than B while D gets as many as B. Who gets the least number of cards?

- (a) B
- (b) C
- (c) D
- (d) A

(IPU CET 2014)

Directions (Q. 22–25): Read the following information and answer the questions below:

Alka is older than Mala. Gopal is older than Mala but younger than Alka. Kapil is younger than Ram and Mala. Mala is older than Ram.

(BBA: SET 2010)

22. Whose age is between Gopal and Ram?

- (a) Mala
- (b) Kapil
- (c) Alka
- (d) None of these

23. Whose age is between Mala and Kapil?

- (a) Gopal
- (b) Ram
- (c) Alka
- (d) None of these

24. Whose age is exactly in the middle of all the five?

- (a) Mala
- (b) Gopal
- (c) Ram
- (d) Alka

25. Who is the eldest?

- (a) Alka
- (b) Mala
- (c) Kapil
- (d) Gopal

(BBA: CBS 2010)

ANSWERS AND EXPLANATIONS

Practice Test 1

1. Escalators help in vertical and horizontal movement.

The correct answer is c.

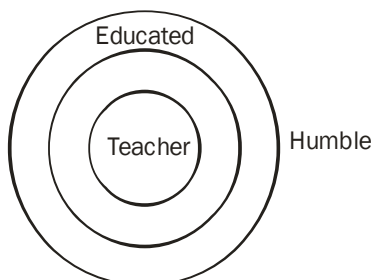
2. 'Legitimate' is always associated with 'justice'.

The correct answer is c.

3. 'Emotion' is always associated with 'Sentiment'.

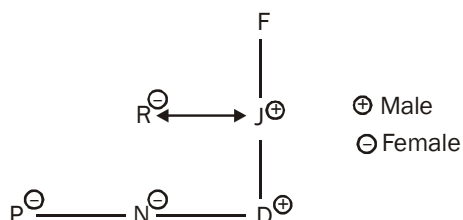
The correct answer is d.

- 4.



The correct answer is a.

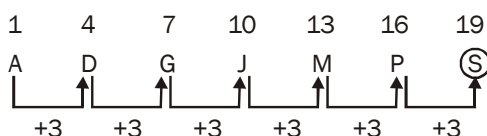
5. As per the given information we can draw the family diagram as



From the family diagram it is clear that J is the husband of R.

The correct answer is a.

6. The pattern followed is



So, the missing term is S.

The correct answer is d.

7. Calculating the number of odd days:

From Jan 7, 1992 to Jan 7, 1993 = 2

From Jan 7, 1993 to Jan 7, 1994 = 1

From Jan 7, 1994 to Jan 7, 1995 = 1

From Jan 7, 1995 to Jan 7, 1996 = 1

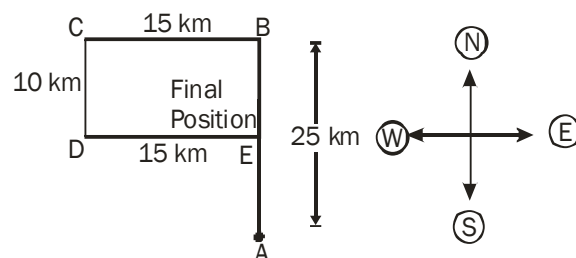
From Jan 7, 1996 to Jan 7, 1997 = 2

Therefore, the total number of odd days = 7

Thus, the day on Jan 7, 1997 will be same as the day on Jan 7, 1992 that is Tuesday.

The correct answer is a.

8. According to the given information, the direction diagram will be as follows



Clearly, Deepak is in the North direction from his house.

The correct answer is a.

9. Given that,

20 pineapples + 25 guavas = 25 pineapples + 20 guavas

5 guavas = 5 pineapples

1 guava = 1 pineapple

So, the pineapples are as costly as the guavas.

The correct answer is c.

Common solution for questions 10 to 11:

Using statements (i) and (ii), we get

nic = is

Similarly, using statements (ii) and (iii), we get

re = Summer

Using statements (i) and (iii), we get

pic = Winter

Using statements (i) and (iv), we get

vic = Cold

10. 're' means 'Summer'

The correct answer is b.

11. Both the statements (i) and (iv) are superfluous.

The correct answer is c.

12. The angle traced by hour hand per minute
 $= \left(\frac{1}{2}\right)^\circ$

The angle traced by hour hand in 10 h 35 min

$$= [(10 \times 60) + 35] \times \frac{1}{2}^\circ$$

$$= \left(\frac{635}{2}\right)^\circ = 317.5^\circ$$

The angle traced by minute hand per minute
 $= 6^\circ$

The angle traced by minute hand in 35 min
 $= 35 \times 6^\circ = 210^\circ$

Therefore, the required angle

$$= (317.5^\circ - 210^\circ) = 107.5^\circ = 107\frac{1}{2}^\circ$$

The correct answer is c.

13. According to the given information, the family diagram can be drawn as,



From the above diagram we can conclude that y's wife is either x's sister or cousin.
 Hence, y is x's brother-in-law.

The correct answer is d.

Common solution for questions 14 to 17:

Looking at the given Venn diagram, the various regions represent:

A: Americans who are neither painters nor sculptors

B: Americans who are painters but not sculptors

C: Americans who are painters but not sculptors

D: Americans who are sculptors but not painters

E: Painters who are also sculptors but not Americans

F: Painters who are neither Americans nor sculptors

G: Sculptors who are neither Americans nor painters.

14. Americans who are painters but not sculptors are denoted by the region B.

The correct answer is a.

15. Non-Americans who are painters and Sculptors are denoted by the region E.

The correct answer is b.

16. Americans who are sculptors as well as painters are denoted by the region C.

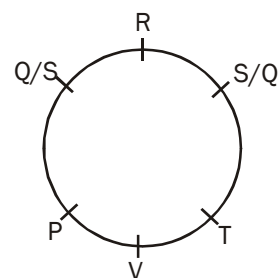
The correct answer is b.

17. Non-American Sculptors who are not Painters are denoted by the region G.

The correct answer is d.

Common solution for questions 18 to 21:

According to the given information, six girls can be seated as:



18. R is second to the left of T.

The correct answer is c.

19. V and R will sit together.

The correct answer is c.

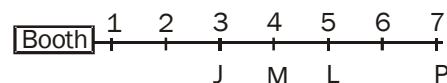
20. T is to the immediate right of V.

The correct answer is d.

21. Either S or Q is sitting just right to T.

The correct answer is d.

22. According to the given information, the location of seven people is as follow:



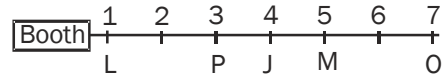
Exactly one person is between L and P. Also, P is at the seventh position.

Therefore, O is behind both K and M, so O is at the sixth position.

The correct answer is c.

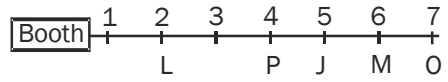
23. M is at the fourth position.

The correct answer is d.



24. J is at the third position.

The correct answer is d.



25. Two possible arrangements as per the given information are:

Hence, O is at the seventh position.

The correct answer is d.

Practice Test 2

1. Statements I and II are the effects of independent causes as two different market conditions – domestic and international market conditions have been mentioned respectively in the two statements.

The correct answer is d.

2. Statements I and II are the effects of independent causes as Statement I mentions 'private' medical colleges and statement II mentions 'Government' medical colleges.

The correct answer is d.

3. Options (c) and (d) are not relevant, while option (a) shall not prove beneficial. The best action is to convey to your boss about your lack of interest as well as your problems, prior to going.

The correct answer is b.

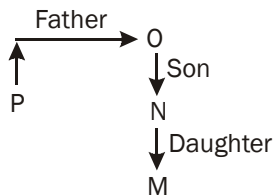
4. Options (a), (b) and (d) convey a negative impression and will hamper your position.

Thus, option (c) will be the better option as you will stay neutral and it shall also help you to take an ethical decision.

The correct answer is c.

Common solution for questions 5 to 6:

According to the given information, we can draw the following family diagram:



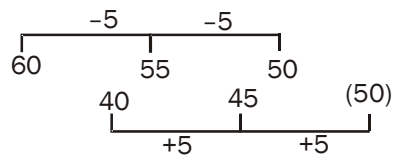
5. If B is the daughter of N, then M and B are sisters.

The correct answer is d.

6. Only I and III are true.

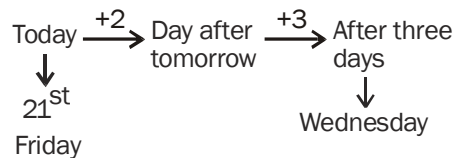
The correct answer is d.

7. The pattern followed is



The correct answer is b.

8. The given information can be briefed as:



Hence, the day and the date on the day before yesterday will be Thursday and 19th respectively.

The correct answer is b.

9. Taking $Z = 2, Y = 3, \dots, N = 14, \dots, B = 26, A = 27$, we have

$$ZIP = (Z + I + P) \times 6 = (2 + 19 + 12) \times 6 = 33 \times 6 = 198$$

$$\text{And, } ZAP = (2 + 27 + 12) \times 16 = 41 \times 6 = 246$$

Therefore,

$$VIP = (V + I + P) \times 6 = (6 + 19 + 12) \times 6 = 37 \times 6 = 222$$

The correct answer is b.

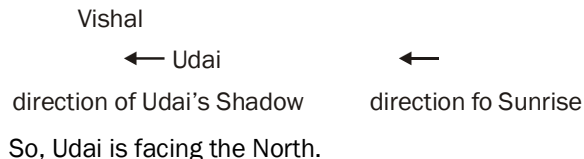
10. The coding pattern followed is:

Letters	T	U	O	R	I	A	L	D	N	C	E
Codes	D	O	N	G	L	C	F	Y	J	M	Z

Therefore, the code for EDUCATION is ZYOMCDLNJ.

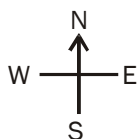
The correct answer is b.

11.



The correct answer is c.

12. Considering the direction to be



The arrangement is

X Y
Z
P

So, P is to the South-west of Y.

The correct answer is d.

13. Using option c, the equation will become:

$$5 - 3 + 2 = 4$$

The correct answer is c.

14. Using option c, the equation will become:

$$4 + 6 \times 2 = 16$$

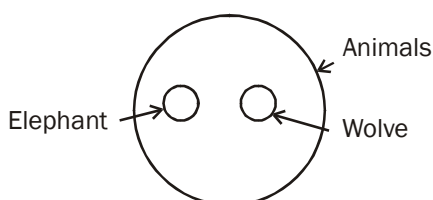
The correct answer is c.

15. Using option d, the equation will become:

$$(2 + 4) / 3 = 2$$

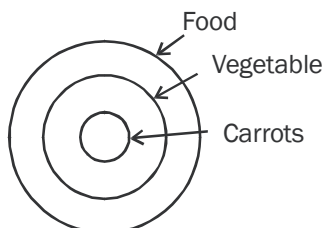
The correct answer is d.

16. Wolves and elephants are animals so correct diagram is



The correct answer is a.

17. The Carrots are vegetables and vegetables are food so it can be represented by diagram in given manners



The correct answer is a.

18. The candidate named Prem Kumar satisfies criteria 1, 2, and 3 but can pay only a little more than the half of the applicable deposit amount. Thus, according to the criteria 8, the candidate should be referred to the manager.

The correct answer is c.

19. The candidate named Lata Jain satisfies criteria 1, 2 and according to the criteria 9, his case may be referred to the manager.

The correct answer is c.

20. The candidate named Rohit satisfies criteria 1 and 3 but does not satisfy criteria 2 as his age is more than twenty-five years. Thus, he is not selected.

The correct answer is d.

21. According to the given information, their arrangement would be like

Y R S V X Z or Z X V S R Y.

Thus, Z and Y are at the extreme ends.

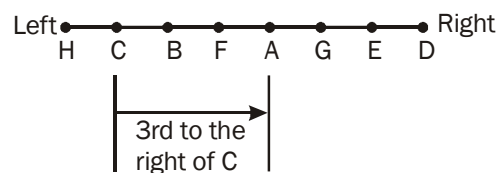
The correct answer is a.

Common solutions for questions 22 to 25:

According to the given information, the arrangement would be like



22.



Clearly, A sits third to the right of C.

The correct answer is c.

23. Clearly, D and H are at the extreme ends.

The correct answer is d.

24. Clearly, H is the third to the left of F.

The correct answer is a.

25. Only one person, that is, G is sitting between A and E.

The correct answer is a.

Practice Test 3

1. Statement (d) says that both Nations and corporations compete in similar ways, one for land share and other for market share. This weakens the given argument.

The correct answer is d.

2. For Sheetal to go watch a movie it is essential that Ravi stays at home. Hence, if Ravi did not agree to stay back, Sheetal will not go to watch the movie.

The correct answer is d.

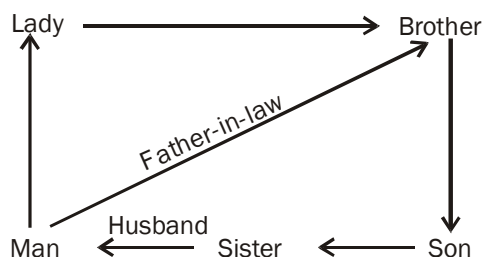
3. The given statement is in the form of an advertisement for the acquisition of a flat in Noida. An advertisement is given in a newspaper with the assumption that the required thing is available in the current situation. Hence, assumption I is correct. The purpose of giving an advertisement is the acquisition of that particular commodity or service which is only possible when people respond to the requisites of the advertisement. Hence, assumption II is also correct.

The correct answer is c.

4. From the given statement, it is clear that joining college is in direct proportion with getting jobs after graduating. And that is the predominant reason for boys to join a college. Hence, assumption I is implicit. Assumption II contradicts the idea mentioned in the given statement. Assumption III is irrelevant, as nothing has been mentioned about girls in the given statement.

The correct answer is a.

5. According to the given information, the family diagram can be drawn as:



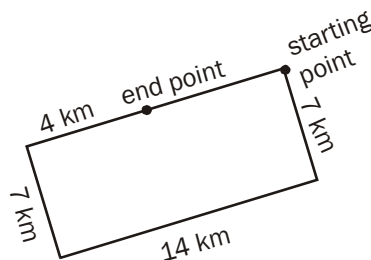
Hence, the lady is the sister of father-in-law of the man.

The correct answer is c.

6. The logic used in this problem is that the last number of any column is the product of the first three numbers of that column. So, the number replacing (?) will be $10 \times 2 \times 2 = 40$.

The correct answer is c.

7. According to the given information, the direction graph can be drawn as



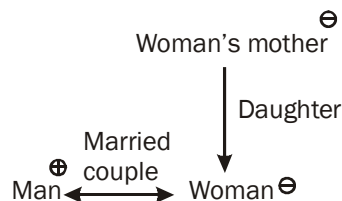
So, Radha is 10 km away from the starting point.

The correct answer is c.

8. As 1704 is divisible by 4. So, 1704 is a leap year. So, option (c) is correct.

The correct answer is c.

9. According to the given information, the family diagram can be drawn as



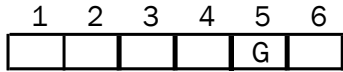
So, it is clear that the woman is the wife of that man.

The correct answer is b.

Common solution for questions 10 to 16:

Given conditions

- I. The green ball is under the cup number 5.

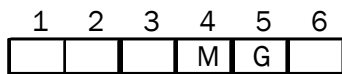


- II. The purple ball's cup number is less than that of the orange ball's cup number.
 III. The magenta ball and the red ball are in adjacent cups.

- 10.** Using condition I, options (a) and (b) are eliminated and using condition II, option (d) is eliminated.

The correct answer is c.

- 11.** Going through the conditions



Therefore, the red ball will be under the cup number 3.

The correct answer is c.

- 12.** The green ball is under the cup number 5, and the magenta ball as well as the purple ball could not be under the cup number 6.

So, the yellow ball could be under the cup number 6.

The correct answer is d.

- 13.** The purple ball's cup number must be lower than that of the orange ball's cup number.

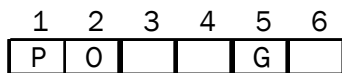
Therefore, the orange ball will be under the cup number 6.

The correct answer is d.

- 14.** Option (c) is correct, because the purple ball cannot be under the cup number 6.

The correct answer is c.

- 15.**



Using given conditions the magenta ball and the red ball will be under the cup number 3

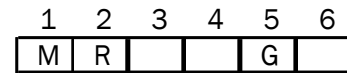
and the cup number 4 respectively, so the yellow ball will be under the cup number 6.

Option (b), (c) and (d) are eliminated.

The green ball and the magenta ball could be under adjacent cups.

The correct answer is a.

- 16.** The magenta ball is under the cup number 1 so the red ball will be under the cup number 2



The purple ball will be under the cup number 3 or the cup number 4.

If the purple ball is under the cup number 3 then the orange ball will be under the cup number 4 or the cup number 6.

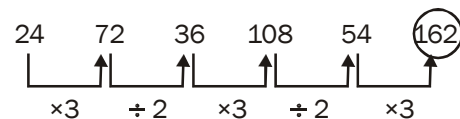
If the purple ball is under the cup number 4 then the orange ball will be under the cup number 6.

So, the orange ball and the green ball must be under adjacent cups.

The correct answer is a.

- 17.** The series pattern followed is

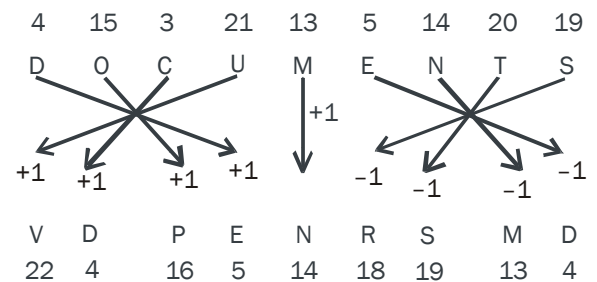
$\times 3, \div 2, \times 3, \div 2, \dots$ and so on.



So, the missing term is 162.

The correct answer is b.

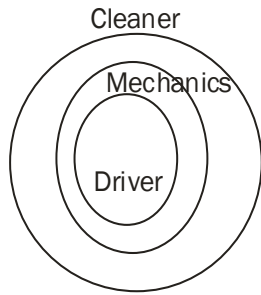
- 18.** The coding pattern followed is



Therefore, in the same code language, code for 'ADVERTISE' will be 'FWEBSDRHS'.

The correct answer is a.

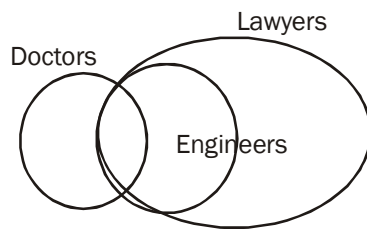
19.



Looking at the Venn diagram it is clear that only (II), (III) and (IV) follow.

The correct answer is b.

20.



Looking at the Venn diagram it is clear that (I), (III) and (IV) follows.

The correct answer is a.

21. Suppose the number of cards B have is x

$$\text{So, } B = x \quad A = x - 1$$

$$E = x + 3 \quad D = x$$

$$C = x + 5$$

So, it is clear that A gets the least number of cards.

The correct answer is d.

Common solution for questions 22 to 25:

According to the given information, people can be arranged in the descending order of their ages as

$$\text{Alka} > \text{Gopal} > \text{Mala} > \text{Ram} > \text{Kapil}$$

22. Mala's age is between Gopal and Ram.

The correct answer is a.

23. Ram's age is between Mala and Kapil.

The correct answer is b.

24. Mala's age is exactly in the middle of all the five.

The correct answer is a.

25. Alka is the eldest.

The correct answer is a.

SECTION 5

**GENERAL AWARENESS, BUSINESS
AWARENESS AND MANAGEMENT
APTITUDE**

General Awareness, Business Awareness and Management Aptitude Ready Reckoner

GENERAL AWARENESS

INDIAN GEOGRAPHY

India Facts

- The Union of India is the seventh largest country in the world, covering an area of 32, 87,263 sq. km and it is an important country of South Asia.
- The size of the country is vast and measures about 3,214 km from north to south and about 2,933 km from west to east.
- South Asia has a total area of about 4.488 million sq. km out of which India is the largest country by area (3.287 sq. km). It occupies 73.2% of the total area.
- It is four times larger than Pakistan, which is second largest country in South Asia. India is 12 times larger than UK and eight times larger than Japan.
- The mainland stretches from latitude 8° 4' north to 37° 6' north and from longitude 68° 7' east to 97° 25' east of Greenwich. The latitudinal and longitudinal extent of the country is almost same in degrees, that is, about 30 degrees.
- The southernmost point in Indian Territory, (in Great Nicobar Islands) is the Indira Point (6° 45'), while Kanyakumari, also known as Cape Comorin, is the southernmost point of Indian mainland. India thus lies wholly in the northern and eastern hemispheres.
- The 82° 30' E longitude is taken as Standard Time Meridian of India, as it passes through the middle of India through Naini, near Allahabad. Hence Naini, near Allahabad is the Standard Time of India.
- Indian Standard Time: GMT +05:30

- Telephone Country Code: +91
- India's coastline is 7,516.6 km encompassing the mainland, Lakshadweep Islands, and the Andaman and Nicobar Islands

Major Dams

States/UTs	Name of Dam	Height	Length	Installed Capacity
Jharkhand	Dam	165 ft.	4780 m	60 MW
Karnataka	Krishna Raja Sagar Dam	131 ft.	2620 m	200 MW
Kerala	Cheruthoni Dam	453 ft.	651 m	32 MW
Madhya Pradesh	Indira Sagar Dam	302ft.	653 m	1,000 MW
Maharashtra	Koyna Dam	399 ft.	807m	1,920 MW
Rajasthan	Bisalpur Dam	130 ft.	574 m	172 MW
Karnataka	Tunga Bhadra Dam	162ft.	2449 m	72 MW
Tamil Nadu	Mettur Dam	120 ft.	1700 m	32 MW
Uttar Pradesh	Rihand Dam	299 ft.	934 m	300 MW

Major Mountain Peaks and Ranges

Peak	Height (in metres)	Range	State Name
Kanchenjunga	8586	Kanchenjunga, Himalaya	Sikkim
Nanda Devi	7816	Garhwal, Himalaya	Uttarakhand
Kamet	7756	Garhwal, Himalaya	Uttarakhand
Saltoro Kangri	7742	Saltoro, Karakoram	Jammu & Kashmir
Saser Kangri I	7672	Saser, Karakoram	Jammu & Kashmir
Saser Kangri II	7518	Saser, Karakoram	Jammu & Kashmir
Mamostong Kangri	7516	Rimo, Karakoram	Jammu & Kashmir
Saser Kangri III	7495	Saser, Karakoram	Jammu & Kashmir
Teram Kangri I	7462	Siachen, Karakoram	Jammu & Kashmir
Jongsong Peak	7462	Kangchenjunga, Himalaya	Sikkim

Most Populous States in India

Name of State	Population	Name of State	Population
Uttar Pradesh	19,98,12,341	West Bengal	9,12,76,115
Maharashtra	11,23,74,333	Madhya Pradesh	7,26,26,809
Bihar	10,40,99,452		

Sex Ratio (Females Per 1000 Males)

Sex Ratio in India	940
Highest sex ratio in state	Kerala (1084)
Lowest sex ratio in state	Haryana (879)

Literacy Rate in India

Total Person Literacy Rate	74%
Males	82.14%
Females	65.46%
Highest Literacy Rate in state	Kerala - 94%
Lowest Literacy Rate in state	Bihar - 61.80%

National Symbols of India

National Symbol	Name	Description
National Flag	Tiranga	The flag comprises of three colours; saffron at the top, white in the middle and green at the bottom. At the centre of the white band is a navy-blue chakra.
National Anthem	Jana-Gana- Mana	Jana-gana-mana was written by Rabindranath Tagore in Bengali which was adopted as the national anthem of India on 24 January 1950 by the Constituent Assembly.
National Song	Vande Mataram	Vande Mataram was composed by Bankimchandra Chatterjee and adopted by the Constituent Assembly on 24 January 1950.
National Bird	Peacock	The Indian peacock, Pavo cristatus, is the National Bird of India.
National Animal	Tiger	The Indian tiger, Panthera tigris, is the national animal of India.
National Flower	Lotus	The lotus (Nelumbo Nucifera Gaertn) is considered to be a sacred flower and an auspicious symbol in the culture of India.

National Parks in India

Name	State
Bandhavgarh National Park	Madhya Pradesh
Kanha National Park	Madhya Pradesh
Periyar Wildlife Sanctuary	Kerala
Sariska Wildlife Sanctuary	Rajasthan

Name	State
Bharatpur Bird Sanctuary	Rajasthan
Keoladeo National Park	Rajasthan
Ranthambore National Park	Rajasthan
Corbett National Park	Uttarakhand

Name	State
Kaziranga National Park	Assam
Sanjay Gandhi Wildlife Sanctuary	Maharashtra
Dachigam National Park	J&K

Name	State
Bandipur National Park	Karnataka
Gir National Park	Gujarat
Sunderbans Tiger Reserve	West Bengal

Natural Resources and Top Producers

Name of Mineral/Crop/Fruit	Name of State
Bauxite	Odisha
Iron ore	Odisha
Coal	Chattisgarh
Gold	Karnataka
Diamond	Madhya Pradesh
Copper	Madhya Pradesh
Mica	Andhra Pradesh
Rice	West Bengal
Wheat	Uttar Pradesh

Name of Mineral/Crop/Fruit	Name of State
Maize	Andhra Pradesh
Sugar	Uttar Pradesh
Cotton	Gujarat
Banana	Tamil Nadu
Grapes	Maharashtra
Apple	Jammu & Kashmir
Mango	Uttar Pradesh and Andhra Pradesh
Cocoa	Kerala

INTERNATIONAL AWARENESS

World Geographical Facts

City of Flowers	Cape Town (South Africa)
City of Seven Hills	Rome (Italy)
City of Skyscrapers	New York (USA)
Cockpit of Europe	Belgium
Dark Continent	Africa
Emerald Isle	Ireland
Empire City	New York
Eternal City of Hopes	Rome, Italy
Forbidden City	Lhasa (Tibet)
Garden City	Chicago
Garden in the Desert	Ethiopia
Garden of England	Kent (England)
Gate of Tears	Strait of bab-el-Mandeb
Gift of Nile	Egypt
Golden City	Johannesburg

Granite City	Aberdeen
Hanging Valleys	Valley of Switzerland
Hermit Kingdom	Korea
Herring Pond	Atlantic Ocean
Holy Land	Palestine
Human Equator of the Earth	Himalayas
Island Continent	Australia
Island of Cloves	Zanzibar
Island of Pearls	Bahrain (Persian Gulf)
Islands of Sunshine	West Indies
Key to Mediterranean	Gibraltar
Land of Five Seas	South West Asia
Land of Lakes	Scotland
Land of Golden Pagoda	Myanmar
Land of Kangaroo	Australia
Land of Golden Fleece	Australia

Land of Lilies	Canada
Land of Maple	Canada
Land of Midnight Sun	Norway
Land of Morning Calm	Korea
Land of Rising Sun	Japan
Land of Setting Sun	United Kingdom
Land of Thousand Elephants	Laos
Land of Thousand Lakes	Finland
Land of Thunderbolt	Bhutan
Land of White Elephant	Thailand
Pillars of Hercules	Straits of Gibraltar
Play Ground of Europe	Switzerland
Quaker City	Philadelphia

Queen of the Adriatic	Venice
Roof of the World	The Pamirs (Tibet)
River in the Sea	Gulf Stream
Sickman of Europe	Turkey
Sugar Bowl of the world	Cuba
Venice of the East	Bangkok
Venice of the North	Stockholm
White City	Belgrade
Windy City	Chicago
Workshop of Europe	Belgium
World's Loneliest Island	Tristan Da Cunha
Yellow River	River Hwang Ho (China)

Headquarters of Organisations

Organization	Headquarters
United Nations Organisation	New York
United Nations Childrens' Fund (UNICEF)	New York
United Nations Population Fund (UNFPA)	New York
United Nations Conference on Trade and Development (UNCTAD)	Geneva
World Health Organisation	Geneva
International Labour Organisation	Geneva
International Committee of the Red Cross	Geneva
World Trade Organisation	Geneva
World Meteorological Organisation	Geneva
World Intellectual Property Organization	Geneva
International Organization for Standardization	Geneva
United Nations Educational Scientific and Cultural Organisation (UNESCO)	Paris

Organization	Headquarters
UN Women	New York
Organisation for Economic Cooperation and Development (OECD)	Paris
United Nations Industrial Development Organization (UNIDO)	Vienna
International Atomic Energy Agency	Vienna
Organisation of Petroleum Exporting Countries (OPEC)	Vienna
International Monetary Fund (IMF)	Washington DC
World Bank	Washington DC
Amnesty International	London
International Maritime Organisation	London
Commonwealth of Nations	London
International Court of Justice	The Hague
Universal Postal Union	Berne
Food and Agricultural Organisation (FAO)	Rome

Organization	Headquarters
North Atlantic Treaty Organisation (NATO)	Brussels
Transparency International	Berlin
International Renewable Energy Agency	Abu Dhabi (UAE)
South Asian Association for Regional Cooperation	Kathmandu
Association of South East Asian Nations (ASEAN)	Jakarta
Asia Pacific Economic Cooperation (APEC)	Singapore
Organisation of Islamic Cooperation	Jeddah
Indian Ocean Rim Association for Regional Cooperation	Ebene, Mauritius
Organisation for the Prohibition of Chemical Weapons	The Hague, The Netherlands
International Olympic Committee	Lausanne, Switzerland
Worldwide Fund for Nature	Gland, Switzerland
International Union of Pure and Applied Chemistry	Zurich, Switzerland
World Economic Forum	Geneva, Switzerland

Organization	Headquarters
International Hydrographic Organization	Monaco
International Association of Athletics Federations (IAAF)	Monaco
Fédération Internationale de Football Association (FIFA)	Zurich, Switzerland
International Cricket Council (ICC)	Dubai, UAE
International Hockey Federation (FIH)	Lausanne, Switzerland
Fédération internationale des échecs (FIDE) or World Chess Federation	Athens, Greece
International Union for Conservation of Nature (IUCN)	Gland, Switzerland
Internet Corporation for Assigned Names and Numbers (ICANN)	Los Angeles, USA
Médecins Sans Frontières (MSF) or Doctors without Borders	Geneva, Switzerland
International Shooting Sports Federation	Munich, Germany
International Council on Monuments and Sites (ICOMOS)	Paris, France

Boundary Lines Between Nations

Majinot Line	France and Germany
Alpine Line	Italy and France
Markat Reef	Sweden and Finland
Durand Line	Durand Line divides Pakistan and Afghanistan. Mortimer Durand drawn it in 1896.
Hindenburg	Line is the divider line between Germany and Poland. The Germans with drawn this line in 1917 at the time of World War I

Marginal Line	Marginal Line: This boundary line was the 320 km line of defensive wall on the Russia-Finland border.
Macmahon Line	Macmahon Line existed between India and China.
Medicine Line	Medicine Line is a boundary line divides Canada and the United States of America.
Order-Neisse Line	Border between Poland and Germany (Neisse is a river) adopted at the Poland Conference after World War II.

Pal Strait	India and Sri Lanka
Radcliffe Line	Boundary line between India and Pakistan. Sir Radcliffe was drawn up this line.
16th Parallel Line	Namibia and Angola
17th Parallel	It is a border line between North Vietnam and South Vietnam before two counties were combined.
24th Parallel	24th Parallel is the line which Pakistan claims for boundary between India and Pakistan. India didn't recognize this line.

36th Parallel	Makes the southernmost border of the Missouri State with the Arkansas State.
38th Parallel	This boundary line divides North Korea and South Korea.
40th Parallel	It is the northern boundary of the British Colony of Maryland.
42nd Parallel	This Border line is present between New York and Pennsylvania.
49th Parallel	This is the boundary/border between United States and Canada.

Rivers of Major World Cities

City	Country	River
Alexandria	Egypt	Nile
Amsterdam	Netherlands	Amstel
Baghdad	Iraq	Tigris
Bangkok	Thailand	Chao Phraya
Belgrade	Yugoslavia	Danube, Sava
Berlin	Germany	Spree, Havel
Bogotá	Colombia	Bogotá
Brussels	Belgium	Senne
Budapest	Hungary	Danube
Buenos Aires	Argentina	Río de la Plata
Cairo	Egypt	Nile
Calcutta	India	Hugli
Damascus	Syria	Barada
Delhi	India	Yamuna
Dublin	Ireland	Liffey
Ho Chi Minh City	Vietnam	Saigon
Hong Kong	China	Pearl
Jakarta	Indonesia	Liwung
Kiev	Ukraine	Dnieper

City	Country	River
Lisbon	Portugal	Tagus
Lima	Peru	Rímac
London	England	Thames
Madrid	Spain	Manzanares
Melbourne	Australia	Yarra
Montreal	Canada	St. Lawrence
Moscow	Russia	Moskva
Paris	France	Seine
Prague	Czech Republic	Moldau
Rome	Italy	Tiber
Saint Petersburg	Russia	Neva
Santiago	Chile	Mapocho
São Paulo	Brazil	Tietê
Seoul	South Korea	Han
Shanghai	China	Huangpu
Tokyo	Japan	Sumida
Vienna	Austria	Danube
Warsaw	Poland	Vistula
Zagreb	Croatia	Sava
Zürich	Switzerland	Limmat, Sihl

INDIAN HISTORY

Chronological Sequence of Important Ancient Indian Rulers and Events

Time	Events
600 BCE	The formation of Sixteen Maha Janapadas (Great Kingdoms)
599 BCE	The birth of Mahavira, founder of Jainism
563 BCE	The birth of Siddhartha Gautama (Buddha), founder of Buddhism
538 BCE	Cyrus the Great conquered parts of present day Pakistan
500 BCE	Earliest written records in Brahmi
500 BCE	Panini standardized grammar and morphology of Sanskrit, converting it into Classical Sanskrit. With this, the Vedic Civilization came to an end.
333 BCE	Darius III was defeated by Alexander the Great. The Macedonian Empire was established
326 BCE	Ambhi, King of Taxila, surrendered to Alexander in the Battle of the Hydaspes River
321 BCE	Chandragupta Maurya established the Mauryan Empire
273 BCE	Emperor Ashoka took over the Mauryan Empire
266 BCE	Ashoka conquered most of South Asia, Afghanistan, and Iran
265 BCE	The Battle of Kalinga, after which Emperor Ashoka embraced Buddhism
232 BCE	Ashoka died and was succeeded by Dasaratha
230 BCE	Satavahana Empire was established
200 to 100 BCE	Tholkappiyam standardized grammar and morphology of Tamil
184 BCE	Collapse of Maurya Empire with the assassination of Emperor Brihadrata, Establishment of the Sunga dynasty
180 BCE	Establishment of the Indo-Greek kingdom
80 BCE	Establishment of the Indo-Scythian kingdom

Time	Events
10 BCE	Establishment of the Indo-Parthian kingdom
68 CE	Establishment of the Kushan Empire by Kujula Kadphises
78 CE	Gautamiputra Satkarni took over Satavahana Empire and defeated Scythian king Vikramaditya
240 CE	Establishment of the Gupta Empire by Sri-Gupta
320 CE	Chandragupta I took over the Gupta Empire
335 CE	Samudragupta took over the Gupta Empire and started expanding it
350 CE	Establishment of the Pallava Empire
380 CE	Chandragupta II took over the Gupta Empire
399 to 414 CE	Chinese scholar Fa-Hien travelled to India
606 CE	Harshavardhana became the King
630 CE	Hiuen Tsiang travelled to India
761 CE	First Muslim invasion by Mohammed Bin Qasim
800 CE	The birth of Shankaracharya
814 CE	Nripatunga Amoghavarsha I became Rashtrakuta king
1000 CE	Invasion by Mahmud of Ghazni
1017 CE	Alberuni travelled to India
1100 CE	Rule of the Chandelas, Cholas, Kadambas, and Rashtrakutas
1120 CE	Kalyani Chalukya Empire attained peak, Vikramaditya VI introduced Vikrama Chalukya Era
1191 CE	First Battle of Tarain between Mohammed Ghori and Prithviraj Chauhan III
1192 CE	Second Battle of Tarain between Ghauri and Prithviraj Chauhan III

Chronological Sequence of Important Medieval Indian Rulers and Events

Events	Indian Rulers
1206 CE	Qutub-ud-din Aibak becomes Sultan of Delhi
1250 CE	Chola dynasty ends
1290 CE	Jalal ud-Din Firuz establishes Khilji Sultanate
1325 CE	Muhammad bin Tughlaq becomes Sultan of Delhi
1343 CE	Southern kingdom builds capital at Vijayanagar
1345 CE	Muslim nobles revolt against Muhammad bin Tughlaq
1398 CE	Taimur ransacks Delhi
1497 CE	Babur becomes the ruler of Ferghana
1526 CE	Babur, the Mughal ruler of Kabul, invaded Delhi and Agra and killed Sultan Ibrahim Lodi
1527 CE	Battle of Khanwa, in which Babur annexed Mewar
1530 CE	Babur died and was succeeded by Humayun
1556 CE	Humayun died and was succeeded by his son Akbar
1600 CE	East India Company was formed in England
1605 CE	Akbar died and was succeeded by Jehangir
1628 CE	Jehangir died and was succeeded by Shah Jahan
1630 CE	Shivaji was born
1658 CE	Shah Jahan built Taj Mahal, Jamia Masjid, and Red Fort

Events	Indian Rulers
1659 CE	Shivaji defeated Adilshahi troops at the Battle of Pratapgarh
1674 CE	Maratha Empire was established
1680 CE	Shivaji died
1707 CE	Aurangzeb died and was succeeded by Bahadur Shah I
1707 CE	Maratha Empire broke into two divisions
1737 CE	Bajirao I conquered Delhi
1740 CE	Bajirao I died and was succeeded by Balaji Bajirao
1757 CE	Battle of Plassey
1761 CE	Third Battle of Panipat ended the expansion of Maratha Empire
1766 CE	First Anglo-Mysore War
1777 CE	First Anglo-Maratha War
1779 CE	Battle of Wadgaon
1780 CE	Second Anglo-Mysore War
1789 CE	Third Anglo-Mysore War
1798 CE	Fourth Anglo-Mysore War
1799 CE	Death of Tipu Sultan
1803 CE	Second Anglo-Maratha War
1817 CE	Third Anglo-Maratha War begins
1818 CE	End of the Maratha Empire and British control over most of India
1857 CE	Revolt of 1857
1869 CE	Birth of Gandhiji
1947 CE	India attains independence

Important Revolutionary Organizations

Organization	Year	Founder	Place
India House	1904	Shyam ji Krishna Verma	London
Abhinav Bharat	1906	S D Savarkar	London
Indian Independence League	1907	Taraknath Bose	America
Gadar Party	1913	Lala Hardayal and Virendra Natha Chattopadhyaya	Berlin
Azad Hind Fauj	1942	Ras Behari Bose (In 1943 Azad Hind Fauz was reorganised by Netaji Subhash Chandra Bose in Singapore)	Tokya
Indian Independence League	1942	Subhas Chandra Bose, Jawaharlal Nehru, S. Srinivasa Iyengar	Tokyo

Important Political Organizations

Organization	Year	Founder	Place
Land holder Society	1838	Dwarkanath Tagore	Calcutta
British India Association	1851	Devendra Nath Tagore	Calcutta
East India Association	1866	Dadabhai Naoroji	London
Indian Association	1876	A M Bose and S N Bannerjee	Calcutta
Bombay Presidency Association	1885	Ferozshah Mehta, Telang	Bombay
Servants of India Society	1905	Gopal Krishna Gokhale	Bombay
U P Kisan Sabha	1918	Malviya, Indra Narayan, Gaurishankar	Lucknow
Ahmedabad Textile Labour Association	1918	Mahatma Gandhi	Ahmedabad
Servants of People Society	1920	Lala Lajpat Rai	Lahore
All India Women's Conference	1927	Lady Sadashiv Ayyar	Madras
Khudai Khitmadgar	1929	Khan Abdul Gaffar Khan	Peshawar
All India Kisan Sabha	1936	N G Ranga, Sahjanand	Lucknow
Indian Bolshevik Party	1939	N D Majumdar	Calcutta
Radical Democratic Party	1940	M N Roy	Calcutta
Indian Bolshevik Lenin Party	1941	Ajit Roy, Indrasena	Calcutta

Newspapers

Newspaper	Year	Founder	Place	Language
Bengal Gazette	1780	James Augustus Hikey	Calcutta	English
Maratha	1881	Agarkar	Bombay	English
Kesari	1881	Bal Gangadhar Tilak	Bombay	Marathi
Bandematram	1909	Hardayal, Shyamji Verma	Paris	English
Al Hilal	1912	Abul Kalam Azad	Calcutta	Urdu
Bombay Chronicle	1913	Ferozshah Mehta	Bombay	English
Gadar	1913	Lala Hardayal	San Francisco	English
Commonweal	1914	Annie Besant	Bombay	English
Servants of India	1918	Sri Niwas Shastri	Madras	English
Independent	1919	Moti Lal Nehru	Allahabad	English
Navjivan	1919	M K Gandhi	Ahmedabad	Gujarati
Young India	1919	M K Gandhi	Ahmedabad	English
Hindustan Times	1922	K M Pannikar	Bombay	English
Harijan	1933	M K Gandhi	Pune	Hindi

Revolutionary Activities

Revolutionaries	Year	Place	Activities
Damodar and Balkrishna Chapekar	1897	Pune	Murder of Plague Commissioner Rand and his associates Amherst
Khudi Ram Bose and Prafulla Chaki	1908	Muzaffarpur (Bihar)	Attempt to kill vindictive judge Kingsford
Ras Behari Bose and Basant Kumar	1912	Delhi	Attempt to murder Viceroy Hardinge
Bismil, Ashfaqullah, and Rajendra Lahri	1927	Kakori	Looted the government cash carried in a train.
Sardar Bhagat Singh	1928	Lahore	Murder of Saunders
Udham Singh	1940	London	Murder of General Dyer

Important Books and Writers

Books	Writers	Books	Writers
Discovery of India	Jawaharlal Nehru	Ashtadhyayi	Panini
Anandmath	Bankim Chandra Chatterjee	Neel Darpan	Dinbandhu mitra

Books	Writers	Books	Writers
Poverty and Un-British Rule in India	Dadabhai Naoroji	Mudrararakshasa, Devichandraguptam	Vishakhadatta
Poverty of India	Dadabhai Naoroji	Mrichchhakatikam	Sudraka
Economic History of India	R C Dutta	Ratnavali, Priyadarsika, Nagananda	Harshavardan
Rangbhoomi, Gaudan, Gaban, Kafan, Do Bailon ki Jodi	Munshi Prem Chand	Kaumudi Mahotsava	Vijjaka
Hindustan Hamara (Contains Sare Jahan Se Acha)	Muhammad Iqbal (Urdu)	Tughlaq Nama and Kiranus-sadan	Amir Khusro
Humayun Nama	Gulbadan Begam	Akbar Nama, Ain-i-Akbari	Abul Fazal
Nuskha-Dilkusha	Bhimsen Saxena	Padshah Nama	Mohamad Waris

Translation of Sanskrit Texts during Mughal Period

- Ramayan:** Translated by Badayuni under the patronage of Akbar.
- Mahabharata:** Titled Razm Nama, this was translated by Badayuni, Naqibkhan, and Sheikh Sultan under the patronage of Akbar.
- Bhagwad Gita:** Translated by Dara Shikoh under the patronage of Shahjahan.
- Panchatantra:** Translated by Abul Fazl under the patronage of Akbar.

First in India

First Governor of Bengal	Lord Clive
Last Governor of Bengal	Warren Hastings
First Governor General of Bengal	Warren Hastings
First Governor General of India	Lord William Bentinck
Last Governor General of India and First Viceroy of India	Lord Canning
First President of Indian Republic	Dr. Rajendra Prasad
First Field Marshal	Gen SHFJ Manekshaw
First Indian to get Jnanpith Award	G. SankaraKurup
First Indian to swim across Indian Channel	Mihir Sen
First Indian Nobel laureate	Rabindranath Tagore
First Chinese Pilgrim to visit India	Fa-Hien
First Indian Pilot	JRD Tata
First man to climb Mt. Everest twice	Nawang Gombu
First Indian Governor General of Independent India	C. Rajagopalachari
First Governor General of India (After Independence)	Lord Louis Mountbatten
First Commander in Chief of Free India	Gen K.M. Cariappa

First Indian Judge of International Court of Justice	Dr. Nagendra Singh
First Indian to receive Bharat Ratna Award	Dr. S Radhakrishnan
First Muslim President of Indian Republic	Dr. Zakir Hussain
First Indian to win Palk Strait Ocean Swimming Contest	Baidyanath Nath
First President of Indian national Congress	WC Bonnerjee
First Indian Submarine	INS Kalvari
First Indian Scientist to get Nobel Prize	CV Raman (Physics)
India's First Chief Election Commissioner	Sukumar Sen
First Scientist of Indian Origin to get Nobel Prize in the field of Medical Science	Dr. Hargobind Khorana
First Scientist of Indian Origin to get Nobel Prize in Chemistry	Venkatraman Ramakrishnan
First Indian-born to get Nobel Prize in Peace	Kailash Satyarthi
First Sports Person to get Bharat Ratna	Sachin Tendulkar
First to reach South Pole	Bijoy Kumar Das
First Chief Minister to die in Office	CN Annadurai, Tamil Nadu
First Indian Sound Film	Alam Ara, directed by Ardeshir Irani
First Indigenously made colour film	Kisan Kanya, directed by Moti B. Gidwani
First Banned film in India	Neel Akasher Neechey
First Post Office opened in India	Kolkata (1727)
First Chief Justice of India	Justice Hiralal J kania
First Indian to win Stalin Award	Saifuddin Kichlu
First Education Minister of Independent India	Maulana Abul Kalam Azad
First Prime Minister of Independent India	Pandit Jawaharlal Nehru
First Home Minister of Independent India	Sardar Vallabhbhai Patel
First Vice President of Independent India	Dr. S. Radhakrishnan
First Chief of Air Staff	Air Marshal Sir Thomas Elmhirst
First Indian Air Chief of India	Air Marshal S Mukherjee
First Chief of Army Staff	Gen M Rajendrasinhji Jadeja
First Chief of Naval Staff of India	Vice Admiral RD Katari
First Large scale Atomic Reactor of India	Apsara
First Aircraft Carrier Indian Ship	INS Vikrant
First Scientist of Indian Origin to get Nobel Prize in the field of Physics	Subrahmanyam Chandrasekhar
India's First University	Nalanda University
First Leader of Opposition	AK Gopalan

First Sikh President of India	Giani Zail Singh
First Indian to climb Mt. Everest without Oxygen Cylinder	Sherpa Phu Dorji
First medium range Missile	Agni
First person to get Param Vir Chakra Award	Major Somnath Sharma
First Muslim President of INC	Badruddin Tayab Ji
First Indian Prime Minister to lose an Election	Indira Gandhi
First Speaker of Lok Sabha	GV Mavlankar
First Indian Recipient of Oscar Award	Bhanu Athaiya
First Finance Minister of India	RK Shanmukhan Chetty
First Indian to win Magasaysay Award	Acharya Vinoba Bhave
India's First Open University	Andhra Pradesh Open University
First President of India to die in office	Dr. Zakir Hussain
First British Prime Minister to visit India	Harold Macmillan
First Indian Space Tourist	Santosh Georgev Kulangara
First Indian to reach South Pole	Col JK Bajaj
First Atomic Submarine of India	INS Chakra
First Asian Games Organized	Delhi
First American President to visit India	Dwight David Eisenhower
First Indian Cosmonaut	Rakesh Sharma
First Indian Prime Minister to resign from Office	Morarji Desai
First Indian Author to win Anderson Award	Ruskin Bond
First Indian Nuclear Center	Tarapur
First Foreign recipient of Bharat Ratna	Khan Abdul Ghaffar Khan
First Indian recipient of Nobel Prize in Economics	Dr. Amartya Sen
First Test tube baby of India	Indira
First Indian to reach Antarctica	Lt. Ram Charan
First Deputy Prime Minister of India	Sardar Vallabhbai Patel
First Indian to win World Billiards Trophy	Wilson Jones
First Law Minister of India	Dr.BR Ambedkar

GENERAL POLITY

Indian Constitution

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Borrowed Features of Indian Constitution

From U.K.	Nominal Head President (like Queen)
	Cabinet System of Ministers
	Post of PM
	Parliamentary Type of Govt.
	Bicameral Parliament
	Lower House more powerful
	Council of Ministers responsible to Lower House
	Speaker in Lok Sabha

From U.S.	Written Constitution
	Executive head of state known as President and him being the Supreme Commander of the Armed Forces
	Vice- President as the ex-officio Chairman of Rajya Sabha
	Fundamental Rights
	Supreme Court
	Provision of States
	Independence of Judiciary and judicial review
	Preamble
	Removal of Supreme court and High Court Judges
From USSR	Fundamental Duties
	Five-year Plan
From Australia	Concurrent list
	Language of the preamble
	Provision regarding trade, commerce and intercourse
From Japan	Law on which the Supreme Court functions
From Weimar Constitution of Germany	Suspension of Fundamental Rights during the emergency
From Canada	Scheme of federation with a strong centre
	Distribution of powers between centre and the states and placing Residuary Powers with the centre
From Ireland	Concept of Directive Principles of States Policy (Ireland borrowed it from Spain)
	Method of election of President
	Nomination of members in the Rajya Sabha by the President

Parliaments of Countries

Country Name	Parliament Name
Afghanistan	Shora
Australia	Parliament
Bangladesh	Jatiya Sangsad
Bhutan	Tasongadu
Canada	Parliament
China	National People Congress
Denmark	Folketing
Egypt	People's Assembly

Country Name	Parliament Name
France	Parlement
Germany	Bundestag
Great Britain	Parliament
Hungary	Országgyűlés
Iceland	Althing
India	Sansad
Iran	Majilis
Ireland	Oireachtas

Country Name	Parliament Name
Israel	The Knesset
Italy	ParlamentolTaliano
Japan	Diet
Kuwait	Majlis-al-Umma
Lativa	Saeima
Malaysia	Majilis
Maldives	Majilis
Magnolia	Khural
Nepal	Rashtriya Panchayat
Netherlands	States General (Staten-Generaal)
Norway	Storting
Oman	Majlis

Country Name	Parliament Name
Pakistan	Majlis-e-Shoora
Poland	Sejm
Russia	Duma
Spain	Cortes
Sweden	Riksdag
South Africa	Parliament
Switzerland	Federal Assembly
Taiwan	Yuan
Turkey	Grand National Assembly
USA	Congress
Uzbekistan	Oliy Majlis

ECONOMY

Economics is the social science that analyzes the production, distribution and consumption of goods and services. The term **economics** comes from the Ancient Greek word “**oikonomia**” (“management of a household, administration”) from **oikos** (“house”) + **nomos** (“custom” or “law”), hence “rules of the house(hold)”. It can be broadly categorized as Micro and Macro economics.

Microeconomics examines the behavior of basic elements in the economy, including individual agents (such as households and firms or as buyers and sellers) and markets, and their interactions.

Macroeconomics analyzes the entire economy and issues affecting it, including unemployment, inflation, economic growth, and monetary and fiscal policy.

Planned Economy

A **planned economy** is an economic system in which decisions regarding production and investment are embodied in a plan formulated by a central authority, usually by a government agency. In such economies, central economic planning by the state or government controls all major sectors of the economy and formulates all decisions about the use of resources. Planners decide what should be produced and direct lower-level enterprises to produce those goods in accordance with national and social objective.

Market Economy

A **market economy** is an economy in which decisions regarding investment, production and distribution are based on supply and demand and the prices of goods and services are determined in a free price system. Contrast this with a planned economy, where investment and production decisions are embodied in a plan of production. Market economies can range from hypothetical laissez-faire and free market variants to regulated markets and interventionist variants. The term **free-market economy** is sometimes used synonymously with market economy, but, as Ludwig Erhard once pointed out, this does not preclude an economy from providing various social welfare programs such as unemployment benefits, as in the case of the social market economy.

Laissez-faire

Laissez-faire is synonymous with what was referred to as strict capitalist free market economy during the early and mid-19th century as an ideal to achieve. It is generally understood that the necessary components for the functioning of an idealized free market include the complete absence of government regulation, subsidies, artificial price pressures and government-granted monopolies and no taxes or tariffs other than what is necessary for the government to provide protection from coercion, theft and maintaining peace, and property rights.

Newly Industrialized Countries

Newly Industrialized Countries (NICs) are countries whose economies have not yet reached First World status but have, in a macroeconomic sense, outpaced their developing counterparts. Another characterization of NICs is that of nations undergoing rapid economic growth (usually export-oriented). Incipient or ongoing industrialization is an important indicator of NIC. In many NICs, social upheaval can occur as primarily rural, or agricultural populations migrate to the cities, where the growth of industries and factories can draw scores of laborers.

NICs often receive support from international organizations such as the World Trade Organization (WTO) and other international support bodies. However, as environmental, labor and social standards tend to be significantly weaker in NICs; many fair-trade supporters have advocated standards for importing their products and criticized the outsourcing of jobs to NICs.

Least Developed Country

Least developed country (LDC) is the name given to a country which, according to the United Nations, exhibits the lowest indicators of socioeconomic development, with the lowest Human Development Index ratings amongst all countries in the world. The concept of LDCs originated in the late 1960s and the first group of LDCs was listed by the UN on 18th November 1971. A country is classified as a Least Developed Country if it meets three criteria:

1. Low income (three-year average GNI per capita of less than US \$905, which must exceed \$1,086 to leave the list)
2. Human resource weakness (based on indicators of nutrition, health, education and adult literacy)
3. Economic vulnerability (based on instability of agricultural production, instability of exports of goods and services, economic importance of non-traditional activities, merchandise export concentration, handicap of economic smallness and the percentage of population displaced by natural disasters)

Measuring Growth

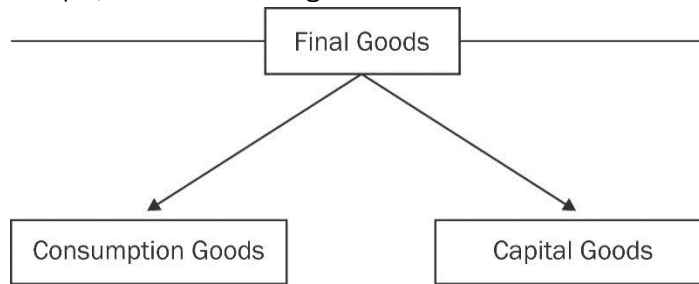
Measures of national income and output are used in economics to estimate the value of goods and services produced in an economy. They use a system of national accounts or national accounting. Some of the common measures are Gross National Product (GNP) and Gross Domestic Product (GDP).

National Income Accounting

Basic concepts

One among the major challenges in economics is ascertaining the total production of goods and services in the economy known as Gross Domestic Product (**GDP**). Towards the same, acquaintance with certain basic concepts is needed.

Final Goods: An item meant for final use that does not pass through any more stages of production or transformation. For example, an item of clothing.



Consumption Goods: Goods that are consumed when purchased by their ultimate consumers are called consumption goods e.g. food grains, clothing, etc purchased by households.

Capital Goods: Goods that are used in production process are called capital goods e.g. machines used in manufacturing cars. Such goods undergo wear and tear and are gradually replaced over time.

Consumer Durables: Certain goods although meant for ultimate consumption are durable e.g. computers, cars etc. They have a long life when compared to articles such as food and clothes. They also undergo wear and tear and need to be replaced.

Intermediate Goods: A number of products are neither meant for final consumption nor are capital goods. Such goods are used as inputs for final products e.g. rubber for manufacturing tyres, steel for manufacturing cars, etc. Such products are called **Intermediate Goods**.

That part of final output of a country that comprises capital goods is called **Gross Investment** of an economy. However, a part of the output of capital goods is devoted to maintenance of capital goods or towards replacement of obsolete capital goods. The value of this part is subtracted from Gross Investment to arrive at Net Investment and is known as Depreciation.

$$\text{Net Investment} = \text{Gross Investment} - \text{Depreciation}$$

Depreciation is accounted for in the form of an annual deduction. Thus, depreciation with respect to a machine that has a life of 20 years is divided into 20 parts and corresponding deduction is made from Gross Investment to arrive at figure of Net Investment.

Now, there are three methods of estimating the aggregate value of goods and services produced (GDP) in an economy in a year.

- 1. Expenditure Method:** In this method the aggregate value of expenditure received by firms for final goods and services that they produce are added. Final expenditure is that part of expenditure made by firms which is undertaken not for intermediate purposes. Under this approach,

$$\text{GDP} = C + I + G + X$$

where C = Final consumption expenditure received on goods and services produced by firms

I = Final investment expenditure on Capital Goods

G = Expenditure made by Government

And, X = Export Revenues

2. **Product Method:** The aggregate value of **final goods** and services produced by all firms is the yardstick to calculate the net value of final goods and services, the **value added** viz. net contribution of each producer is considered.

Value Added of a firm = Value of production of the firm – Value of intermediate goods used by the firm

If we add the gross value added of all the firms in an economy in a year, we get the value of aggregate amount of goods and services produced by the economy in the year. This estimate is called **GDP**.

3. **Income Method:** The aggregate of **factor payments** made during a particular year.

Factor Payments made are either consumed or saved or paid in taxes. Thus, under this approach,

$$\text{GDP} = C + S + T$$

where S = Aggregate Savings and T = Sum of taxes paid

GDP measures the aggregate production of goods and services taking place in an economy. However, a part of this production may in fact accrue to residents of another country e.g. an Indian may be earning in say Kuwait. To take such situation into account the term Gross National Product (GNP) has been coined.

$$\text{GNP} = \text{GDP} + \text{Net Factor Income from Abroad}$$

On subtracting Depreciation from GNP, we get **Net National Product (NNP)**.

The assumption on which the above calculation of GDP is based is that prices do not change over time. This, needless to mention is an imprudent assumption to make. It may be possible that the increase in GDP overtime and difference in GDP of two or more countries is attributable only to changes in prices. In order to overcome this problem, **Real GDP** is used for making comparisons between GDP of different countries or of the same country over time.

Another way of comparing movement in prices in an economy is known as **Consumer Price Index (CPI)**. This is an index of prices of a basket of goods consumed by a representative consumer. CPI is expressed in percentage terms. For reference, two years viz. base year and current year are used. Assuming the CPI in base year to be 100, the CPI for current year is calculated and expressed vis-à-vis the base year.

Yet another index used for comparing price rise in goods is the **Wholesale Price Index (WPI)** which compares change in wholesale prices (at which goods are bought and sold in bulk) of commodities.

GDP is calculated by the above discussed methods on the basis of Market Prices of goods. However, Market Price also includes **Indirect Taxes**. In order to calculate the income that accrues to factors of production, it is necessary to deduct Indirect Taxes. Also, government gives subsidies on many things such as cooking gas and hence the amount of subsidies should also be taken into account. Thus,

$$\text{National Income} = \text{NNP} - (\text{Indirect Taxes} - \text{Subsidies})$$

In order to derive the income received by households called **Personal Income (PI)**, the following formula is used:

$$\text{PI} = \text{NI} - \text{Undistributed Profits} - \text{Net Interest Payments made by the Households} - \text{Corporate Tax} + \text{Transfer Payments to the Households from the Government and Firms}$$

Undistributed Profits is that part of the profit earned by firms and government enterprises which is not distributed among households.

Since Corporate Tax is paid by firms on profits earned and it does not accrue to households it is subtracted from NI.

In order to find that part of income over which households have complete control viz. **Personal Disposable Income (PDI)** we must subtract payments made by households as tax or non-tax. Hence,

$$PDI = PI - \text{Personal Tax Payments} - \text{Non-Tax Payments}$$

Green GDP

Green GDP or green gross domestic product (green GDP) is an index of economic growth with the environmental consequences of that growth factored in. Green GDP monetizes the loss of biodiversity and accounts for costs caused by climate change.

India and green accounting

Green accounting is a type of accounting that attempts to factor environmental costs into the financial results of operations. It has been argued that gross domestic product ignores the environment and therefore decision makers need a revised model that incorporates green accounting.

India aims to factor the use of natural resources in its economic growth estimates by 2015 as we seek to underscore the actions it is taking to fight global warming.

Depression

It is a sustained, long-term downturn in economic activity in one or more economies. It is a more severe downturn than a recession, which is seen by some economists as part of the modern business cycle. There is no agreed definition of the term **depression**, though some have been proposed. A few of them are (1) a decline in real GDP exceeding 10%, or (2) a recession lasting two or more years.

Planning in India

India's five-year plans

Plan	Duration	Target Growth	Actual Growth	Focus	Description
First Plan	1951-56	2.1%	3.6%	Agriculture, price stability, power, and transport	It was based on Harrod-Domar Model
Second Plan	1956-61	4.5%	4.3%	Rapid industrialization-heavy and basic industries. Advocated huge imports through foreign loans	Plan is also known as the Mahalanobis Plan
Third Plan	1961-66	5.6%	2.8%	Aim was to make India a 'self-reliant' and 'self-generating' economy	The plan was thorough failure in reaching the targets due to unforeseen events such Chinese aggression (1962), Indo-Pak War (1965), and severe drought (1965-66)

Plan	Duration	Target Growth	Actual Growth	Focus	Description
Fourth Plan	1969-74	5.7%	3.3%	Main emphasis was on growth rate of agriculture to enable other sectors to move forward	Influx of Bangladeshi refugees before and after 1971 Indo-Pak War was an important issue along with price situation deteriorating to crisis proportions and the plan is considered as big failure.
Fifth Plan	1974-79	4.4%	4.8%	It proposed to achieve two main objectives: 'removal of poverty' (<i>Garibi Hatao</i>) and 'attainment of self reliance'	When Janta Party came to power in 1978, the Plan was terminated.
Sixth Plan	1980-85	5.2%	5.7%	The Plan focussed on an increase in national income, modernization of technology, ensuring continuous growth	The sixth Plan Considered aa success as most of the targets were realized.
Seventh Plan	1985-90	5.0%	6.0%	The Plan aimed at accelerating food grain production, increasing employment opportunities, and raising productivity with focus on 'food, work and productivity'	The plan was very successful with the decade of 80s struggling out of the 'Hindu Rate of Growth'.
Eighth Plan	1992-97	5.6 %	6.8%	The plan undertook drastic policy measures to combat the bad economic situation and to undertake an annual average growth of 5.6% through introduction of fiscal and economic reforms, including liberalization.	Some of the main economic outcomes during the plan period were rapid economic growth, high growth of agriculture and allied sectors, and manufacturing sector, growth in exports and imports, improvement in trade and current account deficit.
Ninth Plan	1997-2002	6.5%	5.4%	Government focussed on "Growth with Social Justice and Equality"	It assigned priority to agriculture and rural development with a view to generate adequate productive employment and eradicate poverty.

Plan	Duration	Target Growth	Actual Growth	Focus	Description
Tenth Plan	2002–07	8%	7.6%	The plan had set 'monitorable targets' for few key indicators (11) of development, which included reduction in gender gaps in literacy and wage rate, reduction in infant and maternal mortality rates, improvement in literacy, access to potable drinking water, cleaning of major polluted rivers, etc.	State-wise break up of targets for growth and social development sought to achieve balanced development of all states. Governance was considered as a factor of development and agriculture was declared as a prime moving force of the economy.
Eleventh Plan	2007–12	9%	8%	The plan aimed towards "Faster and More Inclusive Growth"	Efforts made for sufficiently inclusive growth of many groups, specially SCs, STs, and minorities.

NITI Aayog

The National Institution for Transforming India, also known as NITI Aayog, was formed via a resolution of the Union Cabinet on 1 January 2015. NITI Aayog is the premier policy 'Think tank' of the Government of India, providing both directional and policy inputs. While designing strategic and long-term policies and programmes for the Government of India, NITI Aayog also provides relevant technical advice to the Centre and States. The Government of India, in keeping with its reform agenda, constituted the NITI Aayog to replace the Planning Commission instituted in 1950. This was done in order to better serve the needs and aspirations of the people of India. An important evolutionary change from the past, NITI Aayog acts as the quintessential platform of the Government of India to bring States to act together in national interest, and thereby fosters Cooperative Federalism.

NITI aayog's role

NITI Aayog has been entrusted with the role to co-ordinate 'Transforming our World: The 2030 Agenda for Sustainable Development' (called as SDGs). Moving ahead from the Millennium Development Goals (MDGs), SDGs have evolved through a long and inclusive process for achievement during 2016–30. The SDGs cover 17 goals and 169 related targets resolved in the UN Summit meet during 25–27 September 2015, in which India was represented at the level of the Hon'ble Prime Minister. These SDGs will stimulate, align, and accomplish action over the 15-year period in areas of critical importance for humanity and the planet.

New Economic Policy

The New Economic Policy 1991 was introduced to revive the economy. It emphasized a bigger role for the private sector and focussed on FDI on supplement growth. It aimed at export-led growth along with reducing the role of the states and making planning liberal and market driven.

The main characteristics of New Economic Policy 1991 are as follows:

1. Delicensing: Only six industries were kept under the Licencing Scheme. The private sectors were allowed to set up industrial units without taking any licences. Industrial licensing was abolished for almost all but product categories.
2. Entry to the Private Sector: The role of public sector was limited only to four industries; rest all the industries were opened for the private sector also.
3. The threshold limit of assets in respect of MRTP companies and other major undertakings was abolished. They were free to undertake investments without any ceiling prescribed by MRTP.
4. Disinvestment: Disinvestment was carried out in many public sector enterprises.
5. The role of RBI reduced from regulator to facilitator of financial sector. This means that the financial sector may be allowed to take decisions on many matters without consulting the RBI. The reform policies led to the establishment of private sector banks, Indian as well as foreign. Foreign investment limit in banks was raised to around 50%.
6. Liberalization of Foreign Policy: The government granted approval for FDI up to 51% in high priority areas.
7. In 1991, the rupee was devalued against foreign currencies. This led to an increase in the inflow of foreign exchange.
8. Liberalization in Technical Area: Automatic permission was given to Indian companies for signing technology agreements with foreign companies.
9. Setting up of Foreign Investment Promotion Board (FIPB): This board was set up to promote and bring foreign investment in India.
10. Sick public sector units were recommended to Board for Industrial and Financial Reconstruction (BIFR) for revival.
11. Setting up of Small-scale Industries: Various benefits were offered to small-scale industries.
12. PSUs were given more autonomy.

There are three major components or elements of the New Economic Policy—Liberalization, Privatization, and Globalization.

Salient features of Indian economy

1. Indian Economy is the tenth largest in the world by nominal GDP and the third largest by purchasing power parity (PPP)
2. Sixth largest exporter of services and 19th largest exporter of merchandise in 2015
3. 12th largest merchandise and 7th largest services importer
4. The largest employer in India's economy is Agriculture
5. Manufacturing industry contributes fairly, and the services provided by them is the fastest growing part of the economy

Inflation

It is common knowledge that Inflation refers to a rise in level of prices of goods over a period of time. However, it is important to note that a short-term relative (vis-à-vis a particular year called **base year**) price rise in few commodities is not considered inflation in standard economics. **Classic Inflation** (considered as inflation in standard economics) refers to sustained overall price increase. Two other terms used are **Core Inflation** (a measure of inflation that excludes certain items that face volatile price movements such as food and energy) and **Headline Inflation** (measure of total inflation in the economy). Factors that influence inflation (other than supply-demand interaction as discussed earlier) include decisions taken by Reserve Bank of India (RBI) and

Ministry of Finance (MoF), Government of India. While RBI controls the amount of currency in the economy, MoF controls the fiscal deficit and the revenue deficit.

Inflation in India is measured by a wholesale price index (**WPI**) and different consumer price indices (**CPI**) for different categories of consumers. A new WPI series with 2004–05 as base year was released in September 2010. Under the old series, 1993–94 was used as base year. While the older series was based on price trends in about 430 items, the new series is based on price trends in about 680 items. Food (including primary food articles and manufactured food products) accounts for 24% of new WPI; manufactured products (excluding manufactured food products) account for 55% of new WPI; fuel and power accounts for 15% of new WPI and non-food primary articles and minerals account for 6% of new WPI.

Since late 2009, the government decided to have weekly release of inflation data on food and fuel prices on the WPI and monthly data on the general WPI. That is, inflation of primary goods within the WPI is reported on weekly basis. The earlier system was to release the wholesale price index every week and consumer price index, where food items have greater weightage, every month. The government in February 2012 announced discontinuation of the release of weekly primary and food inflation data based on the Wholesale Price Index.

The Labour Bureau, Government of India, releases three indices: CPI (Industrial Workers), CPI (Agricultural Labourers), and CPI (Rural Labourers).

The Central Statistical Organization is in the process of compiling a new series of CPI urban, CPI rural, and combined CPI (rural + urban) at State/Union Territory/All India level with increased scope and coverage. The year 2010 has been decided as the base year for these indices.

Which index is to be used?

The WPI is useful in certain context. For example, for industrialists, the costs of setting up a factory over the course of several years; and further to calculate the costs of production and returns over several years. The basket of items in the CPI does not include machinery, chemicals, and so on; secondly, the price of electricity in the CPI is the consumer tariffs, not the industrial tariffs; and so on.

Figures for inflation in the WPI are on the average much lower than those in the CPI indices. There could be two reasons for this difference in rates between WPI and CPI: firstly, prices of the items in the CPI basket might have risen more sharply than items excluded from it—this would mean that prices of mass consumption goods have risen more sharply than inputs for production; secondly, the retail prices of commodities might have grown more sharply than the wholesale prices, indicating that middlemen have taken a bigger share.

To capture movement in housing prices, the National Housing Bank launched an index called **RESIDEX** wherein 2007 is the base year and quarterly updates are available for 15 cities (Delhi, Faridabad, Bhopal, Lucknow, Jaipur, Mumbai, Pune Ahmedabad, Surat, Bengaluru, Chennai, Hyderabad, Kochi, Kolkata, and Patna).

GDP Deflator

GDP deflator measures the ratio of nominal (or current price) GDP to the real (or chain value) measure of GDP. It is a measure of the level of prices of all new, domestically produced, final goods and services in an economy. GDP stands for gross domestic product, the total value of all final goods and services produced within that economy during a specified period.

Phillip's curve

It is a historically proven fact that there is an inverse relationship between the rate of unemployment and the rate of inflation in an economy. While it has been observed that there is a stable short run trade-off between unemployment and inflation, this has not been observed in the long run.

Fiscal Policy and Government Budget

Functions of government in a mixed economy

Depending on the participation of private sector and public sector (government), an economy can be classified into market economy, planned economy, and mixed economy.

In a mixed economy, the role of the government is still important in the following contexts:

Certain goods called Public Goods (e.g. defence, administration, etc.) cannot be provided through private producers or service providers. The government is expected to provide these goods and this function of the government is called the **allocation function**.

In order to reduce inequality of income and wealth, to a certain extent the government levies taxes and incurs expenditure aimed at increasing the purchasing power of those who are relatively worse off. The objective behind such actions is to achieve a 'fair' redistribution of income and this function of the government is called the **distribution function**.

In an economy, the level of employment and prices depends on the aggregate demand. The aggregate demand in turn depends on factors, such as income and credit availability. In a given period, the level of expenditure may not be sufficient to utilize the labour-force available. In such situations policy measures are taken by the government to increase the aggregate demand in the economy. On the other hand, in situations where the aggregate demand far exceeds the aggregate supply of goods and services, policy measures are needed to restrict demand. Such policy measures are part of the **stabilization function** of the government.

Components of the government budget

Under Article 112 of the Constitution of India the government is required to present before the Parliament an Annual Financial Statement (budget) of receipts and expenditure in respect of a financial year. This budget must distinguish between expenditure on revenue account from other expenditures.

Accordingly, the Government Budget is classified as follows:

Revenue Budget				Capital Budget			
Revenue Receipts		Revenue Expenditure		Capital Receipts		Capital Expenditure	
Tax Revenue	Non-Tax Revenue	Plan Revenue Expenditure	Non-Plan Revenue Expenditure	Tax Revenue	Non-Tax Revenue	Plan Capital Expenditure	Non-Plan Capital Expenditure

Revenue Receipts are receipts of the government that cannot be reclaimed from the government. Tax Revenue consists of Direct Tax which falls directly on individuals and indirect taxes, the incidence of which can be shifted or transferred by the person on whom it is levied. Fair redistribution of income is sought to be achieved by progressive taxation in which higher the income, higher is the tax rate.

Revenue Expenditure is expenditure incurred for purposes other than the creation of physical or financial assets of the central government. It pertains to expenditure done for normal functioning of government departments and services, payment of interest on loans taken by the government and grants given to state governments. Budget documents classify total expenditure into **plan expenditure** and **non-plan expenditure**. According to this classification, **plan revenue expenditure** relates to Central Five-Year Plans and central assistance for state and union territory plans. Non-Plan Expenditure covers a vast range of general, economic, and social services of the government. The main items of non-plan expenditure are interest payments, defence services, subsidies, salaries, and pensions.

Capital Account is an account of assets and liabilities of the central government. It consists of Capital Receipts and Capital Expenditure.

Capital Receipts consists of all those receipts of the central government that create liability or reduce financial assets. Main items of capital receipts are loans raised by the government from the public, borrowing of the government from Reserve Bank of India and commercial banks, loans received from foreign governments and international organizations, recoveries of loans granted by central government, and proceeds of disinvestment.

Capital Expenditure includes expenditures of the government which results in creation of financial or physical assets or reduction in financial liabilities. This includes expenditure on acquisition of land, building, equipment and loans and advances by the central government to state and union territory governments, PSUs, and other parties. Capital expenditure is classified into **plan** and **non-plan expenditure** in plan documents.

Along with budget, three policy statements are required to be submitted as per the Fiscal Responsibility and Budgetary Management Act, 2003 (FRBMA).

The **Medium-Term Fiscal Policy Statement** sets a **three-year** rolling target for specific fiscal indicators and examines whether revenue expenditure can be financed through revenue receipts on a sustainable basis and how productively capital receipts are being utilized.

The **Fiscal Policy Strategy Statement** sets the priorities of the government in the fiscal area, examining current policies and justifying any deviation in important fiscal measures.

The **Macroeconomic Framework Statement** assesses the prospects of the economy with respect to GDP growth rate, fiscal balance of the central government, and external balance.

Measures of government deficit

When the government spends more than it receives by way of revenue it incurs a budget deficit. There are various measures of government deficit.

$$\text{Revenue Deficit} = \text{Revenue Expenditure} - \text{Revenue Receipts}$$

The Revenue Deficit includes only such transactions that affect the current income and expenditure of the government.

$$\text{Gross Fiscal Deficit} = \text{Total Expenditure} - (\text{Revenue Receipts} + \text{Non-debt creating Capital Receipts})$$

Through changes in its expenditure and taxes, the government attempts to increase output and income and seeks to stabilize the fluctuations in the economy. In the process, the government creates surplus budget (when receipts exceed expenditure) or deficit budget (when expenditure exceeds receipts).

Budgetary Deficits must be financed by either taxation borrowing or printing money. Governments mostly rely on borrowing, thus giving rise to government debt.

Tax Reforms

Excise duty

Manufacture of goods in India attracts Excise Duty under the Central Excise Act, 1944, and Central Excise Tariff Act, 1985. Most of the products attract excise duties at the rate of 16%. Some products also attract special excise duty and an additional duty of excise at the rate of 8% above the 16% excise duty; 2% education cess is also applicable on the aggregate of duties of excise.

Customs duty

The levy and the rate of customs duty in India are governed by the Customs Act, 1962, and Customs Tariff Act, 1975. Imported goods in India attract basic custom duty, additional custom duty and education cess.

Sales tax/VAT

Sales Tax is levied on the sale of movable goods. Most of the Indian states have replaced Sales Tax with a new Value Added Tax (VAT) from 1 April 2005. VAT is imposed on goods only and not services. Other indirect taxes such as excise duty, service tax, etc. are not replaced by VAT. VAT is implemented at the State level by State Governments. VAT is applied on each stage of sale with a mechanism of credit for the input VAT paid. There are four slabs of VAT:

1. 0% for essential commodities,
2. 1% on bullion and precious stones,
3. 4% on industrial inputs and capital goods and items of mass consumption, and
4. All other items at 12.5%

Petroleum products, tobacco, liquor, etc., attract higher VAT rates that vary from one state to another. A Central Sales Tax at the rate of 2% is also levied on interstate sales and would be eliminated gradually.

Service Tax is levied at the rate of 14% (plus 2% education cess) on certain identified taxable services provided in India by specified service providers. Service tax on taxable services rendered in India are exempted, if payment for such services is received in convertible foreign exchange in India and the same is not repatriated outside India.

Goods and services tax (GST)

GST is a multi-point, destination-based tax that will be levied on every value addition. In other words, it is an indirect tax levied on the supply of goods and services. GST Law has replaced many indirect tax laws that previously existed in India. Total burden of the tax is exclusively borne by the direct consumer. Exports are not subjected to GST.

The integration of goods and services taxation would give India a world class tax system and improve tax collections. It would end the long-standing distortions of differential treatment of the manufacturing and services sector. The introduction of GST has led to the abolition of taxes such as octroi, central sales tax, state level sales tax, etc., eliminate the cascading effects (tax on tax), making the prices of the Indian products competitive and benefiting the consumers.

GST is the largest indirect tax reform requiring the centre and the states to adjust their constitutional taxing powers. It has opened fiscal federal challenges. There is mutual surrender of powers to a uniform national taxation system where both gain but there are apprehensions of loss of fiscal autonomy by states and central dominance.

Since 1st July 2017 GST became applicable throughout the country. The GST council decided rate slabs at 5%, 12%, 18% and 28% on varied goods and services. The GST rates structure for certain goods and services are enumerated below:

GST rates structure

Tax Rates	Products or Goods	Services
0%	Milk	NIL
	Eggs	NIL
	Curd	NIL
	Lassi	NIL
	Unpacked Food grains	NIL

Tax Rates	Products or Goods	Services
	Unpacked Paneer	NIL
	Gur	NIL
	Unbranded Natural Honey	NIL
	Fresh Vegetables	NIL
	Salt	NIL
5%	Railway freight	Transport of goods in a vessel including services provided or agreed to be provided by a person located in non-taxable territory to a person located in non-taxable territory by way of transportation of goods by a vessel from a place outside India up to the customs station of clearance in India
	Pharma (Life saving drugs)	Transport of goods by rail and passengers by rail (other than sleeper class)
	Footwear up to Rs. 500	Services of Goods Transport Agency (GTA) in relation to transportation of goods (other than used household goods for personal use)
	Cotton	Renting of motor cab (If fuel cost is borne by the service recipient, then 18% GST will apply)
	Fabric	Selling of space for advertisement in print media
12%	Butter	Transport of goods in containers by rail by any person other than Indian Railways
	Ghee	Supply of food/drinks in restaurant not having facility of air-conditioning or central heating at any time during the year and not having licence to serve liquor.
	Ready-made garments	Renting of hotels, inns, guest houses, clubs, campsites or other commercial places meant for residential or lodging purposes having room tariff Rs.1000 and above but less than Rs.2500 per room per day
	Fruit Juice	Construction of a complex, building, civil structure or a part thereof, intended for sale to a buyer, wholly or partly. [The value of land is included in the amount charged from the service recipient] (12% with Full ITC but no refund of overflow of ITC)
	Packed Coconut Water	Temporary transfer or permitting the use or enjoyment of any Intellectual Property (IP) to attract the same rate as in respect of permanent transfer of IP
18%	Hair Oil	Renting of hotels, inns, guest houses, clubs, campsites or other commercial places meant for residential or lodging purposes where room tariff is Rs. 2500/- and above but less than Rs. 7500/- per room per day.
	Toothpaste	Supply of Food/drinks in air-conditioned restaurant in five star or above rated Hotel.
	Soap	Bundled service by way of supply of food or any other article of

Tax Rates	Products or Goods	Services
		human consumption or any drink, in a premises (including hotel, convention center, club, pandal, shamiana or any other place, specially arranged for organizing a function) together with renting of such premises
	Pasta	Supply of Food/drinks in outdoor catering
	Ice creams	Services by way of admission or access to circus, Indian classical dance including folk dance, theatrical performance, drama
	Soups	Composite supply of Works contracts as defined in clause 119 of section 2 of CGST Act
28%	Small cars (+1% or 5% cess)	Accommodation in hotels including five star and above rated hotels, inns, guest houses, clubs, campsites or other commercial places meant for residential or lodging purposes, where room rent is Rs. 5000/- and above per room per day.
	Consumer durables such as AC and fridge	Services by way of admission to entertainment events or access to amusement facilities including exhibition of cinematograph films, theme parks, water parks, joy rides, merry-go rounds, go-carting, casinos, race-course, ballet, any sporting event such as IPL and the like
	Cigarettes	Gambling

Public Sector Undertakings

Public Sector Undertakings (PSU) companies are divided into three categories:

1. Maharatna
2. Navratna
3. Miniratna CPSEs
 - (a) Category I
 - (b) Category II

1. Maharatna

The eligibility criteria laid down by the Government for grant of Maharatna, Navratna, and Miniratna status to Central Public Sector Enterprises (CPSEs) are the following:

Criteria for grant of Maharatna status

The CPSEs fulfilling the following criteria are eligible to be considered for grant of Maharatna status.

- (a) Having Navratna status.
- (b) Listed on Indian stock exchange with minimum prescribed public shareholding under SEBI regulations.
- (c) Average annual turnover of more than Rs. 25,000 crores during the last 3 years.
- (d) Average annual net worth of more than Rs. 15,000 crores during the last 3 years.
- (e) Average annual net profit after tax of more than Rs. 5,000 crores during the last 3 years.
- (f) Should have significant global presence/international operations.

List of Maharatna

- (a) Coal India Limited
- (b) Indian Oil Corporation Limited
- (c) National Thermal Power Corporation (NTPC) Limited
- (d) Oil and Natural Gas Corporation Limited (ONGC)
- (e) Steel Authority of India Limited (SAIL)
- (f) Bharat Heavy Electricals Limited (BHEL)
- (g) Gas Authority of India Ltd (GAIL)

2. Navratna

It is the title given originally to nine Public Sector Enterprises (PSEs) identified by the Government of India in 1997 as "public sector companies that have comparative advantages", giving them greater autonomy to compete in the global market so as to "support [them] in their drive to become global giants". The number of PSEs with Navratna status has been raised to 17, the most recent addition being Oil India Limited.

These Navratnas have the freedom to

- (a) incur capital expenditures
- (b) decide upon joint ventures
- (c) set up subsidiaries/offices abroad
- (d) enter into technological and strategic alliances
- (e) raise funds from capital market (international and domestic)
- (f) enjoy substantial operational and managerial autonomy
- (g) Boards of these PSEs have been broad based with induction of non-official part-time professional directors.

Criteria for grant of Navratna status

The Miniratna Category I and Schedule 'A' CPSEs, which have obtained 'excellent' or 'very good' rating under the Memorandum of Understanding system in three of the last five years, and have composite score of 60 or above in the six selected performance parameters, namely,

- (a) *Net profit to net worth,*
- (b) *Manpower cost to total cost of production/services,*
- (c) *Profit before depreciation, interest and taxes to capital employed,*
- (d) *Profit before interest and taxes to turnover,*
- (e) *Earning per share, and*
- (f) *Inter-sectoral performance.*

Criteria for grant of Miniratna category I status

The CPSEs which have made profits in the last three years continuously or earned a net profit of Rs. 30 crore or more in one of the three years are eligible to be considered for the grant of Miniratna Category I status.

Criteria for grant of Miniratna category II status

The CPSEs which have made profits in the last three years continuously and have positive net worth are eligible to be considered for the grant of Miniratna Category II status.

Monetary Policy and Markets

Monetary policy

It is the process by which the monetary authority/central bank (Reserve Bank of India) of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability.

Objectives: Accelerating growth of economy, price stability, exchange rate stabilization, balancing savings and investments, and generating employment.

Reserve bank of India (RBI)

RBI is the central banking institution of India and controls the monetary policy of the Indian rupee. The institution was established on 1 April 1935 during the British Raj in accordance with the provisions of the Reserve Bank of India Act, 1934 and was nationalized in the year 1949.

The main functions of RBI are

1. It has the sole right to issue bank notes of all denominations
2. It is the main monetary authority of the country and beside that the central bank acts as the bank of the national and state governments. It formulates, implements, and monitors the monetary policy as well as it has to ensure an adequate flow of credit to productive sectors. Objectives are maintaining price stability and ensuring adequate flow of credit to productive sectors.
3. It manages to achieve the goals of the Foreign Exchange Management Act, 1999, which is to facilitate external trade and payment and promote orderly development and maintenance of foreign exchange market in India.
4. It issues and exchanges or destroys currency and coins not fit for circulation. The objectives are providing adequate supply of good quality currency to the public and providing loans to commercial banks to maintain or improve the GDP.
5. It performs a wide range of promotional functions to support national objectives and industries.
6. It is also a banker to the government and performs merchant banking function for the central and the state governments, that is, it also acts as their banker. The National Housing Bank (NHB) was established in 1988 to promote private real estate acquisition. The institution maintains banking accounts of all scheduled banks as well.

Tools available with RBI to achieve the monetary policy

1. **Bank Rate:** RBI lends to the commercial banks through its discount window to help the banks meet depositor's demands and reserve requirements. The interest rate charged by the RBI to the banks for this purpose is known as bank rate.
2. **Cash Reserve Ratio (CRR):** Every commercial bank has to keep a certain minimum cash reserve with RBI. RBI can vary this rate between 3% and 15%. RBI uses this tool to increase or decrease the reserve requirement depending on whether it wants to affect a decrease or an increase in the money supply.
3. **Statutory Liquidity Ratio (SLR):** Banks are required to maintain liquid assets in the form of gold, cash, and approved securities. A higher liquidity ratio diverts the bank funds from loans and advances to investment in government and approved securities.

4. **Repo Rate:** When banks have any shortage of funds, they can borrow it from RBI or other banks. The rate at which the RBI lends money to commercial banks is called repo rate, a short term for repurchase agreement.
5. **Reverse Repo Rate:** When RBI borrows from the market with the sale of securities and repurchases them the next day or after a few days, the rate at which it borrows is known as reverse repo rate. RBI uses repo and reverse repo techniques to increase or decrease the liquidity in the market.
6. **Base Rate:** The Reserve Bank of India Committee on reviewing the benchmark prime lending rate (BPLR) recommended that the BPLR nomenclature be scrapped and a new benchmark rate — known as Base Rate — should replace it. Base Rate is much more transparent, and banks are not allowed to lend below the base rate (except for cases specified by RBI). Base Rate is to be reviewed by the respective banks at least on quarterly basis and the same is to be disclosed publicly. On the other hand, the calculations of BPLR were mostly not transparent and banks were frequently lending below the BPLR to their prime borrowers and also under pressure due to various reasons.
7. **Selective Credit Control (SCC):** This can be imposed for meeting various goals like discouraging hoarding and black marketing of certain essential commodities by traders, etc., by giving them less credit. Under SCC, the quantum of credit does not change, but the amount lent, and the cost of credit may be changed for specific sector or sectors.
8. **Open market operations:** Central banks use open market operations—buying and selling of eligible securities by central bank in the money market—to influence the volume of cash reserves with commercial banks and thus, influence the volume of loans and advances they can make to the commercial and industrial sectors. In the open money market, government securities are traded at market-related rates of interest.

Stock markets

Stock market or equity market is a public entity (a loose network of economic transactions, not a physical facility or discrete entity) for the trading of company stock (shares) and derivatives at an agreed price; these are securities listed on a stock exchange as well as those only traded privately.

Primary market is that part of the capital markets that deals with the issuance of new securities. Companies, governments or public sector institutions can obtain funding through the sale of a new stock or bond issue. This is typically done through a syndicate of securities dealers. The process of selling new issues to investors is known as underwriting. In the case of a new stock issue, this sale is an initial public offering (IPO).

Secondary market, also known as aftermarket, is the financial market in which previously issued financial instruments such as stock, bonds, options, and futures are bought and sold.

National stock exchange

The National Stock Exchange (NSE) is one of the largest and most advanced stock exchanges in India. It was established on the recommendation of Pherwani Committee by IDBI on the authorization of the Government of India.

The main objectives of NSE are as following:

1. Establishing a nation-wide trading facility for equities, debt instruments, and hybrids,
2. Ensuring equal access to investors all over the country through an appropriate communication network,
 - (a) providing a fair, efficient, and transparent securities market to investors using electronic trading systems,
 - (b) enabling shorter settlement cycles and book entry settlements systems, and
 - (c) meeting the current international standards of securities markets

NIFTY

NIFTY is the leading index for large companies on the National Stock Exchange of India. The Nifty is a well-diversified 50 stock index accounting for 23 sectors of the economy. It is used for a variety of purposes such as benchmarking fund portfolios, index-based derivatives and index funds. Nifty is owned and managed by India Index Services and Products Ltd. (IISL), which is a joint venture between NSE and CRISIL. IISL is India's first specialized company focused upon the index as a core product. IISL has a marketing and licensing agreement with Standard and Poor's.

BSE

BSE It is the first ever stock exchange in Asia (established in 1875) and the first in the country to be granted permanent recognition under the Securities Contract Regulation Act, 1956, BSE Limited has had an interesting rise to prominence over the past 133 years. In 2002, the name "The Stock Exchange, Mumbai" was changed to Bombay Stock Exchange. Subsequently on August 19, 2005, the exchange turned into a corporate entity from an Association of Persons (AoP) and renamed as Bombay Stock Exchange Limited. BSE Limited, which had introduced securities trading in India, replaced its open outcry system of trading in 1995, with the totally automated trading through the BSE Online Trading (BOLT) system. The BOLT network was expanded nationwide in 1997.

SENSEX

SENSEX, also referred to as BSE 30 is a free-float market capitalization-weighted stock market index of 30 well-established and financially sound companies listed on Bombay Stock Exchange. The 30 component companies which are some of the largest and most actively traded stocks are representative of various industrial sectors of the Indian economy. Published since January 1, 1986, the SENSEX is regarded as the pulse of the domestic stock markets in India.

Securities and exchange board of India

Securities and Exchange Board of India (SEBI) is the regulator for the securities market in India. It was formed officially by the Government of India in 1992 with SEBI Act, 1992, being passed by the Parliament of India.

It has three functions rolled into one body: quasi-legislative, quasi-judicial, and quasi-executive. It drafts regulations in its legislative capacity, conducts investigation and enforcement action in its executive function, and passes rulings and orders in its judicial capacity. Though this makes it very powerful, there is an appeal process to create accountability. There is a Securities Appellate Tribunal which is a three-member tribunal. A second appeal lies directly to the Supreme Court.

Forward markets commission

Headquartered at Mumbai, it is a regulatory authority which is overseen by the **Ministry of Consumer Affairs, Food and Public Distribution, Government of India**. It is a statutory body set up in 1953 under the Forward Contracts (Regulation) Act, 1952.

International stock markets

1. **BBC Global 30:** World stock market index of 30 of the largest companies by stock market value in Europe, Asia, and the US.
2. **iShares MSCI EAFE Index (EFA):** Provides investment results generally equivalent to publicly traded securities in the European, Australian, and Far Eastern markets and is maintained by Morgan Stanley Capital International.
3. **MSCI World:** This is a free-float weighted equity index which includes stocks of all the developed markets. It is the common benchmark for world stock funds.

4. **S&P Global 1200:** Global stocks index covering 31 countries and around 70% of global market capitalization.
5. **Dow Jones Indexes:** Leading global index provider.
6. **NASDAQ:** Broad market index of all the common stocks and similar securities traded on the NASDAQ stock market.
7. **NYSE:** Covers all common stocks listed on the New York Stock Exchange.
8. **S&P 500:** Stock market index containing the stocks of 500 Large Cap corporations. It comprises over 70% of the total market cap of all stocks traded in the US, owned by Standard and Poor's.
9. **Hang Seng Index:** Represent about 67% of capitalization of the Hong Kong Stock Exchange
10. **Nikkei 225:** Stock market index for the Tokyo Stock Exchange.
11. **FTSE Bursa:** Malaysia Index
12. **KSE 100:** Index acting as a benchmark to compare prices on the Karachi Stock Exchange, Pakistan.
13. **MICEX Index:** Russia
14. **FTSE 100 Index:** UK

Banking and Other Financial Institutions

Public Sector Banks: They are owned by the government-either in totality or as a majority stakeholder.

Private Sector Banks: These include domestic and foreign banks.

Development Banks: National or regional financial institutions designed to provide medium and long-term capital for productive investment. Such investment is usually accompanied by technical assistance. The examples include IDBI, ICICI, (merged with ICICI Bank in 2000), SIDBI, NABARD, EXIM, and NHB.

Nationalization of banks

Despite the provisions, control, and regulations of Reserve Bank of India, banks in India, except the State Bank of India or SBI, continued to be owned and operated by individual. By the 1960s, the Indian banking industry had become an important tool to facilitate the development of the Indian economy. At the same time, it had emerged as a large employer, and a debate had ensued about the nationalization of the banking industry. The stated reason for the nationalization was to give the government more control of credit delivery. In 1969 and again in 1980, the government nationalized the private commercial banking units.

Commercial Banks: Today, banks are broadly classified into two types – Scheduled and Non-scheduled banks.

Scheduled Banks are those banks which are included in the Second Schedule of the Reserve Bank Act, 1934, and satisfy two condition, therein:

1. Paid-up capital and reserves of an aggregate value of not less than Rs. 5 lakhs.
2. It must satisfy RBI that its affairs are not conducted in a manner detrimental to the depositors.

These banks enjoy certain privileges like approaching RBI for financial assistance, refinance, etc., and correspondingly, they have certain obligations like maintaining certain cash reserves as prescribed by RBI.

There are only 3 Non-scheduled Banks in India.

Co-operative Banks: It is retail and commercial banking organized on a cooperative basis. Cooperative banking institutions take deposits and lend money. An important constituent of the Indian financial system, the co-operative banks are the primary financiers of agricultural activities, some small-scale industries, and self-

employed workers. The Anyonya Co-operative Bank in India is considered to have been the first cooperative bank in Asia.

Non-Banking Financial Company: A Non-Banking Financial Company (NBFC) is a company registered under the Companies Act, 1956, of India, engaged in the business of loans and advances, acquisition of shares, stock, bond sure-purchase, insurance business, or chit business but does not include any institution whose principal business includes agriculture or industrial activity; or the sale, purchase or construction of immovable property. They perform functions similar to that of banks; however, there are a few differences in that an NBFC cannot accept demand deposits; an NBFC is not a part of the payment and settlement system and as such, an NBFC cannot issue cheques drawn on itself; and deposit insurance facility of the Deposit Insurance and Credit Guarantee Corporation is not available for NBFC depositors, unlike banks.

Microfinance institutions: Microfinance institutions, also known as MFIs, offer financial services to underprivileged and impoverished communities. An Increasing number of microfinance institutions (MFIs) are seeking non-banking finance company (NBFC) status from RBI to get wide access to funding, including bank finance.

Unit linked insurance plan

Unit Linked Insurance Plan (ULIP) is a type of life insurance where the cash value of a policy varies according to the current net asset value of the underlying investment assets. It allows protection and flexibility in investment, which are not present in other types of life insurance such as whole life policies. The premium paid is used to purchase units in investment assets chosen by the policyholder. In India, investments in ULIP are covered under Section 80C of IT Act. However, the concept of having an investment is governed by the Insurance Regulatory and Development Authority (IRDA).

Open economy

Most modern economies are open. Interaction with other economies of the world widens choice in three broad ways:

1. Consumers and firms have the opportunity to choose between domestic and foreign goods. This is the product market linkage which occurs through international trade.
2. Investors have the opportunity to choose between domestic and foreign assets. This constitutes the financial market linkage.
3. Firms can choose where to locate production and workers to choose where to work. This is the factor market linkage. Labour-market linkages have been relatively less due to various restrictions on the movement of people through immigration laws. Movement of goods has traditionally been seen as a substitute for the movement of labour.

An open economy is one that trades with other nations in goods and services and, most often, also in financial assets.

Balance of payments

The Balance of Payments (BoP) records the transactions in goods, services, and assets among residents of a country with the rest of the world for a specified time period typically a year. There are two main accounts in the BoP – the current account and the capital account.

The current account records exports and imports in goods and services and transfers payments. When exports exceed imports, there is a trade surplus and when imports exceed exports there is a trade deficit.

Trade in services is denoted as invisible trade (because they are not seen to cross national borders) and this includes both factor income (net income from compensation of employees and net investment income, the latter equals, the interest, profits, and dividends on our assets abroad minus the income foreigners earn on

assets they own in India) and net non-factor income (shipping, banking, insurance, tourism, software services, etc.). Transfer payments are receipts which the residents of a country receive 'for free', without having to make any present or future payments in return. They consist of remittances, gifts, and grants. They could be official or private. The balance of exports and imports of goods is referred to as the trade balance.

Adding trade in services and net transfers to the trade balance, we get the current account balance. BoP comprises of the following:

- (i) Current Account
- (ii) Capital Account
- (iii) Changes in Foreign Exchange Reserves, and
- (iv) Errors and Omissions

Under Current Account, transactions are classified into merchandise (exports and imports) and invisibles. Invisible transactions include:

- (i) Services – travel, transportation, insurance, and miscellaneous (communication, construction, software, etc.)
- (ii) Income, and
- (iii) Transfers (grants, gifts, remittances, etc.) which do not have any element of quid-pro-quo

Under Capital Account, capital inflows can be classified by instrument (debt or equity) and maturity (short-term or long-term). Main components of capital account include foreign investment, loans (external assistance, external commercial borrowings, and trade credit) and banking capital (including non-resident Indian deposits). Foreign Investment comprises of Foreign Direct Investment (FDI) that refers to net inflows to acquire a lasting managing interest in an enterprise operating in an economy other than that of investor and is used as a measure of foreign ownership of productive assets and Foreign Portfolio Investment (FPI) that refers to foreign investment in stocks and bond markets. FDI is usually a long-term and stable investment in an economy that accompanies transfer of technical know-how. On the other hand, FPI has been observed to be very volatile.

Foreign Exchange Reserves (FER) can be an outcome of current account surplus or capital inflows in excess of an economy's absorptive capacity. India falls in the latter category. FER in India has accumulated on account of

- (i) absorption of excess foreign exchange inflows by the Reserve Bank of India through intervention in foreign exchange market;
- (ii) aid receipts;
- (iii) interest receipts; and
- (iv) funding from institutions such as the International Bank for Reconstruction and Development (IBRD), Asian Development Bank (ADB), and International Development Association (IDA).

FER are maintained in major currencies, such as US Dollar, Euro, Pound Sterling, Australian Dollar, and Japanese Yen but denominated and expressed in US Dollar.

New initiations for financial inclusion

1. **White Label ATM:** ATMs which are owned and operated by non-bank entities, but they are not doing 'outstanding-contract' from a particular bank. Money is provided by sponsor bank, but ATMs does not have logo of any particular bank. White label companies have to take permission or license from the RBI, and they have to open few ATMs in Tier 3 to Tier 6 cities as per guidelines.

2. **Payment Banks:** These are new stripped down type of banks, which are expected to reach customers mainly through their mobile phones rather than traditional bank branches. Their target guideline will be small businessman, poor people in particular.

Features of payment banks

1. They can't offer loans but can raise deposits upto Rs. 1 lakh and pay interest on their balances just like a saving bank amount does.
2. They can enable transfers and remittances through mobile phones.
3. They can issue debit cards and ATM cards usable on ATM networks of all banks.
4. They can offer forex services.

GENERAL SCIENCE

Physics

Units and measurement

Anything, which can be expressed in numerical value, is known as the quantity, for example, age, weight, time, etc. Every quantity has two distinct values, namely, units and magnitude. Unit expresses the real sense of independent physical characteristics of the quantity whereas magnitude represents the numerical value of the particular unit. For example, if a person's weight is 50 kg; here, kilogram is the unit of the weight and 50 is the magnitude.

Scalar Quantities: Those physical quantities, which can be expressed and calculated without the prior concern of direction are known as Scalar Quantities, implying that these have only magnitude and not direction. Examples are time, distance, mass, and pressure.

Vector Quantities: Those physical quantities which have both the direction and magnitude are known as Vector Quantities. These can be expressed and calculated with the help of both direction and magnitude. These cannot be simply added or subtracted; they follow the Law of Triangle or Law of Parallelograms. Examples are displacement, velocity, force, etc.

Fundamental Quantities: Such quantities which can be expressed independently and have distinct units are known as Fundamental Quantities, such as length of a pencil, time interval between two different events, etc. It is our common sense that time cannot be expressed in terms of metre, litre, or kg. It means that the measurement in difference between two different and distinct events is totally independent and different than the measurement of the length or weight of any body. Likewise, there are seven fundamental qualities, which are independent of each other and cannot interconvert. They are called as Fundamental Units. And they are the extended form of the MKS system and were accepted in the International Conference of Weights and Measures held in Geneva in 1960. According to the International System of Units (abbreviated SI from French: *Système international d'unités*) these are as follows:

S. No.	Physical Quantity	SI Unit	Symbol
1.	Length (L)	Meter	m
2.	Mass (M)	Kilogram	kg
3.	Time (t)	Second	s
4.	Temperature (T)	Kelvin	K
5.	Electric Current (I)	Ampere	A

S. No.	Physical Quantity	SI Unit	Symbol
6.	Luminous Intensity (I_v)	Candela	cd
7.	Amount of substance (n)	Mole	mol 1 mole = Avagadro's number = 6.023×10^{23}

Systems of units

1. Centimeter, Gram and Second (CGS) system or metric system or French system

Length – centimeter (cm), Mass – gram (gm), Time – second (s)

2. Foot, Pound, Second (FPS) System

Length – Foot (F), Mass – Pound (P), Time – second (s)

3. Meter, Kilogram, Second (MKS) system

Length – meter (m), Mass – kilogram (kg), Time – second (s)

4. Supplementary Units: There are two supplementary units – radian (rad) for plane angle and steradian (sr) for solid angle.

5. Derived Units: Certain units which can be expressed in the terms of fundamental units only are known as derived units. For instance: Dyne/Newton for force and joule/erg for work. Some important derived units are listed as follows:

Physical Quantity	SI Units
Area	m^2
Volume	M^3
Density	$Kg\cdot m^{-3}$
Velocity	ms^{-1}
Force	$Kg\ ms^{-1}$ or Newton

Physical Quantity	SI Units
Momentum	$Kg\cdot ms^{-1}$
Pressure	Nm^{-2} or Pascal
Work or Energy	N-m or Joule
Magnetic Intensity	Field Tesla or weber- m^{-1}

Newton's laws of motion

Sir Isaac Newton is considered as the Father of physics. He discovered the laws of motion in his famous book Principia.

Newton's first law of motion or law of inertia or law of Galileo

According to this law, "Everybody tends to maintain its state of rest or state of motion, in other words, the body continues in its state of rest or uniform motion in a straight line unless disturbed by an external force, or everybody maintains its initial state of rest or motion with uniform speed on a straight line unless an external force acts on it".

Some examples of inertia:

When a moving body suddenly stops, the passengers boarding on it bend forward and vice-versa.

When any cloth, carpet or blanket is beaten by a stick, the dust particles are removed.

Momentum: Momentum is the property of a moving body and is defined as the product of mass of the body and the velocity of the body, that is,

$$p = m \times v$$

Momentum is a vector quantity and its unit is kg-m/s

Newton’s second law of motion

The acceleration of a body is parallel and directly proportional to the net force F and inversely proportional to the mass m, that is, $F = ma$. In other words, it can also be defined as the rate of change in the momentum of a body is directly proportional to the applied force on the body and takes place in the direction of the force. In fact, this law gives the magnitude of the force. Moreover, the first law is contained in the second law.

Newton’s third law of motion

The mutual forces of action and reaction between two bodies are equal, opposite, and collinear or to every action there is an equal and opposite reaction. In daily life it is experienced that the force never acts independently, it always acts in pairs as a result of the action between the two bodies. The examples are movement of foot on the ground, swimming, recoil of a gun, etc.

Work, Energy, and Power

Work

If a body gets displaced when a force acts on it, work is said to be done. In a very general sense, mechanical work is the amount of energy transferred by force acting through a distance in the direction of the force. Like energy, it is a scalar quantity, with SI unit of joules.

Energy

Energy is capacity to do work; in other words, the capacity of doing work by a body is called its energy. It is an indirectly observed quantity. In the International System of Units (SI), energy is measured in joules.

Power

In very general and wide terms, power is the rate at which energy is transferred, used, or transformed. For example, the rate at which a light bulb transforms electrical energy into heat and light is measured in watts—the more wattage, the more power, or equivalently the more electrical energy is used per unit time.

In the case of constant power P, the amount of work performed during a period of duration T is given by:

$$W = P \times T$$

Transformation of energy

Equipments/Instruments (from)	Transformation of Energy (to)
Solar Cell (solar energy)	Electrical energy
Dynamo (Mechanical energy)	Electrical energy
Electric Motor (Electrical energy)	Mechanical energy
Microphone (sound energy)	Electrical energy
Loudspeaker (Electrical energy)	Sound energy
Musical Instruments (mechanical energy)	Sound energy
Bulb/Tube light (Electrical energy)	Light and heat energy

Equipments/Instruments (from)	Transformation of Energy (to)
Heater (Electrical energy)	Thermal energy
Candle (chemical energy)	Light and thermal energy
Coal/fossil fuels e.g. petroleum, etc. (chemical energy)	Thermal energy
Electric cell (chemical energy)	Electrical energy
Heat Engines (thermal energy)	Mechanical energy
Battery/dry cell (chemical energy)	Electrical energy

Pressure

Pressure (P) is the force per unit area applied in a direction perpendicular to the surface of an object. Gauge pressure is the pressure relative to the local atmospheric or ambient pressure. Pressure is defined as the force acting normally (perpendicular) to the surface on per unit area. Pressure at times is called as the thrust.

$$\text{Pressure} = \frac{F}{A}$$

where F = Force perpendicular to the surface, A = Area of the surface

The SI unit of pressure is the N/m² or also known as the Pascal (pa). Pressure is a scalar quantity.

Principle of floatation and Archimedes' principle

Buoyant Force: When a body is partially or wholly immersed in a liquid, a force acts on the body by the liquid in the upward direction. This is known as buoyancy and the force is known as the buoyant force or the up thrust. This force is equal to the weight of the displaced liquid by the body and acts at the centre of the displaced liquid. Thus, buoyancy is a force exerted by a fluid that opposes an object's weight. In a column of fluid, pressure increases with depth as a result of the weight of the overlying fluid. Thus, a column of fluid, or an object submerged in the fluid, experiences greater pressure at the bottom of the column than at the top.

Archimedes principle: It states that when a body is immersed partially or wholly in a liquid there is an apparent loss in the weight of the body which is equal to the weight of the liquid displaced by the body. The weight of the displaced fluid is directly proportional to the volume of the displaced fluid (if the surrounding fluid is of uniform density). In simple terms, the principle states that the buoyant force on an object is going to be equal to the weight of the fluid displaced by the object, or the density of the fluid multiplied by the submerged volume times the gravitational constant, g. Thus, among completely submerged objects with equal masses, objects with greater volume have greater buoyancy.

Density and relative density

Density is known as the mass per unit volume. That is,

$$\text{Density}(\rho) = \frac{\text{Mass}}{\text{Volume}}$$

Unit = kg/m³ or g/cm³

Surface tension

As all liquids have no definite shape but a definite volume, they acquire a free surface when poured in a container. These surfaces possess some additional energy. This phenomenon is known as surface tension and it is concerned with only liquid as gases do not have free surfaces. Surface tension is a force per unit length (or surface energy per unit area) acting in the plane of the interface between the plane of the liquid and any other substance.

Light and optics

Light or visible light is the portion of electromagnetic radiation that is visible to the human eye and is responsible for the sense of sight. Visible light has a wavelength in a range from about 380 or 400 nanometres to about 760 or 780 nm, with a frequency range of about 405 THz to 790 THz.

Speed of light

Romer first determined the speed of light with the help of motion of satellites of the planet, Jupiter. The speed of light in a vacuum is defined to be exactly 299,792,458 m/s.

The Refractive Index of any medium can be calculated as follows:

$$\text{Refractive Index } (\mu) = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in the medium}}$$

The speed of light in different mediums can be shown as follows:

Vacuum > Water > Oil of Turpentine > Glass > Rock salt = Nylon

Reflection

Laws of Reflection: There are two laws of reflection.

- (i) Incident ray, normal ray, and the reflected ray are all in the same plane.
- (ii) Angle of incidence = angle of reflection

The ability of a lens to converge or diverge light rays depends on its focal length.

Electromagnetic spectrum

Generally, EM radiation (the designation 'radiation' excludes static electric and magnetic and near fields) is classified by wavelength into radio, microwave, infrared, the visible region we perceive as light, ultraviolet, X-rays, and gamma rays. The behaviour of EM radiation depends on its wavelength. Higher frequencies have shorter wavelengths and lower frequencies have longer wavelengths. When EM radiation interacts with single atoms and molecules, its behaviour depends on the amount of energy it carries per quantum.

Human eye

There are two kinds of cells in human eye:

- (i) Cones, which are sensitive to bright light, and
- (ii) Rods, which are sensitive to dim light. Besides, cones sense colour. At the junction of the optic nerve and the retina, there are no sensory cells, so no vision is possible at that spot. This is known as the blind spot.

Chemistry

Chemistry is the science of matter, especially its chemical reactions, composition of matter, its structure, and properties. Chemistry is concerned with atoms and their interactions with other atoms, and particularly with the properties of chemical bonds. It is the science of matter and the changes it undergoes. In comparison to physics, which takes a more general and fundamental approach, chemistry is more specialized, being concerned with the composition, behaviour (or reaction), structure, and properties of matter, as well as the changes it undergoes during chemical reaction.

Matter, element, atom, and molecule

Matter

Matter is any substance which occupies space, and by virtue of inertia possesses some mass. On the basis of physical composition, matter can be divided into solid, liquid, and gas. On the basis of chemical composition, matter can be divided into the following groups – element, compound, and mixture. However, before we understand element, we need to understand the concept of atom.

Element

The concept of chemical element is related to that of a chemical substance. A chemical element is specifically a substance composed of a single type of atom. A chemical element is characterized by a particular number of protons in the nuclei of its atoms. This number is known as the atomic number of the element. For example, all atoms with 6 protons in their nuclei are atoms of the chemical element carbon, and all atoms with 92 protons in their nuclei are atoms of the element uranium.

Atom

The basic elementary structural unit of this universe is atom. An atom is the basic unit of any element. It is the smallest possible particle in any type substance, which does not exist in the free state but definitely takes part in the chemical reactions and in turn possesses all the basic characteristics of the particular substance. It consists of a positively charged core (the atomic nucleus) which contains protons and neutrons, and which maintains a number of electrons to balance the positive charge in the nucleus. The atom is also the smallest entity that can be envisaged to retain some of the chemical properties of the element, such as electronegativity, ionization potential, preferred oxidation state(s), coordination number, and preferred types of bonds to form (e.g., metallic, ionic, covalent).

Molecule

A molecule is the smallest indivisible portion of a pure chemical substance that has its unique set of chemical properties, that is, its potential to undergo a certain set of chemical reactions with other substances. Molecules can exist as electrically neutral units unlike ions. Molecules are typically a set of atoms bound together by covalent bonds, such that the structure is electrically neutral, and all valence electrons are paired with other electrons either in bonds or in lone pairs.

Compound

A compound is a substance with a particular ratio of atoms of particular chemical elements, which determines its composition, and a particular organization, which determines chemical properties. For example, water is a compound containing hydrogen and oxygen in the ratio of two to one, with the oxygen atom between the two hydrogen atoms, and an angle of 104.5° between them. Compounds are formed and inter converted by chemical reactions.

Mixture

A mixture is an impure form of substance which is composed of more than two pure substances (elements). It is important to note that all the components of a mixture are associated with each other only by physical means and not by the chemical means which in turn can be separated easily.

Separation of mixtures

The components of the mixtures are separated by the following practices:

Crystallization: This process is used in the separation of the components present in the inorganic solids, and they are purified as well.

Distillation: By this process, mainly the mixtures of the liquids which have a substantial gap among the boiling points of the mixture are separated. The component mixtures get vaporized and transported to another container or pot where they get condensed and hence have different boiling points at which they are cooled and stored.

There are certain solids which are converted directly into vapour state rather than being converted into liquid first, and on cooling transform directly into solids. This process is known as sublimation and these substances are known to sublime. Thus, by this process, the mixture of two substances are separated of which one

substance is a sublimate, for e.g. substances like naphthalene, ammonium chloride, camphor, antharsin, benzoic acid, etc.

Fractional Distillation: This method is useful in the separation of those liquids, which have very narrow range of the boiling point gap, or in other words nearly same boiling points. Crude oil from the earth's crust, which contains petrol, diesel, kerosene oil, etc., can be separated by this method. Moreover, this process separates the various gases from the air.

Chromatography: This process is applied for the mixtures, which have differential absorptive capacity. Thus, the absorption is made at different distances and ultimately gets separated. It has different techniques e.g. paper chromatography, column chromatography, ion chromatography, etc.

Steam Distillation: Steam distillation is a special type of distillation (a separation process) for temperature sensitive materials like natural aromatic compounds and organic substances like Acetone, Acetaldehyde, Methyl alcohol etc.

Substance

A chemical substance is a kind of matter with a definite composition and set of properties. Strictly speaking, a mixture of compounds, elements or compounds and elements is not a chemical substance, but it may be called a chemical. Most of the substances encountered in daily life are some kind of mixture, for example: air, alloys, biomass, etc.

Mole and amount of substance

Mole is a unit to measure amount of substance (also called chemical amount). A mole is the amount of a substance that contains as many elementary entities (atoms, molecules or ions) as there are atoms in 0.012 kilogram (or 12 grams) of carbon-12, where the carbon-12 atoms are unbound, at rest and in their ground state.

The number of entities per mole is known as the Avogadro constant, and is determined empirically. The currently accepted value is $6.02214179(30) \times 10^{23} \text{ mol}^{-1}$ (2007 CODATA).

Acid, base and salt

The most commonly used natural indicator is litmus. When added to an acidic solution, it turns red and when added to a basic solution, it turns blue. Common examples of acids include acetic acid (in vinegar), sulfuric acid (used in car batteries), and tartaric acid (used in baking).

Indicator	Change of Colour
Blue litmus paper	Turns red
Methyl orange	Orange to pink
Phenolphthalein	Remains colourless

Acids

See the sources of different acids in the following table:

Acids	Sources
Citric Acid	Lemons and oranges
Lactic Acid	Sour milk, in the process of fermentation during normal metabolism and exercise
Butyric Acid	Rancid Butter
Acetic Acid	Vinegar
Maleic Acid	Apples
Carbonic Acid	Aerated drinks and soda water
Stearic Acid	Fats
Oxalic Acid	Tomato, wood sorrel
Formic Acid	Red ants, in the sting of the ants
Citric Acid (Vitamin C)	Amla fruits (richest source of Vitamin C)

Bases

A base is a substance that can accept hydrogen ions or more generally, donate electron pairs. A soluble base is referred to as an alkali if it contains and releases hydroxide ions (OH^-) quantitatively.

Use of bases

Base	Uses
Calcium hydroxide (traditionally called as slaked lime) hydrated lime, builders lime, slack lime, cal, or pickling lime $[\text{Ca}(\text{OH})_2]$	Sewage treatment, house-washing, in manufacturing of concrete and plaster, production of bleaching powder, softening water, removing hair from the outer layer of the leather, to neutralize the acidity of soil and to neutralize the effect of venom of bees (formic acid).
Sodium hydroxide or Caustic Soda (NaOH)	As a strong chemical base in the manufacture of pulp and paper, textiles, drinking water, soaps and detergents drugs, and as a drain cleaner.
Potassium Hydroxide or Caustic potash (KOH)	In the manufacturing of biodiesel by esterification of the free fatty acids in vegetable oil. Glycerin from potassium hydroxide-processed biodiesel is useful as an inexpensive food supplement for livestock, once the toxic methanol is removed. Aqueous potassium hydroxide is employed as the electrolyte in alkaline batteries based on nickel-cadmium and manganese dioxide-zinc. Potassium hydroxide is preferred over sodium hydroxide because its solutions are more conductive.
Calcium Oxide or Quick lime/burnt lime or CaO	When quicklime is heated to 2400°C , it emits an intense glow. This form of illumination is known as a limelight or calcium light and was used broadly in theatrical productions prior to the invention of electric lighting, in the production of bleaching powder.

Base	Uses
Magnesium hydroxide or milk of magnesia [Mg(OH) ₂]	Magnesium hydroxide is a common component of antacids and laxatives; it interferes with the absorption of folic acid and iron, use in the form of antidote due to acidic poisoning, in sugar industries.
Magnesium oxide or Magnesia (MgO)	MgO is one of the raw materials for making Portland cement in dry process plants, Pressed MgO is used as an optical material.

pH value

Generally, pH stands for “power of hydrogen”, though it is not defined properly, it can be also understood as the “percentage of hydrogen”. pH is a measure of the acidity or basicity of an aqueous solution. Pure water is said to be neutral, with a pH close to 7.0 at 25 °C. Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline.

Salts

Salt is essential for animal life in small quantities but is harmful to animals and plants in excess.

Metals and non-metals

As a general definition, the elements which provide cations and hence lose electrons are known as metals, for e.g. iron, sodium, magnesium, aluminium, silver, gold, etc. It is important to note that metals like copper, gold, and silver are in human use since the very proto-historic era. In the present day, there are 90 metals.

Physical properties of metals

1. Metals are malleable implying that a number of thin foils can be drawn by hammering, for e.g. gold and silver are the two most malleable metals.
2. Metals have the property of ductility, that is, they can be drawn into the thin wires, for e.g. the most ductile metal is silver.
3. Metals also possess lustre properties as a result of the presence of free electrons.
4. Almost all the metals are good conductors of heat and electricity, which is also due to the availability of free electrons; copper and silver are the two best conductors, but lead is the least.

Chemical properties of metals

1. Metals generally react with non-metals like oxygen, hydrogen, chlorine, sulphur, and form their respective compounds. The oxides of metals are basic in nature.
2. Metals are easily reactive with the acids and bases.
3. The more reactive metals (e.g. sodium and calcium) react with cold water while others react with hot water and steam.

Non-metals and their compounds

Elements which do not exhibit the property of metals are known as non-metals for e.g. hydrogen, nitrogen, carbon, sulphur, etc. Presently, 22 non-metals are placed in the modern periodic table out of which 11 are gases, 1 is liquid, and 10 are solids. Bromine is only non-metal which occurs as liquid at the standard condition of temperature and pressure at room temperature.

On the basis of the presence of the different salts, water may be of the following types:

1. **Hard water:** This type of water contains impurities of calcium and magnesium, is not suitable for drinking purposes, and does not produce lather with washing soap.
2. **Soft water:** It is the normal water which is suitable for drinking and washing purposes.

Water

Water is a chemical substance with the chemical formula H_2O . Water covers 70.9% of the Earth's surface and is vital for all known forms of life. On the Earth, 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapour, clouds (formed of solid and liquid water particles suspended in air), and precipitation. Only 2.5% of the Earth's water is fresh water and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products.

Hardness of water

- 1. Permanent Hardness:** Hardness is due to the chloride and sulphate of calcium and magnesium salts, which can be removed by mixing sodium carbonate.
- 2. Temporary Hardness:** It is due to the presence of bicarbonates of calcium and magnesium salts which can be removed by boiling the water.

Estimated world water supply

Source	Percentage of Total Available Water
Oceans	97.33%
Saline lakes and inland seas	0.008%
Polar ice and glaciers	2.04%
Ground water	0.61%
Lakes	0.009%
Soil moisture	0.005%
Atmospheric water vapour	0.001%
Rivers	0.0001%

Carbon and its compounds

Carbon is the basic building block of all living things on this Earth. It is such an important element of the living world that the scientists have evolved a totally new branch under the name of 'Organic Chemistry'. Carbon is the chemical element with symbol C and atomic number 6. As a member of group 14 on the periodic table, it is non-metallic and tetravalent – making four electrons available to form covalent chemical bonds. There are three naturally occurring isotopes, with ^{12}C and ^{13}C being stable, while ^{14}C is radioactive, decaying with a half-life of about 5,730 years. Carbon is one of the few elements known since antiquity.

Carbon is found in the following two states:

- 1. Free state:** As graphite, diamond, and coke
- 2. Compound state:** As hydrocarbon, bicarbonate, carbonate, CO_2 , etc.

There are three naturally occurring isotopes, with ^{12}C and ^{13}C being stable, while ^{14}C is radioactive, decaying with a half-life of about 5,730 years. There are several allotropes of carbon of which the best known are graphite, diamond, and amorphous carbon. The physical properties of carbon vary widely with the allotropic form.

Allotropes

Atomic carbon is a very short-lived species and, therefore, carbon is stabilized in various multi-atomic structures with different molecular configurations called allotropes. The three relatively well-known allotropes of carbon are amorphous carbon, graphite, and diamond.

Some important carbon compounds

Terpenes are released by trees, more actively during warmer weather, acting as a natural form of cloud seeding. The clouds reflect sunlight, allowing the forest to regulate its temperature.

Soaps: Chemically, soap is a salt of a fatty acid. Soaps are mainly used as surfactants for washing, bathing, and cleaning, but they are also used in textile spinning and are important components of lubricants. Soaps for cleansing are obtained by treating vegetable or animal oils and fats with a strongly alkaline solution. Fats and oils are composed of triglycerides: three molecules of fatty acids attached to a single molecule of glycerol.

Metallic soaps are also useful, including those of aluminium, sodium, and their mixtures. Such soaps are also used as thickeners to increase the viscosity of oils. In ancient times, lubricating greases were made by the addition of lime to olive oil.

Detergents: It is a surfactant or a mixture of surfactants with "cleaning properties in dilute solutions". Generally, "detergent" refers to alkyl benzene sulfonates, a family of compounds that are similar to soap but are less affected by hard water. In most household contexts, the term "detergent" by itself refers specifically to laundry detergent or dish detergent, as opposed to hand soap or other types of cleaning agents. Detergents are commonly available as powders or concentrated solutions.

Waxes: It is an ester, which is generally present in the form of oil and fat. Waxes are insoluble in water but soluble in organic, nonpolar solvents. All waxes are organic compounds, both synthetic and naturally occurring.

Paraffin: Although most natural waxes are esters, paraffin waxes are hydrocarbons, mixtures of alkanes, usually in a homologous series of chain lengths. These materials represent a significant fraction of petroleum.

Candles: Waxes and hard fats such as tallow have been used to make candles, for lighting and decoration in a number of religious traditions, including Christianity and Hinduism, as well as various neo-pagan religions such as Wicca.

Plastics: A plastic material is any of a wide range of synthetic or semi-synthetic organic solids that are moldable. Plastics are typically organic polymers of high molecular mass, but they often contain other substances. They are usually synthetic, most commonly derived from petrochemicals, but many are partially natural.

There are two types of plastics: thermoplastics and thermosetting polymers.

Thermoplastics are the plastics that do not undergo chemical change in their composition when heated and can be molded again and again. Examples include polyethylene, polypropylene, polystyrene, polyvinyl chloride, and polytetrafluoroethylene (PTFE). These chains are made up of many repeating molecular units, known as repeat units, derived from monomers; each polymer chain will have several thousand repeating units.

Thermosets can melt and take shape once they have solidified. In the thermosetting process, a chemical reaction occurs that is irreversible. The vulcanization of rubber is a thermosetting process. Before heating with sulfur, the polyisoprene is a tacky, slightly runny material, but after vulcanization the product is rigid and non-tacky.

Biodegradable plastic: Biodegradable plastics break down (degrade) upon exposure to sunlight (e.g., ultraviolet radiation), water or dampness, bacteria, enzymes, wind abrasion, and in some instances rodent pest or insect attack are also included as forms of biodegradation or environmental degradation. Some modes of degradation require that the plastic be exposed at the surface, whereas other modes will only be effective if certain conditions exist in landfill or composting systems.

Bioplastic: Most plastics are produced from petrochemicals. Motivated by the finiteness of petrochemical reserves and possibility of global warming, bioplastics are being developed. Bioplastics are made substantially from renewable plant materials, such as cellulose and starch.

Rubber: Natural rubber, also known as India rubber, is an elastomer (an elastic hydrocarbon polymer) that was originally derived from latex, a milky colloid produced by some plants. The purified form of natural rubber is chemical polyisoprene, which can also be produced synthetically. Latex is a natural polymer of isoprene (most often cis-1,4-polyisoprene) – with a molecular weight of 100,000 to 1,000,000. Polyisoprene is also created synthetically, producing what is sometimes referred to as "synthetic natural rubber". Some natural rubber sources called gutta-percha are composed of trans-1,4-polyisoprene, a structural isomer.

Explosives: An explosive material, also called an explosive, is a reactive substance that contains a great amount of potential energy that can produce an explosion if released suddenly, usually accompanied by the production of light, heat, sound, and pressure. An explosive charge is a measured quantity of explosive material.

1. **Nitroglycerin:** A highly unstable and sensitive liquid.
2. **Acetone peroxide:** Extremely unstable white organic peroxide.
3. **TNT:** Yellow insensitive crystals that can be melted and cast without detonation.
4. **Nitrocellulose:** A nitrated polymer which can be a high or low explosive depending on nitration level and conditions.
5. **RDX, PETN, HMX:** Extremely powerful explosives which can be used in pure or plastic explosives.
6. **C-4 (or Composition C-4):** An RDX plastic explosive plasticized to be adhesive and malleable.

Some important chemicals and their applications

Compound	Composition	Chemical Formula	Uses
Baking powder	Sodium Bicarbonate	NaHCO_3	
Baking soda	Sodium Bicarbonate	NaHCO_3	Fire Extinguishers, Baking applications
Bleaching powder	Calcium hypochlorite	CaOCl_2	Water treatment and as a bleaching agent.
Caustic soda	Sodium Hydroxide	NaOH	Production of many useful organic chemicals, paints, glass and ceramics and in fuel cells
Chalk (Marble)	Calcium Carbonate	CaCO_3	
Chloroform	Tri-Choloro Methane	CHCl_3	Solvent, reagent, anaesthetic
Dry Ice	Solid carbon dioxide	CO_2	Cooling agent, preservation
Green Vitriol	Ferrous sulphate	$\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$	
Gypsum		$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	Added to Cement to increase its setting time

Compound	Composition	Chemical Formula	Uses
Laughing gas	Nitrous oxide	N_2O	used in surgery and dentistry for anaesthetic and analgesic effects
Lime	Calcium oxide	CaO	Basic lining in furnaces
Limestone	Calcium carbonate	$CaCO_3$	$(CaCO_3) \gg CaO + CO_2$
Mohr's Salt	Ammonium Ferrous Sulphate	$FeSO_4(NH_4)_2SO_4 \cdot 6H_2O$	In analytical chemistry, used for titration purposes
Plaster of Paris		$(CaSO_4) \cdot 2H_2O$	Fractured bones. Fine proofing
Potash Alum	Potassium Aluminium Sulphate	$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$	used in water purification, leather tanning, dyeing, fireproof textiles
Potash Ash	Potassium carbonate	K_2CO_3	fertilizers
Quick Lime	Calcium oxide	CaO	remove silica from blast furnace and remove acidic gases from power station chimney.
RDX		$C_3H_6N_6O_6$	Explosive
Rock Salt	Sodium chloride	$NaCl$	Food uses
Silica		SiO_2	Exists in sand, Flint, Quartz, Opal
Sodium Thiosulphate	(hypo)	$Na_2S_2O_3$	Used in photography
Vinegar	Acetic Acid	CH_3COOH	Food, preservation
Washing soda	Sodium Carbonate	$Na_2CO_3 \cdot 10H_2O$	Softening hard water

Life Science

Introduction

The branch of natural science under which living beings or organisms and their activities like morphology (structure), anatomy (internal structure), classification, reproduction, etc., are studied in a more comprehensive, lucid, and distinct way is called Life Science/Biology. It studies the differences which distinguishes the living beings from the non-living beings. Aristotle separated this branch of study of living beings as Biology from natural science and hence, he is considered as the Father of Biology.

The most accepted nomenclature was followed by R. H. Whittaker. According to his five-kingdom system, all organisms were classified into five kingdoms:

1. **Monera** includes bacteria and blue green algae.
2. **Protista** includes unicellular organisms, e.g., amoeba.
3. **Plantae** includes all green-coloured plants which perform photosynthesis.

4. **Fungi** includes non-green coloured plants which do not perform photosynthesis and thus derive their nutrition from dead and decaying organisms (known as saprophytes or parasites), e.g. mushroom.
5. **Animalia** includes all such animals which are mainly multicellular, well-developed and diversified creatures, for e.g., all true animals, including frog, fish, reptiles, birds, and mammals.

Binary names of some common living beings according to the 'Binary System' are

Organisms	Scientific Name
Man	Homo sapiens
Cat	Felis domestica
Dog	Canis familiaris
Cow	Bos indicus
Frog	Rana tigrina
Tiger	Panthera tigris
Lion	Panthera leo
Elephant	Elephas
Gangetic Dolphin	Platanista

Organisms	Scientific Name
Pea Cock	Pavocristatus
House Fly	Musca domestica
Mango	Mangifera indica
Wheat	Triticum aestivum
Pea	Pisum sativum
Rice	Oryza sativa
Mustard	Brassica campestris
Lotus	Nelumbo nucifera

Virus

A virus is a small infectious agent that can replicate only inside the living cells of organisms. Most viruses are too small to be seen directly with a light microscope. Viruses infect all types of organisms, from animals and plants to bacteria. Since Dmitri Ivanovsky's 1892 article describing a non-bacterial pathogen infecting tobacco plants and the discovery of the tobacco mosaic virus by Martinus Beijerinck in 1898, about 5,000 viruses have been described in detail, although there are millions of different types. Viruses are found in almost every ecosystem on Earth and are the most abundant type of biological entity. The study of viruses is known as virology.

Cells

The basic building block of the living world is cell. It is a basic structural and functional unit of any living organism. The study of the cell is known as cytology. On the basis of the number of the cells, organisms are classified as follows:

1. Unicellular, for e.g., amoeba, paramecium, euglena, etc.
2. Multicellular, for e.g., All higher living beings.

Types of cells

- (a) **Prokaryotic cell:** The prokaryotes are a group of organisms that lack a true cell nucleus, or any other membrane-bound organelles. Most prokaryotes are unicellular, for e. g., bacteria and blue green algae, but a few such as myxobacteria have multicellular stages in their life cycles.
- (b) **Eukaryotic cell:** The organisms that have a cell nucleus are called eukaryotes. A eukaryote is an organism whose cells contain complex structures enclosed within membranes. The defining membrane-bound structure that sets eukaryotic cells apart from prokaryotic cells is the nucleus, or nuclear envelope, within which the genetic material is carried. The presence of a nucleus gives eukaryotes their name. Most eukaryotic cells also contain other membrane-bound organelles such as

mitochondria, chloroplasts, and the Golgi apparatus. All species of large complex organisms are eukaryotes, including animals, plants, and fungi.

Usually, the human body has 100,000 billion cells. If any organism is large in size (e.g. elephant and whale), it does not mean that the cells of their body are also very large, but the truth is that the number of cells is unlimited or uncountable.

The living matter inside the cell is known as the protoplasm and in fact protoplasm is the wonder colloid liquid, which exhibits all the characteristics of life. Purkinje has called protoplasm as “the physical basis of life”. All the living and non-living material inside a cell is collectively referred to as the cytoplasm and the material inside the nucleus is called as the nucleoplasm. Thus, it can be stated that –

Cytoplasm = Non-living matter + living matter (protoplasm) inside the cell - nucleoplasm

Bacteria

These are most simplified living organisms which contain cell wall and their cell is prokaryotic type insofar as they lack true nucleus and other cell organelles. Antony Van Leeuwenhoek discovered bacteria and that is why he is called as the Father of Bacteriology. Later, on the basis of different experiments, Louis Pasteur proposed the **Germ Theory of Disease**. Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structure, that is, the outermost glycocalyx followed by the cell wall and then the plasma membrane. Although each layer of the envelope performs a distinct function, they act together as a single protective unit.

Bacteria can be classified into two groups on the basis of the differences in the cell envelopes and the manner in which they respond to the staining procedure developed by Gram viz., those that take up the gram stain are Gram positive and the others that do not are called Gram negative bacteria.

Fungi: The study of the fungi is known as Mycology; they are non-chlorophyllous, nucleated, and mainly saprophytic. A fungus is a member of a large group of eukaryotic organisms that includes microorganisms, such as yeasts and moulds, as well as the more familiar mushrooms. These organisms are classified as a Kingdom. Fungi are separate from plants, animals, and bacteria. One major difference is that fungal cells have cell walls that contain chitin, unlike the cell walls of plants, which contain cellulose.

Useful fungi: Yeasts, used in the making of foods and drinks such as bread and beer, are fungi. Several important medicines come from fungi; the antibiotic penicillin is produced by a sac fungus *Penicillium notatum* is a common bluish-green mould. A number of industrial processes depend on certain species of fungus. Some water fungi are important in the natural decomposition of sewage.

Lichens: Lichens are composite organisms consisting of a symbiotic association of a fungus (the mycobiont) with a photosynthetic partner (the photobiont or phycobiont), usually either a green alga. The morphology, physiology, and biochemistry of lichens are very different from those of the isolated fungus and alga in culture. The fungi facilitate water, minerals, vitamins, etc., to the algae and the algae facilitate in the preparation of the food. Lichens occur in some of the most extreme environments on Earth—arctic tundra, hot deserts, rocky coasts, and toxic slag heaps. They are most commonly found on the trees. However, they are also abundant as epiphytes on leaves and branches in rain forests and temperate woodland, on bare rock, including walls and gravestones, and on exposed soil surfaces (e.g., *Collema*).

Lichens are widespread and may be long-lived; however, many are also vulnerable to environmental disturbance, and may be useful to scientists in assessing the effects of air pollution, ozone depletion, and metal contamination. Lichens have also been used in making dyes and perfumes, as well as in traditional medicines.

Algae: Algae are primarily aquatic plants, dwelling in oceans, seas, rivers, ponds, lakes, etc. Algae are a large and diverse group of simple, typically autotrophic organisms, ranging from unicellular to multicellular forms, such as the giant kelps that grow to 65 m in length. They are photosynthetic like plants and “simple because their tissues are not organized into the many distinct organs found in land plants. The largest and most complex marine forms are called seaweeds. Algae lack the various structures that characterize land plants, such as phyllids (leaves) and rhizoids in nonvascular plants, or leaves, roots, and other organs that are found in higher plants.

Algal bloom: An algal bloom is a rapid increase or accumulation in the population of algae in an aquatic system. Algal blooms may occur in freshwater as well as marine environments. Harmful algal blooms (HABs) are identified as algal bloom events involving toxic or otherwise harmful phytoplankton or diatoms. Such blooms often take on a red or brown hue and are known as red tides.

Bryophytes: These are called as the amphibious plants as they are found on the land and also in the water. Most common example is the mosses. They produce neither flowers nor seeds, thus, they reproduce via spores. Mosses are small and soft though some species are much larger.

Pteridophytes: Under this category are placed those plants which are almost higher in evolution and developed in nature, they have well-developed transportation tissues (vascular tissues e.g. xylem for water distribution and phloem for food).

Gymnosperm: Gymnosperm (gymno means “naked”, sperm means “seed”) are a group of seed-bearing plants that includes conifers, cycads, and Ginkgo. The term "gymnosperm" comes from the Greek word “gymnospermos”, meaning "naked seeds", after the unenclosed condition of their seeds (called ovules in their unfertilized state). By far, the largest group of living gymnosperms is the conifers (pines, etc.), followed by cycads (e.g. cycus), and Ginkgo (a single living species). These plants are mostly perennial and xerophytes. These are flowerless plants and hence, no fruit formation takes place. Ginkgo is known as the living fossil.

Angiosperm: These are the groups of plants which are most developed. These are the flowering plants, which bear flowers and seeds within fruits. They can be divided into two main groups as following:

- (i) **Monocotyledonous:** Its seed contain a single cotyledon. Examples: grasses, bamboo, sugarcane, maize, cereals, bananas, palms, lily, orchids and so on.
- (ii) **Dicotyledonous:** The seeds have double cotyledons. Examples: nearly all the hardwood trees, pulses, fruits, vegetables, spices and so on.

Important facts about morphology of the flowering plants

1. Carrot, radish, beet root, turnip, sweet potato, and dahlia have modified roots to store the food. Rhizophora (the mangroves) have the respiratory roots called pneumatophores to avail respiration in the salt soil.
2. Potato is a stem and is known as tuber.
3. Ginger and Turmeric are stems and they are known as rhizomes.
4. Onion, Garlic, Tulips, and Lilies have a stem in the form of bulb.
5. Gladiolus, Crocus, and Saffron have corm type of stem.
6. Saffron obtained from the crocus plant is the product of dried stigma of the flowers.
7. Mint oil or mentha is obtained from the leaves of the plant.
8. Cork is made from a chemical substance suberin which is obtained from Quercussuber plant.

Important Facts

1. *Gambusia* (mosquito fish) and *Poecilia* (Guppy fish) are common fishes which feed on the larvae of mosquito, hence it can be introduced as the bio control for Malaria.
2. Devonian Period is the Golden Age of fishes.
3. The study of fishes is known as Ichthyology.
4. Cultivation of fishes is known as Pisciculture.
5. *Scoliodon* is the Indian shark or dogfish. Its skin is used as abrasive (shagreen).
6. *Rhincodon* is largest living shark or also known as the whale shark.
7. *Torpedo* is the electric ray. Electric organ is modified branchial muscle that gives an electric shock of 50–60 volts.
8. *Latimarea* is the oldest living fish.
9. The scales of *Lepisosteus* are used in making jewellery.
10. Rohu or *Labeo* is used to control pest.
11. *Catla* is the largest Indian carp.
12. *Exocoetus* is the flying fish.
13. *Hippocampus* is the sea horse.
14. The eggs of the *Salmo* or Atlantic salmon are very costly and are used as the caviar.
15. Largest fish is the whale shark (18 m, 40 tonnes).
16. Stone fish is most poisonous.
17. Isin glass is a gelatinous material obtained from the air bladder of some fishes.
18. *Anabus* can live outside water for several days.

Animal tissue

The group of cells, which are common in origin, structure, and function, are called as the tissue. In human beings and higher animals, there are four types of tissues:

1. **Epithelium tissue:** It is the superficial tissue found on the upper layer of skin and the internal organs. Epithelial tissues line the cavities and surfaces of structures throughout the body, and also form many glands. The functions of epithelial cells include secretion, selective absorption, protection, transcellular transport, and detection of sensation. The upper layer of the human skin is mostly composed of dead layer of epithelial tissue.
2. **Connective tissue:** It imparts the basic structural framework to the body and supports the different types of organs. It also plays an important role in body defence, storage, and transportation. Some common and important active tissues are as follows:
 - (a) **Adipose tissue:** These tissues synthesise and store the fat. It makes the body thermally insulated and acts as a cushion to absorb the shock.
 - (b) **Tendons:** It connects muscles to bones.
 - (c) **Ligament:** It connects bones to bones.

- (d) **Bone:** It is basically solid, hard, and powerful, connective tissue in whose matrix the salts of calcium and phosphorus are deposited. It provides a definite shape to the higher animals and supports the body frame.
- (e) **Cartilage:** This is semi solid and elastic connective tissue, found in the peak of the human nose, ear pinna, etc.
- (f) **Blood:** This is basically a fluid connective tissue. Generally, blood is red, dense, and salty in taste (pH is more than 7 means it is slightly basic in nature). The quantity of blood in a healthy person is almost 35 litres or 7%–10% of the body weight.
3. **Muscular tissue:** These tissues are made of muscle fibres and are mainly attached to the skeletons. The contraction and relaxation of these muscles provide the movement and locomotion activities. Their different types are described as follows:
- (a) **Smooth or unstriated or involuntary muscles:** These muscles contract and relax involuntary as there is no self-control of these muscles. Such tissues are found in the internal organs such as walls of stomach, intestine, ureter, etc.
- (b) **Striped or skeletal or voluntary muscles:** They have a large number of nuclei and are attached to the skeletons. They are under the self-control mechanism and hence are called as the voluntary muscles.
- (c) **Cardiac or heart muscles:** These muscles are only found in the walls of the heart and are involuntary in nature. These muscles contract and relax the heart and hence, help in blood circulation.
4. **Nervous tissue:** These tissues primarily function in the regulation and coordination of the body. Organs, such as brain, spinal cord, nerves, etc., are made from such type of tissues, which transmits the impulses, and receives responses, according to which the individual takes action and survives. The tissue is composed of the neuron and neuroglia cells.

Different types of nutrients and their functions

On the basis of intake, use, chemical composition, and calorific value, nutrients are classified as carbohydrates, proteins, fats, minerals, vitamins, and water.

1. **Carbohydrates:** A carbohydrate is an organic compound that consists of carbon, hydrogen, and oxygen, with hydrogen: oxygen atom ratio of 2:1 (as in water). Carbohydrates can be viewed as hydrates of carbon, hence their name.

Monosaccharides are the simplest carbohydrates. Monosaccharides are classified according to three different characteristics: the placement of its carbonyl group, the number of carbon atoms it contains, and its chiral handedness.

Oligosaccharides and polysaccharides – Oligosaccharides (between three and ten monosaccharide) and polysaccharides (than ten monosaccharide units) are composed of longer chains of monosaccharide units. The distinction between the two is based upon the number of monosaccharide units present in the chain.

2. **Proteins:** Proteins are biochemical compounds consisting of one or more polypeptides typically folded into a globular or fibrous form, facilitating a biological function. The sequence of amino acids in a protein is defined by the sequence of a gene, which is encoded in the genetic code. Many proteins are enzymes that catalyze biochemical reactions and are vital to metabolism.

Proteins are important in cell signaling, immune responses, cell adhesion, and the cell cycle. Proteins are also necessary in animals' diet, since animals cannot synthesize all the amino acids they need and must obtain essential amino acids from food. Through the process of digestion, animals break down ingested protein into free amino acids that are then used in metabolism.

3. **Fats:** Generally fat means lipid, like the carbohydrates these are also the organic compounds of the carbon, hydrogen, and oxygen but unlike carbohydrates, the ratio between hydrogen and oxygen is never 1:2. Fats may be either solid or liquid at room temperature, depending on their structure and composition. Although the words "oils", "fats", and "lipids" are all used to refer to fats, "oils" is usually used to refer to fats that are liquids at normal room temperature, while "fats" is usually used to refer to fats that are solids at normal room temperature.

"Lipids" is used to refer to both liquid and solid fats, along with other related substances. The word "oil" is also used for any substance that does not mix with water and has a greasy feel, such as petroleum (or crude oil), heating oil, and essential oils, regardless of its chemical structure.

Examples of edible animal fats are lard, fish oil, and butter or ghee. They are obtained from fats in the milk and meat, as well as from under the skin of an animal.

Examples of edible plant fats include peanut, soya bean, sunflower, sesame, coconut, olive, and vegetable oils. Margarine and vegetable shortening, which can be derived from the above oils, are used mainly for baking.

These examples of fats can be categorized into saturated fats and unsaturated fats.

Saturated fat consists of triglycerides containing only saturated fatty acids. Saturated fatty acids have no double bonds between the individual carbon atoms of the fatty acid chain. That is, the chain of carbon atoms is fully "saturated" with hydrogen atoms. Examples of foods containing a high proportion of saturated fat include animal fats such as cream, cheese, butter, and ghee; suet, tallow, lard, and fatty meats; as well as certain vegetable products, such as coconut oil, cottonseed oil, palm kernel oil, chocolate, and many prepared foods.

An **unsaturated fat** is a fat or fatty acid in which there is at least one double bond within the fatty acid chain. In cellular metabolism, unsaturated fat molecules contain somewhat less energy, that is, fewer calories than an equivalent amount of saturated fat.

4. **Minerals** required in physiology or the Dietary Minerals: These are known as mineral nutrients and are the chemical elements required by living organisms, other than the four elements carbon, hydrogen, nitrogen, and oxygen, present in common organic molecules. Examples of mineral elements include calcium, magnesium, potassium, sodium, zinc, and iodine.

Bacteria play an essential role in the weathering of primary minerals that result in the release of nutrients for their own nutrition and for the nutrition of others in the ecological food chain. Plants absorb dissolved minerals in soils, which are subsequently picked up by the herbivores that eat them and so on, the minerals move up the food chain.

Important minerals and their uses

Dietary element	Sources	Deficiency Disease	Excess Disease
Calcium	Dairy products, eggs, canned fish with bones (salmon, sardines), green leafy vegetables, nuts, seeds, tofu, thyme, oregano, dill, cinnamon.	Hypocalcaemia	Hypercalcaemia
Chlorine	Table salt	Hypochloremia	Hyperchloremia
Iodine	Sea vegetables, iodized salt, and eggs. Alternate but inconsistent sources of iodine: strawberries, mozzarella cheese, yogurt, milk, fish, and shellfish.	Iodine deficiency	Iodism

Dietary element	Sources	Deficiency Disease	Excess Disease
Iron	Dietary sources include red meat, leafy green vegetables, fish (tuna, salmon), eggs, dried fruits, beans, whole grains, and enriched grains. Grains, dry beans, eggs, spinach, chard, turmeric, cumin, parsley, lentils, tofu, asparagus, salad greens, soybeans, shrimp, beans, tomatoes, olives	Anemia	Iron overload disorder
Magnesium	Raw nuts, soybeans, cocoa mass, spinach, chard, sea vegetables, tomatoes, halibut, beans, ginger, cumin, cloves.	Hypomagnesaemia, magnesium deficiency	Hypermagnesemia
Sodium	Table salt (sodium chloride, the main source), sea vegetables, milk, and spinach.	Hyponatremia	Hypernatremia

5. **Vitamins:** This chemical substance is not important as the source of energy, but it directly controls and regulates the metabolic activities of the human body. The human body cannot directly synthesize the vitamins and hence, it is necessary to intake the proper amount of the required vitamins for proper and smooth functioning of metabolism and life processes.

For example, ascorbic acid (Vitamin C) is a vitamin for humans, but not for most other animals, and biotin and Vitamin D are required in the human diet only in certain circumstances.

List of vitamins

General Name of Vitamin	Deficiency Disease	Overdose Disease
Vitamin A	Night-blindness, Hyperkeratosis, and Keratomalacia	Hypervitaminosis A
Vitamin B1	Beriberi, Wernicke-Korsakoff syndrome	Drowsiness or muscle relaxation
Vitamin B2	Ariboflaviniosis	
Vitamin B3	Pellagra	Liver damage (doses > 2g/days) and other problems
Vitamin B5	Paresthesia	Diarrhea; possibly nausea and heartburn
Vitamin B6	Anemia peripheral neuropathy	Impairment of proprioception, nerve damage (doses > 100 mg/day)
Vitamin B7	Dermatitis, enteritis	
Vitamin B9	Megaloblast and deficiency during pregnancy is associated with birth defects, such as neural tube defects	May mask symptoms of Vitamin B12 deficiency; other effects.
Vitamin B12	Megaloblastic anemia	Acne-like rash
Vitamin C	Scurvy	Vitamin C megadosage
Vitamin D	Rickets and Osteomalacia	Hypervitaminosis D

General Name of Vitamin	Deficiency Disease	Overdose Disease
Vitamin E	Deficiency is very rare; mild hemolytic anemia in newborn infants	Increased congestive heart failure seen in one large randomized study
Vitamin K	Bleeding diathesis	Increases coagulation in patients taking warfarin

6. **Water:** Almost 90% to 94% of the human body is water. Total amount of water in a man of average weight (70 kg) is approximately 40 litres, averaging 57% of his total body weight. In diseased states where body water is affected, the compartment or compartments that have changed can give clues to the nature of the problem. Body water is regulated by hormones. The main function of water is to maintain the body temperature of the human beings by perspiration and by vaporization. Besides, it acts as an important medium of excretion.

BUSINESS GK

List of Some of the Best Brand Slogans

Brand	Slogan
Amul	The Taste of India
Thums Up	Taste the Thunder
Surf	Daag Acche Hain
Tata Safari	Reclaim Your Life
Asian Paints	Har Ghar Kuchch Kahta Hai
Air Deccan	Simplify
Frooti	Fresh N Juicy
Coca Cola	Thanda Matlab Coca Cola
Raymond's	The Complete Man
Dairy Milk	Swad Zindagi Ka
Bingo	No Confusion, Great Combination
Boost	Boost is the Secret of our Energy
Polo	The Mint with a Hole
Lifebuoy	Lifebuoy Hai Jahan, Tandrusti Hai Wahan
Ceat	Born Tough
MRF	Tyres with Muscle
Idea	An Idea can Change your life
Maggi	Taste Bhi, Health Bhi
Dermicool	Thanda Thanda Cool Cool

Brand	Slogan
Harpic	Ready for Harpic Challenge?
Airtel	Express Yourself
Fevicol	Fevicol ka Mazboot Jod Hai Tootega Nahin!
Hero	Desh ki Dhadkan
Indian Army	Do you have it in you?
Malaya Manorama	Nobody Delivers Kerala Better
Tata Sky	Isko Laga Dala to Life Zingalala
LIC	Zindagi ke Saath Bhi, Zindagi ke Baad Bhi
Nike	Just do it
Wills	Made for Each Other
Lux	Beauty Bar of Film Stars
Chlormint	Dobara Mat Poochna
Tata Salt	Desh ka Namak
Big Bazar	Isse Sasta Aur Accha Kahin Nahin
The Economic Times	Journalism of Courage
Videocon	The Indian Multinational
Mentos	Dimag Ki Batti Kala De

Brand	Slogan
Kit Kat	Have a Break, Have a Kit Kat
Taj Mahal	Wah Taj!
Telegraph	The Unputdownable
ICICI	Hum Hain Na
Sprite	Bujhaye Pyaas, Baaki all Bakwas!
Alpenlibe	Jee Lalchaye, Raha Na Jaye
Lay's	No One Can Eat Just One
HDFC Std Life	Jiyo Sar Uttha Ke
Apple	Think Different
L'Oréal	Because You're Worth It
MasterCard	There are some things money can't buy. For everything else, there's MasterCard.
BMW	The Ultimate Driving Machine
Tesco	Every Little Helps
De Beers	A Diamond is Forever
Audi	Vorsprung Durch Technik (Advancement Through Technology)
Dunkin' Donuts	America Runs on Dunkin
McDonald's	I'm Lovin' It
The New York Times	All the News That's Fit to Print
General Electric	Imagination at Work
Verizon	Can You Hear Me Now? Good.
EBAY	The World's Online Market Place
AMAZON.COM	Earth's Biggest Book Store
TIMESJOBS.COM	If you have a reason, we have the job
HP-Invent	Everything is Possible
Accenture	High Performance. Delivered
IBM	On Demand

Brand	Slogan
LENOVO	We are building a new technology company.
Infosys	Powered by Intellect, Driven by Values
WIPRO	Applying Thought
Adobe	Simplicity at Work. Better by Adobe
Macromedia	What the Web can be
FORD	Built for the Road Ahead
GM	Only GM
TOYOTA	Touch the Perfection
HYUNDAI	Drive Your Way
HONDA	The Power of Dreams
SKODA	Obsessed with Quality since 1897
VOLKSWAGEN	Drivers wanted
FIAT	Driven by Passion. FIAT
TATA MOTORS	Even More Car per Car
IBM	I think, therefore IBM
Dell	Easy as DELL
Intel	Intel inside
LEE	The Jeans that built America
Sun Microsystems	The Network is the Computer
Ernst and Young	Quality in Everything we Do
Barclays	Fluent in Finance; It's our business to know your business
Standard Chartered Bank	Your Right Partner
CNBC	Profit from it
AT&T	The World's Networking Company
Monster.com	Never Settle
Lufthansa	There's no Better to Fly
British airways	The Way to Fly
Air Canada	A Breath of Fresh Air

Brand	Slogan
Sahara	Emotionally Yours
Malaysian Airlines	Going Beyond Expectations
Lenovo	For those who Do
Chevron Corporation	Human Energy
Reliance industries Limited	Growth is Life
British Petroleum	Beyond Petroleum
ONGC	Making Tomorrow Brighter
IOCL	Bringing Energy to Life
BPCL	Pure for Sure
IBP	Pure bhi. Poorabhi
GAIL	Gas and Beyond
Kinley	Boond Boond Mein Vishwas
NDTV Profit	News You can Use
Toyota Innova	All You Desire
Star Sports	We know Your Game
BIOCON	The difference lies in our DNA
CIPLA	Caring for Life
REDDY'S LABORATORIES	Life. Research. Hope.
Bombay Stock Exchange	The Edge is Efficiency
NYSE (New York Stock Exchange)	The World puts its Stock in us
NASDAQ	Stock Market for the Digital

Brand	Slogan
	World
Singapore Stock Exchange, SGX	Tomorrow Markets Today
Metropolitan Life Insurance Metlife	Have You Met Life Today
Allianz Group	The Power on Your Side
Prudential Insurance	Growing and Protecting Your Wealth
AIG or American International Group	We Know Money
Max NewYork Life Insurance	Your Partner for Life
Standard Insurance Company Limited	Positively Different
Bank of Baroda	India's International Bank
Union Bank of India	Good People to Bank With
Bank of America	Higher Standards
UBS	You and Us
CITIGROUP or CITIBANK	The Citi Never Sleeps
HSBC	The World's Local Bank
Deutsche Bank	A Passion to Perform
ABN AMRO Bank	Making More Possible
Pepsi	Yehi Hain Right Choice Baby
Rasna	I Love You Rasna

MISCELLANEOUS

Books and Authors

Book Name	Author
A bend in the River	V S Naipaul
A Bride for the Sahib and the other Stories	Khushwant Singh
A Brush with Life	Satish Gujral
A Foreign Policy for India	I K Gujral
A House for Mr. Biswas	V S Naipaul
A Million Mutinies Now	V S Naipaul
A Passage to England	Nirad C Chaudhuri
A Prisoner's Scrapbook	L K Advani
A River Sutra	Gita Mehta
A Sense of Time	H S Vatsyayan
A Strange and Subline Address	Amit Chaudhuri
A Suitable Boy	Vikram Seth
A Village by the S	Anita Desai
A Voice for Freedom	Nayantara Sahgal
Aansoo	Jayashankar Prasad
Afternoon Raag	Amit Chaudhuri
Ageless Body, Timeless Mind	Deepak Chopra
Agni Veena	Kazi Nazrul Islam
Ain-i-Akbari	Abul Fazal
Amarakosh	Amarasimha
An Autobiography	Jawaharlal Nehru
An Equal Music	Vikram Seth
An Idealist View of Life	Dr. S Radhakrishnan

Book Name	Author
Amrit Aur Vish	Amritlal Nagar
Anamika	Suryakant Tripathi Nirala
Anandmath	Bankim Chandra Chatterjee
An Area of Darkness	V S Naipaul
Arthashastra	Kautilya
A Secular Agenda	Arun Shourie
Ashtadhyayi	Panini
A Strange and Sublime Address	Amit Chaudhuri
Autobiography of an Unknown India	Nirad C Choudhuri
Bandicoot Run	Manohar Malgonkar
Between the Lines	Kuldip Nayar
Beyond Modernisation, Beyond Self	Sisirkumar Ghose
Bhagvad Gita	Ved Vyas
Bharat Bharati	Maithili Sharan Gupt
Bharat Durdasha	Bharatendu Harishchandra
Border and Boundaries: Women in India's Partition	Ritu Menon and Kamla Bhasin
Breaking the Silence	Anees Jung
Buddha Carita	Asvaghosa
By God's Decree	Kapil Dev
Chandalika	Rabindranath Tagore
Chandrakanta Santati	Devkinandan Khatri

Book Name	Author
Chemmen: Thakazhi	Sivasankara Pillai
Chitra	Rabindranath Tagore
Chitralkha	Bhagwati Charan Verma
Chitrangada	Rabindranath Tagore
Clear Light of Day	Anita Desai
Confession of a Lover	Mulk Raj Anand
Confrontation with Pakistan	B M Kaul
Conquest of Self	Mahatma Ghandhi
Coolie	Mulk Raj Anand
Culture in the Vanity Bag	Nirad C Chaudhuri
Days of My Years	H P Nanda
Daybhag	Jeemootwahan
Death of a City	Amrita Pritam
Devdas	Sharat Chandra Chatterjee
Discovery of India	Jawaharlal Nehru
Distant Drums	Manohar Malgonkar
Distant Neighbours: India	Kuldip Nayar
Divine Life	Swami Sivananda
Durgesh Nandini	Bankim Chandra Chattopadhyay
Dynamics of Social Change	Chandra Shekhar
Eight Lives	Rajmohan Gandhi
English August	Upamanyu Chatterjee
Essays on the Gita	Sri Aurobindo Ghosh
Eternal Himalayas	Major H P S Ahluwalia

Book Name	Author
Eternal India	Mrs. Indira Gandhi
Faces of Everest	Major H P S Ahluwalia
Forty-Nine Days	Amrita Pritam
From Rajpath to Lokpath	Vijayaraje Scindia
Gaban	Munshi Premchand
Ganadevata	Tarasankar Bandyopadhyay
Geet Govind	Jayadev
Ghashiram Kotwal	Vijay Tendulkar
Gitanjali	Rabindranath Tagore
Gita Rahasya	Bal Gangadhar Tilak
Glimpses of World History	Jawaharlal Nehru
Godan	Prem Chand
Gora	Rabindranath Tagore
Harvest	Manjula Padmanabhan
Heir Apparent	Dr. Karan Singh
Himalayan Blunder	Brigadier J P Dalvi
Hind Swaraj	M K Gandhi
Hinduism	Nirad C Choudhuri
History of India	Romila Thapar
Hullabaloo in a Guava Orchard	Kiran Desai
Humanyu-Nama	Gul-badan Beghum
Hungry Stones	Rabindranath Tagore
I follow the Mahatma	K M Munshi
Idols	Sunil Gavaskar
India After Nehru	Kuldip Nayar
India Divided	Rajendra Prasad

Book Name	Author
India Unbound	Gurcharan Das
India of our Dreams	M V Kamath
India Wins Freedom	Abdul Kalam Azad
India's Priceless Heritage	N A Palkhivala
Indian Philosophy	Dr. S Radhakrishnan
Indira Gandhi Returns	Khushwant Singh
Inscrutable Americans	Anurag Mathur
Interpreter of Maladies	Jhumpa Lahiri
It's Always Possible	Kiran Bedi
Jai Somnath	K M Munshi
Jhansi Ki Rani	Vrindavanlal Verma
Kadambari	Bana Bhatt
Kagaz Te Canvas	Amrita Pritam
Kamasutra	S H Vatsyayan
Kanthapura	Raja Rao
Kopal-Kundala	Bankim Chandra Chatterjee
Karmabhumi	Munshi Premchand
Kashmir: A Tale of Shame	Hari Jaisingh
Kashmir: A Tragedy of Errors Kayar	Thakazhi Sivasankara Pillai
Kitab-ul-Hind	Al-Beruni
Kitni Nawon Kitni Bar	S H Vatsyayan
Kulliyat-e-Ghalib	Ghalib
Kumarasambhava	Kalidasa
Kurukshetra	Ramdhari Singh Dinkar
Life Divine	Sri Aurobindo Ghosh
Lipika	Rabindranath Tagore

Book Name	Author
Mahabhartar	Ved Vyas
Mahatma Gandhi and his Apostles	Ved Mehta
Malgudi Days	R K Narayan
Malti Madhav	Bhavabhuti
Meghdoot	Kalidasa
Mitaksara	Vigyaneshwar
Mrichhakatikam	Sudraka
My Days	R K Narayan
My India	S Nihal Singh
My Life and Times	V V Giri
My Music, My Life	Pt. Ravi Shankar
My Presidential Years	R Venkataraman
My Truth	Indira Gandhi
Mudrarakshas	Vishakhadatta
Natural History	Pliny
New Dimensions of India's Foreign Policy	A B Vajpayee
Nishith	Uma Shankar Joshi
Operation Bluestar: The True Story	Lt. Gen K S Brar
Our Films, Their Films	Satyajit Ray
Padmavat	Malik Muhammad Jayasi
Panchatantra	Vishnu Sharma
Parineeta	Sharat Chandra Chatterji
Past Forward	G R Narayanan
Pather Panchali	Bibhuti Bhushan
Plain Speaking	N Chandrababu Naidu and Sevanti Ninan

Book Name	Author
Portrait of India	Ved Mehta
Prem Pachisi	Munshi Prem Chand
Prem Vatika	Raskhan
Rajatarangini	Kalhana
Ram Charita Manas	Tulsidas
Ramayana	Maharishi Valmiki
Raghuvamsa	Kalidasa
Ranghbhommi	Munshi Premchand
Ratnavali	Harsha Vardhan
Raavi Paar (Across the River)	Gulzar
Red Earth and Pouring Rain	Vikram Chandra
Ritusamhara	Kalidasa
Saket	Maithili Sharan Gupt
Satya Harischandra	Bharatendu Harishchandra
Sakharam Binder	Vijay Tendulkar
Seven Summers	Mulk Raj Anand
Shadow from Ladakh	Bhabani Bhattacharya
Shahnama	Firdausi
Shrikant	Sarat Chandra Chattopadhyay
Snakes and Ladders: Essays on India	Gita Mehta
Social Change in Modern India	M N Srinivas
Sultry Days	Shobhaa De
Sunny Days	Sunil Gavaskar
Sursagar	Sur Das
Swami and Friends	R K Narayanan

Book Name	Author
The Beginning of the Beginning	Bhagwan Shri Rajneesh
The Bride's Book of Beauty	Mulk Raj Anand
The Broken Wing	Sarojini Naidu
The Bubble	Mulk Raj Anand
The Cat and Shakespeare	Raja Rao
The Circle of Reason	Amitav Ghosh
The Company of Women	Khushwant Singh
The Continent of Circe	Nirad C. Chaudhuri
The Court Dancer	Rabindranath Tagore
The Critical Years: In Jail	Kuldip Nayar
The Dark Room	R K Narayanan
The Degeneration of India	T N Seshan
The Gardener	Rabindranath Tagore
The Glass Palace	Amitav Ghosh
The God of Small Things	Arundhati Roy
The Golden Gate	Vikram Seth
The Golden Threshold	Sarojini Naidu
The Guide	R K Narayanan
The Harsha Charita	Bana Bhatta
The Hindu View of Life	Dr. S Radhakrishnan
The Judgement: Inside story of the Emergency in India	Kuldip Nayar
The Last Burden	Upamanyu Chatterjee
The Lost Child	Mulk Raj Anand

Book Name	Author
The Men Who Killed Gandhi	Manohar Malgonkar
The Painter of Signs	R K Narayan
The Post Office	Rabindranath Tagore
The Seven Spiritual Laws of Success	Deepak Chopra
The Songs of India	Sarojini Naidu
The Story of My Experiments with Truth	Mahatma Gandhi
The Sword and the Sickle	Mulk Raj Anand
The Untold Story	B M Kaul
The Vendor of Sweets	R K Narayanan
The Way of the Wizard	Deepak Chopra

Book Name	Author
The Wreck	Rabindranath Tagore
Train to Pakistan	Khushwant Singh
Two Leaves and a Bud	Mulk Raj Anand
Urvashi	Ramdhari Singh Dinkar
Visarjan	Rabindranath Tagore
Waiting for the Mahatma	R K Narayan
Wake up India	Annie Besant
We Indians	Khushwant Singh
Yama	Mahadevi Verma
Yashodhara	Maithili Sharan Gupt
Years of Pilgrimage	Dr. Raja Ramanna

Important Days and Dates

Date	Event
4 February	World Cancer Day
6 February	International Day of Zero Tolerance to Female Genital Mutilation
13 February	World Radio Day (UNESCO)
8 March	International Women's Day
22 March	World Water Day
24 March	World Tuberculosis Day
7 April	World Health Day (WHO)
22 April	International Mother Earth Day
25 April	World Malaria Day (WHO)
31 May	World No Tobacco Day (WHO)
5 June	World Environment Day (UNEP)

Date	Event
12 June	World Day Against Child Labour
21 June	International Day of Yoga
11 July	World Population Day
8 September	International Literacy Day (UNESCO)
21 September	International Day of Peace
27 September	World Tourism Day
5 October	World Teachers' Day (UNESCO)
16 October	World Food Day (FAO)
24 October	United Nations Day
1 December	World AIDS Day
10 December	Human Rights Day

Glossary

- **Absenteeism:** The habitual non-presence of an employee at his or her job.
- **Absolute standards:** It is a method of performance appraisal used to evaluate the performance of an employee in comparison to standards established by the firm.
- **Acquisition:** It is a corporate action in which a company buys most (50%), if not all, of another firm's ownership stakes to assume control of it.
- **Action learning:** It is a process in which members work together in a group (a "set") on real-world priorities (called a "problem" by many practitioners) primarily by sharing questions and taking actions between meetings.
- **Advertising campaign:** A coordinated series of linked advertisements with a single idea or theme.
- **Administrative management:** The process of creating information systems and supervising its flow from and to others within an organization.
- **Agenda:** A list of items to be discussed at a formal meeting.
- **Alliance:** A union or association formed for mutual benefit, especially between countries or organizations.
- **Appraisal interview:** Conducted between an employee and manager, an appraisal interview discusses job expectations, work performance and possible areas of growth for the worker.
- **Apprenticeship training:** It is a programme is the combination of on-the-job training and the classroom training, wherein the workers earn while learning the skills required for performing the specialized job.
- **Arbitration:** It is a mechanism for resolving disputes between investors and brokers, or between brokers. It is overseen by the Financial Industry Regulatory Authority (FINRA), and the decisions are final and binding.
- **Asset:** It is a resource with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit.
- **Balance sheet:** It is the financial statement of a company which includes assets, liabilities, equity capital, total debt, etc. at a point in time. Balance sheet includes assets on one side, and liabilities on the other.
- **Bankruptcy:** It is a legal proceeding involving a person or business that is unable to repay outstanding debts.
- **Base compensation/pay:** It is the initial rate of compensation an employee receives in exchange for services. It excludes extra lump sum compensation such as bonuses or overtime pay, as well as benefits and raises.
- **Behavioural interview:** It is an interviewing technique that employer uses to evaluate a potential employee based on their past experience to understand the way they can react in various job-related situations.
- **Benchmark:** Standard, or a set of standards, used as a point of reference for evaluating performance or level of quality.
- **Brand:** Unique design, sign, symbol, words, or a combination of these, employed in creating an image that identifies a product and differentiates it from its competitors.
- **Branding:** The process involved in creating a unique name and image for a product in the consumers' mind, mainly through advertising campaigns with a consistent theme.
- **Brand leader:** Most widely sold and recognized product in a particular market segment. Also called market leader.
- **Brand loyalty:** The extent of the faithfulness of consumers to a particular brand, expressed through their repeat purchases, irrespective of the marketing pressure generated by the competing brands.

- **Brand manager:** Person responsible for overseeing all activities and functions associated with a particular product or product family. Also called product manager.
- **Brand stretching:** The act of using an established brand name in order to introduce unrelated products, such as a tobacco company that introduces non tobacco related products in order to circumvent advertising restrictions.
- **Business plan:** Set of documents prepared by a firm's management to summarize its operational and financial objectives for the near future (usually one to three years) and to show how they will be achieved.
- **Buyout:** Purchase by a publicly traded firm of its outstanding (held by the public) stock to thwart a takeover attempt, or to take the firm off the stock-market for converting it into a private company.
- **Cash flow:** Incomings and outgoings of cash, representing the operating activities of an organization.
- **Chief Executive Officer (CEO):** Top executive responsible for a firm's overall operations and performance.
- **Clock in/on:** It is used for the time an employee enters or leaves the office on a working day.
- **Consumer behaviour:** The process by which individuals search for, select, purchase, use, and dispose of goods and services, in satisfaction of their needs and wants.
- **Controlling interest:** Ownership of 51 percent or more of the voting-stock (shares) that gives the owner(s) legal control of a firm.
- **Crash:** Reducing the completion time of a project by sharply increasing manpower and/or other expenses.
- **Damagecontrol strategy:** One of the major duties in public relations is of 'damage control'. These are the strategies which involve minimizing the negative effect of any event or series of events.
- **Decentralization:** In an organisation, transfer of decision-making power and assignment of accountability and responsibility for results.
- **Disclosure:** In accounting, statutory or good faith revelation of a material fact (or an item of information that is not generally known) on a financial statement or in the accompanying notes (footnotes).
- **Distribution channel:** The path through which goods and services travel from the vendor to the consumer or payments for those products travel from the consumer to the vendor.
- **Downscale:** A product low in quality and cheap in price; relating to or intended for people who are poor or not educated
- **Dumping:** Exporting goods at prices lower than the home-market prices. In price-to-price dumping, the exporter uses higher home-prices to supplement the reduced revenue from lower export prices.
- **E-commerce:** The buying and selling of products and services by businesses and consumers through an electronic medium, without using any paper documents.
- **Economies of scale:** Reduction in cost per unit resulting from increased production, realized through operational efficiencies.
- **Economy drive:** It is a vigorous effort to save money or materials.
- **Endorse:** To sign a legal document, such as a check. Also, to sign a legal document, such as a check.
- **Equity financing:** It is financing by selling common stock or preferred stock to investors.
- **Exit interview:** Final formal meeting between the management and an employee leaving the firm. It is used as a learning opportunity for the executive concerned who seeks candid views on work related problems.

- **Field research:** Any activity aimed at collecting primary (original or otherwise unavailable) data, using methods such as face-to-face interviewing, telephone and postal surveys, and direct observation.
- **Flexitime:** Non-traditional work scheduling practice which allows full-time employees to choose their individual starting and quitting times within certain limits
- **Flight of capital:** The movement of money from one investment to another in search of greater stability or increased returns.
- **Franchise:** It is a form of business organization in which a firm which already has a successful product or service (the franchisor) enters into a continuing contractual relationship with other businesses (franchisees) operating under the franchisor's trade name and usually with the franchisor's guidance, in exchange for a fee.
- **Free port:** It is a free trade zone encompassing an entire port area such as Hong Kong, Isla Margarita, Panama, and Singapore, where imported merchandise may be stored duty-free pending re-export or duty-paid entry into the importing country.
- **Gambling:** Betting (wagering) that must result either in a gain or a loss. Gambling is neither risk taking in the sense of speculation (assumption of substantial short-term risk) nor investing (acquiring property or assets for securing long-term capital gains).
- **Goodwill payment:** A payment made to senior members of a business as a reward for hard work a payment made for the goodwill of a business when it is bought a payment made by a supplier to a customer because of a problem the customer has had, for example with quality or late delivery of goods.
- **Gross Domestic Product (GDP):** GDP is the final value of the goods and services produced within the geographic boundaries of a country during a specified period of time, normally a year.
- **Hacking:** Hacking is an attempt to exploit a computer system or a private network inside a computer.
- **Hard copy:** Original document, paper copy, printout, or any record that can be read (by humans) without the use of any device.
- **Hard currency:** It is a currency widely accepted around the world as a form of payment for goods and services.
- **Hoarding:** It is the purchase of large quantities of a commodity with the intent of pushing up the price.
- **Human capital:** It is a measure of the economic value of an employee's skill set.
- **Human resource management:** The process of hiring and developing employees so that they become more valuable to the organization.
- **Incentive:** It is an inducement or supplemental reward that serves as a motivational device for a desired action or behavior.
- **Income statement:** It is a summary of a management's performance as reflected in the profitability (or lack of it) of an organization over a certain period.
- **Increment:** It is an increase in quantity or size; commonly used to refer to the development of large subdivisions in phases.
- **Induction:** It begins with an individual problem or question and proceeds to form a general principle based on the evidence observed in the real world of economic activity.
- **Innovation:** The process of translating an idea or invention into a good or service that creates value or for which customers will pay.
- **Interpersonal skills:** The set of abilities enabling a person to interact positively and work effectively with others.
- **Inventory:** An itemized catalog or list of tangible goods or property, or the intangible attributes or qualities.

- **Jingle:** It is a short, catchy song used in a radio or television commercial.
- **Job description:** A broad, general, and written statement of a specific job, based on the findings of a job analysis.
- **Job evaluation:** An assessment of the relative worth of various jobs on the basis of a consistent set of job and personal factors, such as qualifications and skills required.
- **Job satisfaction:** Contentment (or lack of it) arising out of interplay of employee's positive and negative feelings toward his or her work.
- **Joint venture:** It is a business arrangement in which two or more parties agree to pool their resources for the purpose of accomplishing a specific task.
- **Key jobs:** Jobs that are common in an organization and in a labor market (such as those of clerks, drivers, janitors, secretaries), and which are used to determine the general pay scales.
- **KISS:** Keep it short and simple
- **Knowledge engineering:** It is a field of artificial intelligence (AI) that creates rules to apply to data in order to mimic the thought process of a human expert.
- **Labor union:** It is an organization intended to represent the collective interests of workers in negotiations with employers over wages, hours, benefits and working conditions.
- **Lead time:** It is the amount of time that elapses between when a process starts and its completion.
- **Letter of credit:** It is a letter from a bank guaranteeing that a buyer's payment to a seller will be received on time and for the correct amount.
- **Liability:** A claim against the assets, or legal obligations of a person or organization, arising out of past or current transactions or actions.
- **Line management:** Those managers in an organization who are responsible for the main activity or product of the organization, as distinct from those, such as transport, accounting, or personnel, who provide services to the line management.
- **Locus of control:** The extent to which an entity believes the current and anticipated circumstances, and its response to them (behavior), are within its control.
- **Logo:** Recognizable and distinctive graphic design, stylized name, unique symbol, or other device for identifying an organization.
- **Marketing:** The management process through which goods and services move from concept to the customer.
- **Market nicher:** A small but profitable segment of a market suitable for focused attention by a marketer.
- **Management training:** It is training activity that focuses on improving an individual's skills as a leader and manager.
- **Merchandise:** It is a free sample of the product for getting it publicised.
- **Mission statement:** A written declaration of an organization's core purpose and focus that normally remains unchanged over time.
- **Nepotism:** Practice of appointing relatives and friends in one's organization to positions for which outsiders might be better qualified.
- **Networking:** It is a process that fosters the exchange of information and ideas among individuals or groups that share common interests. Networking may fall into one of two categories: social or business.
- **Niche market:** It is a focused, targetable portion of a market.

- **Nominal Group Technique (NGT):** More-controlled variant of brainstorming used in problem solving sessions to encourage creative thinking, without group interaction at idea-generation stage.
- **Non-conforming high performer:** An individualistic team member whose presence is disruptive to the team and also affects the team performance.
- **Objective career:** A career objective is a short statement that defines the position you are seeking, setting the tone for the rest of your resume.
- **Office personnel:** He/she advocates for innovated human resources practices, encourages recognition opportunities of deserving employees, professional development opportunities, and assists federal employees with information regarding their pay rates and advancement opportunities within the public sector.
- **Open-plan office:** An open-plan building, office, or room has no internal walls dividing it into smaller areas.
- **Overtime:** Work performed by an employee or worker in excess of a basic workday (typically 8 hours a day, 5 days a week) as defined by company rules, job contract, statute, or union (collective) agreement.
- **Performance appraisal interview:** It is a formal discussion process between an employee and his/her manager. It is one of the best ways for an employee to increase productivity and change work habits.
- **Placement:** The sale of securities directly to an institutional investor, which can include banks, mutual funds, or foundations.
- **Portfolio analysis:** An analysis of elements of a company's product mix to determine the optimum allocation of its resources. Two most common measures used in a portfolio analysis are market growth rate and relative market share.
- **Product differentiation:** It is a marketing process that showcases the differences between products.
- **Product life cycle:** Product life cycle (PLC) is the cycle through which every product goes through from introduction to withdrawal or eventual demise.
- **Profit margin:** It is part of a category of profitability ratios calculated as net income divided by revenue, or net profits divided by sales.
- **Quality circles:** It is a work group of employees who meet regularly to discuss their quality problems, investigate causes, recommend solutions, and take corrective actions.
- **Quality control:** It is that “part of quality management focused on fulfilling quality requirements” and consists of activities employed in detection and measurement of the variability in the characteristics of output attributable to the production system and includes corrective responses.
- **Quality gap:** It is the gap between the expectation of the customer and the product delivery by the firm.
- **Rational management:** Rational management of resources and distribution of goods and services, helps ensure that business operations are efficient and effective.
- **Recruitment:** The process of finding and hiring the best-qualified candidate (from within or outside of an organization) for a job opening, in a timely and cost-effective manner.
- **Red tape:** It is a colloquial term for bureaucratic practice of hair splitting or foot dragging, blamed by its practitioners on the system that forces them to follow prescribed procedures to the letter.
- **Reference power:** Influence over others, acquired from being well liked or respected by them.
- **Retail audit:** It is carried out on a certain number of retail outlets to measure the effectiveness, sales trends, sales volume etc. of a brand or product in the retail outlet.
- **Risk capital:** Risk capital consists of investment funds allocated to speculative activity and refers to the funds used for high-risk, high-reward investments such as junior mining or emerging biotechnology stocks.

- **Role differentiation:** The degree to which different members of a group have specialized functions
- **Salaried staff:** A worker who is paid a fixed amount of money or compensation (also known as a salary) by an employer.
- **Sales promotion:** It is the process of persuading a potential customer to buy the product.
- **Seasonal unemployment:** An elevated level of unemployment that is expected to occur at certain parts of the year.
- **Selection ration:** The selection ratio is a concept used by business human resource (HR) professionals to help make better choices concerning the hiring of applicants for job positions.
- **Sell-off:** It is the rapid selling of securities such as stocks, bonds and commodities due to different reasons like oil prices surge, a disappointing earnings report etc.
- **Sexual harassment:** It includes unwelcome sexual advances, requests for sexual favors, and other verbal or physical harassment of a sexual nature in the workplace or learning environment, according to the Equal Employment Opportunity Commission (EEOC).
- **Shift work:** It occurs in a work schedule that utilizes 24 hours a day and occasionally, 7 days a week, to keep an organization operating.
- **Skills inventory:** It is the activity of making sure that a company always has exactly the right amount of goods available to sell.
- **Stock control:** It is the activity of making sure that a company always has exactly the right amount of goods available to sell.
- **Task analysis:** The systematic identification of the fundamental elements of a job, and examination of knowledge and skills required for the job's performance.
- **Takeover target:** A publicly traded company that is the object of a takeover, especially, but not necessarily, a hostile takeover.
- **Total quality management:** It describes a management approach to long-term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services, and the culture in which they work.
- **Unique selling proposition/point (USP):** The factor or consideration presented by a seller as the reason that one product or service is different from and better than that of the competition.
- **Upmarket:** Upmarket goods and products are of very high quality and intended to be bought by people who are quite rich.
- **Venture capitalists:** Wealthy investors like to invest their capital in start-up companies with a potential to grow, with a long-term growth perspective. Such investors are called venture capitalists.
- **Warranty:** When one makes a major purchase, the manufacturer or seller makes an important promise to stand behind the product. It's called a warranty.
- **Wholesaler:** Person or firm that buys large quantity of goods from various producers or vendors, warehouses them, and resells to retailers.
- **Win lose bargaining:** It is probably the most familiar form of negotiating that is undertaken. Individuals decide what they want, then each side takes up an extreme position, such as asking the other side for much more than they expect to get.
- **Work experience:** the experience that a person already has of working
- **Year-end bonus:** A reward paid to an employee at the end of the year. It is tied to performance metrics and the amount can vary depending whether certain milestones are met.
- **Zero defects:** It is a term coined by Mr. Philip Crosby. It ensures that there is no waste existing in a project. Waste refers to all unproductive processes, tools, employees and so on.

MANAGEMENT AND BUSINESS APTITUDE

Management and Business Aptitude is an examination topic assessed in the Indraprastha University-Common Entrance Test. It includes questions on the basic concepts of management and awareness with respect to the economic realities of India. Here, we provide concepts to help you revise the concepts and understand the framework of the questions asked.



Note

Please note that you are required to go through this section only if you are planning to appear for the IPU-CET.

What is Management?

According to Henry Fayol: “to manage is to forecast and to plan, to organize, to command, to co-ordinate and to control.” Peter Drucker defined the basic task of management as twofold: marketing and innovation. **Management** may be described as the process of achieving organizational goals by working with and through people and other organizational resources. It refers to all the aspects involved in the administration of an organization.

Management includes defining the strategy of an organization and coordinating the efforts of its employees or volunteers to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources.

The salient features of management are:

1. It is a process or series of continuous and coherent activities.
2. It is directed towards the achievement of organizational goals.
3. In order to realize these goals, it relies on effective collaboration between people and other resources.

Management functions

The four basic management functions are as follows:

1. **Planning:** Planning involves identifying the tasks that must be performed to attain organizational goals, defining the blueprint of how and when the tasks must be performed. Planning essentially focuses on devising an approach plan for actualizing goals. The managers focus on identifying success drivers – both for the short term and long term.
2. **Organizing:** Organizing involves allocation of responsibilities and roles to the various stakeholders (individuals and groups) within the organization. It aims to create a mechanism to put plans into action. The organizational goals are broken down into departmental, teams and individual goals so that all activities and efforts are geared to contribute effectively towards the achievement of these goals. It is only through organization that the work performed at the various levels can be streamlined.
3. **Influencing:** Also known as motivating, leading or directing, Influencing involves constant guidance of all organizational members in the direction towards the fulfilment of organizational goals. The purpose of influencing is to increase productivity. It is a commonly known fact that a motivated workforce is a productive workforce. Employees that can identify with the aims and visions of the organization and who have clarity with respect to the contribution of their work in realizing these visions are more proactive, solution-oriented and driven
4. **Controlling:** Controlling is an ongoing process. Controlling involves the following:
 - (a) Collecting information to measure performance
 - (b) Comparison of performance exhibited with the expected performance standards.
 - (c) Identifying the gaps and lacunae and devise action plans to address them.

Fayol's 14 principles of management

Henry Fayol gave 14 principles of management. They are as following:

1. **Division of Work:** When employees are specialized, output can increase because they become increasingly skilled and efficient.
2. **Authority:** Managers must have the authority to give orders, but they must also keep in mind that with authority comes responsibility.
3. **Discipline:** Discipline must be upheld in organizations, but methods for doing so can vary.
4. **Unity of command:** Employees should have only one direct supervisor.
5. **Unity of direction:** Teams with the same objective should be working under the direction of one manager, using one plan. This will ensure that action is properly coordinated.
6. **Subordination of individual interests to the general interest:** The interests of one employee should not be allowed to become more important than those of the group. This includes managers.
7. **Remuneration:** Employee satisfaction depends on fair remuneration for everyone. This includes financial and non-financial compensation.
8. **Centralization:** This principle refers to how close employees are to the decision-making process. It is important to aim for an appropriate balance.
9. **Scalar chain:** Employees should be aware of where they stand in the organization's hierarchy, or chain of command.
10. **Order:** The workplace facilities must be clean, tidy and safe for employees. Everything should have its place.
11. **Equity:** Managers should be fair to staff at all times, both maintaining discipline as necessary and acting with kindness where appropriate.
12. **Stability of tenure of personnel:** Managers should strive to minimize employee turnover. Personnel planning should be a priority.
13. **Initiative:** Employees should be given the necessary level of freedom to create and carry out plans.
14. **Esprit de corps:** Organizations should strive to promote team spirit and unity.

Historical theories of management

Scientific management theory (1890–1940)

Frederick Taylor developed the “scientific management theory” which espoused the careful specification and measurement of all organizational tasks. Tasks were standardized to the maximum extent and workers were rewarded and punished based on the degree of task completion.

Bureaucratic management theory (1930–1950)

Max Weber elaborated the scientific management theory with his bureaucratic theory. Weber focused on dividing organizations into hierarchies, establishing strong lines of authority and control. He suggested organizations develop comprehensive and detailed standard operating procedures for all routinized tasks.

Human relations movement (1930–today)

Over time, the dehumanizing and mechanizing impact of these theories was ascertained which led to a shift in the outlook of organizations and management. The role of individual capabilities and capacities was recognized and the role of motivational rewards in ensuring a prosperous and productive workforce was highlighted. This resulted in the advent of the Human Resource function. The behavioural sciences played a

strong role in helping to understand how the needs of the organization and its workers could be better aligned. Various new theories were spawned, many based on the behavioural sciences

Contemporary theories of management

Contingency theory

This theory asserts that managers make decisions based on the situation at hand rather than a "one size fits all" method. A manager takes appropriate action based on aspects most important to the current situation. Managers in a university may want to utilize a leadership approach that includes participation from workers, while a leader in the army may want to use an autocratic approach.

Systems theory

Managers who understand systems theory recognize how different systems affect a worker and how a worker affects the systems around them. A system is made up of a variety of parts that work together to achieve a goal. Systems theory is a broad perspective that allows managers to examine patterns and events in the workplace. This helps managers to coordinate programs to work as a collective whole for the overall goal or mission of the organization rather than for isolated departments.

Chaos theory

Change is constant. Although certain events and circumstances in an organization can be controlled, others can't. Chaos theory recognizes that change is inevitable and is rarely controlled. As organizations grow, their susceptibility towards complexity increases. Organizations increase energy to maintain the new level of complexity, and as organizations spend more energy, more structure is needed for stability. The system continues to evolve and change.

Centralization Vs decentralization

Centralization is a process where the decision-making powers and authority are vested in a few hands. According to Allen, "Centralization" is the systematic and consistent reservation of authority at central points in the organization.

Under centralization, the important and key decisions are taken by the top management and their implementations carried out at the lower levels.

On the other hand, **Decentralization** is a systematic delegation of authority at all levels of management throughout the organization. In a decentralization concern, while the authority for taking major decisions and framing macro policies is retained by the top management; the rest of the authority and decision-making power is vested with the middle and lower management. Thus, in a decentralized organization, the top management confines itself to identifying the broad frameworks and structures and their interpretation and implementation is left to the next level of managers,

Decentralization is not the same as delegation. In fact, decentralization is an extension of delegation. Decentralization patterns are wider in scope and power is distributed to the most junior levels of management. On the other hand, Delegation of authority takes place from one person to another. The key elements of delegation are Authority, Responsibility and Accountability. For achieving delegation, a manager has to perform following steps:

1. Assignment of tasks and duties
2. Granting of authority
3. Creating responsibility and accountability

Criterion	Delegation	Decentralization
Meaning	Managers delegate some of their function and authority to their subordinates.	Right to take decisions is shared between the top management and other levels of management.
Scope	Scope of delegation is limited as a superior delegates the powers to the subordinates on individual bases.	Scope is wide as the decision making is shared by the subordinates also.
Responsibility	Responsibility remains with the managers and cannot be delegated	Responsibility is also delegated to subordinates.
Freedom of Work	Freedom is not given to the subordinates as they have to work as per the instructions of their superiors.	Freedom to work can be maintained by subordinates as they are free to take decision and to implement it.
Nature	It is a routine function	It is an important decision of an enterprise.
Need or purpose	Delegation is important in all concerns whether big or small. No enterprises can work without delegation.	Decentralization becomes more important in large concerns and it depends upon the decision made by the enterprise, it is not compulsory.
Grant of Authority	The authority is granted by one individual to another.	It is a systematic act which takes place at all levels and at all functions in a concern.
Grant of Responsibility	Responsibility cannot be delegated	Authority with responsibility is delegated to subordinates.
Degree	Degree of delegation varies from concern to concern and department to department.	Decentralization is total by nature. It spreads throughout the organization, that is, at all levels and all functions
Process	Delegation is a process which explains superior subordinate relationship	It is an outcome which explains the relationship between top management and all other departments.
Essentiality	Delegation is essential to all kinds of concerns	Decentralization is a decisions function by nature.
Significance	Delegation is essential for creating the organization	Decentralization is an optional policy at the discretion of top management.
Withdrawal	Delegated authority can be taken back.	It is considered as a general policy of top management and is applicable to all departments.

Decentralization can be termed as an extension of delegation. When delegation of authority is done to the fullest possible extent, it leads to decentralization.

Communication

Simply put, communication is the process of sharing information. However, it has a few defining features:

1. It is a two-way process aimed at mutual understanding
2. Involves exchange of information, ideas, opinions and emotions
3. Includes creating and sharing meaning

Communication is a key management function as effective communication among the various levels is vital for successful operation.

Channels of communication

Basically, there are two ways of communication:

1. Oral communication

Oral communication is a method of communication through speech. It is characteristic of its immediacy and personal touch, which might be difficult to capture in other forms of communication. In this form, there is often an informal or flexible setting (atmosphere), which allows the sender and receiver, interact with questions and answers, comments and response. All this takes place in a given time and results in immediate feedback and permits an instant reaction.

2. Written communication

Some basic characteristics of written communication are that it

- has a more formal perspective, suggesting greater authority and trust worthiness;
- can be a potential record, capable of extended life and of being used again and again;
- can be extracted in parts or portions and can be quoted;
- it is suitable for reading at an individual's convenience, speed and place; and is accessible to a large readership which can lead to the benefit of expert
- criticism and review by peers.

Types of communication

Verbal and non-verbal communication

Verbal communication is the form of communication in which the message is transmitted verbally, either through speech (oral communication) or written word (written communication) using medias that are understood by all the concerned parties.

All communication that is done without the use of words is known as **Non-verbal communication**. It can include many different elements. Let's look at some:

- **Vocal cues**, referred to as paralinguistic, is a form of non-verbal communication that includes such things as pitch, inflection, tone, volume, speed of the speech, quality, non-word sounds, pronunciation, enunciation and even silence.
- **Body movement and gestures** are also part of non-verbal communication. For example, leaning forward may indicate interest, while crossing arms is often viewed as a defensive posture.
- **Haptics** refers to the use of touch to communicate, for example, shaking hands, holding hands, patting, etc;
- **Facial expressions** are also a form of non-verbal communication. Examples include smiling, crying and grimacing.
- **Chronemics** that is to say how time is considered is sometimes a message in itself, a form of non-verbal communication and is called Chronemics; and
- **Clothing and artifacts** also act as non-verbal communicators as they indicate status, conformity or rebellion. Artifacts include such things as hairstyles, jewellery, cosmetics, watches, shoes, tattoos and body piercing.
- **Iconics**, which means interpretation of symbolism, found in objects or designs can be considered a type of communication. The best example of this type of communication is international traffic signs.

Formal and informal communication

Companies need to be able to communicate effectively. This is especially true of large companies where personal interaction may not be practical. This is where formal communication comes into play.

Formal communication involves utilizing the formal communication channels of an organization. Formal communication can move vertically in an organization. Information is collected and flows up to the top levels of management for review and decision making, while orders flow down from the top to the place where it will be implemented.

Formal communication can also flow horizontally across the organization. Unlike vertical communication that involves communication between a higher and lower level of an organizational hierarchy, horizontal communication occurs between two parts of the organization at the same level.

Not all communication in an organization is formal. **Informal communication** is communication between employees outside the formal communication structure of the company. While the subject of informal communication can be business-related, it need not be.

The grapevine

One type of informal communication is called 'the grapevine.' The **grapevine** is an informational communication channel that goes in every direction - up, down and sideways. Messages are spread by employees sharing information on an informal basis, such as during breaks. It is often a source of rumours and gossip.

Intra-personal, interpersonal, group and mass communication

Communication can also be classified in terms of its levels. The different levels of communication are as follows:

- **Intrapersonal communication** means communication within one person, that is, talking to oneself, reading something, etc. In this type of communication, the source and recipient of information becomes one person. Intrapersonal communication includes a person's thoughts, experiences and perceptions during a communication event. Intrapersonal communication is of different types which include:
 - (i) postures,
 - (ii) muscle tension,
 - (iii) sleep,
 - (iv) use of tranquilisers, and
 - (v) emotions
- **Interpersonal communication** means communication between two or more persons. It could be face-to-face, or it could be at a distance with the help of telephone or letters, etc. For effective interpersonal communication we must develop certain skills and tactics, which will help us to establish rapport quickly with new persons. One such skill is to be able to control the communication situation. This does not mean that we must act in a dominant way.
- **Group communication** is a form of communication many people are involved and the speaker and the listener are shifted among the participants. This type of communication may take place between small groups usually not exceeding 25. It may also take place in large groups where there is communication by one or more persons to an audience of more persons.
- **Public or mass communication** generally refers to communication, which takes place between one person or a group of persons through a special media to a large audience. Mostly large-scale communication is disseminated by the media of print, broadcasting, film or the electronic media to large audiences. This type of communication is referred to public or mass communication.

In mass communication the relationship between sources and dissemination is different from that in case of individual or interpersonal communications. Interpersonal communication is one-to-one exchange, whereas mass communication is one-to-many exchange in which a few sources transmit to a great number of destinations.

Communication process

The process of exchange of information between a sender and a receiver is known as the Communication process. Every communication has two constituents – the sender and the receiver. The sender has a thought; he/she then encodes it and transmits the message using a media. Upon receipt of the message, the receiver reverts with a response as feedback. Hence, the elements involved in the cycle are:

Sender: Sender is the person or party who conveys the message or idea to the receiver. The Sender is the source and the originating point of the communication.

Message: Message is the set of symbols that the sender transmits to the receiver through the media or channel. Messages can be in oral, written and symbolic form.

Encoding: Since the subject matter of communication is theoretical and intangible, its further passing requires use of certain symbols such as words, actions or pictures etc. Encoding refers to the process of organizing thought into symbolic form which can be understood by another person. It involves converting the idea into an understandable message.

Media: Media refers to the specific communication channel through which the message moves from sender to receiver. It bridges the gap between the sender and the receiver. We use different types of media for transmitting messages like letter, newspapers, radio, TV, telephone, fax, e-mail etc.

Decoding: Decoding is the process by which the receiver assigns meaning to the symbols encoded by the sender. According to **Bovee** and Others, “Decoding is the process of interpreting a message to arrive at the senders meaning.” Communication will be more effective if decoding matches clearly with encoding.

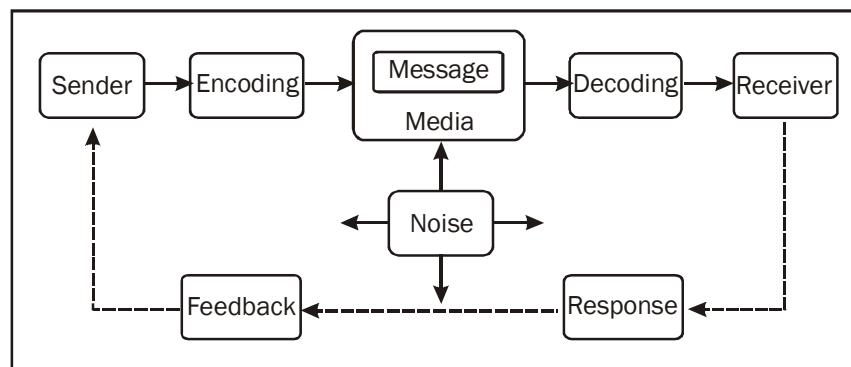
Receiver: Receiver is the person or party who is the intended recipient of the message, the one who finally receives the message.

Response: Response is the action or reaction of the receiver after getting the message. The response may be immediate or deferred, favorable or unfavorable.

Feedback: The process of ensuring that the intended recipient of the message has received it and has derived the same meaning from it, as desired by the sender, is known as feedback. As stated above, communication is a bilateral process, hence, the receiver’s response to the sender’s communication is known as feedback.

Noise: Noise is the unplanned static or distortion that occurs in the transfer of information. It results in a disruption of the communication process and causes the receiver to receive a distorted message. Noise may occur in any of the steps in the communication process.

Elements of communication process



The seven C's of effective communication

Communication principles providing guidelines for choice of content and style of presentation adapted to the purpose and receiver of your message. The seven C's of Effective Communication are as following:

1. Completeness:

Completeness offers numerous benefits:

Bring the desired results without the expense of additional messages

- They can do a better job of building goodwill
- Can help avert costly lawsuits that may result if important information is missing.

For achieving completeness:

- Provide all necessary information (Who? What? When? Where? Why? How?).
- Answer all questions asked, look for questions, locate them and then answer precisely.

In an organization we have two types of questions:

- (a) Stated
- (b) Implied

2. Conciseness:

What you have to say in the fewest possible words without sacrificing the other C qualities. A concise message is complete without being wordy.

- Eliminate wordy expressions
Advantages:
To save the time of both sender and receiver
 - (a) At this time – Now
 - (b) Due to the fact that – because
 - (c) Have need for – need
- Include only relevant material
 - (a) Stick to the purpose of the message
 - (b) Delete irrelevant words and confused/rambling sentences
 - (c) Omit information obvious to the receiver, if you feel it is important to remind the audience of known (familiar) information, subordinate the known information.
- Avoid unnecessary repetition
 - (a) Use shorter name after you have mentioned the long one once
 - (b) Use pronouns or initials rather than repeat the long names
 - (c) Cut out all needless repetition of phrases and sentences.
- Omit unnecessary expression:
 - (a) Wordy – please advise that your admission statement has been received.
 - (b) Concise – your admission statement has been received.
 - (c) Wordy – allow me to say how helpful your response was.
 - (d) Concise – your last response was helpful.
- Omit wordy conventional statement with concise one.
 - (a) Wordy – please find attached the list you requested.
 - (b) Concise – the request list is attached.

- Omit “which” and “that”.
 - (a) Wordy – he bought desks that one of executive type.
 - (b) Concise – he bought executive type of desks.
- Eliminate unnecessary prepositional phrases:
 - (a) Wordy – the issue of most relevance is team work.
 - (b) Concise – the most relevance issue is team work.
- Limit use of passive voice:
 - (a) Wordy – the total balance due will be found on page 2 of this report.
 - (b) Concise – total balance due is on page 2 of this report.
- Avoid long introduction unnecessary explanation excessive objective and proposition pompous word and gushy politeness.

3. Consideration

Consideration means preparing every message by keeping the receivers in mind:

- Put yourself in their place
- You are considerate, you do not lose your temper
- You do not accuse
- You cannot charge them without facts.

By keeping in mind, the above attributes, you will develop “YOU” attitude (empathy, human touch).

Your Attitude: keep in mind the receiver like and as well as unlike of the receiver. Your attitude plays an important role in business organization.

- (a) Focus on “you” instead of “I” and “we”: to create considerate, audience-oriented message, focus on how message receiver will benefit, what they will receive of what they want or need to know.
 - (i) We – attitude: I am delighted to announce that we will be extending our hours to make shopping more convenient.
 - (ii) You – attitude: You will be able to shop evenings with the extended hours.

Exceptions, do not use “you”: Sarcastic of negative information.

Tactless: “You failed to enclose the check”

More Tactful: Apply passive voice “The check was not enclosed”.

- (b) Show audience benefit or interest in the receiver, audience may react positively when benefits are shown to them. Wherever possible are true, show how your receiver will benefit from whatever the message, ask or announce.
 - (i) Benefits must meet their needs, address their concerns, or offer them rewards.
 - (ii) Merely only inserting the word “you” does not ensure the “you” attitude.

For example: you will be glad to know that we now have walk up window open 7–9 AM and 3–4PM every week.

You take care of your banking needs at our new walk-up windows it is open with a capable teller to serve 7–8AM and 3–4PM you every week.

- (c) Emphasize positive, pleasant facts

Stress on what can be done instead of what cannot be done.

- (i) Negative unpleasant: We don’t refund if the returned item is soiled and unassailable.
- (ii) Positive pleasant: We refund when the returned item is clean and resalable.

- (iii) Negative unpleasant: it is impossible to open for you an account today.
- (iv) Positive pleasant: as soon as we received your signature card, we will gladly open an account for you.

Negative unpleasant: When you travel on our company expense you will receive approval for first class fare.

Positive pleasant: When you travel on company expense approval fare is for tourist class.

- (i) Positive words to which people react favorably are:
Benefit, cordial, happy, help, generous, loyal, pleasure, thanks, thoughtful.
- (ii) Words with negative connotation that often allow unfavorable reaction are:
Blame, complaint, failed, fault, negligence, regret, reject, trouble, unfair.
- (iii) As final note consideration is a result of integrity and ethics.
In broad but true sense, consideration underlines the other 6 C's quality.

4. Concreteness:

Communicating concretely means being specific, definite, solid and vivid rather than vague

- Often it means using denotative (direct, often dictionary based) rather than connotative words (ideas or notions suggested by or associated with a word or phrase).
- Choose vivid, image-building words

Advantages of concrete messages:

- (a) Save time for both.
- (b) We required.
- (c) Too many simple sentences, too many simplistic ideas gave the impressions of the writing of a first-year student.
- (d) Proposals submitted this quarter were uninteresting
- (e) It is along letter. (not concrete)
- (f) You send me a letter as long as you said it would be. (concrete)

How to compose a concrete, convincing message (a guideline):

- (a) Use specific facts and figurative, that is, (1979)
 - (i) Not clear- Student GMAT score are higher.
 - (ii) Concrete- In 2000 students GMAT score are 13% average.

Advantages: Nobody can bring changes in your messages. Whenever possible, use an exact precise statement at a figure in place of a general word to make your message more specified concrete.

- (i) Western Europe is making progress investments (not clear).
- (ii) In 2011 investment in Eastern Europe were 40\$ million, today that figure is increased by 15%. (Concrete)

Some exceptions do not use figure.

- (a) When it is not possible to be specific, that is, you may not have the precise figure or facts.
- (b) When you wish to be diplomatic (considerate)
 - (i) You have missed three invitations to my office.
 - (ii) (Avoided) I have sent you several reminders to see me in the office.

- When exact figures are unimportant.
 - i. More than half of the committee was present.
- Put action in your verbs not infinitives and nouns.
 - ii. He drinks.
- Use active voice rather than passive voice.
 - iii. The tests were administered by professors. (P.V)
 - iv. The professors administered the test. (A.V)

Exception when we use passive rather than active voice.

- (a) When you avoid personal, blunt, accusations or comments.
 - i. You failed to enclose the check. (A.V)
 - ii. The check was not enclosed. (P.V)
- (b) When you want to stress the object of the action.
 - i. You are invited. (Active Voice)
 - ii. We invite you. (Passive Voice)
- (c) When the doer is not important.
 - i. Three announcements were made before meeting started. (P.V)
 - ii. Figures show. (A.V)
 - iii. It is shown by figures. (P.V)

Chose vivid and image building words:

Business writing uses less figurative language than dose the world of fiction devices to make the language more forceful and vivid.

- (a) Sensory appeal: concrete language often evokes a sensory response inn people, it appeals to one or more of the five senses and such language is more descriptive than conversional business language.

For example: it was hot in the factory. (It is literal)

- i. Sweat trickled down the arms of the worker.

Sensory appeal very often used in market products.

- (b) Comparison: Analogies (same to same) either literal or figurative make unclear ideas clear and more vivid.
 - i. Some women were stopped in their promotion. (Literal)
 - ii. Some women face “glass ceiling” in their promotion. (Figurative)
 - iii. Aslam is lion like. (Comparison)

5. **Clarity:** Getting the meaning from your head into the head of your reader — accurately is the purpose of clarity. Of course, you know this is not simple. We all carry around our own unique interpretations, ideas, experiences associated with words.

- Choose precise, concrete and familiar words

Construct effective sentences and paragraphs:

At the core of clarity is the sentence. This grammatical statement, when clearly expressed, moves thoughts within a paragraph. Important characteristics to consider are:

- (a) **Length:** Generally, short sentences are preferred. The suggested average sentence length should be about 17 to 20.
- (b) **Unity:** in a sentence—whether simple, compound or complex—unity means that you have one main idea and any other ideas in the sentence must be closely related to it.

- (c) **Coherence:** in a coherent sentence the words are correctly arranged so that the ideas clearly express the intended meaning.
- (d) **Emphasis:** the quality that gives force to important parts of sentences and paragraphs is emphasis.

6. Courtesy:

True courtesy involves being aware not only of the perspective of others, but also their feelings. Courtesy stems from a sincere you-attitude

(a) Be sincerely tactful, thoughtful, and appreciative

- (i) Tactless, Blunt: *Stupid letter; I can't understand any of it.*
- (ii) More Tactful: *it's my understanding*

(b) Use expressions that show respect

Omit irritating expressions.
Omit questionable humor.

Note: 1. Offensive

E.g. Hay man, what's this I hear about the good news? You sure pulled a fast one this past weekend and then didn't tell any of us about it.

Note: 2. More courteous

E.g. Warm congratulations on your wedding!

Well, you certainly took us by surprise. In fact, just a few of us even suspected you were taking off to get married. But even though we didn't hear about it until later, we-my wife and I- wish you the best.

- (c) **Choose non-discriminatory expressions:** Another requirement for courtesy is the use of non-discriminatory language that reflects equal treatment of people regardless of gender, race, ethnic origin, and physical features.

(i) Sexist terms: "man" words

Questionable	More Desirable
Freshman	Entering students, first year students
Manpower	Workers, employees, workforce, personnel
Man-made	Manufactured, constructed, built

(ii) Singular Pronouns

Questionable: Anyone who comes to class late will get his grade reduced.

More Desirable: students who come late to class will have their grade reduced.

(iii) Names

Undesirable	More desirable
Ted April and Ruth	Ted and Ruth April

(iv) Correctness

At the core of correctness are proper grammar, punctuation and spelling.

(d) Use the right level of language

More formal	Less formal
Participate	Join
Procure	Get
Endeavor	Try
Ascertain	Find out

(e) Check accuracy of figures, facts and words

(v) Verify your statistical data

(vi) Double check your totals

(vii) Have someone else read your message if the topic involves data

(viii) Determine whether a “fact” has changed over time

(f) Maintain acceptable writing mechanics

Motivation

The Internal and external factors that stimulate desire and energy in people to be committed to a job, role or subject or to make an effort to attain a goal is termed as motivation. Simply put, it is the desire to do things. It is critical for the successful definition and attainment of goals. It is the result of an interaction of both conscious and unconscious factors such as:

1. Intensity of desire or need,
2. Incentive or reward value of the goal, and
3. Expectations of the individual and of his or her peers.

X and Y theory of motivation

X Theory and the Y Theory are two contrasting theories on human motivation and management that were expounded in the 1960s by the Social psychologist, Douglas McGregor of MIT. McGregor championed Theory Y as the basis of good management practice and promoted the argument that workers were not mere cogs in the company machinery—a belief supported by the Theory X-Type organizations.

Theory X

This theory assumed that employees were not inherently motivated and disliked working, which in turn encouraged an authoritarian style of management. As per this view, management must be directive. This style of management assumes that workers:

- Dislike working.
- Avoid responsibility and need to be directed.
- Need to be controlled, coerced, and threatened to deliver what's needed.
- Need supervision at every step, with adequate controls in place.
- Require enticement to produce results; failing which they have no ambition or incentive to work.

Organizations that subscribe to this theory tend to be top heavy, with managers and supervisors required at every step to control the workers. There is minimum delegation of authority with a centralized command structure.

McGregor believed that X-Type workers were in fact usually the minority, and yet in mass organizations, such as a large scale production environment, Theory X management may be required and may well be unavoidable.

Theory Y

This theory puts forth a participative and decentralized style of management. It assumes that employees are happy to work, are self-motivated and creative, and enjoy working with greater responsibility. It assumes that workers:

- Take responsibility and are motivated to fulfil the goals they are given.
- Seek and accept responsibility and can work with minimal direction.
- Consider work as a natural part of life and solve work-related problems creatively.

Erg theory of motivation

The ERG theory is a theory in psychology which has been proposed by Clayton Alderfer.

Alderfer further developed Maslow's hierarchy of needs by classifying the hierarchy into his ERG theory (Existence, Relatedness and Growth). As per this theory, the existence group is concerned with providing the requirements for basic material existence of humans. These include the items that Maslow categorized as physiological and safety needs.

The second group of needs is that of relatedness—the in-born need that people have for developing and sustaining important interpersonal relationships. It takes social interaction for these social and status-related desires to be satisfied. In addition, this group of needs align with Maslow's social need and the external component of Maslow's esteem classification.

Finally, Alderfer isolates growth needs: an intrinsic desire for personal development. These include the intrinsic component from Maslow's esteem category and the characteristics included under self-actualization.

Alderfer categorized the lower order needs (Physiological and Safety) into the Existence category. He fit Maslow's interpersonal love and esteem needs into the Relatedness category. The Growth category contained the self-actualization and self-esteem needs. Alderfer also proposed a regression theory to go along with the ERG theory. He said that when needs in a higher category are not met then individuals redouble the efforts invested in a lower category need. For example, if self-actualization or self-esteem is not met then individuals will invest more effort in the relatedness category in the hopes of achieving the higher need.

SECTION 6
MOCK TESTS

Chapter

9

Mock Test 1 Based on IPU CET

Total Time: 150 Minutes

Total Marks: 150

Instructions

1. There are four sections in the question paper.

Sr. No.	Sections	Number of Questions
1	Management Aptitude and Communication Skills	37
2	English Language and Comprehension	38
3	General Awareness	38
4	Logical and Analytical Ability	37
Total		150

2. This is an objective test. Each question has 4 responses. Candidate should choose an appropriate response.
3. There is a total of 150 questions carrying 4 marks each.
4. One mark will be deducted for each incorrect answer.
5. Candidates are advised to read all options thoroughly.
6. No clarification of any sort relating to the question paper is permitted.

SECTION I

MANAGEMENT APTITUDE AND COMMUNICATION SKILLS

- 1. A 'call' means**

 - (a) an internet terminology
 - (b) contacting a prospective customer
 - (c) visiting a call centre
 - (d) attending to a complaint

(IPU CET 2015)

- 2. Probing in a communication process is**

 - (a) an attempt to gain additional information
 - (b) making judgements
 - (c) an attempt to explain what the sender meant
 - (d) None of the above

(IPU CET 2014)

- 3. Customer retention can be ensured by**

 - (a) offering freebies
 - (b) offering loans at low rates
 - (c) personalised services
 - (d) giving incentives

(IPU CET 2015)

- 4. A speech designed to change or reinforce the audience's beliefs or actions. This is an example of**

 - (a) informative speech
 - (b) ceremonial speech
 - (c) persuasive speech
 - (d) None of these

(IPU CET 2014)

- 5. After replacing the Foreign Exchange Regulation Act (FERA), the Foreign Exchange Management Act (FEMA) came into force on**

 - (a) 1st April, 1998
 - (b) 31st May, 2002
 - (c) 31st March, 2000
 - (d) None of the above

(IPU CET 2015)

- 6. The tagline 'The Edge is Efficiency' is used by**

 - (a) BSE
 - (b) NASDAQ
 - (c) NYSE
 - (d) EURONEXT

(IPU CET 2014)

- 7. The collective perceptions and impressions people have formed about an organisation, its products and/or its services, is known as its**

 - (a) brand value
 - (b) brand asset
 - (c) brand image
 - (d) brand attribute

(IPU CET 2015)

- 8. In a disappointing newsletter**

 - (a) it is important to apologise
 - (b) apology can be made with reason
 - (c) no apology is offered for the decision
 - (d) None of the above

(IPU CET 2014)

- 9. Which of the following is a power generating company?**

 - (a) Reliance
 - (b) Hindalco
 - (c) TISCO
 - (d) HPCL

(IPU CET 2015)

- 10. Ashok Leyland is owned by the**

 - (a) Tatas
 - (b) Birlas
 - (c) Hinduja
 - (d) None of these

(IPU CET 2014)

- 11. Which of the following does not come under Maharatna status?**

 - (a) Bharat Heavy Electrical Limited
 - (b) Coal India Limited
 - (c) Bharat Electronics Limited
 - (d) Steel Authority of India Limited

(IPU CET 2014)

12. Among the following, which form of unemployment is rampant in rural India

- (a) Disguised unemployment
- (b) Seasonal unemployment
- (c) Frictional unemployment
- (d) Both 'a' and 'b'

(IPU CET 2015)

13. Business activity is primarily concerned with making profit by

- (a) marketing
- (b) production
- (c) distribution exchange
- (d) All of these

(IPU CET 2014)

14. In marketing term, attitude can best be defined as

- (a) rude behaviour of sales person
- (b) rude behaviour of consumer
- (c) mental state of consumer
- (d) ego of the marketing executive

(IPU CET 2014)

15. Mass communication with customers or potential customers, usually through paid public media is known as

- (a) publicity
- (b) sales promotion
- (c) public relations
- (d) advertising

(IPU CET 2015)

16. 'Load' means

- (a) fee charged when one buys or sells the units of a fund.
- (b) share price at the time of buying
- (c) stamp duty
- (d) fund value

(IPU CET 2015)

17. Which is not the stage of product life cycle?

- (a) Introduction
- (b) Increase
- (c) Decline
- (d) Maturity

(IPU CET 2014)

18. In general grapevine is related to learn something informally by means of

- (a) gossip
- (b) rumour
- (c) Both 'a' and 'b'
- (d) None of these

(IPU CET 2014)

19. A 'cold call' means

- (a) a futile exercise
- (b) calls made in cold countries
- (c) sales talk
- (d) calls made without prior appointment

(IPU CET 2015)

20. 'Functional Finance' is associated with

- (a) Adacns
- (b) Abba P Lerner
- (c) Adolph Wagner
- (d) Adam Smith

(IPU CET 2014)

21. Which of the following services provided by a bank in India is not liable for taxation for service tax as per existing laws?

- (a) Credit cards
- (b) Safe deposit lockers
- (c) Merchant banking services
- (d) None of the above

(IPU CET 2015)

22. In which year, 'The Banking Regulation Act' was passed?

- (a) 1947
- (b) 1948
- (c) 1949
- (d) 1961

(IPU CET 2014)

23. Which of the following is a global international organisation dealing with the rules of trade between nations?

- (a) IMF
- (b) WTO
- (c) UNO
- (d) ITA

(IPU CET 2015)

24. The characteristics of a group include

- (a) activities or tasks
- (b) common objectives
- (c) membership or association with group
- (d) All of the above

(IPU CET 2014)

25. Which brand uses the slogan 'Made for Each Other' for its cigarettes?

- (a) Cavenders
- (b) Red and White
- (c) Wills
- (d) Four Square

(IPU CET 2015)

26. 'NRE' deposit stands for

- (a) Non-Resident External Deposit
- (b) Non-Resident Exchange Deposit
- (c) Non-Refundable External Deposit
- (d) Non-Resident Extended Deposit

(IPU CET 2015)

27. In an economy the sectors are classified into public and private on the basis of

- (a) employment conditions
- (b) nature of economic activities
- (c) ownership of enterprises
- (d) use of raw materials

(IPU CET 2014)

28. The term 'disinvestment' refers to

- (a) selling of government stake and then buying them back
- (b) selling of public sector stake
- (c) selling of government stake in public sector undertakings
- (d) the process of buying an asset to meet financial goals

(IPU CET 2015)

29. Marketing of goods experimentally in several carefully selected areas before releasing them on a wide scale is known as

- (a) sampling
- (b) segmentation
- (c) segregation
- (d) test-marketing

(IPU CET 2015)

30. A _____ communication is the traditional form of communication in which employees sent messages to their seniors.

- (a) bottom down
- (b) lower up
- (c) lower down
- (d) bottom up

(IPU CET 2014)

31. Digjam is a product of

- (a) Oswal Enterprise
- (b) Tata Enterprise
- (c) Reliance Enterprise
- (d) Birla Enterprise

(IPU CET 2014)

32. Which of the following is not a consumer right as per Consumer Protection Act, 1986?

- (a) Right to Consumer Education
- (b) Right to Negotiate
- (c) Right to Seek Redressal
- (d) Right to be Informed

(IPU CET 2015)

33. ETOP stands for

- (a) Entry Threats and Opportunity Position
- (b) Environmental Technology Opportunities Portal
- (c) Energy Table On Price
- (d) None of the above

(IPU CET 2014)

34. The segmentation of markets based on the gender of the customer is a type of

- (a) geographic segmentation
- (b) demographic segmentation
- (c) socio-cultural segmentation
- (d) lifestyle-based segmentation

(IPU CET 2015)

35. Which of the following is/are the characteristic/s of an entrepreneur?

- (a) Ability to innovate
- (b) Capacity to face uncertainties
- (c) It is a creative activity
- (d) All of the above

(IPU CET 2014)

36. Which of the following is treated as artificial currency?

- (a) ADR
- (b) GDR
- (c) SDR
- (d) None of the above

(IPU CET 2015)

37. A situation in which consumer purchases are unplanned is called

- (a) latent demand
- (b) impulse buying
- (c) irregular demand
- (d) None of these

(IPU CET 2015)

SECTION II

ENGLISH LANGUAGE AND COMPREHENSION

Directions (Q. 38–45): Read the passage carefully and answer the questions given below.

Although speech is generally accepted as the most advanced form of communication, there are many ways of communicating without using words. In every known culture, signals, signs, symbols and gestures are commonly utilised as instruments of communication. There is a great deal of agreement among communication scientists as to what each of these methods is and how each differs from the others. For instance, the basic function of any signal is to impinge upon the environment in such a way that it attracts attention, as, e.g., the dots and dashes that can be applied in a telegraph circuit. Coded to refer to speech, the potential for communication through these dots and dashes—short and long intervals as the circuit is broken—is very great. Less adaptable to the codification of words, signs also contain agreed upon meaning, that is, they convey information in and of themselves. Two examples are the hexagonal red sign that conveys the meaning of stop and the red and white swirled pole outside a shop, that communicates the meaning of barber.

Symbols are more difficult to describe than either signals or signs because of their intricate relationship with the receiver's cultural perceptions. In some cultures, applauding in a theatre provides performers with an auditory symbol of approval. In other cultures, if done in unison, applauding can be a symbol of the audience's discontent with the performance. Gestures such as waving and handshaking also communicate certain cultural messages.

Although signals, symbols and gestures are very useful, they also have a major disadvantage in communication. They usually do not allow ideas to be shared without the sender being directly adjacent to the receiver. Without an exchange of ideas, interaction comes to a halt. As a result, means of communication intended to be used across long distances and extended periods must be based upon speech. To radio, television and

telephone, one must add fax, paging systems, electronic mail and the internet and no one doubts but that there are more means of communication on the horizon.

(IPU CET 2014)

- 38. Applauding was cited as an example of**
- (a) a signal (b) a sign
(c) a symbol (d) a gesture
- 39. The word 'intricate' in second paragraph could best be replaced by which of the following?**
- (a) Inefficient (b) Complicated
(c) Historical (d) Uncertain
- 40. The word 'potential' in first paragraph could be replaced by**
- (a) range (b) advantage
(c) organisation (d) possibility
- 41. The word 'it' in paragraph first refers to**
- (a) function (b) signal
(c) environment (d) way
- 42. The phrase 'impinge upon' in first paragraph is closest in meaning to**
- (a) intrude (b) improve
(c) vary (d) prohibit
- 43. What does the author say about speech?**
- (a) It is the only true form of communication
(b) It is dependent upon the advances made by inventors
(c) It is necessary for communication to occur
(d) It is the most advanced form of communication
- 44. Which of the following would be the best title for of the passage?**
- (a) Signs and Signals
(b) Gestures
(c) Communication
(d) Speech

45. Why were the telephone, radio, and TV invented?

- (a) People were unable to understand signs, symbols and signals
- (b) People wanted to communicate across long distances
- (c) People believed that signs, signals and symbols were obsolete
- (d) People wanted new forms of entertainment

Directions (Q. 46–52): Read the passage carefully and answer the questions given below

A leading Indian industrialist in a recent article on ways to strengthen India's economy has drawn attention to the problems of inflation and industrial sickness among other things. One of the main reasons for industrial sickness in our country has been the fact that business and industrial managers, have not been able to look beyond the immediate future. They have been too preoccupied with their attempts to report favourable results for the current year-higher profits and larger dividends to the share holders. The planning horizon has hardly ever exceeded five years. Investments have been inadequate for new plants and towards diversification and expansions. Modernisation and asset creation has seriously lagged behind. In business, growth is needed for survival, one has to grow 'if one does not want to be wiped out. This is particularly true today with liberalisation of imports and increasing competition. Moreover, growth and higher productivity create employment and higher employment creates larger markets both for industrial and consumer products. It was Henry Ford, who brought home the need for the creation of a larger and a more stable middle class, that is, a larger number of people who can afford more and more of goods and services. Even after forty years of independence our industrialists have not been able to shed and petty shopkeeper's mentality and our highly educated management has tagged along merrily and without concern.

(IPU CET 2014)

46. 'The planning horizon has hardly ever exceeded five years' implies

- (a) planning should not be for a period of less than five years
- (b) the planning process is very time consuming
- (c) planning should take care of all probable ups and downs in the next five years period
- (d) Five year period is too short for successful implementation of plans

47. Why did Henry Ford stress the need for a more stable middle class?

- (a) They are mostly service oriented
- (b) They do not have shopkeeper mentality'
- (c) They can afford to buy more and more expensive goods
- (d) They are most unstable

48. In order to improve the condition of Indian industries, the industrialist should do all of the following except

- (a) giving up the narrow mentality which very small shopkeepers generally have
- (b) striving to earn long term profits
- (c) encouraging competition from industrialists within the country and from abroad
- (d) resorting to long term planning for industrial growth and expansion in diverse fields

49. The leading industrialist attributes industrial sickness mainly to

- (a) lacunae in five year plans
- (b) preoccupations of managers with matters unrelated to business
- (c) higher profits and larger dividends to shareholders
- (d) lack of foresight among managers

50. According to the passage, growth and increasing productivity leads to

- (a) imposition of restrictions on imports
- (b) employment and thus provide an outlet to industrial and consumer products
- (c) encouragement to export of excess consumer goods
- (d) disproportionate surplus of commodities

51. According to the passage, the net gains pursued by managers are at the cost of

- (a) diversification, modernisation and asset creation
- (b) availability of markets for industrial and consumer products
- (c) inflation and industrial sickness
- (d) liberalisation of imports and increasing competition

52. Which of the following short comings of Indian industrialists has been highlighted by the author?

- (a) They invest unreasonable high amount on diversification and expansion
- (b) They are more concerned for immediate net gains than for developmental activities
- (c) They are reluctant to maintain the shopkeeper mentality
- (d) They are less concerned for payment of dividends to shareholders

Directions (Q. 53–58): In each of the following, out of the given alternatives, choose the word which is opposite in meaning to the given word.

(IPU CET 2015)

53. Chronic

- (a) Acute
- (b) Fleeting
- (c) Irregular
- (d) Temporary

54. Sacrosanct

- (a) Demanding
- (b) Permitting
- (c) Irreverent
- (d) Worldly

55. Integrate

- (a) Isolate
- (b) Analyse
- (c) Mark
- (d) Distribute

56. Alien

- (a) Native
- (b) Domiciled
- (c) Natural
- (d) Resident

57. Confess

- (a) Refuse
- (b) Deny
- (c) Contest
- (d) Contend

58. Absolute

- (a) Deficient
- (b) Faulty
- (c) Limited
- (d) Scarce

Directions (Q. 59–64): In each of the following questions, out of the given alternatives, choose the one which best expresses the meaning of the given word.

(IPU CET 2014)

59. IMMACULATE

- (a) refined
- (b) pure
- (c) faithful
- (d) splendid

60. EBULLIENT

- (a) Gilted
- (b) Enthusiastic
- (c) Luscious
- (d) Arrogant

61. IGNOMINIOUS

- (a) shameful
- (b) fruitful
- (c) unexpected
- (d) expected

62. INNOCUOUS

- (a) harmless
- (b) insidious
- (c) insolvent
- (d) invasion

63. CHICANERY

- (a) choleric
- (b) cogent
- (c) trickery
- (d) confess

64. CHAGRINED

- (a) frustrated
- (b) annoyed
- (c) disappointed
- (d) tired

Directions (Q. 65–67): Fill in the blanks by selecting the most appropriate alternative from the given choices under each sentence.

(IPU CET 2015)

65. The _____ of glory lead, but to the _____ .

- (a) ways, happiness
- (b) acts, prosperity
- (c) paths, grave
- (d) achievements, sufferings

66. Due to _____ rainfall this year, they had to _____ cuts in water supply.

- (a) scantily, lift
- (b) heavy, regulate
- (c) inadequate, impose
- (d) sufficient, enforce

67. He is so _____ that everyone is always _____ to help his work.

- (a) helpful, reluctant
- (b) aloof, co-operative
- (c) magnanimous, eager
- (d) miserly, ignorant

Directions (Q. 68–69): Fill in the blanks in the following sentences by selecting the most appropriate alternative from amongst the given choices under each sentence.

(IPU CET 2014)

68. In all these and a thousand other details you and I please ourselves and _____

- (a) ask of no one's leave.....
- (b) ask no one's leave
- (c) ask leave of no one
- (d) ask from anyone no leave

69. They praised him _____

- (a) and pointed out it was a good hit
- (b) and exclaimed it was a good hit
- (c) and said that it was a good hit
- (d) and showed that it was a good hit

Directions (Q. 70–72): In each of the following, a word has been written in four different ways, out of which only one is correctly spelt. Find the correct spelt word.

(IPU CET 2015)

70.

- (a) Obliterate
- (b) Oblitirate
- (c) Obleiterate
- (d) Obletirate

71.

- (a) Philenthropist
- (b) Philanthropiest
- (c) Philanthropist
- (d) Phileanthropist

72.

- (a) Billigerent
- (b) Biligerent
- (c) Belligerent
- (d) Beligerant

Directions (Q. 73–75): In the following questions six sentences are given. The first and the sixth sentences are numbered 1 to 6. The 2nd, 3rd, 4th and 5th sentences are not in proper sequence and named P, Q, R and S. Select the correct sequence of these four sentences from the responses given below each question.

73.

1. The Ganga is a holy river to the Hindus
 - P. Every Hindu wishes to die on the bank of the holy Ganga, so that he may reach heaven.
 - Q. It comes from the Gangotri mountains in the Himalayas.
 - R. It is one of biggest rivers in India.
 - S. The Hindus call the Ganga 'Mother Ganga.'
 6. At Haridwar, it leaves the mountains and enters the plains.
- (a) SQRP (b) PRQS
(c) RSQP (d) SPRQ

74.

1. The two men who were following
 - P. and who were separated from the tigress by the rock,
 - Q. when they saw me stop
 - R. a few yards behind me
 - S. stood still
 6. and turn my head
- (a) RPSQ (b) QPSR
(c) RQPS (d) RQSP

75.

1. Science improves our living conditions, but
 - P. rejecting or accepting anything, provided
 - Q. and not be afraid of
 - R. teach us to think straight
 - S. it should also
 6. there are sufficient reasons for doing so.
- (a) SRQP (b) SRPQ
(c) RSPQ (d) PQSR

SECTION III

GENERAL AWARENESS

- 76. Headquarter of United Nations Children's Fund is in**
- (a) Washington DC (b) Paris
(c) New York City (d) Geneva
- 77. ING Vysya Bank which was a privately owned Indian multinational bank, merged with Kotak Mahindra Bank in**
- (a) 2016 (b) 2015
(c) 2014 (d) 2013
- 78. The International Finance Corporation was founded in 1956. The headquarters of IFC is in**
- (a) Geneva (b) Washington D.C.
(c) Rome (d) The Hague
- 79. The World Bank (WB) is an international financial institution that provides loans to developing countries for capital programs. World Bank (WB) is located at**
- (a) Washington DC (b) London
(c) New York (d) Paris
- 80. FDI is actively utilized in open markets rather than closed markets for investors. It is a _____ investment.**
- (a) Fixed (b) On border
(c) Cross border (d) Indirect
- 81. In a regressive tax system**
- (a) The amount of tax paid increases with income
(b) The average rate of tax is constant as income increases
(c) The average rate of tax falls as income increases
(d) The average rate of tax increases with more income
- 82. _____ for salaried people and _____ for small businessmen and professionals, are the two income tax returns filing forms that have been introduced by the Income tax department and are aimed at simplifying the process of filing the income tax.**
- (a) Sahaj, Sugam
(b) Sugam, Saral
(c) Sugam, Sahaj
(d) Saral, Sahaj
- 83. Which of the following can the government not use directly to control the economy?**
- (a) Investment in education
(b) Pay rates in the public sector
(c) Pay rates within the private sector
(d) Benefits available for the old and poor
- 84. A bull taming sport played in Tamil Nadu as a part of Pongal celebrations, in which the forcible knocking down of a bull is practiced, is known as:**
- (a) Marramattu (b) Kalighattu
(c) Jallikattu (d) Thiruvodu
- 85. The Reserve Bank of India (RBI) is the India's central bank. It is the regulator of banking system in India and is the banker of the banks. Its functions are governed by**
- (a) Companies Act, 1956
(b) Reserve Bank of India Act, 1934
(c) Banking Regulation Act 1949
(d) None of the above
- 86. Stirling Prize is for**
- (a) Chemistry (b) Architecture
(c) Physics (d) Peace
- 87. Which country is the largest exporter of Diamonds in the world?**
- (a) China (b) South Africa
(c) India (d) Belgium
- 88. _____ are formed through the change of igneous and sedimentary rocks.**
- (a) Igneous rocks
(b) Sedimentary rocks
(c) Metamorphic rocks
(d) None of these

- 89. The Securities and Exchange Board of India (SEBI) is the regulator of securities market in India which are owned by Government of India. It is a _____ body established on April 12, 1992.**
- (a) Constitutional (b) Advisory
(c) Statutory (d) Non-registered
- 90. Which of the following is the slogan of the World Wildlife Fund (WWF)?**
- (a) Earth and nature
(b) Nature is life
(c) For a living planet
(d) Life and planet
- 91. Vishu is the first day of _____ calendar.**
- (a) Chinese (b) Hijri
(c) Buddhist (d) Malayalam
- 92. The Generali group in the Future Generali insurance venture hails from**
- (a) Germany (b) USA
(c) France (d) Italy
- 93. ICICI Lombard General Insurance is the largest private sector general insurance company in India. The percentage stake of ICICI Bank in ICICI Lombard General Insurance is:**
- (a) 66% (b) 64%
(c) 80% (d) 85%
- 94. The full form of IPO is**
- (a) Initial Public Offer
(b) Initial Public Ownership
(c) Investment of Public offering
(d) None of the above
- 95. Which multinational company has recently launched two new initiatives 'My Business' and 'Digital Unlocked'?**
- (a) Intel (b) Google
(c) Microsoft (d) Facebook
- 96. 'Hum Hain Naa' is the punchline of which bank?**
- (a) SBI (b) PNB
(c) ICICI (d) HSBC
- 97. How many Prime Ministers of India have been conferred the Bharat Ratna – the highest civilian award?**
- (a) Six (b) Seven
(c) Eight (d) Nine
- 98. In a planned or command economy, all the economic decisions are taken by the**
- (a) government (b) voters
(c) workers (d) consumers
- 99. National Voter's Day' is celebrated on which of the following days?**
- (a) Jan 12 (b) Jan 15
(c) Jan 21 (d) Jan 25
- 100. What is the capital of Papua New Guinea?**
- (a) Port Moresby (b) Ulaanbaatar
(c) Nassau (d) Baku
- 101. ITU is the oldest global international organisation. It was founded in 1865 and its headquarters are in Geneva, Switzerland. In ITU, T stands for**
- (a) Telecom
(b) Transportation
(c) Trade
(d) Telecommunication
- 102. The study of particular species is called**
- (a) Agronomy (b) Ecology
(c) Autecology (d) None of these
- 103. Where is the Tadoba National Park?**
- (a) Maharashtra (b) Tamil Nadu
(c) Kerala (d) Karnataka
- 104. In CIBIL, B stands for _____.**
- (a) Bharat (b) Bank
(c) Biology (d) Bureau
- 105. Startup Mentorship Circle, a unique platform to help in connecting start-ups with the global marketplace was launched by**
- (a) CII (b) FICCI
(c) ASSOCHAM (d) NITI Aayog
- 106. Which of the following is known as Smart Money?**
- (a) Internet Banking
(b) Demand drafts of Banks
(c) Credit cards
(d) FDRs in Banks

107. Net worth of a business means:

- (a) Total Share Capital
- (b) Total Assets
- (c) Total Assets – Total Liabilities
- (d) Fixed Assets – Current Liabilities

108. Lionel Messi is a famous football player of which country?

- (a) Argentina
- (b) Germany
- (c) Spain
- (d) Brazil

109. The minimum capital requirement for an entity to start a payment bank in India is

- (a) Rs. 50 crore
- (b) Rs. 100 crore
- (c) Rs. 150 crore
- (d) Rs. 500 crore

110. Baku which is famous for the mining of mineral oil is located in

- (a) Turkmenistan
- (b) Uzbekistan
- (c) Azerbaijan
- (d) Brazil

111. World Yoga Day is celebrated on

- (a) 10th June
- (b) 11th December
- (c) 21st June
- (d) 21st December

(IPU CET 2015)

112. Which is the highest literary award of the world?

- (a) Booker Prize
- (b) International Rubery Book Award
- (c) America Award
- (d) Sahitya Akademi Award

(IPU CET 2015)

113. The World Environment Day is celebrated on

- (a) 5th June
- (b) 8th June
- (c) 11th June
- (d) 18th June

(IPU CET 2015)

SECTION IV

LOGICAL AND ANALYTICAL ABILITY

114. If 'ZOOM' is coded as 13, 'PUSA' will be coded as

- (a) 15
- (b) 16
- (c) 17
- (d) 18

(IPU CET 2014)

115. In a certain code language, 'Sue Re Nik' means 'She is brave', 'Pi Sor Re Nik' means 'She is always smiling' and 'Sor Re Zhi' means 'Is always cheerful'. What is the code used for the word 'smiling'?

- (a) Sor
- (b) Nik
- (c) Re
- (d) Pi

(IPU CET 2015)

116. If 'CORRESPONDENCE' is coded as 'NUTTRAXUPQRPNR' in a certain code, how will 'SCOPE' be coded?

- (a) AUXNR
- (b) ANUXR
- (c) RNUXA
- (d) XUPAR

(IPU CET 2014)

117. Today is Wednesday, what will be the day after 94 days?

- (a) Monday
- (b) Tuesday
- (c) Wednesday
- (d) Sunday

(IPU CET 2014)

Directions (Q. 118–121): In the questions given below establish the relationship between the two words/numbers. Then, from the given options select one which has the same relationship as of the given two words/numbers.

118. Daybreak: Bedstead

- (a) Earthen: Brazen
- (b) Fresh: Tired
- (c) Nocturnal: Diurnal
- (d) Eyeglass: Landmark

(IPU CET 2014)

119. 42 : 56

- (a) 81 : 100
- (b) 72 : 90
- (c) 90 : 92
- (d) 100 : 121

(IPU CET 2015)

120.08 : 28 :: 15 : ?

- (a) 63
- (b) 126
- (c) 65
- (d) 124

(IPU CET 2014)

121. Chimney: Smoke

- (a) Tea: Kettle
- (b) Clay: Ceramic
- (c) House: Roof
- (d) Gun: Bullet

(IPU CET 2015)

Directions (Q. 122): In the following question there is a series. The one term is missing in the series. Find out the missing term.

122. K P A, L Q B, M R C, N S D,

- (a) T O E
- (b) O E T
- (c) E T O
- (d) O T E

(IPU CET 2014)

123. Find out the wrong number in the series.

3, 12, 36, 144, 431, 1728, 5184

- (a) 5184
- (b) 36
- (c) 144
- (d) 431

(IPU CET 2015)

124. XWA, VTC, SPF, OKJ, ?

- (a) JDN
- (b) JEO
- (c) LPN
- (d) JDP

(IPU CET 2015)

125. Find out the wrong number in the series.

15, 45, 90, 360, 1080, 2160, 6480

- (a) 90
- (b) 360
- (c) 6480
- (d) 2160

Directions (Q. 126): In the following question there is a series. Find out the missing alphabets.

126. -yyx-xyx-yxyx-y

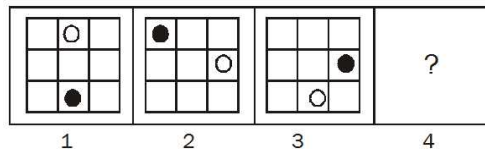
- (a) yxy
- (b) xyxy
- (c) yxyx
- (d) xyxx

(IPU CET 2014)

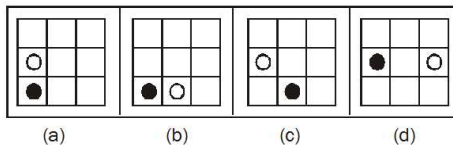
Directions (Q. 127-129): In each of the questions given below which one of the answer figures should come in place of question mark, if the sequence continues.

127.

Problem Figures



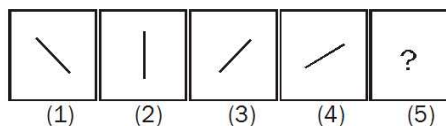
Answer Figures



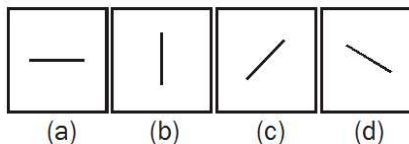
(IPU CET 2015)

128.

Problem Figure



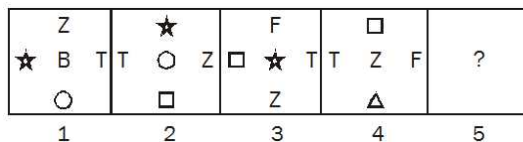
Answer Figures



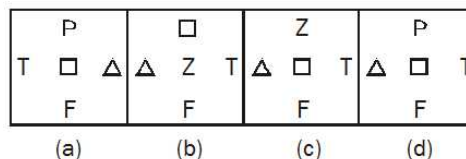
(IPU CET 2014)

129.

Problem Figures



Answer Figures



(IPU CET 2015)

130. Ram walks 10 m South from his house, turns left and walks 25 m, again turns left and walks 40 m, then turns right and walks 5 m to reach the school. In which direction the school is from his house?

- (a) North
- (b) South-West
- (c) North-East
- (d) East

(IPU CET 2015)

131. A train runs 120 km in West direction, 30 km in South direction and then 80 km in East direction before reaching the station. In which direction is the station from the train's starting point?

- (a) South-West (b) North-West
(c) South-East (d) South

(IPU CET 2014)

132. Ankit started walking towards North. After walking 30 m, he turned towards left and walked 40 m. He, then turned left and walked 30 m. He again turned left and walked 50 m. How far is he from his original position?

- (a) 50 m (b) 40 m
(c) 30 m (d) 10 m

(IPU CET 2015)

133. Kusum is the wife of Ravi. Govind and Prabhu are brothers. Govind is the brother of Ravi. Prabhu is Kusum

- (a) cousin (b) brother
(c) brother-in-law (d) uncle

(IPU CET 2015)

134. Madhuri is the wife of Rajesh and Rajesh is the brother of Mahesh. Mahesh is the uncle of Pranav. What is Pranav's relation with Madhuri?

- (a) Daughter (b) Nephew
(c) Sister-in-law (d) Niece

135. Introducing a woman, a man said, 'Her mother's husband's sister is my aunt. How is the man related to the woman?

- (a) Nephew (b) Brother
(c) Uncle (d) Cousin

(IPU CET 2014)

136. Akash was born on 3rd March 1980. Sanjiv was born 4 days before Akash. The Republic day that year fell on Saturday. Which day was Sanjiv's birthday?

- (a) Wednesday (b) Friday
(c) Thursday (d) Tuesday

(IPU CET 2014)

137. If 15 apples and 20 oranges cost as much as 20 apples and 15 oranges. How do you compare the costs of two?

- (a) Apples are as costly as oranges
(b) Oranges are costly than apples
(c) Apples are costly than oranges
(d) None of the above

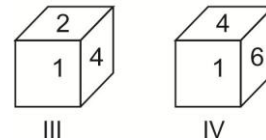
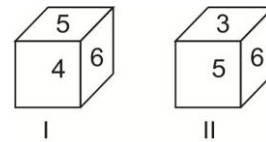
(IPU CET 2014)

138. At what angle the hands of a clock are inclined at 15 min past 5?

- (a) $72\frac{1}{2}^\circ$ (b) $67\frac{1}{2}^\circ$
(c) $58\frac{1}{2}^\circ$ (d) 64°

(IPU CET 2014)

139. From the given four positions of a single dice, find the digit at the face opposite to the face having digit 3.



- (a) 1 (b) 2
(c) 4 (d) 5

(IPU CET 2015)

Directions (Q. 140–143): Read the following information carefully and answer the questions given below it.

Five friends Ramesh, Suresh, Mahesh, Dinesh and Ganesh are sitting on a bench.

- (i) Ramesh is sitting next to Suresh.
(ii) Mahesh is sitting next to Dinesh.
(iii) Dinesh is not sitting with Ganesh.
(iv) Ganesh is on the left end of the bench.
(v) Mahesh is on second position from right.
(vi) Ramesh is on the right side of Suresh and to the right side of Ganesh.

(IPU CET 2014)

140. What is the position of Suresh?

- (a) Second from right
- (b) Centre
- (c) Extreme left
- (d) Second from left

141. At what position is Ramesh sitting?

- (a) Between Suresh and Mahesh
- (b) Between Dinesh and Mahesh
- (c) Between Ganesh and Dinesh
- (d) Between Mahesh and Ganesh

142. What is the position of Dinesh?

- (a) Extreme left
- (b) Extreme right
- (c) Third from left
- (d) Second from left

143. Who is sitting at the centre?

- (a) Ramesh
- (b) Suresh
- (c) Mahesh
- (d) Dinesh

144. Five students participated in the scholarship examination. Sudha scored higher than Puja. Kavita scored lower than Suma but higher than Sudha. Mamta scored between Puja and Sudha. Who scored lowest in the examination?

- (a) Kavita
- (b) Puja
- (c) Mamta
- (d) Sudha

(IPU CET 2015)

Directions (Q. 145–147): In the following questions, there are four options. Find out the one that is correct in verification of the given statement.

(IPU CET 2015)

145. A train always has

- (a) Engine
- (b) Rails
- (c) Driver
- (d) Guard

146. Which one of the following is always with 'Bargain'?

- (a) Sumptuousness
- (b) Exchange
- (c) Triviality
- (d) Eloquence

147. Which one of the following is always found is 'Wonder'?

- (a) Crowd
- (b) Lumber
- (c) Astonishment
- (d) Rustic

Directions (Q. 148–149): In the following questions, find out the most suitable answer.

148. The Selection Board call the candidates for the interview because

- (a) they want to see the candidate's physical appearance
- (b) it is then easier to decide which candidate is fit for the job
- (c) the members of the Selection Board have no other work during office hours
- (d) None of the above

(IPU CET 2014)

149. Now a days many young people use high heeled shoes because

- (a) these shoes increase the heights of the young people
- (b) it comes under fashion
- (c) it is safer for them to wear these types of shoes
- (d) they practice to balance their bodies after wearing such shoes

(IPU CET 2014)

Directions (Q. 150): In the following question find out the most suitable answer.

150. If today is Sunday, then what day of the week will be 3 days after tomorrow?

- (a) Thursday
- (b) Wednesday
- (c) Saturday
- (d) Friday

(IPU CET 2015)

ANSWERS AND EXPLANATIONS

1. In marketing terms, calling involves making contact with a likely buyer or a prospective customer and persuading him/her to buy the particular product or service.
The correct answer is b.
2. 'To probe' is to delve deeper into an issue or a piece of information. Probing, as a communication technique also involves gaining additional information.
The correct answer is a.
3. One of the most effective ways to retain customers is to provide personalised services that are customised to meet the specific requirements of the customers.
The correct answer is c.
4. Persuasive speeches are used to convince, incite action and enhance belief, etc.
The correct answer is c.
5. FEMA 1999 came into force on 1st June, 2002.
The correct answer is d.
6. Bombay Stock Exchange (BSE) uses the tagline 'The Edge is Efficiency'.
The correct answer is a.
7. Brand image is the way in which a brand is perceived by the customers with respect to the products offered and their value addition to the customer.
The correct answer is c.
8. In a disappointing newsletter, a decision is made without any rationale or explanation being provided for it. There is no apology or reasoning provided.
The correct answer is c.
9. Reliance is an Indian conglomerate holding company. It is a power generating company.
The correct answer is a.
10. Ashok Leyland, an Indian automobile manufacturing company based in Chennai, is owned by the Hinduja Group.
The correct answer is c.
11. Bharat Electronics Limited enjoys the Navratna status.
The correct answer is c.
12. Disguised unemployment is highly prevalent in rural India. It refers to the condition wherein if a labourer stops working, it has no impact on the output. In other words, it is the condition in which the marginal productivity of a labour is zero.
The correct answer is a.
13. Any business activity primarily aims to generate profits by performing several activities such as operations, marketing, production and distribution exchange, etc.
The correct answer is d.
14. In marketing terms, the rude behaviour demonstrated by a sales person is defined as attitude.
The correct answer is a.
15. Advertising is a paid form of communication used to encourage or persuade an audience to take some desirable action.
The correct answer is d.
16. 'Load' is the name given to the fee levied when one buys or sells the units of a fund. It is an extra burden on the buyer or the seller.
The correct answer is a.
17. The stages of a product's life cycle are: Introduction, growth, maturity and decline.
The correct answer is b.
18. Grapevine refers to the unofficial communication channels present in any group – the informal sharing of information through gossip and rumour.
The correct answer is c.
19. In marketing, a cold call means an unplanned, first contact with a prospective customer.
The correct answer is d.
20. Functional finance is an economic theory proposed by Abba P Lerner based on the principle of effective demand and Chartalism.
The correct answer is b.

21. Of the various services provided by banks, credit cards are not liable for taxation for service tax. The other two, that is, safe deposit lockers and merchant banking services are taxable services.
The correct answer is a.
22. 'The Banking Regulation Act' was passed in the year 1949.
The correct answer is c.
23. Established on 1st January, 1955, the World Trade Organisation (WTO) has a mandate to supervise and liberalise international trade.
The correct answer is b.
24. A group is characterised by a set of norms and characteristics. Some of the identifiable characteristics of a group are interdependence, social interaction, perception of a group, commonality of purpose and favouritism, etc.
The correct answer is d.
25. Wills uses the slogan 'Made for each other'.
The correct answer is c.
26. NRE Deposit stands for Non-Resident External Deposit. This deposit scheme has been launched to encourage NRI investment in India.
The correct answer is a.
27. In an economy, the sectors are primarily classified into public and private, based on the ownership of enterprises.
The correct answer is c.
28. Disinvestment refers to the process of selling of the government's stake in public sector units. It is an important tool of privatisation.
The correct answer is c.
29. A test market, in the field of business and marketing, is a representative geographic region used to judge the viability of a product or service in the mass market prior to a wide scale roll out.
The correct answer is d.
30. One of the more traditional forms of communication, a bottom up communication is one in which communication flows from subordinates to superiors.
The correct answer is d.
31. Digjam is a product of Oswal Enterprise.
The correct answer is a.
32. Right to Negotiate is not a consumer right as per Consumer Protection Act, 1986. The Right aims to give native title parties a chance to discuss the impact of any proposed future act, in order to build consensus.
The correct answer is b.
33. The Environmental Technology Opportunities Portal (ETOP) is a website aimed to enhance the interface with programmes that foster development of new cost effective environmental technologies.
The correct answer is b.
34. Demographic segmentation refers to the division of the market into various segments on the basis of demographic variables such as age, gender, family size, education, religion, etc.
The correct answer is b.
35. Entrepreneurship demands creativity, innovation and the ability to face uncertainties.
The correct answer is d.
36. Special Drawing Rights (SDR) function as artificial currency as they are the rights granted by IMF to withdraw amounts in different currencies to make payments for imports.
The correct answer is c.
37. Impulse buying, as the name suggests, is an unplanned, impulsive decision to buy a product or a service and is made just before the purchase.
The correct answer is b.
38. Applauding is cited as an example of a symbol. It is clear from the second paragraph of the passage.
The correct answer is c.
39. The word 'intricate' could be replaced by 'complicated'.
The correct answer is b.
40. The word 'potential' could be replaced by 'possibility'.
The correct answer is d.

41. 'It' in the first paragraph refers to 'way'.
The correct answer is b.
42. 'To impinge upon' is to 'intrude'.
The correct answer is a.
43. From the opening lines of the passage it can be deduced that the author refers to speech as the most advanced form of communication.
The correct answer is d.
44. The word 'Gestures' captures the central idea being discussed in the passage.
The correct answer is c.
45. The answer can be traced in the lines, 'As a result, means of communication must be based upon speech (third paragraph).
The correct answer is b.
46. A five year period is considered a very short time for the successful implementation of plans. So, it is also referred to as the immediate future in the passage.
The correct answer is d.
47. Refer to lines, 'It was Henry Ford who brought home the need for the creation of a larger and more stable middle class, that is a larger number of people who can afford more and more goods and services'.
The correct answer is c.
48. All the options except Option (c) are mentioned as a requirement to improve the condition of Indian industries.
The correct answer is c.
49. The answer is implied in the words of the author that business and industrial managers are concerned with short term gains and not able to look at the larger picture.
The correct answer is d.
50. Refer to lines, 'Moreover growth and higher productivity create employment and higher employment creates larger markets both for industrial and consumer product'.
The correct answer is b.
51. The net gains pursued by managers are at the cost of diversification, modernisation and asset creation.
The correct answer is a.
52. The author mentions that profit is the main concern for Indian industrialists rather than developmental activities.
The correct answer is b.
53. The word 'CHRONIC' means permanent. Therefore, option (d) is correct.
The correct answer is d.
54. The word 'SACROSANCT' means 'respectful', whereas 'IRREVERENT' means 'lacking respect'. Therefore, option (c) is correct.
The correct answer is c.
55. The word 'INTEGRATE' means to combine, whereas 'ISOLATE' means to separate. Therefore, option (a) is correct.
The correct answer is a.
56. The word 'ALIEN' means 'not being local', whereas 'NATIVE' means 'being local'.
The correct answer is a.
57. The word 'CONFESS' means 'accepting a fact' whereas 'DENY' means 'not accepting a fact'. Therefore, option (b) is correct.
The correct answer is b.
58. The word 'ABSOLUTE' means 'completely', whereas 'LIMITED' means 'not completely'.
The correct answer is c.
59. 'Immaculate' means 'perfectly clean', 'spotless' or 'faultless' or 'pure'.
The correct answer is b.
60. 'Ebullient' means 'exuberant' or 'enthusiastic'.
The correct answer is b.
61. 'Ignominious' means 'humiliating' or 'shameful'.
The correct answer is a.
62. 'Innocuous' refers to 'harmless'.
The correct answer is a.
63. 'Chicanery' means the use of 'trickery' or 'deception' to achieve one's purpose.
The correct answer is c.
64. 'Chagrin' means 'annoyance or distress'.
The correct answer is c.
65. The use of 'the' in the second blank makes every option except option (c) incorrect.
The correct answer is c.

66. The sentence conveys the impression of certain negative results that have been caused due to unfavourable circumstances.
The correct answer is c.
67. Options (a), (b) and (d) contradict the idea being conveyed in the sentence. Out of all the options, only option (c) makes a meaningful combination.
The correct answer is c.
68. The correct phrase that shall complete the sentence while maintaining the parallel structure is “ask of no one’s leave”.
The correct answer is a.
69. The correct phrase that shall complete the sentence while maintaining the parallel structure is “and exclaimed it was a good hit”.
The correct answer is b.
70. The correct spelling is ‘Obliterate’.
The correct answer is a.
71. The correct spelling is ‘Philanthropist’.
The correct answer is c.
72. The correct spelling is ‘Belligerent’.
The correct answer is c.
73. SP form a mandatory pair as S elucidates the point made in the first statement and P builds on it. RQ shall follow them as they use the pronoun ‘it’. Also, Q connects with the last line of the passage as well. SPRQ is the correct sequence.
The correct answer is d.
74. The correct sentence is “The two men who were following a few yards behind me and who were separated from the tigress by the rock stood still when they saw me stop.” (RPSQ.)
The correct answer is a.
75. The correct sentence is “Science improves our living conditions, but it should also teach us to think straight and not be afraid of rejecting or accepting anything, provided there are sufficient reasons for doing so.” (SRQP)
The correct answer is a.
76. The headquarter of UNICEF is in New York City, USA. It was founded on December 11, 1946 by United Nations General Assembly. It works to improve health, nutrition, education and general welfare of children particularly in less-developed countries and in various emergency situations. It was awarded to the Nobel Prize in peace in 1965.
The correct answer is c.
77. Kotak Mahindra Bank and ING Vysya Bank merged in 2016. Kotak Mahindra Bank and ING Vysya Bank decided to merge on November 20, 2014. RBI approved the merger on April 1, 2015 and the whole merger process was completed in 2016.
The correct answer is a.
78. The International Finance Corporation was founded on July 20, 1956 and is headquartered in Washington DC. It is a member of the World Bank Group. It is the largest global development institution which focuses on private sector development in low income and other emerging markets.
The correct answer is b.
79. World Bank comprises two institutions: the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). Poverty reduction is the official goal of the World Bank. Its headquarter is located in Washington DC.
The correct answer is a.
80. FDI is a cross border investment.
The correct answer is c.
81. A regressive tax is a tax that takes a larger percentage of income from low-income earners rather than from high-income earners.
The correct answer is c.
82. Sugam and Sahaj forms are especially targeted at small businessmen and salaried persons respectively and are another step in making tax filing more user friendly and simpler.
The correct answer is a.
83. Presently, Union/State Governments in India cannot directly control the pay rates and salaries in the private sector.
The correct answer is c.

- 84.** Due to the extreme dangers involved, the Supreme Court had banned the bull taming sport, Jallikattu. But the order met with strong public opposition. In order to overcome the Supreme Court order, the government of Tamil Nadu has promulgated the Prevention of Cruelty to Animals (Tamil Nadu Amendment) Ordinance, 2017. A Bill has also been passed on similar lines in the Legislative Assembly. The State amendment to the Central legislation exempts the conduct of Jallikattu from the provisions of the Prevention of Cruelty Act.
- The correct answer is c.**
- 85.** RBI was established on April 1, 1935. Its headquarters is in Mumbai, Maharashtra. The functions of RBI are governed by Reserve Bank of India Act, 1934. It regulates Indian banking system. It controls the issue and supply of Indian rupee.
- The correct answer is b.**
- 86.** Stirling Prize, which is named after James Stirling, is the most prestigious architecture British prize which is given for the excellence in architecture. It was founded in 1996.
- The correct answer is b.**
- 87.** Countries that exported the highest dollar value worth of diamonds during 2015 are India (18.1% of total diamond exports), United States (15.3%), Israel (14.5%) and Belgium (12.8%).
- The correct answer is c.**
- 88.** Metamorphic rocks are formed through the change of igneous and sedimentary rocks.
- The correct answer is c.**
- 89.** The Securities and Exchange Board of India (SEBI) is a statutory body which implies it is a non-constitutional body, set up by parliament. A statutory body has authority to pass the law and take decision on the behalf of state or country.
- The correct answer is c.**
- 90.** Found in 1961, with an aim to preserve wilderness and reduce humanity's footprint on the environment, the World Wide Fund for Nature (WWF) is an international non-governmental organization. It was formerly named the World Wildlife Fund.
- The correct answer is c.**
- 91.** Vishu is the first day of Malayalam calendar and is the new year of Kerala. It is an Indian festival natively celebrated in one of the Indian state Kerala, Mangalore, Tulu Nadu, etc.
- The correct answer is d.**
- 92.** Future Generali Life Insurance is a joint venture between three leading groups: Future Group – a leading retailer of India, Generali Group – a global insurance group that features among the top 50 largest companies of the world and Industrial Investment Trust Limited (IITL) – a leading investment company.
- The correct answer is d.**
- 93.** ICICI bank has a 64% stake in the venture while Fairfax has a 35% stake in this joint venture. ICICI Lombard General Insurance Company was established in 2001.
- The correct answer is b.**
- 94.** An Initial Public Offering (IPO) is the first time that the stock of a private company is offered to the public.
- The correct answer is a.**
- 95.** Under 'My Business' Websites, Google will provide free websites and web tools to small businesses in order to bolster their digital presence. 'Digital Unlocked' is a training programme launched in association with FICCI. Digital Unlocked will provide Indian SMBs essential digital skills to enable them to go online and connect to customers in different parts of the country.
- The correct answer is b.**
- 96.** Originally promoted in 1994 by ICICI limited – an Indian financial Institution – ICICI bank is India's largest private sector bank.
- The correct answer is c.**
- 97.** Seven Prime Ministers of India have been awarded the Bharat Ratna, who are as follows: Jawaharlal Nehru, Indira Gandhi, Rajiv Gandhi, Morarji Desai, Lal Bahadur Shastri, Gulzarilal Nanda and Atal Bihari Vajpayee.
- The correct answer is b.**
- 98.** A planned economy is an economic system in which inputs are based on direct allocation.
- The correct answer is a.**

99. In order to mark the Election Commission's foundation day, January 25 is celebrated every year as 'National Voters' Day'.

The correct answer is d.

100. Papua New Guinea is the world's third largest island which covers 462840 km². It is situated in the Pacific Ring of Fire. It is one of the few regions close to the equator that experience snowfall. Port Moresby is the capital of Papua New Guinea and Kina is its currency.

The correct answer is a.

101. ITU stands for International Telecommunication Union. ITU is responsible for the issues related to information and communication technologies. Its three sectors are radiocommunication (ITU-R), telecommunication standard (ITU-T) and telecommunication development (ITU-D).

The correct answer is d.

102. The study of particular species is called Autecology. It is also known as 'Species Ecology'. It is the study of interactions of an individual organism or a single species with the living and non-living factors of its environment.

The correct answer is c.

103. Tadoba National Park is located in the Chandanpur district of Maharashtra and is the Maharashtra's oldest and largest national park. Tadoba National Park and the Andhari Wildlife Sanctuary come under the Tadoba Andhari Tiger Reserve.

The correct answer is a.

104. CIBIL stands for Credit Information Bureau (India) Limited, the first credit information company in India. It established in August 2000. Basically, it collects and maintains the records of individuals and commercial entities which is related to the borrowings and payments of loans and credit cards.

The correct answer is d.

105. The Startup Mentorship Circle platform was launched in view of the Union Government's vision of nurturing entrepreneurship under the Startup India Initiative. Under this platform, large corporate houses are planning to mentor about 100 start-ups over the next two years.

The correct answer is a.

106. A credit card is a payment card issued to users (cardholders) to enable the cardholder to pay a merchant for goods and services, based on the cardholder's promise to the card issuer to pay them for the amounts so paid plus other agreed charges.

The correct answer is c.

107. Net worth is the amount by which assets exceed liabilities. Net worth is a concept applicable to individuals and businesses as a key measure of how much an entity is worth.

The correct answer is c.

108. Lionel Messi is an Argentine professional footballer. On Jan. 11, 2016, Messi won the fifth FIFA Ballon d'Or for World Player of the Year of his career — beating competitor Cristiano Ronaldo and his Barcelona teammate Neymar, Jr.

The correct answer is a.

109. Payment banks are a new model of banks conceptualized by the Reserve Bank of India (RBI). These banks can accept a restricted deposit which is currently limited to INR 1 lakh per customer and may be increased further. These banks cannot issue loans and credit cards. Both current account and savings account can be operated by such banks. The minimum capital requirement for an entity to start a payment bank in India is 100 crores.

The correct answer is b.

110. Baku is the capital and the largest city of Azerbaijan. Moreover, it is the largest city on the Caspian Sea and of the Caucasus region.

The correct answer is c.

111. International Yoga Day, also known as Yoga Day in some places. 21st June was declared as the International Day of Yoga by the United Nations General Assembly on 11th December, 2014.

The correct answer is c.

112. The Man Booker Prize for Fiction (commonly known as the Booker Prize) is the highest literary prize awarded each year for the best original novel written in the English language and published in the UK.

The correct answer is a.

113. World Environment Day (WED) is celebrated every year on 5th June to raise global awareness, to take positive environmental action, to protect nature and the planet Earth.

The correct answer is a.

114. The positional value of different letters of 'ZOOM' is

$$Z = 26; O = 15; O = 15; M = 13$$

$$\text{Now, we have } (26 + 15) - (15 + 13) = 13$$

Similarly, the positional value of different letters of 'PUSA' is

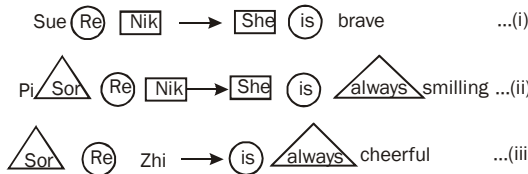
$$P = 16; U = 21; S = 19; A = 1$$

Therefore, the code for 'PUSA' will be

$$(16 + 21) - (19 + 1) = 17$$

The correct answer is c.

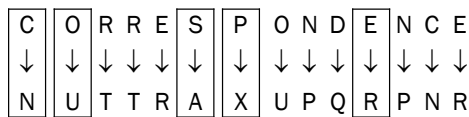
115. Given coding decoding question can be analysed as following:



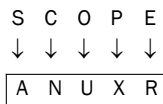
Therefore, from Eqs. (i), (ii) and (iii), the code for 'smiling' is 'Pi'.

The correct answer is d.

116. The pattern followed is



Therefore, the code for 'SCOPE' will be



The correct answer is b.

117. The number of odd days

$$= \frac{94}{7} = (7 \times 13) + 3 \text{ odd days}$$

So, 94th day will be Wednesday + 3

= Saturday

Hence, after 94 days it will be Sunday.

The correct answer is d.

118. As 'Daybreak' and 'Bedstead' are related to each other. In the same way 'Fresh' and 'Tired' are related to each other.

The correct answer is b.

119. Clearly, $42 = 6 \times 7$, $56 = 7 \times 8$

$$\text{Similarly, } 72 = 8 \times 9, 90 = 9 \times 10$$

So, 72 and 90 has the same relationship as 42 and 56.

The correct answer is b.

120. The pattern followed is

$$(3^2 - 1) : (3^3 + 1) :: (4^2 - 1) : (4^3 + 1)$$

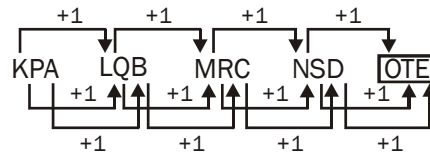
$$08 : 28 :: 15 : 65$$

The correct answer is c.

121. Smoke comes out of the chimney and bullet comes out of the gun.

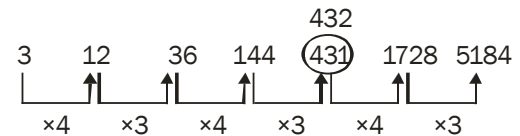
The correct answer is d.

122. The pattern followed in the series is



The correct answer is d.

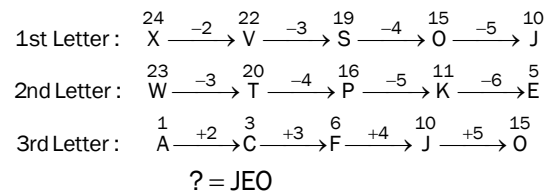
123. The pattern followed is



Hence, the number 431 is incorrect and should be replaced by 432.

The correct answer is d.

124. The pattern followed is



The correct answer is b.

125. The pattern followed is



So, 6480 does not follow the pattern. It should be replaced by 8640.

The correct answer is c.

126. $xyyx/yxxy / xyyx / yxxy$

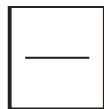
The given sequence is made of repetition of two blocks $xyyx$ and $yxxy$ alternatively.

The correct answer is d.

127. Observing the problem figures, we see that in each turn, the black circle moves three steps clockwise and the white circle moves two steps clockwise.

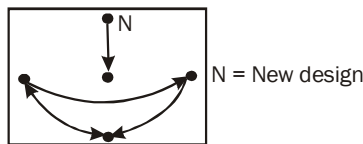
The correct answer is a.

128. Observing the problem figures, we see that the line moves 45° in clockwise direction. After third figure it will move by $(45/2)^\circ$ in clockwise.



The correct answer is a.

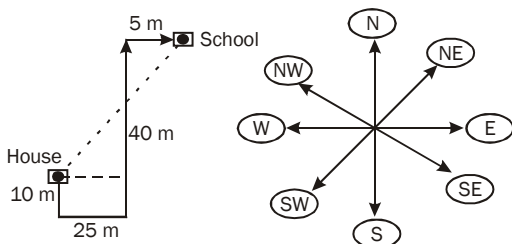
129. The sequence followed in the problem figure from (2) to (3) is



Similar rule follows from problem figure (4) to answer figure.

The correct answer is d.

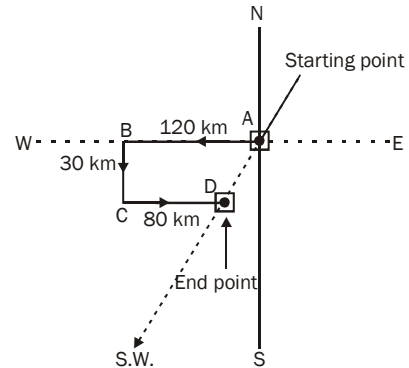
130. According to the question, we can draw the following direction diagram:



Hence, it is clear from the diagram that the school is in the North-East direction from Ram's house.

The correct answer is c.

131. According to the given information, we can draw the direction graph as following:



Hence, from the direction graph it is clear that A is the starting point and D is the ending point of the train. So, the direction of station will be South-West from the starting point.

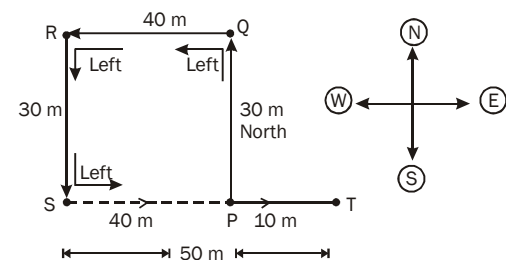
The correct answer is a.

132. According to the question, the direction diagram can be drawn as following:

P = Starting point

T = Finishing point

PO = RS = 30 m



OR = SP = 40 m

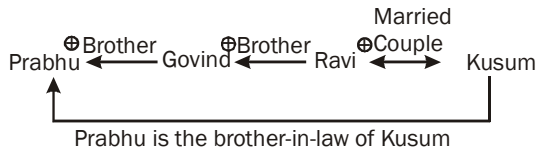
ST = 50 m

So, the required distance,

PT = ST - SP = 50 - 40 = 10 m

The correct answer is d.

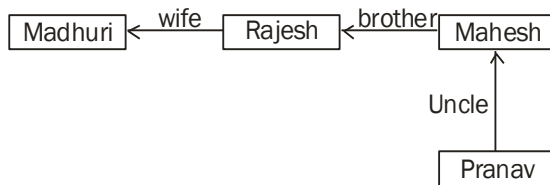
133. According to the given question, the family diagram can be drawn as following:



Hence, from the above diagram it is clear that Prabhu is the brother-in-law of Kusum.

The correct answer is c.

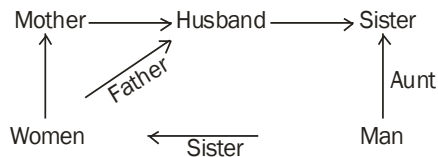
134. According to the given information, we can draw the relationship diagram as following:



Here, it may be possible that the Pranav is the son of Madhuri and Rajesh. But in the options, 'son' is not given. Here, Rajesh must have two brothers, therefore, Pranav is the nephew of Madhuri.

The correct answer is b.

135. According to the given question, the family diagram can be drawn as following:



Woman's mother's husband's sister means that sister of woman's father. It means that she is the aunt of woman also. Hence, woman is the sister of man and man is the brother of the woman.

The correct answer is b.

136. The year 1980 was a leap year and the Republic day was on Saturday.

So, 26 Jan – Saturday 1980
 2 Feb – Saturday 1980
 9 Feb – Saturday 1980
 16 Feb – Saturday 1980
 23 Feb – Saturday 1980

1 March – Saturday 1980
 2 March – Sunday 1980
 3 March – Monday 1980

Akash was born on 3rd March 1980. Sanjiv was born 4 days before Akash. Therefore, 4 days before was Thursday, 28 February.

The correct answer is c.

137. 15 Apples + 20 Oranges = 20 Apples + 15 Oranges

On comparing, we have

5 Oranges = 5 Apples

1 Orange = 1 Apple

So, apples are as costly as Oranges.

The correct answer is a.

138. At 15 min past 5, the minute hand is at 3 and hour hand slightly ahead of 5.

Now, the angle through which hour hand shifts is $15 \text{ min} = \left(15 \times \frac{1}{2}\right)^\circ = 7\frac{1}{2}^\circ$

And the angle between 3 and 5

$= \frac{360^\circ}{60} \times 10 = 60^\circ$ (There are 10 min between 3 and 5)

So, the angle at 15 min past 5

$= \left(60 + 7\frac{1}{2}\right)^\circ = 67\frac{1}{2}^\circ$

The correct answer is b.

139. From positions II and IV,

Common digit 6 is at the same (side) face in both the positions.

So, the digit opposite to 3 is 4.

The correct answer is c.

Common Solution for questions 140 to 143:

Five friends, Ramesh, Suresh, Mahesh, Dinesh and Ganesh are sitting on a bench.

From the given information in the question, the positions of five friends will be



140. Suresh's position is second from the left.

The correct answer is d.

141. Ramesh is sitting between Suresh and Mahesh.

The correct answer is a.

142. Dinesh's position is at the extreme right.

The correct answer is b.

143. Ramesh is sitting at the center.

The correct answer is a.

144. From the given conditions, data can be arranged as

Suma > Kavita > Sudha > Mamta > Puja

Hence, Puja scored the lowest in the examination.

The correct answer is b.

145. A train cannot be called so without the engine. So, the answer is (a).

The correct answer is a.

146. 'Eloquence' is always associated with Bargain.

The correct answer is d.

147. 'Astonishment' is always associated with 'Wonder'.

The correct answer is c.

148. The Selection Board call the candidates for interview because it is then easier to decide which candidate is fit for the job.

The correct answer is b.

149. These shoes increase the heights of the young people.

The correct answer is a.

150. Today = Sunday

Tomorrow = Monday

3 days after tomorrow = Monday + 3 odd

days = Thursday

The correct answer is a.

Chapter

10

Mock Test 2 Based on DU JAT

Total Time: 150 Minutes

Total Marks: 150

Instructions

1. There are four sections in the question paper.

Sr. No.	Sections	Number of Questions
1	Quantitative Ability	25
2	Reasoning and Analytical Ability	25
3	General English	25
4	Business and General Awareness	25
Total		100

2. This is an objective test. Each question has 4 responses. Candidate should choose an appropriate response.
3. There is a total of 100 questions carrying 4 marks each.
4. One mark will be deducted for each incorrect answer.
5. Candidates are advised to read all options thoroughly.
6. No clarification of any sort relating to the question paper is permitted.

SECTION I

QUANTITATIVE ABILITY

1. A man takes 8 hours to walk to a certain place and ride back. However, he could have gained 2 hrs, if he had covered both ways by riding. How long would he take to walk both ways?

(a) 2 hours (b) 8 hours
(c) 10 hours (d) 12 hours

(BBA: CBS 2009)

2. The equation $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$ has

(a) Many solutions
(b) Exactly one solution
(c) Exactly two solutions
(d) No solution

(BBA: DU JAT 2011)

3. How many triangles can be formed by joining 12 points, 7 of which are collinear?

(a) 220 (b) 35
(c) 185 (d) 84

(BBA: DU JAT 2012)

4. Rohan found that for a function f , $f(x) = 3x - 5$ and $f(g(x)) = 2x$, then the function $g(x) =$

(a) $2x$ (b) $x + 3$
(c) $\frac{2x+5}{3}$ (d) 2

(BBA: CBS 2010)

5. If $a_1, a_2, a_3, \dots, a_n, \dots$ are in G.P., the value of

$$\begin{vmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{vmatrix} \text{ is}$$

(a) a_n (b) 0
(c) $a_1 a_n$ (d) $a_1 + a_n$

(BBA: DU JAT 2011)

6. The value of $\sin\left(\frac{1}{2} \cos^{-1} \frac{1}{8}\right)$ is equal to:

(a) $\frac{4}{7}$ (b) $\frac{3}{7}$
(c) $\frac{\sqrt{7}}{4}$ (d) $\frac{\sqrt{3}}{4}$

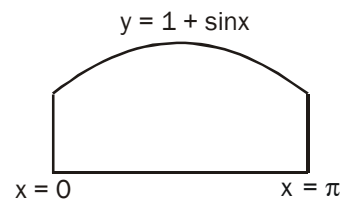
(BBA: DU JAT 2012)

7. The coefficients of x^2 and x^3 in the expansion of $[3 + ax]^9$ are equal, then the value of a is

(a) 6 (b) $\frac{1}{3}$
(c) $\frac{3}{7}$ (d) $\frac{9}{7}$

(BBA: DU JAT 2011)

8. A window is in the shape as shown below. If the cost of glass is Rs.20 per sq. unit, then the cost of covering the window with the glass is



(a) Rs.($20\pi + 40$) (b) Rs.($20\pi + 20$)
(c) Rs.($\pi + 20$) (d) Rs.($2\pi + 40$)

(BBA: CBS 2010)

9. A 3 feet tall man finds that the angle of elevation of the top of a 15 feet high pillar and the angle of depression of its base are complementary angles. The distance of the man from the pillar is

(a) 4 feet (b) 6 feet
(c) 8 feet (d) 5 feet

(BBA: DU JAT 2011)

10. If the diameter of a circle is increased by 100% then its area is increased by

- (a) 400% (b) 300%
(c) 200% (d) 100%

(BBA: DU JAT 2011)

11. The value of $\int_{-1}^2 \frac{|x|}{x} dx$ is

- (a) 1 (b) -1
(c) 0 (d) 2

(BBA: DU JAT 2011)

12. If $\log_8 \log_{13} (\sqrt{x+13} + \sqrt{x}) = 0$, what is the value of x ?

- (a) 16 (b) 36
(c) 23 (d) 26

(BBA: CBS 2010)

Directions (Q. 13–15): Each of the following consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and given the answer.

- (a) Statement (I) alone is sufficient, but statement (II) alone is not sufficient.
(b) Statement (II) alone is sufficient, but statement (I) alone is not sufficient.
(c) Both statements together are sufficient, but neither statement alone is sufficient.
(d) Each statement alone is sufficient.

(BBA: DU JAT 2012)

13. At Delhi Metro Rail Corporation, the average age of an executive employee is 50 years and the average age of non-executive employee is 30 yrs. What is the average age of the employees at Delhi Metro Rail Corporation?

- I. There are 100 executive employees.
II. The number of non-executive employees is 20 times the number of executive employees.

14. Among five boys A, B, C, D, E who is the youngest?

- I. D is younger to both A and C
II. B is elder to E but younger to D.

15. If Sanya's age is exactly twice of Peter's age, what is Sanya's age?

- I. Four years ago, Sanya's age was exactly three times Peter's age.
II. Eight years from now, Sanya's age will be exactly 1.5 times Peter's age.

16. The range of the function $f(x) = \frac{x}{1+x^2}$, for $x \in R$, is :

- (a) $[-1/2, 0) \cup (0, 1/2]$
(b) $(-1/2, 0) \cup (0, 1/2)$
(c) $[-1/2, 1/2]$
(d) $[0, 1/2]$

(BBA: DU JAT 2012)

17. Increasing the original price of an article by 16% and then increasing the new price by 20% is equivalent to increasing the original price by

- (a) 36.35%
(b) 39.2%
(c) 38%
(d) None of the above

(BBA: CBS 2009)

18. If it is known that two heads appeared on three tosses of a balanced coin, what is the probability of heads on the 4th toss?

- (a) $\frac{2}{3}$ (b) $\frac{1}{4}$
(c) $\frac{1}{2}$ (d) $\frac{3}{4}$

(BBA: DU JAT 2011)

19. Mahesh purchased three calculators and four pen stands for Rs. 2,140. He then purchased an additional calculator and five pen stands for Rs. 1,355. How much did he spend on purchasing only the calculators?

- (a) Rs. 1,575 (b) Rs. 1,920
(c) Rs. 1,440 (d) Rs. 1,540

(BBA: CBS 2010)

20. The area of the region enclosed by $y = x^2$ and $2y = x$ is

- (a) $\frac{1}{48}$ (b) $\frac{1}{24}$
 (c) $\frac{1}{16}$ (d) $\frac{1}{12}$

(BBA: DU JAT 2012)

21. How many even integers n , where $100 \leq n \leq 200$, are divisible neither by seven nor by nine?

- (a) 40 (b) 37
 (c) 39 (d) 38

(BBA: CBS 2010)

22. A train travelling at 60 mph enters a tunnel that is 5 miles long. The train is one mile long. How many minutes does it take for the train to pass through the tunnel?

- (a) 4 (b) 5
 (c) 6 (d) 7

(BBA: CBS 2009)

Directions (Q. 23–25): Refer the following table to answer the questions that follow.

Number of students registered for

Subject	I Year	II Year	III year
Science	20	40	80
History	30	60	120
Maths	40	80	160
Economics	50	70	100

(BBA: CBS 2010)

23. Number of students registered for History for all the years is less than the number of students registered for Maths for all the three years by:

- (a) 12.5% (b) 17.5%
 (c) 25% (d) 22.5%

24. The total registration fees collected from the students of Ist year for Science, History, Maths and Economics is in the ratio 3 : 2 : 3 : 1. If the total registration fee collected is Rs. 1,35,00, then what is the registration fee for Economics?

- (a) Rs.350 (b) Rs.300
 (c) Rs.250 (d) Rs.287.5

25. Assuming the data of Q. 28, what is the total registration fee collected for Maths in Ist year?

- (a) Rs.45000 (b) Rs.47500
 (c) Rs.50500 (d) Rs.50725

SECTION II

REASONING AND ANALYTICAL ABILITY

26. A man is facing north-west. He turns 90° in the clockwise direction and then 135° in the anticlockwise direction. What direction is he facing now?

- (a) East (b) West
 (c) North (d) South

(BBA: CBS 2009)

27. Find the missing alphabet:

T, r, O, m, J, ?

- (a) h (b) i
 (c) l (d) g

(BBA: CBS 2010)

28.

41	44
36	66

- (a) 120
 (c) 130

72	78
62	?

- (b) 122
 (d) 132

(BBA: CBS 2009)

Directions (Q. 29–31): A cube is coloured black on two adjacent faces, blue on the two faces opposite to the black faces and green on the remaining two faces. It is cut into 64 smaller cubes of equal size. Answer the following questions based on this information.

(BBA: DU JAT 2012)

29. How many cubes are there which have no face coloured?

- (a) 24 (b) 16
(c) 8 (d) 12

30. How many cubes are coloured on exactly one face and the colour is blue?

- (a) 4 (b) 8
(c) 16 (d) 32

31. How many cubes have one face green and at least one of the adjacent faces black or blue?

- (a) 20 (b) 12
(c) 24 (d) 32

Directions (Q. 32–33): In a particular coded language the alphabets are written as following:

A = 2; B = 5; C = 10; D = 17; E = 26; ...

Decode the language and answer the following

32. 5 82 325 17 stands for

- (a) BURN (b) BARK
(c) BIND (d) BIRD

33. Which of the following will be the coded Language for the word EXAM?

- (a) 26 626 2 145
(b) 26 577 2 170
(c) 36 626 2 145
(d) 36 577 2 169

(BBA: CBS 2009)

Directions (Q. 34–37): Read the following information, and answer the questions given below. P, Q, R and S live together in a house.

- I. P lives with his (or her) parents.
- II. Q lives with at least 3 persons younger than him (or her).
- III. S lives with his mother, and is older than at least 2 persons living with him.
- IV. R lives with his (or her) son and is not older than s.

(BBA: CBS 2010)

34. The total number of persons in that house is

- (a) 3 (b) 4
(c) 5 (d) 6

35. Q is P's

- (a) Father (b) Mother
(c) Son (d) Grandmother

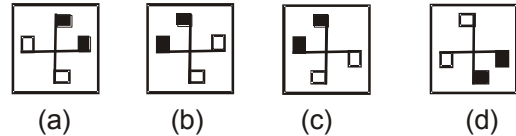
36. S is P's

- (a) Brother (b) Father
(c) Mother (d) Sister

37. R is Q's

- (a) Daughter (b) Son
(c) Grandson (d) Daughter-in-law

38. Which figure is the odd one out?



(BBA: CBS 2009)

Directions (Q.39–40): In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern.

39. 3, 12, 27, 48, 75, 108, ...

- (a) 147 (b) 162
(c) 183 (d) 192

(BBA: DU JAT 2011)

40. (2, 3), (3, 5), (5, 7), (7, 11), (11, 13), (....)

- (a) (13,15) (b) (13,17)
(c) (15,16) (d) (13,19)

(BBA: DU JAT 2011)

Directions (Q. 41–42): In each of the following questions, three statements are given followed by four conclusions numbered I, II, III and IV. You have to assume the statements to be true and then decide which of the given conclusions logically follows from the given statements.

(BBA: DU JAT 2012)

41.

Statements: Some elephants are rats.

All rats are flowers.

Some flowers are not elephants.

I. Some flowers are elephants.

II. All elephants are flowers.

III. All rats are elephants.

IV. No flower is an elephant.

- (a) Only I follows
(b) Only I and II follow
(c) Only II and III follow
(d) None follows

42.

Statements: All pens are papers.

All papers are aeroplanes.

All aeroplanes are skies.

- I. All pens are skies.
- II. All skies are papers.
- III. All aeroplanes are pens.
- IV. All papers are skies.

- (a) Only I follows
- (b) Only I and III follow
- (c) Only I and IV follow
- (d) Only III and IV follow

Directions (Q. 43–44): A is three times older than B. C is half the age of D. B is older than C.

43. Which of the following can be inferred?

- (a) A is older than D
- (b) A may be younger than D
- (c) B is older than D
- (d) None of the above **(BBA: CBS 2010)**

44. Which of the following information will be sufficient to estimate A's age?

- (a) Both B and D are older than C by the same number of years
- (b) C is 8 years old
- (c) Both (a) and (b)
- (d) None of the above **(BBA: CBS 2010)**

Directions (Q.45–47): In each question, the main statement is followed by four sentences. Select the pair of sentences that relate logically to the given statement.

(BBA: DU JAT 2011)

45. Either the employees have no confidence in the management or they are hostile by nature.

- I. They are hostile by nature
- II. They are not hostile by nature
- III. They have confidence in the management
- IV. They have no confidence in the management

- (a) II, I
- (b) III, II
- (c) IV, I
- (d) II, IV

46. All irresponsible parents shout if their children do not cavort.

- I. All irresponsible parents do not shout

- II. Children cavort
- III. Children do not cavort
- IV. All irresponsible parents shout

- (a) I, II
- (b) II, I
- (c) III, I
- (d) All of these

47. Ram gets a swollen nose whenever he eats hamburgers.

- I. Ram gets a swollen nose
- II. Ram does not eat hamburgers
- III. Ram does not get a swollen nose
- IV. Ram eats hamburgers

- (a) I, II
- (b) IV, III
- (c) I, III
- (d) None of these

Directions (Q. 48–50): Read the text and the statements carefully and answer the questions.

Four people of different nationalities live on the same side of a street in four houses, each of different colour. Each person has a different favourite drink. The following additional information is also known:

- (i) The Englishman lives in the red house.
- (ii) The Italian drinks tea.
- (iii) The Norwegian lives in the first house on the left.
- (iv) In the second house from the right, they drink milk.
- (v) The Norwegian lives adjacent to the blue house.
- (vi) The Spaniard drinks fruit juice.
- (vii) Tea is drunk in the blue house.
- (viii) The white house is to the right of the red house.

(BBA: DU JAT 2012)

48. Milk is drunk by:

- (a) Norwegian
- (b) Englishman
- (c) Italian
- (d) None of these

49. The Norwegian drinks:

- (a) milk
- (b) cocoa
- (c) tea
- (d) fruit juice

50. Which of the following is not true?

- (a) Milk is drunk in the red house
- (b) Italian lives in the blue house
- (c) The Spaniard lives in a corner house
- (d) The Italian lives next to the Spaniard

SECTION III

GENERAL ENGLISH

Directions (Q. 51–54): Read the following passage and answer the questions, choosing the correct answer from the choices given.

The existence of mammals on the earth can be traced back to at least the Triassic time. The rate of development was retarded, till evolutionary change suddenly accelerated in the oldest Paleocene. This resulted in an increase in average size, larger mental capacity, and special adaptations for different modes of life, during the Eocene time. Further improvement was seen during the Oligocene Epoch, with the appearance of some new lines and extinction of others. The Miocene and Pliocene times are especially significant as they mark the culmination of various groups and a continued approach toward modern characters. It is in the Miocene time that the mammals reached their peak with reference to variety and size.

The ability of the mammals to adapt to various modes of life finds a parallel in the reptiles of the Mesozoic time, and apart from their greater intelligence, the mammals apparently have not done much better than the corresponding reptilian forms. Undoubtedly the bat is a better flying animal than the pterosaur, but at the same time the dolphin and whale are hardly more fish like than the ichthyosaur. Quite a few of the swift-running mammals inhabiting the plains, like the horse and the antelope, must excel any of the dinosaurs. Although the tyrannosaur was a more weighty and robust carnivore than perhaps any carnivorous mammal, the lion and the tiger, by virtue of their superior brain are far more efficient and dangerous beasts of prey. It is significant to note that various species of mammals gradually adapted themselves to various kinds of lifestyles, some took to grazing on the plains and were able to run swiftly (horse, deer, bison), others started living in rivers and swamps (hippopotamus, beaver), inhabiting trees (sloth, monkey), burrowing underground (rodent, mole), feeding on flesh (tiger, wolf), swimming in the water (dolphin, whale, seal), and flying in the air (bat). Human

beings on account of their superior brain have been able to harness mechanical methods to conquer the physical world and adapt to any set of conditions.

Such adaptation to different conditions leads to a gradual change in form and structure. This is a biological characteristic of the youthful, plastic stage of a group. It is seen that early in its evolutionary cycle animals possess the capacity for change, but as the animal progresses in its cycle becoming old and fixed, this capacity for change disappears. The generalized types of organisms retain longest the ability to make adjustments when required, and it is from them that new, fecund stocks take origin – certainly not from any specialized end products. With reference to mammals, we see their birth, plastic spread in many directions, increased specialization, and in some cases, extinction; this is a characteristic of the evolution of life, which can be seen in the geologic record of life.

(BBA: DU JAT 2012)

- 51. From the following, choose the most appropriate title for the above passage.**
- (a) From Dinosaur to Man
 - (b) Adaptation and Extinction
 - (c) The Superior Mammals
 - (d) The Geologic Life Span
- 52. From the above passage, we can infer that, the pterosaur:**
- (a) resembled the bat
 - (b) was a Mesozoic mammal
 - (c) was a flying reptile
 - (d) inhabited the seas
- 53. As inferred from the passage, the largest number of mammals were found in which of the following periods?**
- (a) Eocene period
 - (b) Oligocene epoch
 - (c) Pliocene period
 - (d) Miocene period

54. It is clear from the passage, that the evidence used to discuss the life of past time periods:

- (a) was developed by Charles Darwin
- (b) has been negated by more recent evidence
- (c) was never truly established
- (d) is based on fossilized remains

Directions (Q. 55–58): Each of the following questions has a pair of words that have a relationship to each other. Choose the alternative from the choices given that has the same relationship.

(BBA: CBS 2009)

55. Morose : Cheerful

- (a) Fragile : Frail
- (b) Beautiful : Pretty
- (c) Replete : Deprive
- (d) Pittance : Paltry

56. Flock : Bird

- (a) Classroom : Student
- (b) Team : Player
- (c) Garden : flower
- (d) Parliament : Minister

57. River : Ocean

- (a) River : Distributary
- (b) River : Tributary
- (c) Tributary : River
- (d) Distributary : River

58. Vixen : Fox

- (a) Kitten : Cat
- (b) Lion : Tiger
- (c) Bull : Ox
- (d) Hen : Cock

Directions (Q. 59–61): Choose the correct antonym for the following words given in CAPITALS.

(BBA: CBS 2010)

59. CLANDESTINE

- (a) Secret
- (b) Invisible
- (c) Hidden
- (d) Overt

60. SORDID

- (a) Clean
- (b) Squalid
- (c) Filthy
- (d) Despair

61. DEARTH

- (a) Life
- (b) Terror
- (c) Brightness
- (d) Abundance

Directions (Q. 62–63): Choose the alternative that best expresses the meaning of the words given in CAPITALS.

(BBA: DU JAT 2012)

62. MALEVOLENCE

- (a) Spite
- (b) Violence
- (c) Mankind
- (d) Liquid

63. BENEFACTOR

- (a) Relative
- (b) Detractor
- (c) Patron
- (d) Boss

Directions (Q.64): Choose the alternative that can be substituted for the given sentence.

(BBA: DU JAT 2011)

64. That which cannot be believed.

- (a) Incredible
- (b) Ineluctable
- (c) Impassable
- (d) Unrequited

Directions (Q. 65–66): In each of the questions the voice of the sentence needs to be changed from active to passive and vice versa. Choose the best option.

(BBA: CBS 2010)

65. Brutus stabbed Ceasar

- (a) Brutus killed Ceasar.
- (b) Ceasar stabbed Brutus.
- (c) Ceasar was stabbed by Brutus.
- (d) Brutus loved Ceasar.

66. He taught me to read Persian

- (a) I learnt to read Persian.
- (b) He read Persian.
- (c) I read Persian.
- (d) I was taught to read Persian by him.

Directions (Q. 67–69): The four sentences in each question need to be arranged in the proper sequence. Choose the sequence that you think is the correct one.

(BBA: CBS 2010)

67.

- (p) It also has a small tail, little eyes and a long nose, called the trunk
- (q) The elephant is the largest of all animals living and the strongest
- (r) It is a strange looking animal with its thick legs and large, hanging ears

- (s) The trunk is the elephant's peculiar feature and it puts it to many uses
- (a) pqrs (b) qrps
(c) rpqs (d) spqr

68.

- (p) I had never seen a house on fire before
- (q) I joined a large crowd of people who had gathered at the spot
- (r) So one evening when I heard the fire engine rushing past my house, I ran out
- (s) We could only see the fire from a distance, the police would not let us near
- (a) prqs (b) rqsp
(c) qspr (d) spqr

69.

- (p) The human race is spread all over the world from the polar regions to the tropics
- (q) Thus in India, people live chiefly on different kinds of grain and vegetables
- (r) This depends partly on the climate and partly on the food that their region produces
- (s) The people of whom it is made eat different kinds of food
- (a) srqp (b) rqp
(c) qpsr (d) psrq

Directions (Q. 70–72): Read each sentence to find out whether there is any grammatical error in it. If you find an error, select the part that is incorrect. If there is no error, the answer is 'd'. (Ignore the errors of punctuation, if any).

(BBA: DU JAT 2012)

70.

- (a) Many physicists initially regarded
- (b) quantum theory as unnatural, absurd
- (c) and incompatible to common sense
- (d) No error

71.

- (a) According to Hume, it is not logic
- (b) and reasoning that determine
- (c) our actions, but emotion
- (d) No error

72.

- (a) The academy members waged a relentless war
- (b) against my supervisor and I, because our
- (c) research seemed to contradict their findings
- (d) No error

Directions (Q. 73–75): In each of the following groups, one word is misspelt. Choose that word.

(BBA: CBS 2009)

73.

- (a) preference (b) lettering
(c) betterment (d) detterent

74.

- (a) opportunity (b) oprobrium
(c) obsolete (d) onerous

75.

- (a) cushion (b) fusion
(c) mission (d) fashion

SECTION IV

BUSINESS AND GENERAL AWARENESS

76. Who gets Dronacharya Award?

- (a) Best Wrestler
- (b) Best Batsman
- (c) Best Tennis Player
- (d) Best Coach

(IPU CET 2015)

77. Who was the first recipient of the Bharat Ratna?

- (a) Dr Sarvapelli Radhakrishnan
- (b) Shri VV Giri
- (c) Dr Zakir Hussain
- (d) Shri JRD Tata

(IPU CET 2015)

- 78. Football Club Manchester United is owned by**
- (a) Glazer Family
 - (b) Roman Abramovich
 - (c) Fenway sports group
 - (d) Silvio Berlusconi
- 79. Gazprom is a famous energy company of which country?**
- (a) Brazil
 - (b) Russia
 - (c) China
 - (d) South Africa
- 80. SPIC MACAY is related with**
- (a) Textile Manufacturing
 - (b) Mobile Industry
 - (c) Art and Culture
 - (d) Environmental Protection
- 81. The Bentley car is manufactured by which company?**
- (a) Rolls Royce
 - (b) Daimler Chrysler
 - (c) BMW Group
 - (d) Volkswagen Group
- 82. Chad Hurley, Steven Chen and Javed Karim co-founded**
- (a) Yahoo
 - (b) Google
 - (c) You-tube
 - (d) Wikipedia
- 83. eBay is a famous**
- (a) Auction company
 - (b) Online gaming company
 - (c) Tour and Travel company
 - (d) Online gambling company
- 84. Birju Maharaj is a famous Kathak artist and was awarded by Padma Vibhushan in 1986. The Kathak is the folk dance of**
- (a) Kerala
 - (b) Tamil Nadu
 - (c) Bihar
 - (d) Uttar Pradesh
- 85. Which country has the world's largest uranium reserves?**
- (a) South Africa
 - (b) Canada
 - (c) Australia
 - (d) Germany
- 86. An underground economy consists of**
- (a) legal transactions.
 - (b) legal transactions not declared for tax and illegal activities.
 - (c) the water distribution system.
 - (d) part of the metro rail network
- 87. Who was the first Indian actress to appear in the ad campaign of Lux soap?**
- (a) Parveen Babi
 - (b) Madhuri Dixit
 - (c) Vaijayantimala
 - (d) Leela Chitnis
- 88. A scooter called Gusto belongs to:**
- (a) Mahindra Two Wheelers Ltd.
 - (b) Honda Motor India Pvt. Ltd.
 - (c) Bajaj Auto Ltd.
 - (d) Hero MotoCorp Ltd.
- 89. Real brand of fruit beverages is owned by**
- (a) Hamdard
 - (b) Dabur
 - (c) Baidyanath
 - (d) Kraft Foods
- 90. The book *Made in Japan* is the story of a Japanese company. Identify the name of the company from the given options.**
- (a) Sony
 - (b) Mazda
 - (c) Honda
 - (d) Isuzu
- 91. 'Power, beauty and soul' is the tagline of**
- (a) Toyota Camry
 - (b) Aston Martin
 - (c) Honda City
 - (d) Maruti Suzuki Ritz
- 92. Who is the founder of the WikiLeaks?**
- (a) Pierre Omidyar
 - (b) Julian Assange
 - (c) Jeff Bezos
 - (d) Bill Gates
- 93. Which of the following days is celebrated as World Consumer Rights Day?**
- (a) February 28
 - (b) March 3
 - (c) March 15
 - (d) April 7
- 94. The first passenger railway operation started in India in the year**
- (a) 1849
 - (b) 1851
 - (c) 1853
 - (d) 1855
- 95. IST is ahead of GMT by**
- (a) +4 hours
 - (b) +5 hours
 - (c) +4.5 hours
 - (d) +5.5 hours

96. 'Nokrek' biosphere reserve is in

- (a) Mizoram
- (b) Meghalaya
- (c) Tripura
- (d) Manipur

97. According to the latest census 2011, which Indian state has the least population density?

- (a) Sikkim
- (b) Goa
- (c) Mizoram
- (d) Arunachal Pradesh

98. Which of the following countries is also known as 'Cockpit of Europe'?

- (a) Austria
- (b) Belgium
- (c) Norway
- (d) Germany

99. The number of member countries in SAARC is

- (a) 7
- (b) 8
- (c) 9
- (d) 10

100. Freedom 251, which was touted as the world's cheapest smartphone when it was announced back in February, 2016, and was later withdrawn by the company. Name the manufacturing company.

- (a) Google
- (b) Ringing Bells
- (c) Micromax
- (d) Lava

ANSWERS AND EXPLANATIONS

1. Total time taken to walk one way and Riding back = 8 hours

Time taken in Riding both ways

$$= 8 - 2 = 6 \text{ hours}$$

So, time taken in riding one way = 3 hours

Hence, Time taken in walking both ways

$$= 5 \times 2 = 10 \text{ hours}$$

The correct answer is c.

2.
$$x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$$

$$\Rightarrow (x-1)^2 = 0 \Rightarrow x = 1$$

But the equation is not defined for $x = 1$. Therefore, the given equation has no solution.

The correct answer is d.

3. Number of triangles formed by joining 12 points in which 7 are collinear is

$$= {}^{12}C_3 - {}^7C_3 = 220 - 35 = 185$$

The correct answer is c.

4. $f(x) = 3x - 5$, $f(g(x)) = 2x$

From the given options, using $g(x) = \frac{2x+5}{3}$,

we get

$$f(g(x)) = 3\left(\frac{2x+5}{3}\right) - 5 = 2x + 5 - 5 = 2x$$

The correct answer is c.

5. Suppose $a_n = a$ and the common ratio of the GP is r .

$$\begin{vmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{vmatrix}$$

$$= \begin{vmatrix} \log a & \log ar & \log ar^2 \\ \log ar^3 & \log ar^4 & \log ar^5 \\ \log ar^6 & \log ar^7 & \log ar^8 \end{vmatrix}$$

Using $C_2 - C_1$ and $C_3 - C_1$, we get

$$= \begin{vmatrix} \log a & \log ar - \log a & \log ar^2 - \log ar \\ \log ar^3 & \log ar^4 - \log ar^3 & \log ar^5 - \log ar^4 \\ \log ar^6 & \log ar^7 - \log ar^6 & \log ar^8 - \log ar^7 \end{vmatrix}$$

$$= \begin{vmatrix} \log a & \log r & \log r \\ \log ar^3 & \log r & \log r \\ \log ar^6 & \log r & \log r \end{vmatrix}$$

Using $C_3 - C_2$, we get

$$= \begin{vmatrix} \log a & \log r & \log r - \log r \\ \log ar^3 & \log r & \log r - \log r \\ \log ar^6 & \log r & \log r - \log r \end{vmatrix}$$

$$= \begin{vmatrix} \log a & \log r & 0 \\ \log ar^3 & \log r & 0 \\ \log ar^6 & \log r & 0 \end{vmatrix} = 0$$

The correct answer is b.

6. Suppose $\cos^{-1} \frac{1}{8} = \theta$

$$\Rightarrow \cos \theta = \frac{1}{8}$$

$$\sin\left(\frac{1}{2} \cos^{-1} \frac{1}{8}\right) = \sin \frac{\theta}{2}$$

$$\text{Now } \cos \theta = 1 - 2\sin^2 \frac{\theta}{2}$$

$$\Rightarrow 2\sin^2 \frac{\theta}{2} = 1 - \cos \theta$$

$$\Rightarrow 2\sin^2 \frac{\theta}{2} = 1 - \frac{1}{8} = \frac{7}{8}$$

$$\Rightarrow \sin^2 \frac{\theta}{2} = \frac{7}{16}$$

$$\Rightarrow \sin \frac{\theta}{2} = \frac{\sqrt{7}}{4}$$

The correct answer is c.

7. Using binomial expansion, we have
 $[3+ax]^9 = {}^9C_0 3^9 + {}^9C_1 3^8(ax) + {}^9C_2 3^7(ax)^2$
 $+ {}^9C_3 3^6(ax)^3 + \dots + {}^9C_9(ax)^9$
 As the coefficients of x^2 and x^3 are equal
 $3^7 \times {}^9C_2 \times a^2 = 3^6 \times {}^9C_3 \times a^3$
 $\Rightarrow 3 \times 36 = 84a \Rightarrow a = \frac{9}{7}$

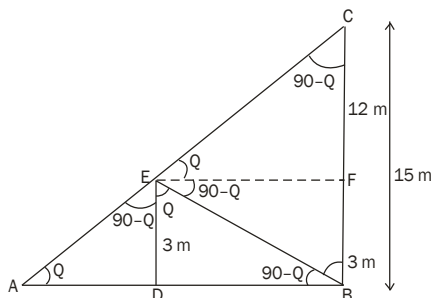
The correct answer is d.

8. Area of window = $\int_0^\pi (1 + \sin x) dx$
 $= \int_0^\pi dx + \int_0^\pi \sin x dx$
 $= [x]_0^\pi + (-\cos x)_0^\pi$
 $= [\pi - 0] + [-\cos \pi - (-\cos 0)] = (\pi + 2)$

Cost of covering window with glass
 = Rs. $20(\pi + 2)$ = Rs. $(20\pi + 40)$

The correct answer is a.

9. From the given information, we can draw the following diagram:



Let us assume that DE is the height of the man and BC is the height of the pillar.

Now, $\triangle ABC \sim \triangle EFC$

$$\frac{EF}{AB} = \frac{CF}{CB}$$

$$\Rightarrow \frac{EF}{AB} = \frac{12}{15} = \frac{4}{5}$$

Let $EF = x$, so, $DB = x$ and $AD = \frac{x}{4}$

Now, $\triangle ADE \sim \triangle EDB$

$$\frac{AD}{ED} = \frac{DE}{DB}$$

$$\Rightarrow \frac{x}{4 \times 3} = \frac{3}{x} \Rightarrow x = 6 \text{ cm}$$

The correct answer is b.

10. Suppose the diameter of the circle is D units.

$$\text{Then, area} = \frac{\pi D^2}{4} \text{ unit}^2$$

Area when diameter becomes 2D

$$= \frac{\pi(2D)^2}{4} = \pi D \text{ unit}^2$$

Hence, the percentage increase in

$$\text{area} = \frac{\pi D - \frac{\pi D^2}{4}}{\frac{\pi D^2}{4}} \times 100 = 300\%$$

The correct answer is b.

11. It should be noticed that the function is not differentiable at $x = 0$.

In case the above is not considered the question will be solved as below:

$$\int_{-1}^2 \frac{|x|}{x} dx = \int_{-1}^0 -1 dx + \int_0^2 1 dx$$

$$= [-x]_{-1}^0 + [x]_0^2 = -1 + 2 = 1$$

The correct answer is a.

12. $\log_8 \log_{13} (\sqrt{x+13} + \sqrt{x}) = 0$

Looking at the options, we can conclude that only $x = 36$ satisfies the given equation.

The correct answer is b.

13. Using statement I alone, the average age of employee cannot be determined.

Using statement II alone, we get

Let the number of executive employees be x and the number of non-executive employees be $20x$.

$$\text{Average age} = \frac{x \times 50 + 20x \times 30}{x + 20x}$$

$$= \frac{650x}{21x} = \frac{650}{21} \text{ years}$$

Hence, statement II alone is sufficient.

The correct answer is b.

- 14.** Using statement I alone, we get
 $D < A, C$
 So, it is not sufficient.
 Using statement II alone, we get
 $E < B < D$
 It is not sufficient.
 Combining both the statements, we get
 $E < B < D < A, C$
 So, E is the youngest.
 Hence, both the statements taken together are sufficient.

The correct answer is c.

- 15.** Let Peter's age be x years.
 So, Sanya's age = $2x$ years
 Using statement I alone, we get
 $2x - 4 = 3(x - 4)$
 $\Rightarrow x = 8$
 Therefore, Sanya's age = 16 years
 Hence statement I alone is sufficient.
 Using statement II alone, we get
 $2x + 8 = 1.5(x + 8)$
 $\Rightarrow 0.5x = 4$
 $x = 8$ years
 Hence, Sanya's age = 16 years
 Hence, each statement alone is sufficient.

The correct answer is d.

- 16.** Let $y = \frac{x}{1+x^2}$
 $\Rightarrow y + x^2y = x$
 $\Rightarrow x^2y - x + y = 0$
 $D = (-1)^2 - 4y^2$
 x is real
 $(-1)^2 - 4y^2 \geq 0$
 $\Rightarrow 1 - 4y^2 \geq 0$
 $\Rightarrow (1 - 2y)(1 + 2y) \geq 0$
 $\Rightarrow -\frac{1}{2} \leq y \leq \frac{1}{2}$
 $y = \left[-\frac{1}{2}, \frac{1}{2} \right]$.

The correct answer is c.

- 17.** We know, for two successive changes of $a\%$ and $b\%$, total percentage change

$$= \left(a + b + \frac{ab}{100} \right) \%$$

Therefore, equivalent increase in percentage

$$= 162039.2\% \frac{1620}{100} =$$

The correct answer is b.

- 18.** For a balanced coin, the fourth toss is independent of the previous tosses.

$$\text{So, required probability} = \frac{1}{2}$$

The correct answer is c.

- 19.** Suppose the CP of a calculator and a pen stand is Rs. C and Rs. P respectively.

$$3C + 4P = 2140 \quad (1)$$

$$C + 5P = 1355 \quad (2)$$

Now, solving above two equations, we get

$$3C + 15P = 4065$$

$$\text{And, } 3C + 4P = 2140$$

$$\Rightarrow 4065 - 15P = 2140 - 4P$$

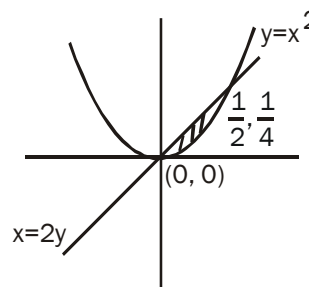
$$\Rightarrow 11P = 4065 - 2140 = 1925$$

$$\Rightarrow P = \text{Rs. } 175, C = \text{Rs. } 480.$$

So, money spend on purchase of calculators = $480 \times 4 = \text{Rs. } 1920$

The correct answer is b.

- 20.**



The points of intersection of the curves $y = x^2$ and $2y = x$ are $(0,0)$ and $\left(\frac{1}{2}, \frac{1}{4}\right)$

$$\left[y = x^2 \Rightarrow y = (2y)^2 \Rightarrow 4y^2 - y = 0 \Rightarrow y = 0, \frac{1}{4} \right]$$

Area enclosed is shown by the shaded region.

$$\text{Area} = \int_0^{\frac{1}{2}} (y_1 - y_2) dx$$

$$= \int_0^{\frac{1}{2}} \left(\frac{x}{2} - x^2 \right) dx = \left[\frac{x^2}{4} - \frac{x^3}{3} \right]_0^{\frac{1}{2}}$$

$$= \frac{1}{16} - \frac{1}{24} = \frac{1}{48} \text{ square units}$$

The correct answer is a.

21. Total even numbers from 100 to 200 = 51
 Even numbers from 100 to 200 divisible by 7 = 105, 112, 119, ..., 196 = 7
 Even numbers from 100 to 200 divisible by 9 = 108, 117, 126, ..., 198 = 6
 Even numbers from 100 to 200 divisible by 63 = 126 = 1
 So, total even numbers from 100 to 200 divisible neither by 7 nor by 9
 = 51 - (7 + 6 - 1) = 51 - 12 = 39

The correct answer is c.

22. Speed of the train = 60 miles/hour
 Total distance
 = Length of the tunnel + Length of the train
 = (5 + 1) miles = 6 miles
 Time = $\frac{\text{Distance}}{\text{Speed}} = \frac{6}{60} = \frac{1}{10}$ hours
 = $\frac{1}{10} \times 60$ minutes = 6 minutes

The correct answer is c.

23. Number of students registered for history for all the three years
 = 30 + 60 + 120 = 210
 Number of students registered for Maths for all the three years
 = 40 + 80 + 160 = 280
 Required percentage
 = $\frac{280 - 210}{280} \times 100 = 25\%$

The correct answer is c.

24. Ration = 3 : 2 : 3 : 1
 Sum of the ratio = 9
 Total fees collected from Economics first year = $\frac{1}{9} \times 135000 = \text{Rs. } 15000$

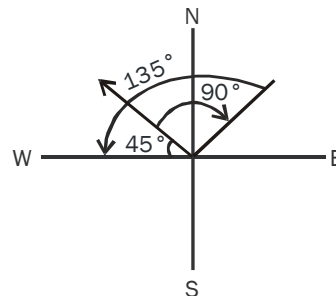
So, registration fees for Economics
 = $\frac{15000}{50} = \text{Rs. } 300$

The correct answer is b.

25. Total fees collected from Maths first year
 = $\frac{3}{9} \times 135000 = \text{Rs. } 45000$

The correct answer is a.

26. We can notice that, turning 90° in clockwise direction and then 135° in anticlockwise direction is equivalent to turning 45° in anticlockwise direction.



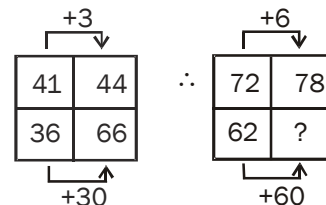
So, he is facing West.

The correct answer is b.

27. The pattern followed is
 T, r, O, m, J, ?(h)
 -2 -3 -2 -3 -2

The correct answer is a.

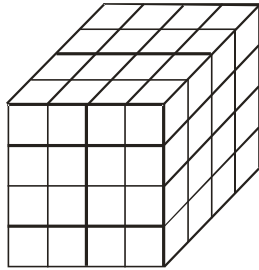
28. The pattern followed is



$$\Rightarrow 62 + 60 = 122$$

The correct answer is b.

Common solution for question 29 to 31:



29. If a coloured cube is a divided into n^3 parts, then cubes from the inner most core of the original cubes will not have any color on any of its faces and number of such small cubes is $(n - 2)^3$.

Number of cubes which have no face painted = $(4 - 2) \times (4 - 2) \times (4 - 2) = 8$

The correct answer is c.

30. As the two faces of the cube are painted with the colour blue; therefore, total number of cubes with one face painted with the colour blue will be $2\{(4 - 2) \times (4 - 2)\} = 8$.

The correct answer is b.

31. As shown in the figure, the top and the bottom faces are painted with the colour green and cubes along edges (including corners) of these faces are painted with two or more colours, where one colour is green, and the remaining is/are either black or blue.

Therefore, the required number of cubes = $2 \times 12 = 24$.

The correct answer is c.

Common solution for questions 32 to 33:

Codes of alphabets follow the following pattern:

Alphabet	Position Number	Code
A	1	$1^2 + 1 = 2$
B	2	$2^2 + 1 = 5$
C	3	$3^2 + 1 = 10$
D	4	$4^2 + 1 = 17$
E	5	$5^2 + 1 = 26$

32. Applying the pattern, we get

$$5 \rightarrow 2^2 + 2 \rightarrow B$$

$$82 \rightarrow 9^2 + 2 \rightarrow I$$

$$325 \rightarrow 18^2 + 1 \rightarrow R$$

$$17 \rightarrow 4^2 + 1 \rightarrow D$$

The correct answer is d.

33. The codes corresponding to the given alphabets are as following:

$$E \rightarrow 5^2 + 1 = 26$$

$$X \rightarrow 24^2 + 1 = 577$$

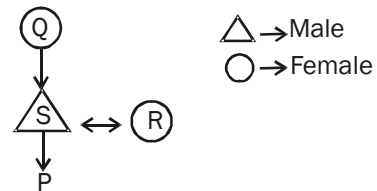
$$A \rightarrow 1^2 + 1 = 2$$

$$M \rightarrow 13^2 + 1 = 170$$

The correct answer is b.

Common solution for questions 34 to 37:

The family tree for the given information can be constructed as following:



34. The total number of persons in the house is 4.

The correct answer is b.

35. Q is P's grandmother.

The correct answer is d.

36. S is P's father.

The correct answer is b.

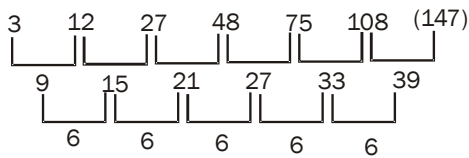
37. R is Q's daughter-in-law.

The correct answer is d.

38. Looking at the figures we can conclude that the parity of unshaded rectangular figures attached to the terminating points of lines is identical, that is, either in clockwise or anticlockwise direction in all the figures except in option (a).

The correct answer is a.

39. The series follows the following pattern:



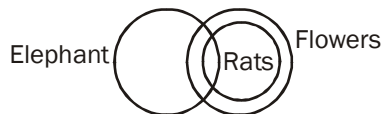
Hence, the next term of the series is 147.

The correct answer is a.

40. Looking at the series, we can conclude that each pair consists of two consecutive prime numbers starting with 2. Therefore, the next term of the series will be (13, 17).

The correct answer is b.

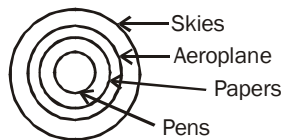
41. The Venn diagram can be drawn as:



Therefore, only statement I follows.

The correct answer is a.

42. The Venn diagram can be drawn as:



Therefore, statements I and IV follow.

The correct answer is c.

Common solution for questions 43 and 44:

From the given information we can conclude the following:

$$A = 3B, C = \frac{1}{2}D \text{ and } B > C$$

Therefore, $A > B > C$ and $D > C$

Now, by putting some numerical values in the above information, we conclude that A is older than D.

43. A is older than D

The correct answer is a.

44. Both options (a) and (b) are needed to estimate A's age.

The correct answer is c.

45. In an Either-Or statement, one of the conditions has to be correct, that is, either the employees have no confidence in the management or they are hostile by nature. Both the conditions cannot be true at the same time. According to option (d) as the employees are not hostile in nature, the second condition is true, that is, they have no confidence in the government.

The correct answer is d.

46. The 'If' condition is the condition of 'sufficient cause', that is, the cause is sufficient to have the effect but the effect is not solely dependent on that particular cause. Hence, 'If A (children do not cavort) then B (parents shout)' is 'If not A (children cavort), then not B (parents do not shout)'. Hence, option (a) is correct.

The correct answer is a.

47. None of the given pairs of sentences are correct. Hence, option (d) is the answer.

The correct answer is d.

Common solution for questions 48 to 50:

The given information can be tabulated as following:

Position of house from left to right	Ist	IInd	IIIrd	IVth
Houses	-	Blue	Red	White
Nationalities	Norwegian	Italian	Englishmen	Spaniard
Drinks		Tea	Milk	Fruit Juice

48. Milk is drunk by Englishman.

The correct answer is b.

49. The Norwegian drinks cocoa.

The correct answer is b.

50. Except option (d), all are correct.

The correct answer is d.

51. The passage focusses on two aspects – the adaptability of mammals and the reality of extinction. Only option (b) captures this central idea.

The correct answer is b.

52. The answer can be inferred from the second paragraph, “that the bat had better flying abilities than the “pterosaur”. Thus “pterosaur” was a flying reptile.
The correct answer is c.
53. Option (d) can clearly be inferred from concluding lines of the first paragraph, “It is in the Miocene era that the mammals reached their peak with reference to size.”
The correct answer is d.
54. The last line of the third paragraph states that “with reference to mammals, we see their extinction is a characteristic of the evolution of life, which can be seen in the geologic record of life — “Geology is the study of the rocks the earth is composed of. Fossil means the remains of the dead animals or plants turned into rocks.
The correct answer is d.
55. The relation between the two words is that of antonyms. *Morose* refers to a sad, melancholy person while *cheerful* is its antonym. The same relation is replicated in option (c) as *replete* means abundantly supplied or provided and is an antonym of *deprive* which means to remove or withhold something from the enjoyment or possession of (a person or persons). The other options are synonyms for each other.
The correct answer is c.
56. A collection of birds, sheep or goats is called a *Flock*. Similarly, a *team* is a group of players. A garden can have things other than flowers, the same holds true for a classroom and a parliament.
The correct answer is b.
57. Just like a *river* flows into an *ocean*, similarly a *tributary* flows into a *river*.
The correct answer is c.
58. A female fox is called a *vixen*. Similarly, *hen* is the feminine of *chicken*.
The correct answer is d.
59. *Clandestine* indicates secrecy and concealment. Its correct antonym is *Overt* which means ‘open to view or knowledge; not concealed or secret’.
The correct answer is d.
60. *Squalid* means ‘foul and repulsive, as from lack of care or cleanliness’. *Clean* would be the correct antonym.
The correct answer is a.
61. *Dearth* means ‘shortage or lack of something’. *Abundance* would be the correct antonym.
The correct answer is d.
62. “Malevolence” means having, showing, or arising from intense, often vicious, ill will, spite, or hatred.
The correct answer is a.
63. “Benefactor” means one that confers a benefit; one that makes a gift or bequest. “Patron” means one that uses wealth or influence to help an individual.
The correct answer is c.
64. “Incredible” means “too extraordinary and improbable to be believed.”
The correct answer is a.
65. The sentence given in the question is in active voice. Option (c) is the only possible answer because all the other answer options are also in active voice.
The correct answer is c.
66. The sentence given in the question is in active voice. Option (d) is the only possible answer because all the other answer options are also in active voice.
The correct answer is d.
67. Statement q has to be the opening statement as it introduces the elephant while all the other statements refer to the elephant as ‘it’. Thus, the only possible answer is q r p s.
The correct answer is b.
68. The use of ‘so’ in Statement r indicates that it is a conclusion drawn on the basis of something. p is the only statement that can logically precede it. The author had never seen a house on fire so when he heard the fire engine he ran out. The use of pronoun ‘we’ in statement s connects it to statement q. The answer is p r q s.
The correct answer is a.

69. In statement s we find the phrase 'the people of whom it is made'. Here 'it' refers to the human race, which is mentioned in statement p. (p-s) therefore are a mandatory pair. Statement q is a conclusion that follows statement r. The correct answer is psrq.
The correct answer is d.
70. The correct sentence is "many physicists initially regarded quantum theory as unnatural, absurd and incompatible with common sense."
The correct answer is c.
71. There is no error in the statements.
The correct answer is d.
72. The correct sentence is "the academy members waged a relentless war against my supervisor and me, because our research...". Here "me" is used because it is the object of the verb.
The correct answer is b.
73. The correct spelling is *deterrent* and means something that discourages or restrain from acting or proceeding.
The correct answer is d.
74. The correct spelling is *opprobrium* which refers to a cause or object of disgrace or reproach.
The correct answer is b.
75. The correct spelling is *mission*.
The correct answer is c.
76. Dronacharya Award is an award presented by the Ministry of Youth Affairs and Sports, Government of India for excellence in sports coaching.
The correct answer is d.
77. The first recipient of the Bharat Ratna was philosopher Sarvepalli Radhakrishnan, along with C Rajagopalachari and C V Raman, who were honoured in 1954.
The correct answer is a.
78. Manchester United Football Club is a professional football club based in Greater Manchester, England. It competes in the Premier League. It is nicknamed "the Red Devils". Its Co-chairmen are Joel and Avram Glazer.
The correct answer is a.
79. The headquarter of Gazprom is in Moscow, Russia. This company was founded in 1989, and is in the business of extraction, production, transport, and sale of natural gas.
The correct answer is b.
80. The Society for the Promotion of Indian Classical Music and Culture Amongst Youth (SPIC MACAY) is a voluntary youth movement which promotes intangible aspects of Indian cultural heritage. SPIC MACAY was established by Dr. Kiran Seth in 1977 at IIT Delhi. It promotes Indian classical music, classical dance, folk music, yoga, meditation, crafts and other aspects of Indian culture. It is a movement with chapters in over 300 cities all over the world.
The correct answer is c.
81. Volkswagen Group, or VW AG, is a German multinational automotive manufacturing company headquartered in Wolfsburg. It manufactures the Bentley car.
The correct answer is d.
82. YouTube service was created by three former PayPal employees – Chad Hurley, Steve Chen, and Jawed Karim in February 2005. This American video –sharing website is headquartered in San Bruno, California, USA. In November 2006, it was bought by Google for US\$ 1.65 billion.
The correct answer is c.
83. eBay was founded by Pierre Omidyar in 1995. It is an American multinational corporation and e-Commerce company that provides consumer-to-consumer and business-to-consumer sales services via the Internet. It is headquartered in San Jose, California, USA.
The correct answer is a.
84. Kathak is the folk dance of Uttar Pradesh. It is one of the major folk dance form of northern India, quite similar to Bharatanatyam in south India.
The correct answer is d.

85. Australia now tops the list of countries having uranium reserves as it has the largest quantities of recoverable uranium reserves within its borders.

The correct answer is c.

86. In an underground economy, goods and services are exchanged but are either under-reported or not reported at all. It gives rise to a parallel black economy.

The correct answer is b.

87. Leela Chitnis was an actress in the Indian film industry, active from 1930s to 1980s. In 1941, Chitnis, at the height of her popularity and glamour, became the first Indian film star to endorse the popular Lux soap brand, a concession only granted to top Hollywood heroines at that time.

The correct answer is d.

88. Mahindra Two Wheelers Limited (MTWL) is a group venture owned by Mahindra & Mahindra Limited (M&M), which manufactures scooters and motorcycles. Mahindra Two Wheelers Limited was founded in 2008, when Mahindra & Mahindra Limited acquired the business assets of the Kinetic Motor Company Limited.

The correct answer is a.

89. Dabur (Dabur India Ltd.) is India's largest Ayurveda medicines & related products manufacturer. Dabur was founded in 1884 by SK Burman, a physician in West Bengal, to produce and dispense Ayurvedic medicines.

The correct answer is b.

90. Made in Japan – Akio Morita and Sony is the autobiography of Akio Morita, the co-founder and former chairman of the Sony Corporation. It was written with the assistance of Edwin M. Reingold and Mitsuko Shimomura. The book not only narrates the story of Morita, but also of the Sony Corporation's formation in the aftermath of Japan's brutal defeat in World War II, and its subsequent rapid rise to fame and fortune.

The correct answer is a.

91. Aston Martin Lagonda Limited is a British manufacturer of luxury sports cars and grand tourers. It was founded in 1913 by Lionel Martin and Robert Bamford.

The correct answer is b.

92. Julian Paul Assange is an Australian computer programmer, publisher and journalist. He is editor-in-chief of the organisation WikiLeaks, which he founded in 2006. He came to global prominence in 2010 when WikiLeaks published a series of leaks, provided by Chelsea Manning. Following the 2010 leaks, the United States government launched a criminal investigation, Assange sought and was granted asylum by Ecuador in August 2012. Assange has since remained in the Embassy of Ecuador in London.

The correct answer is b.

93. On 15 March 1962, President John F Kennedy gave an address to the US congress in which he formally addressed the issue of consumer rights. He was the first world leader to do so, and the consumer movement now marks 15 March every year as a means of raising global awareness about consumer rights.

The correct answer is c.

94. The first train in India became operational on 22 December 1851 for localized hauling of canal construction material in Roorkee. A year and a half later, on 16 April 1853, the first passenger train service was inaugurated between Bori Bunder in Mumbai and Thane.

The correct answer is c.

95. Indian Standard Time (IST) is the time observed throughout India and Sri Lanka, with a time offset of UTC +05:30. Indian Standard Time is calculated on the basis of 82.30' E longitude, in Shankargarh Fort, Mirzapur in Uttar Pradesh which is nearly on the corresponding longitude reference line. Greenwich Mean Time (GMT) is the mean solar time at the Royal Observatory in Greenwich, London. GMT was formerly used as the international civil time standard, now superseded in that function by Coordinated Universal Time (UTC).

The correct answer is d.

96. Nokrek Biosphere Reserve is a national park located in West Garo Hills district of Meghalaya. UNESCO added this National park to its list of Biosphere Reserves in May 2009. Along with Balphakram national park, Nokrek is a hotspot of biodiversity in Meghalaya.

The correct answer is b.

97. With 17 people per square kilometer, the state of Arunachal Pradesh has the lowest record of population density.

The correct answer is d.

98. Belgium is called the Cockpit of Europe because it has been the site of more European battles than any other country.

The correct answer is b.

99. The South Asian Association for Regional Cooperation (SAARC) is the regional intergovernmental organization and geopolitical union of nations in South Asia. Its member states include Afghanistan, Bangladesh, Bhutan, India, Nepal, the Maldives, Pakistan and Sri Lanka.

The correct answer is b.

100. Ringing Bells, the company that created a stir in February 2016 by claiming that it will come up with the cheapest smartphone, later said that it will start phase-wise distribution of the Freedom 251 mobile smartphones. Freedom 251, which was touted as the world's cheapest smartphone when it was announced back in February, was later withdrawn by the company.

The correct answer is b.

Chapter

11

Mock Test 3 Based on SET

Total Time: 150 Minutes

Total Marks: 150

Instructions

1. There are four sections in the question paper.

Sr. No.	Sections	Number of Questions
1	Quantitative Aptitude	40
2	Analytical and Logical Reasoning	30
3	General English	40
4	General Awareness	40
Total		150

2. This is an objective test. Each question has 4 responses. Candidate should choose an appropriate response.
3. There are four sections in the question paper.
4. There is a total of 150 questions carrying 1 mark each.
5. There is No Negative Marking for incorrect answer.
6. Candidates are advised to read all options thoroughly.
7. No clarification of any sort relating to the question paper is permitted.

SECTION I

QUANTITATIVE ABILITY

1. How many 3 digit numbers are there which are each equal to the product of the digits?
 (a) 2 (b) 3
 (c) 5 (d) zero
 (BBA: SET 2011)
2. A society collected Rs. 5776. Each member contributed as many rupees as there were members. Find the number of members.
 (a) 76 (b) 26
 (c) 66 (d) 14
 (BBA: SET 2011)
3. A vegetable vendor at market cheats customers by using a false weight of 800 g instead of 1 kg. What is the percentage point difference between the percentage by which he underweights and the percentage profit if he claims to sell at cost price?
 (a) 0 (b) 5
 (c) 10 (d) 6
 (BBA: SET 2009)
4. A total profit of Rs. 3,600/- is to be distributed amongst A, B and C such that A : B = 15 : 8 and B : C = 7 : 8. How much is the share of A?
 (a) Rs. 1,680 (b) Rs. 1,024
 (c) Rs. 896 (d) Rs. 240
 (BBA: SET 2009)
5. If a quantity of rice serves 100 men for 15 days, then how many men will it serve for 6 days?
 (a) 200 (b) 225
 (c) 275 (d) 250
 (BBA: SET 2011)
6. The population of a town increases 5% annually but decreases by emigration by $\frac{1}{4}$ %. What is the net increase percent in 3 years?
 (a) 14% (b) 14.93%
 (c) 12% (d) 19.4%
 (BBA: SET 2010)
7. The speed of boat in still water is 20 kmph. If it can travel 16 km upstream in 1 hour, what time would it take to travel the same distance downstream?
 (a) 45 minutes (b) 40 minutes
 (c) 36 minutes (d) 30 minutes
 (BBA: SET 2009)
8. A man loses 20% of his money. After spending 25% of the remainder, he has Rs. 480 left. How much money did he originally have?
 (a) Rs. 800 (b) Rs. 850
 (c) Rs. 825 (d) Rs. 600
 (BBA: SET 2011)
9. The average of 11 numbers is 50. If the average of the first six numbers is 49 and that of the last six numbers is 52, what is the sixth number?
 (a) 56 (b) 50
 (c) 52 (d) 49
 (BBA: SET 2010)
10. A student obtained 65 marks and failed by 65 marks in an examination. If the passing % was 65 how much were the total marks?
 (a) 105 (b) 150
 (c) 200 (d) 350
 (BBA: SET 2009)
11. A man had 7 children. When their average age was 12 years, the child who was 6 years of age, died. What is the average of the surviving children 5 years after the death of his child?
 (a) 16 years (b) 17 years
 (c) 18 years (d) 12 years
 (BBA: SET 2011)
12. A Rainy day occurs once in every 10 days. Half of the rainy days produce rainbows. What percent of all the days do have not rainbows?
 (a) 95% (b) 10%
 (c) 50% (d) 5%
 (BBA: SET 2010)

- 13. The total population of a country is 294000, out of which 150000 are males. Out of 100 males, 98 can read and write, but only 53% of the total population can do so. Find the percentage of woman who can read and write.**
- (a) 6.125% (b) 6.121%
(c) 6.215% (d) 6.225%
- (BBA: SET 2010)**
- 14. When a plot is sold for Rs. 18,700, the owner loses 15%. At what price must the plot be sold in order to gain 15%?**
- (a) Rs. 21,000 (b) Rs. 22,500
(c) Rs. 25,300 (d) Rs. 25,800
- (BBA: SET 2010)**
- 15. A and B start a business jointly. A invests Rs. 16,000 for 8 months and B remains in the business for 4 months. Out of total profit, B claims $\frac{2}{7}$ of the profit. How much money was contributed by B?**
- (a) Rs. 10,500 (b) Rs. 11,900
(c) Rs. 12,800 (d) Rs. 13,600
- (BBA: SET 2010)**
- 16. If a man reduces the selling price of a fan from Rs. 400 to Rs. 380, his loss increases by 2%. The cost price of the fan is:**
- (a) Rs. 480 (b) Rs. 500
(c) Rs. 1,000 (d) None of these
- (BBA: SET 2010)**
- 17. Ramesh took Rs. 1500 on loan from Manish Singh at 14% per annum simple interest. After 5 years, he gave Rs. 2100 and a watch to Manish Singh to clear the account. Find the cost of watch.**
- (a) Rs. 400 (b) Rs. 550
(c) Rs. 450 (d) Rs. 475
- (BBA: SET 2011)**
- 18. A red light flashes 3 times per minute and a green light flashes 5 times in two minutes at regular intervals. If both the lights start flashing at the same time, how many times do they flash together in each hour?**
- (a) 60 (b) 18
(c) 26 (d) 30
- (BBA: SET 2011)**
- 19. A man can row 5 kmph in still water. If the velocity of the current is 1 kmph and, it takes him 1 hr to row to a place and come back, how far is the place?**
- (a) 2.4 kms (b) 2.5 kms
(c) 3 kms (d) 3.6 kms
- (BBA: SET 2011)**
- 20. A, B and C have certain number of mangoes with them. B has 10% less mangoes than A and C has 20% less than A. By what percentage is the number of mangoes with B more than those with C?**
- (a) 10% (b) 12.5%
(c) 15% (d) 16.667%
- (BBA: SET 2009)**
- 21. The soldiers of an army were made to stand in a solid square. In doing so, 5 soldiers were left. If there were only 5630 soldiers in the army, find the number of soldiers in the outermost row of the solid square.**
- (a) 25 (b) 15
(c) 75 (d) 225
- (BBA: SET 2010)**
- 22. Four bells ring at intervals of 6, 8, 12 and 18 seconds. They start ringing simultaneously at 12 O'clock. Find when they will again ring simultaneously.**
- (a) 26 seconds (b) 30 seconds
(c) 72 seconds (d) 36 seconds
- (BBA: SET 2010)**
- 23. A man repays a loan of Rs. 3250 by paying Rs. 20 in the first month and then increases the payment by Rs. 15 every month. How long will it take to clear his loan?**
- (a) 10 months (b) 15 months
(c) 20 months (d) 21 months
- (BBA: SET 2011)**
- 24. If the number representing volume and surface area of a cube are equal, then the length of the edge of the cube in terms of the unit of measurement will be:**
- (a) 3 (b) 4
(c) 5 (d) 6
- (BBA: SET 2010)**

38. In a firing range, four shooters are firing at their respective targets. The first shooter hits his target once every 5 seconds; second shooter hits his target once every 6 seconds, the third shooter hits his target once every 7 seconds and the fourth shooter hits his target once every 8 seconds. All of

them hit their targets at 10 : 00 a.m., when will they next hit their targets together again?

- (a) 10 : 14 am (b) 10 : 28 am
(c) 10 : 30 am (d) 10 : 31 am

(BBA: SET 2009)

Directions (Q.39–40): The following table gives the percentage population of five states P, Q, R, S, T on the basis of poverty line and also on the basis of sex. Study the table and answers the questions based on it.

(BBA: SET 2011)

State	Percentage of population below poverty line	Proportion of Males Females	
		Below poverty line	Above poverty line
		M : F	M : F
P	35	5 : 6	6 : 7
Q	25	3 : 5	4 : 5
R	24	1 : 2	2 : 3
S	19	3 : 2	4 : 3
T	15	5 : 3	3 : 2

39. What will be the number of females above poverty line in the state S if it is known that the population of state S is 7 million?

- (a) 3 million (b) 2.43 million
(c) 5.7 million (d) 1.61 million

40. If the male population above poverty line in state R is 1.9 million, then the total population of state R is

- (a) 4.5 million (b) 4.85 million
(c) 6.25 million (d) 7.6 million

SECTION II

ANALYTICAL AND LOGICAL REASONING

Directions (Q. 41–45): Without resolving anything yourself, choose the conclusions that logically follow from the statements.

(BBA: SET 2010)

41. Statement: All that glitters is not gold.

Conclusions:

- (a) Non metals also glitter.
(b) Only gold glitters.
(c) Not all metals glitter.
(d) Glittering thing may be deceptive.

42. Statement: Ability is poor man's wealth.

Conclusions:

- (a) A poor man is always able.
(b) A poor man has the ability to earn wealth.
(c) A wealthy man is always able.
(d) A poor man can earn wealth if he has ability.

43. Statement: All beggars are poor.

Conclusions:

- (a) If A is beggar, then A is not rich.
- (b) If A is not rich, then A is not a beggar.
- (c) All those who are poor are beggars.
- (d) If A is rich, then A is not a beggar.

44. Statement: Many creative persons become artists.

Conclusions:

- (a) A creative person will certainly become an artist.
- (b) It is not possible to become an artist without creativity.
- (c) A high level of creativity is needed to become an artist.
- (d) Some artists are creative persons.

45. Statement: To pass an examination, we must work hard.

Conclusions:

- (a) Examination is related with hard work.
- (b) All those who work hard, pass.
- (c) Without hard work, one does not pass.
- (d) Hard working person is a satisfied person.

Directions (Q. 46–47): In each of the following question four words (or pairs) are given out of which three are alike in some manner and the fourth is different. Find the odd one.

(BBA: SET 2009)

46. Find the odd one out.

- (a) Bake
- (b) Boil
- (c) Freeze
- (d) Simmer

47. Find the odd one out.

- (a) Asia
- (b) Argentina
- (c) Africa
- (d) Australia

(BBA: SET 2009)

48. Facing North I started my journey and turned towards right and left as per the sequence given below. Which sequence will finally lead me to face a direction other than the North?

- (a) Left, left, right, left, right, right
- (b) Right, left, right, left, right, left,
- (c) Right, right, left, left, right, right
- (d) Left, left, left, right, right, right

(BBA: SET 2010)

49. Rahul put his timepiece on the table in such a way that at 6 p.m. hour hand points to North. In which direction the minute hand will point at 9.15 p.m.?

- (a) South-East
- (b) South
- (c) North
- (d) West

(BBA: SET 2011)

50. A bus leaves for Mumbai every 40 minutes. An enquiry clerk told a passenger that the last bus left 10 minutes back and the next one would leave at 11.15 am. At what time did the enquiry clerk give this information to the passenger?

- (a) 10.45 am
- (b) 10.35 am
- (c) 10.25 am
- (d) None of the above

(BBA: SET 2009)

51. Arrange the given words in alphabetical order and tick the one that comes last.

- (a) Finger
- (b) Flourish
- (c) Format
- (d) Forget

(BBA: SET 2011)

52. Find the missing number.

68	95	75
103	59	82
34	?	133

- (a) 63
- (b) 73
- (c) 83
- (d) 93

(BBA: SET 2009)

53. If India completed 60 years of independence on 15th August 2007 on Wednesday, what day will it be when 70 years are completed?

- (a) Sunday
- (b) Tuesday
- (c) Thursday
- (d) Wednesday

(BBA: SET 2011)

54. Choose the alternative which closely resembles the mirror image of the given combination.

T A R A I N 1 0 1 4 A

- (1) A P T O T N I A Y A L
- (2) A T O T P N I A Y A T

(3) АГ ОГ ДТАЯ АИИ

(4) АДГОГИИАЯАТ

- (a) 1 (b) 2
(c) 3 (d) 4

(BBA: SET 2011)

55. In this question, a letter series has been given in the first row and a number series in the second row with some terms missing in each row. Find out the missing terms and select the correct alternative from the choices given below:

bhn ___ ben _ he _ _ _

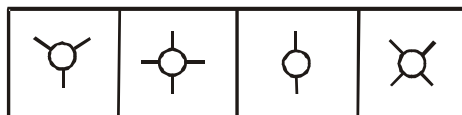
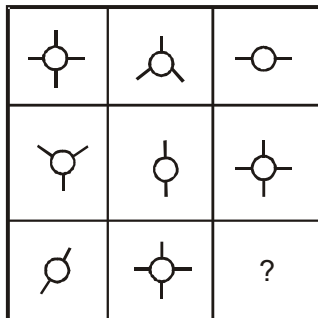
_ 1 _ 2 _ 43 _ _ 12 _ 1 _ _

The last four terms of the series are

- (a) ebhn (b) behn
(c) nehb (d) bhne

(BBA: SET 2009)

56. Select a suitable figure from the four alternatives that would complete the figure matrix.



- (1) (2) (3) (4)
(a) 1 (b) 2
(c) 3 (d) 4

(BBA: SET 2011)

Directions (Q. 57–59): Read the instructions carefully and answer the questions below:

Ravi and Kunal are good in Hockey and Volleyball. Sachin and Ravi are good in Hockey and Baseball.

Gaurav and Kunal are good in Cricket and Volleyball. Sachin, Gaurav and Michael are good in Football and Baseball.

(BBA: SET 2010)

57. Who is good in Hockey, Cricket and Volleyball?

- (a) Sachin (b) Kunal
(c) Ravi (d) Gaurav

58. Who is good in Baseball, Cricket, Volleyball and Football?

- (a) Sachin (b) Kunal
(c) Gaurav (d) Ravi

59. Who is good in Baseball, Volleyball and Hockey?

- (a) Sachin (b) Kunal
(c) Ravi (d) Gaurav

60. If SHOOT is coded as 19 – 8 – 15 – 15 – 20, then LADY is coded as

- (a) 10 – 1 – 4 – 23
(b) 12 – 1 – 4 – 25
(c) 12 – 1 – 4 – 22
(d) 12 – 1 – 4 – 23

(BBA: SET 2009)

61. If OPTICAL and OPTICIAN are coded as 76 and 87 respectively, then GLASSES would be coded as:

- (a) 80 (b) 82
(c) 84 (d) 86

(BBA: SET 2009)

62. If wall is called window, window is called door, door is called floor, floor is called roof and roof is called ventilator, what will a person stand on?

- (a) Window (b) Wall
(c) Floor (d) Roof

(BBA: SET 2009)

Directions (Q.63–66): Read the following information carefully and answer the questions below:

A family consists of six members P, Q, R, S, T and U. There are two married couples. Q is a doctor and the father of T. U is grandfather of R and is a contractor. S is grandmother of T and is a housewife. There is one doctor, one contractor, one nurse, one housewife and two students in the family.

(BBA: SET 2011)

63. Who is the husband of P?

- (a) R (b) U
(c) Q (d) S

64. What is the profession of P?

- (a) Doctor
(b) Nurse
(c) Doctor or Nurse
(d) Housewife

65. Which of the following are two married couples?

- (a) US, QT (b) US, QP
(c) TS, RU (d) US, RP

66. Which of the following is definitely a group of male members?

- (a) QU (b) QUT
(c) QUP (d) UT

67. Some boys are standing in a queue. If the 10th boy from behind is 5 behind the 12th boy from the front then how many boys are there in the queue?

- (a) 27 (b) 17
(c) 26 (d) 20

(BBA: SET 2010)

Directions (Q. 68–70): Six scientists A, B, C, D, E, and F are to present a paper each at a one-day conference. Three of them will present their papers in the morning session before the lunch break whereas the other three will be present in the afternoon session. The lectures have to be scheduled in such a way that they comply with the following restrictions:

B's should present his paper immediately before C's presentation; their presentations cannot be separated by the lunch break. D must be either the first or the last scientist to present his paper.

(BBA: SET 2009)**68. In case C is to be the fifth scientist to present his paper, then B must be**

- (a) first (b) second
(c) third (d) fourth

69. B could be placed for any of the following place in the order of presenters EXCEPT

- (a) first (b) second
(c) third (d) fourth

70. In case F is to present his paper immediately after D presents his paper, C could be scheduled for which of the following places in the order of presenters?

- (a) Second (b) Third
(c) Fourth (d) Fifth

SECTION III GENERAL ENGLISH

Directions (Q.71–74): For each word written in capital letters, choose a word from the given alternatives which is closest in meaning.

71. SKIRMISH

- (a) enmity (b) fight
(c) anguish (d) savour

72. STEADFAST

- (a) deep (b) solid
(c) starve (d) determined

73. OMNIPOTENT

- (a) everlasting (b) all-powerful
(c) all-merciful (d) all-knowing

74. JUVENILE

- (a) young (b) criminal
(c) immoral (d) corrupt

(BBA: SET 2009)

Directions (Q. 75): Choose the word from the given alternatives which is the closest in meaning.

75. THWART

- (a) Strike vigorously (b) Enrage
(c) Injure (d) Block

(BBA: SET 2010)

Directions (Q. 76–77): Choose from the given alternatives the word closest to the meaning of the underlined word.

76. The sullen child kept aloof.

- (a) sleepy (b) gloomy
(c) rude (d) tired

77. The empty vessel was docked at the harbour.

- (a) garbage can (b) ship
(c) big pot (d) vast room

(BBA: SET 2010)

Directions (Q.78–82): For each word written in capital letters, choose a word from the given alternatives which is opposite in meaning.

(BBA: SET 2011)

78. DENSITY

- (a) Clot (b) Rarity
(c) Squeeze (d) Thick

79. ANGEL

- (a) Zeus (b) Jove
(c) Minerva (d) Satan

80. LIVID

- (a) Happy (b) Calm
(c) Friendly (d) Busy

81. VIVID

- (a) Clear (b) Violent
(c) Indistinctive (d) Pretty

82. OSTENTATIOUS

- (a) Show (b) Display
(c) Modest (d) Strut

Directions (Q.83–87): Read the passage and answer the questions that follow.

The first half of the twentieth century ushered in many drastic changes. Some of the most far-reaching changes have been brought about by one invention, the automobile. The increased availability of gasoline-powered cars has affected all aspects of society, all over the world.

In 1909 Ford's Model T sold for three hundred and fifty dollars. However, with the invention of the assembly line, which reduced the production time for a car from fourteen hours to ninety-three minutes, Ford was able to sell the Model T for less

than three hundred dollars by the end of the decade. In the 1920s General Motors introduced five classes of car, from the luxurious Cadillac to the economical Chevrolet. By 1929 there was one car on the road for every five people living in the United States.

The booming industry helped to support many others, including the steel, chemical, rubber, petroleum, and glass industries. Americans willingly paid state gasoline taxes to create the new highway that soon crisscrossed the nation. The automobile also affected industries not directly involved with production or transportation. For example: advertising agencies responded to increased highway traffic with a tremendous surge in roadside billboard advertising. In all, by the 1930s more than 3.7 million workers in some way owed their jobs to the popularity of the automobile. That number of workers continued to grow for the greater part of the century.

(BBA: SET 2009)

Choose the correct answer from the choices given after each statement.

83. What is the main idea of the passage?

- (a) Turn-of –the-century automobiles.
(b) The effect of the automobile on American industry.
(c) The history of the American highway system.
(d) The impact of assembly-line technology on American industry.

84. All of the following are mentioned as having benefited from the increased popularity of the automobile, except

- (a) the rubber industry
(b) the tourist industry
(c) the steel industry
(d) highway construction

85. According to the passage, the effect of assembly-line production on the automobile industry was

- (a) reduction in the average worker's salary by three hundred dollars.
(b) automobiles of better quality
(c) an increase in the popularity of the Chevrolet.
(d) reduction in the price of Model T.

86. The word 'booming' (in the last para) could best be replaced by

- (a) rapidly growing
- (b) severely limited
- (c) noise-producing
- (d) explosive

87. The passage implies that the increase in the number of roadside billboards was primarily due to

- (a) an increase in the number of highway workers.
- (b) an increase in advertising overall.
- (c) a new gasoline tax.
- (d) an increase in the number of cars on the highway

Directions (Q.88–91): Choose the meaning of the idioms from the four options given below:

(BBA: SET 2011)

88. TO TAKE TO TASK

- (a) To work hard
- (b) To rebuke or scold
- (c) To be lazy
- (d) To be serious

89. TO TURN A DEAF EAR TO

- (a) To disregard
- (b) Run away from
- (c) Complain about
- (d) Not understand

90. TO MAKE THE ENDS MEET

- (a) Tie a knot
- (b) To make a circle
- (c) To live within one's income
- (d) Make friends

91. BY HOOK OR BY CROOK

- (a) By fair means or foul
- (b) Underhanded tricks
- (c) Help out
- (d) None of these

Directions (Q.92): Choose the meaning of the underlined part of the sentences given below:

92. I am done for.

- (a) Ruined
- (b) Sleeping
- (c) Exhausted
- (d) Bed ridden

(BBA: SET 2011)

Directions (Q.93): Complete the following sentences choosing a word from options given.

93. An imaginary name assumed by an author as a disguise is a _____ .

- (a) pet name
- (b) homonym
- (c) nickname
- (d) pseudonym

(BBA: SET 2009)

Directions (Q.94): Find the correct substitute for the given phrases from the options given.

94. A tank in which fish are kept is called an

- (a) aquarium
- (b) aquatics
- (c) aqua duct
- (d) arboretum

(BBA: SET 2009)

Directions (Q. 95): Choose the appropriate preposition to fill in the blanks.

95. The public are cautioned _____ pickpockets.

- (a) from
- (b) of
- (c) with
- (d) on

(BBA: SET 2010)

Directions (Q. 96): Name the part of speech of the Underlined word in the following sentence.

96. There is more evidence yet to be offered.

- (a) Adverb
- (b) Verb
- (c) Preposition
- (d) Article

(BBA: SET 2010)

Directions (Q. 97–99): Choose the appropriate tenses from the alternatives given below to fill in the blanks.

(BBA: SET 2010)

97. By this time tomorrow I _____ reached my home.

- (a) will have
- (b) will be
- (c) may be
- (d) should

98. It _____ raining all night.

- (a) had
- (b) has been
- (c) is being
- (d) was being

99. I wish my brother _____ here.

- (a) were
- (b) was
- (c) is
- (d) has been

100. Choose the correct option:

This paper _____ twice weekly.

- (a) is publishing
- (b) is published
- (c) publishes
- (d) has published

(BBA: SET 2010)

Directions (Q.101): Name the part of speech of the underlined word in the following sentence:

101. We scored as many goals as them.

- (a) Pronoun (b) Conjunction
(c) Adverb (d) Preposition

(BBA: SET 2011)

Directions (Q.102): Choose the appropriate tense from the alternatives given below to fill in the blanks:

102. Mr. Lowe _____ us his lawnmower today as ours is broken

- (a) is lending (b) lends
(c) lent (d) lended

(BBA: SET 2011)

Directions (Q.103): Choose the correct option to fill in the blanks:

103. He has his fingers _____ the pulse of the nation.

- (a) In (b) Below
(c) Over (d) On

(BBA: SET 2011)

104. The adjective used for cattle is

- (a) Corvine (b) Leonine
(c) Bovine (d) Porcine

(BBA: SET 2011)

Directions (Q. 105–106): Choose the meaning of the part of the sentences underlined.

105. Things are looking up now.

- (a) at the sky (b) above
(c) Improving (d) bad

106. His friends expected that he would get off with a fine.

- (a) escape (b) get caught
(c) run away (d) rusticated

(BBA: SET 2010)

Directions (Q. 107): Choose the option that is closest in meaning to the phrases in bold.

107. Some people have a habit of wearing their hearts on their sleeves.

- (a) saying something which is not to be taken seriously.
(b) exposing their innermost feelings to others.
(c) avoiding being friendly with others.
(d) always trying to gain advantage over others.

(BBA: SET 2010)

Directions (Q.108–110): Complete the following sentences choosing a word from the options given below:

(BBA: SET 2011)

108. Botany is to plants as _____ is to animals.

- (a) Astrology (b) Zoology
(c) Geology (d) Theology

109. School is to fish as _____ is to geese.

- (a) Giggle (b) Gaggle
(c) Group (d) Gang

110. Miniscule is to massive as _____ is to large.

- (a) Wide (b) Huge
(c) Tiny (d) Big

SECTION IV GENERAL AWARENESS

111. Mumps is a disease caused by

- (a) fungus (b) bacteria
(c) virus (d) None of these

(IPU CET 2015)

112. National Science Centre is located at

- (a) Delhi (b) Bengaluru
(c) Bombay (d) Kolkata

(IPU CET 2015)

113. Photosynthesis takes place faster in

- (a) yellow light (b) white light
(c) red light (d) darkness

(IPU CET 2015)

114. Traveller's cheques is a/an

- (a) medium of exchange
(b) tax levied by GOI
(c) custom duty paid by a traveller
(d) service tax on goods/services purchased/used by a traveller

115. Rohan Boppana, who is a famous sports personality, is associated with

- (a) Chess (b) Badminton
(c) Lawn Tennis (d) Table Tennis

116. World Heritage Day is celebrated on

- (a) April 12 (b) April 18
(c) April 11 (d) April 13

117. _____ is the market regulator of India.

- (a) IRDAI (b) RBI
(c) NABARD (d) SEBI

118. World Health Day is observed on

- (a) February 20 (b) March 15
(c) April 7 (d) May 5

119. Round revolution is related to the production of

- (a) Eggs (b) Cotton
(c) Potato (d) Muskmelon

120. The vast resources of unutilized natural gas can be used in the production of

- (a) Coal
(b) Synthetic petroleum
(c) Fertilizers
(d) Carbide

121. Which of the following public sector companies of India is a reinsurance company?

- (a) National Insurance Company Limited
(b) General Insurance Corporation of India Limited
(c) Oriental Insurance Company Limited
(d) Agriculture Insurance Company of India Limited

122. Which one of the following is not correctly matched?

(Share value index)	(Stock exchange)
(a) Sensex	Mumbai
(b) Nikkei	Singapore
(c) AEX	Amsterdam
(d) Dow Jones	New York

123. Consider the following pairs:

(Committee)	(Stock exchange)
1. Chelliah committee	Tax Reform
2. Kelkar task force	Direct and Indirect Taxes
3. Rangrajan committee	Efficient Management of Public Expenditure

Which of the pairs given above are correctly matched?

- (a) 1 and 2 only (b) 1, 2 and 3
(c) 2 and 3 only (d) 1 and 3 only

124. GAAR is the abbreviation of

- (a) General Anti-Acceptance Rule
(b) General Advance Avoidance Rule
(c) General Anti-Avoidance Rule
(d) None of the above

125. When a country devaluates its currency, then

- (a) Imports become cheaper and exports become expensive.
(b) Imports become expensive and exports become cheaper.
(c) Both imports and exports become cheaper.
(d) Both imports and exports become expensive.

126. Which one of the following is not correctly matched?

(Scheme/programme)	(Objective)
(a) Make in India	To promote manufacturing sector
(b) Pradhanmantri Jandhan Yojana	Financial Inclusion
(c) Digital India	To promote sustainable development
(d) Direct benefit	To provide cash subsidy transfer scheme

127. The general meaning of disguised unemployment is that

- a large number of people do not have employment
- alternative employments are not available.
- the marginal productivity of labourers is zero.
- the productivity of labourers is comparatively less.

128. Consider the following statements with regard to Security and Exchange Board of India:

- It is a constitutional body.
- Its headquarters are located in Mumbai.

Which of the statements given above is/are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

129. Which of the following is not an objective of the fiscal policy?

- Rapid economic development
- Price stability
- Equilibrium in balance of payment
- Control over banks.

130. Consider the following pairs:

(Organization)	(Headquarters)
1. Asian Development Bank	Bangkok
2. World Trade Organization	Geneva
3. ASEAN	Manila

Which of the pairs given above is/are correctly matched?

- 1, 2 and 3
- 1 and 3 only
- 2 and 3 only
- 2 only

131. Which of the following is not a measure to control inflation?

- To harden the issuance of currency
- To reduce the quantity of currency
- To issue more currency
- To adopt strict credit policy

132. India's largest commercial bank, in terms of revenue, is the State Bank of India. The second largest bank is:

- HDFC Bank
- ICICI Bank
- Axis Bank
- Bank of Baroda

133. In an economy the Reference Rate

- Determines inflation rate
- Determines capital market
- Determines export rate
- Determines exchange

134. Consider the following pairs:

(Sectors allowed for foreign direct investment)	(Allowed limit of investment)
1. Multi Brand Retail	: 51%
2. Telecommunication	: 100%
3. Private sector banking	: 74%

Which of the pairs given above are correctly matched?

- 1 and 3 only
- 1 and 2 only
- 2 and 3 only
- All of the above

135. Which of the following is not connected with fiscal policy?

- Income tax
- National Old age pension scheme
- VAT
- Interest rates

136. India is the second largest producer of cement in the world. Which of the following sectors is the biggest demand driver of cement in the country?

- (a) Highway construction sector
- (b) Housing construction sector
- (c) Railway construction sector
- (d) Industrial building construction sector

137. Which of the following companies is not a Maharatna Company?

- (a) Oil and Natural Gas Corporation.
- (b) Bharat Electronics Limited.
- (c) Coal India Limited.
- (d) Gas Authority of India Limited.

138. It is a general perception that in underdeveloped countries a substantial share of national income is generated

- (a) in primary sector.
- (b) in secondary sector.
- (c) in tertiary sector.
- (d) in quaternary sector.

139. Which of the following is not related to the Reserve Bank of India?

- (a) Repo Rate
- (b) Bank Rate
- (c) Statutory Liquidity Rate
- (d) Fiscal Policy

140. Which of the following organizations has undertaken a quality improvement project called 'Project Arrow' to transform itself into a vibrant and responsive organization?

- (a) Indian Railways
- (b) India Post
- (c) Airport Authority of India
- (d) Shipping Corporation of India

141. In which of the given places is the gas based thermal power plant of the National Thermal Power Corporation Limited (India) located?

- (a) Dadri
- (b) Korba
- (c) Ramagundam
- (d) Talcher

142. The process of capital formation is completed in three phases. Which of the following is not one of them?

- (a) Saving

- (b) Collection of means
- (c) Export
- (d) Investment

143. The objective of Foreign Exchange Management Act is

- (a) to make the transactions harder in foreign currency market.
- (b) to check the development of foreign currency market within country.
- (c) to make the transactions easy in the foreign currency market.
- (d) All of the above

144. _____ is responsible for Monetary and Credit Policy.

- (a) Finance Ministry
- (b) Planning Commission
- (c) Niti Aayog
- (d) Reserve Bank of India

145. Underwriting is

- (a) dividing public debts by RBI
- (b) calculation of bad loans
- (c) taking financial risk for a fee
- (d) the act of flow of investment

146. Which of the following pairs is not correctly matched?

(Revolution)	(Activity)
(a) Blue Revolution	Fish production
(b) Pink Revolution	Onion production
(c) Grey Revolution	Meat production
(d) Golden Revolution	Horticulture production

147. Consider the following statements:

1. Bengaluru is called India's Silicon Valley.
2. India's largest industry according to annual output is sugar industry.

Which of the following statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

148. Match list I (industries for infrastructure development) with list II (selected clusters) and give the answer using codes given below the lists:

List I (Industries)	List II (Selected clusters)
A. Auto parts	1. Kolkata
B. Food Processing	2. Amritsar
C. Woollen Garments	3. Guwahati
D. Engineering Goods	4. Vijay Wada

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	1	2	4	3
(c)	4	3	1	2
(d)	4	3	2	1

149. Which of the following does the government not control directly?

- (a) Spending on health
- (b) Spending on defence
- (c) Firms' investment decisions
- (d) Public spending on education

150. Match List I (Railway's new production units) with List II (location place) and choose the correct answer using the codes given in the following lists:

List I (Production units)	List II (Location)
A. Rail Wheel	1. Chhapra
B. Electric Locomotive Factory	2. Marhowra
C. Diesel locomotive factory	3. Madhepura
D. Rail coach factory	4. Rai Bareilly

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	2	1	4	3
(d)	3	1	4	2

ANSWERS AND EXPLANATIONS

1. There is no such 3 digit number which is equal to the product of the digits.
The correct answer is d.

2. Suppose the number of members is x .
Therefore, the total amount collected = x^2
 $\Rightarrow x^2 = 5776$
 $\Rightarrow x = \pm 76$
As 'x' cannot be negative so, the number of members = 76
The correct answer is a.

3. The underweight percentages
 $= \frac{200}{1000} = 20\%$
Profit percentages = $\frac{1000 - 800}{800} = 25\%$
Hence, the required difference = 5%
The correct answer is b.

4. The ratio of the profits of A, B and C is
 $A : B : C = 105 : 56 : 64$
Hence, A's share in the profit
 $= 3600 \times \frac{105}{225} = \text{Rs. } 1,680$
The correct answer is a.

5. In 15 days, number of men served = 100
So, in 1 days number of men served
 $= 15 \times 100 = 1500$
And in 6 days number of men served
 $= \frac{1500}{6} = 250$
The correct answer is d.

6. Net percent change in population
 $= 5\% - 0.25\% = 4.75\%$ annually
Suppose the initial population is P.
Population after 3 years
 $= P \left\{ 1 + \frac{4.75}{100} \right\}^3 \approx 1.1493P$
The percentage change in population in 3 years
 $= 1.1493P - P = 0.1493P = 14.93\%$
The correct answer is b.

7. Suppose the speed of the stream is u km/h.
Given that $1 = \frac{16}{20 - u}$
So, $u = 4$ km/h
The time taken to travel 16 km downstream
 $= \frac{16}{20 + 4} = \frac{2}{3}$ hour = 40 minutes.
The correct answer is b.

8. Suppose the amount with the man is Rs. $100x$.
Amount lost = Rs. $20x$
Amount spent = $\frac{25}{100} \times 80x = \text{Rs. } 20x$
The amount left with the man
 $= \text{Rs. } (100x - 20x - 20x) = \text{Rs. } 60x$
According to the question,
 $60x = 480$. So, $x = 8$
Therefore, the total amount with man originally = Rs. $100x = \text{Rs. } 800$
The correct answer is a.

9. The sum of 11 numbers = 11×50
The sum of first six numbers = 6×49
The sum of last six numbers = 6×52
Therefore, the sixth number
 $= 6(49 + 52) - 11 \times 50$
 $= 606 - 550 = 56$
The correct answer is a.

10. Suppose the total marks is x .
According to the question,
 $65 + 65 = 65 \times \frac{x}{100}$
 $\Rightarrow x = 130 \times 100/65$
 $\Rightarrow x = 200$
The correct answer is c.

11. When the average age of children was 12 years, their total age was $12 \times 7 = 84$ years.
As child of age 6 years died, the total age of remaining six children = $84 - 6 = 78$ years.
The total age of six children after 5 years
 $= 78 + 5 \times 6 = 108$ years.

The required average age = $\frac{108}{6} = 18$ years.

The correct answer is c.

- 12.** The required percentage
 $= 1 - \frac{1}{10} \times \frac{1}{2} = \frac{19}{20} = 95\%$

The correct answer is a.

- 13.** The number of persons who can read and write = $\frac{53}{100} \times 294000 = 155820$

The number of males who can read and write = $\frac{98}{100} \times 150000 = 147000$

The number of females
 $= 155820 - 147000 = 8820$

The required percentage
 $= \frac{8820}{144000} \times 100 = 6.125\%$

The correct answer is a.

- 14.** CP of the plot = $\frac{18700}{0.85} = \text{Rs. } 22,000$

SP of the plot to gain 15%
 $= 22000 \times 1.15 = \text{Rs. } 25,300$

The correct answer is c.

- 15.** Suppose B's contribution in the business is x.

A's contribution in profit sharing
 $= \text{Rs. } 16000 \times 8$

Similarly, B's contribution in profit sharing
 $= \text{Rs. } 4x$

According to the question,

$$\frac{4x}{16,000 \times 8 + 4x} = \frac{2}{7}$$

$$\Rightarrow 16,000 \times 4 + 2x = 7x$$

$$\Rightarrow x = \text{Rs. } 12,800$$

The correct answer is c.

- 16.** The given statement implies that
 2% of the CP of the fan = Rs. 20
 So, CP of fan = $20 \times 50 = \text{Rs. } 1,000$

The correct answer is c.

- 17.** Interest to be paid yearly

$$= \frac{14}{100} \times 1500 = \text{Rs. } 210$$

So, the total amount to be paid after five years = $\text{Rs. } 1500 + 210 \times 5 = \text{Rs. } 2550$

Therefore, the cost of the watch
 $= \text{Rs. } 2550 - \text{Rs. } 2100 = \text{Rs. } 450$

The correct answer is c.

- 18.** Time interval between two consecutive flashes of Red light = $\frac{60}{3} = 20$ sec

Time interval between two consecutive flashes of Green light = $\frac{120}{5} = 24$ sec

If both light flashes together, next time they will flash together after LCM of 20 sec and 24 sec.

LCM (20, 24) = 120 sec

Number of times the two lights flash together each hour = $\frac{60 \times 60}{120} = 30$

The correct answer is d.

- 19.** Suppose the place is at the distance of d km.
 According to the question,

$$\frac{d}{5+1} + \frac{d}{5-1} = 1$$

$$\Rightarrow \frac{d}{6} + \frac{d}{4} = 1$$

$$\Rightarrow \frac{5d}{12} = 1$$

$$\Rightarrow d = \frac{12}{5} = 2.4 \text{ km}$$

The correct answer is a.

- 20.** Suppose the number of mangoes with A is 100

So, the number of mangoes with B = 90

And the number of mangoes with C = 80

The required percentage

$$= \frac{90 - 80}{80} \times 100 = 12.5\%$$

The correct answer is b.

- 21.** The required number of soldiers

$$= 5630 - 5 = 5625$$

As they form a solid square, therefore, the number of soldiers in the outermost row of the solid square = $\sqrt{5625} = 75$

The correct answer is c.

- 22.** The time taken by bells to ring again simultaneously

$$= \text{LCM of } (6, 8, 12, 18) = 72 \text{ seconds}$$

The correct answer is c.

- 23.** Let the number of months in which amount get repaid be n.

The first repayment 'a' = Rs. 20

The increase in amount every month 'a'

= Rs. 15

According to the question,

$$3250 = \frac{n}{2}(2a + (n-1)d)$$

$$\Rightarrow 3250 = \frac{n}{2}(40 + (n-1)15)$$

$$\Rightarrow 6500 = n(40 + 15n - 15)$$

$$\Rightarrow 15n^2 + 25n - 6500 = 0$$

$$\Rightarrow 3n^2 + 5n - 1300 = 0$$

Solving for n, we get

$$n = 20 \text{ months}$$

The correct answer is c.

- 24.** Suppose the length of the edge of the cube is a units.

So, the volume of the cube = a^3

And the surface area of the cube = $6a^2$

According to the question,

$$\Rightarrow a^3 = 6a^2$$

$$\Rightarrow a = 6 \text{ units}$$

The correct answer is d.

- 25.** Suppose the speed and the length of the faster train are V_f and L_f respectively.

Similarly, the speed and the length of the slower train are V_s and L_s respectively.

According to the question,

$$L_f = 17 \times V_f \quad \text{and} \quad L_s = 27 \times V_s$$

The time taken to pass each other = 23 sec

$$\Rightarrow \frac{L_f + L_s}{V_f + V_s} = 23$$

$$\Rightarrow 23(V_f + V_s) = L_f + L_s$$

$$\Rightarrow 23V_f + 23V_s = 17V_f + 27V_s$$

$$\Rightarrow 4V_s = 6V_f$$

$$\text{So, } V_s : V_f = 3 : 2.$$

The correct answer is b.

- 26.** The total number of students

$$= 1100 + 700 = 1800$$

The number of boys who failed

$$= 1100 \times 0.58 = 638$$

The number of girls who failed

$$= 700 \times 0.70 = 490$$

The total number of students who failed

$$= 638 + 490 = 1128$$

The required percentage

$$= \frac{1128}{1800} \times 100 = 62.67\%$$

The correct answer is b.

- 27.** Suppose the number of coins is n.

According to the question,

The volume of cylinder

$$= n \times \text{The volume of a coin}$$

$$\Rightarrow \pi \times 3 \times 3 \times 8 = n \times \pi \times 0.75 \times 0.75 \times 0.2$$

$$\Rightarrow n = 640$$

The correct answer is d.

- 28.** Suppose the height of the building is h meters.

Using similarity of triangles, we get

$$\Rightarrow \frac{1.4}{1.2} = \frac{h}{5.4}$$

$$\Rightarrow h = 6.3 \text{ meters}$$

The correct answer is b.

- 29.** Suppose the quantity of milk and water into mixture are 5x and x respectively as ratio given to us is 5 : 1.

After adding 5 liters of water to the mixture, we have

$$\frac{5x}{x+5} = \frac{5}{2}$$

$$\Rightarrow x = 5$$

Therefore, the quantity of milk

$$= 5 \times 5 = 25 \text{ litres}$$

The correct answer is b.

30. Suppose the weight of an adult is 'x' kg and that of a child is 'y' kg.

According to the question,

$$12x = 20y$$

$$\Rightarrow \frac{x}{y} = \frac{5}{3}$$

$$\Rightarrow x = \frac{5y}{3}$$

Suppose the number of adults is 'n'

$$15y + n\left(\frac{5y}{3}\right) = 20y$$

$$\Rightarrow n = 3$$

The correct answer is c.

31. Suppose it takes x days to complete the remaining task.

According to the question,

$$\frac{1}{12} \times 4 + \left(\frac{1}{12} - \frac{1}{16}\right)x = 1$$

On solving, we get $x = 32$ days

The correct answer is a.

32. Suppose the length of the wall to be built is L meters.

According to the question,

$$\Rightarrow \frac{20 \times 6}{112} = \frac{25 \times 3}{L}$$

On solving for L, we get

$$\Rightarrow L = 70 \text{ meters}$$

The correct answer is b.

33. Given that,

$$\left(\frac{6}{12} \text{ of } \frac{9}{8} \text{ of } \frac{250}{125}\right) \div \frac{3}{2} \times \frac{x}{6} = 1$$

$$\Rightarrow \frac{9}{8} \times \frac{2}{3} \times \frac{x}{6} = 1$$

$$\Rightarrow x = 8$$

The correct answer is b.

34. Suppose $2x + 1$, $2x + 3$ and $2x + 5$ are the three consecutive odd numbers.

The sum of three consecutive odd numbers

$$= (2x + 1) + (2x + 3) + (2x + 5)$$

$$= 6x + 9 \text{ which is always divisible by 3.}$$

The correct answer is a.

35. Suppose the amounts received by A, B, C and D are a, b, c and d respectively.

So, according to the question,

$$a = b + c \quad (1)$$

$$b = c + 125 \quad (2)$$

$$c = d \quad (3)$$

From Eq. (1) and Eq. (2) we get

$$a = 2c + 125 \quad (4)$$

From Eqs. (2), (3) and (4), we get

$$2c + 125 + c + 125 + c + c = 750$$

$$\Rightarrow 5c + 250 = 750$$

$$\Rightarrow c = 100$$

So, A's share = $2c + 125 = \text{Rs. } 325$

The correct answer is d.

36. Given expression,

$$x - y = 1 \quad (1)$$

On cubing both the sides, we get

$$x^3 - y^3 - 3xy(x - y) = 1 \quad (2)$$

Substituting value of $x - y$ from Eq. (1) into

Eq. (2), we get

$$x^3 - y^3 - 3xy = 1$$

The correct answer is b.

37. Numbers which satisfy given condition can be written as following:

$$K \times \text{LCM}(6, 8, 10, 12) + 5$$

$$\text{Or, } 120K + 5$$

Where K is a whole number.

For such least number which is divisible by 13 as well, K should be 7 (By hit and trial)

Therefore, the required number

$$= 120 \times 7 + 5 = 845$$

The correct answer is c.

38. Required time

$$= 10 \text{ am} + \text{LCM}(5, 6, 7, 8) \text{ seconds}$$

$$= 10 \text{ am} + 840 \text{ seconds}$$

$$= 10 \text{ am} + 14 \text{ minutes} = 10 : 14 \text{ minutes}$$

The correct answer is a.

39. The percentage of population above poverty line for state S = 81%

The fraction of females in the above poverty

$$\text{line population of state S} = \frac{3}{7}$$

Population of state S = 7 million

So, the number of females above poverty line in state S

$$= \frac{81}{100} \times 7 \times \frac{3}{7} \text{ million} = 2.43 \text{ million}$$

The correct answer is b.

40. Suppose the total population of the state is x.

According to the question,

$$\frac{2}{5} \times \frac{76}{100} \times x = 1.9 \text{ million}$$

$$\Rightarrow x = 6.25 \text{ million}$$

The correct answer is c.

41. 'All that glitters is not gold' means that all that looks precious isn't necessarily. So, based on this, only Statement (d) logically follows.

The correct answer is d.

42. 'Ability is poor man's wealth' means that a poor man can use his/her ability to gain success, just like a rich man may use his wealth for the same end. Conclusion (d) clearly puts across this point.

The correct answer is d.

43. "All Beggars are Poor." So, a rich person will definitely not be a beggar.

The correct answer is d.

44. The statement says that "many creative persons become artists". From this we cannot conclude that all creative persons will become artists. So (a) is incorrect. Similarly, it cannot be said that creativity is a necessary condition to become an artist. So (b) is eliminated. The given statement does not mention anything about the level of creativity needed to become an artist. Hence, (c) is also eliminated. Since it is given that many creative persons become artists, we can conclude that some artists are creative persons.

The correct answer is d.

45. If hard work is a necessary condition to pass an examination then it can safely be concluded that one cannot pass without working hard.

The correct answer is c.

46. Baking, Boiling and Simmering involve increasing the temperature whereas freezing involves decreasing the temperature.

The correct answer is c.

47. Asia, Africa and Australia all are continents but Argentina is a country.

The correct answer is b.

48. The sequence "right, right, left, left, right and right" will lead to face a direction other than the North.

The correct answer is c.

49. When the timepiece is put in such a way then the arrangement will be,

$$\begin{array}{ccccccc} & & & 5 & 6 & 7 & \\ & & & 4 & & & 8 \\ & & 3 & & & & 9 \\ & & 2 & & & & 10 \\ & & & & 1 & 12 & 11 \end{array}$$

Therefore, at 9:15 pm the minute hand will point towards the West.

The correct answer is d.

50. A bus leaves for Mumbai every 40 minutes and the last bus left 10 minutes back. So, the next bus would leave after 30 minutes which is given as 11:15 am. Therefore, 30 minutes before 11:15 am is 10:45 am. Hence the enquiry clerk gave this information at 10:45 am.

The correct answer is a.

51. When arranged in alphabetical order, the words would be,

Finger, Flourish, Forget, Formal

The correct answer is c.

52. From the given information, we have

65 → 11 → 2	95 → 14 → 5	75 → 12 → 3
103 → 4	59 → 14 → 5	82 → 10 → 1
34 → 7	83 → 11 → 2	133 → 7
2 + 4 + 7 = 13	5 + 5 + 2 = 12	3 + 1 + 7 = 11
= 1 + 3 = 4	= 1 + 2 = 3	= 1 + 1 = 2

Here, taking the digit sum of each number in each column and then adding it for all the elements in respective columns, we get the results as 13 and 11 for the first and the

third columns respectively. Therefore, this value for the second column should be 12.

The correct answer is c.

53. Calculating the number of odd days:

16th August 2007 to 15th August 2008 = 2
(Since 2008 is a leap year)

16th August 2008 to 15th August 2009 = 1
and so on.

So, the total number of odd days from 16th August 2007 to 15th August 2017

$$= 2 + 1 + 1 + 1 + 2 + 1 + 1 + 1 + 2 + 1$$

$$= 13 = 6$$

Six days after Wednesday is Tuesday.

The correct answer is b.

54. The mirror image of 'T A R A I N 1 0 1 4 A' is A 1 0 1 N I A R A T.

The correct answer is d.

55. In the given letter series there are four blocks of four letters each. These letters are b, h, n and e. From the first to the second block, the position of the fourth letter is constant and if the first three letters are positioned as I, II and III in the second block then they rearrange their positions as II, III and I with respect to the previous block, same is the case for the second to the third block and so on.

Through observation, we get b = 3, h = 1, n = 4 and e = 2.

The correct answer is d.

56. Looking at the figure it can be observed that every row and every column contains one circle each with 2, 3 and 4 lines connected to it. So, '?' can be replaced with the figure.1.

The correct answer is a.

Common solution for questions 57 to 59:

The given information can be tabulated as following:

	Hockey	Volleyball	Baseball	Football	Cricket
Ravi	Y	Y	Y		
Kunal	Y	Y			Y
Sachin	Y		Y	Y	
Gaurav		Y	Y	Y	Y
Michael			Y	Y	

57. Looking at the above table, we can conclude that Kunal is good in Hockey, Cricket and Volleyball.

The correct answer is b.

58. Looking at the above table, we can conclude that Gaurav is good in Baseball, Cricket, Volleyball and Football.

The correct answer is c.

59. Looking at the above table, we can conclude that Ravi is good in Baseball, Volleyball and Hockey.

The correct answer is c.

60. The code pattern is

S H O O T
↓ ↓ ↓ ↓ ↓
19 8 15 15 20

Here, each letter is coded by its corresponding alphabet position.

L A D Y
↓ ↓ ↓ ↓
12 1 4 25

The correct answer is b.

61. The code pattern is

O P T I C A L
↓ ↓ ↓ ↓ ↓ ↓ ↓
15+16+20+9+3+1+12 = 76

O P T I C I A N
↓ ↓ ↓ ↓ ↓ ↓ ↓
15+16+20+10+3+9+1+14 = 87

Here, the code is the sum of the corresponding alphabetic positions of all the letters.

G L A S S E S
↓ ↓ ↓ ↓ ↓ ↓ ↓
7+12+1+19+19+5+19 = 82

The correct answer is b.

62. Given that

wall → window → door → floor → roof → ventilator
As we know that we stand on the floor and here the floor is called roof, so the person stands on the roof.

The correct answer is d.

Common solution for questions 63 to 66:

$$\boxed{U} = \textcircled{S}$$

Grandparents of T and R

Since Q is the father of T and there are two married couples. P must be Q's wife.

63. Q is the husband of P

The correct answer is c.

64. The profession of P is Nurse.

The correct answer is b.

65. Among the given options, US and QP are the two married couples.

The correct answer is b.

66. Q and U are definitely a group of male members.

The correct answer is a.

67. Total number of boys in the queue

$$= 10 + 12 + 5 - 1 = 26$$

The correct answer is c.

Common solution for questions 68 to 70:

As per the given information → (BC)

68. → D is at the extreme position.



The correct answer is d.

69. B cannot be kept for the third position because in that case C has to give his presentation after the lunch which is not permissible.

The correct answer is c.

70. D will present his work first as F has to follow him, in this case B can give his presentation either at the fourth or the fifth position, so 'C' can give his presentation either at the fifth or the sixth position.

The correct answer is d.

71. *Skirmish* means any unplanned or irregular clash between small groups. Hence, *fight* is an apt synonym. *Anguish* means extreme distress.

The correct answer is b.

72. *Steadfast* means resolute and unwavering in an idea or action. Hence, determined is the best fit.

The correct answer is d.

73. *Omnipotent* means 'all powerful'; someone having great or unlimited authority or power.

The correct answer is b.

74. *Juvenile* refers to someone who is young and youthful.

The correct answer is a.

75. *To thwart* means to create obstacles/hinder. *Enrage* means to make someone extremely angry.

The correct answer is d.

76. *Sullen* means gloomy or dismal.

The correct answer is b.

77. A *vessel* is a container for holding liquids or things. It is also used as a synonym for a ship or an aircraft. Since the vessel is docked at the harbour, it is a ship.

The correct answer is b.

78. "Rarity", which means the lack or paucity of something, is the opposite of Density.

The correct answer is b.

79. "Satan" is the chief evil spirit, or the devil.

"Zeus" — the king of God in Greek mythology.

"Jove" — the king of Gods in Roman mythology.

"Minerva" — the Roman Goddess of wisdom & arts.

The correct answer is d.

80. "Livid" means "extremely angry or enraged". Thus, "calm" is the correct antonym.

The correct answer is b.

81. 'Vivid' means clear and distinct so "indistinctive" is the antonym.

The correct answer is c.

82. "Ostentatious" is given to extravagance or superficial display of wealth or power. So "Modest" is the opposite.

The correct answer is c.

- 83.** The central idea of the passage is the impact of automobiles on society and the impact of the automobile industry on other industries in America. Hence, the main idea of the passage is rightly presented by option (b).
The correct answer is b.
- 84.** It can be inferred from the first line of the paragraph that all the other options except the tourism industry are mentioned in the passage.
The correct answer is b.
- 85.** Assembly line production resulted in reduction in the price of Model T. Refer to the lines, "However, with the invention of assembly line...decade."
The correct answer is d.
- 86.** *Booming* means to grow exponentially or rapidly. This makes option (a) correct.
The correct answer is a.
- 87.** Refer to the lines, "Advertising agency responded to increased highway traffic."
The correct answer is d.
- 88.** "To take someone to task" means to rebuke, scold or punish him/her.
The correct answer is b.
- 89.** "To turn a deaf ear to" means to completely ignore or disregard.
The correct answer is a.
- 90.** "To make ends meet" means to subsist or to have just enough money for the things that you need.
The correct answer is c.
- 91.** "By hook or by crook" means that one is willing to adopt any means to achieve a desired result.
The correct answer is a.
- 92.** 'done for' means 'marked for death or destruction, ruined'.
The correct answer is a.
- 93.** An imaginary name assumed by an author is a *pseudonym*.
The correct answer is d.
- 94.** Aquarium is a tank in which the fish are kept. *Arboretum* is a plot of land on which many different trees or shrubs are grown for study or display.
The correct answer is a.
- 95.** Cautioned *of* would be the correct choice.
The correct answer is b.
- 96.** Here 'yet' is used as an adverb to mean "something extra; in addition".
The correct answer is a.
- 97.** The future perfect 'will have' is required here as the sentence is talking about what will have been achieved by a certain moment in time. All other options are grammatically incorrect.
The correct answer is a.
- 98.** The present perfect continuous "has been raining" is required here to indicate an action which began at some point in the past and is still continuing.
The correct answer is b.
- 99.** The sentence is in the subjunctive mood and refers to an unreal past. Hence, 'were' will be used and not 'was'.
The correct answer is a.
- 100.** The correct form is "is published."
The correct answer is b.
- 101.** 'Them' is a pronoun.
The correct answer is a.
- 102.** The present continuous "is lending" is required here to indicate an action in the present that is temporary.
The correct answer is a.
- 103.** 'Fingers on the pulse' is correct. It means to be aware of the current trends and relevant topics.
The correct answer is d.
- 104.** 'Bovine' is used to refer to cattle.
The correct answer is c.
- 105.** *Looking up* means becoming better or improving. It also means to visit (look up an old friend)
The correct answer is c.

106. Get off means to avoid punishment/penalty; to escape.

The correct answer is a.

107. The idiom 'wear one's heart on one's sleeve' means to display one's feelings openly by one's behaviour.

The correct answer is c.

108. Botany is the study of plants. Similarly, Zoology is the study of animals.

The correct answer is b.

109. A group of fish is called a 'school'. Similarly, a cluster or group of geese is called a 'gaggle'.

The correct answer is b.

110. 'Miniscule' means 'very small'. It is an antonym of 'massive'. Similarly, 'tiny' is an antonym of 'large'.

The correct answer is c.

111. Mumps, also known as epidemic parotitis, is a viral disease caused by the mumps virus of the genus rubulavirus.

The correct answer is c.

112. The National Science Centre in Delhi is a unit of the National Council of Science Museums (NCSM), which is an autonomous body under the Ministry of Culture of the Government of India.

The correct answer is a.

113. Photosynthesis is a process used by plants and other organisms to convert light energy, normally from the Sun (white light) into chemical energy that can be later released to fuel the organisms' activities.

The correct answer is b.

114. Traveller's cheque is a medium of exchange which a traveller can use to encash or payment after endorsing the holder's signature.

The correct answer is a.

115. Rohan Bopanna is an Indian tennis player. He is a member of the Indian Davis Cup team since 2002.

The correct answer is c.

116. World Heritage Day is celebrated on April 18. It is also known as the International Day for Monuments and Sites. It is celebrated to raise awareness about the preserving human heritage, diversity and vulnerability of world's monuments and sites.

The correct answer is b.

117. The Securities Exchange board of India (SEBI) established on April 12, 1992. Its head office is in Mumbai. It is the market regulator of India. Monitors and regulates the Indian capital and securities market.

The correct answer is d.

118. The World Health Day is a global health awareness day celebrated every year on 7 April, under the sponsorship of the World Health Organization (WHO)

The correct answer is c.

119. The government of India adopted Round Revolution to increase the production of potatoes. Its period was from 1965 to 2005.

The correct answer is c.

120. Natural gas is a key source of fertilizers in the form of ammonia and urea.

The correct answer is c.

121. Reinsurance is insurance that is purchased by an insurance company from one or more insurance companies (the "reinsurer") directly or through a broker as a means of risk management, General Insurance Corporation of India Limited is the sole public sector reinsurance company in the Indian insurance market.

The correct answer is b.

122. Nikkei is the share index of Tokyo Stock Exchange.

The correct answer is b.

123. All the combinations express the correct relationship.

The correct answer is b.

124. General Anti-Avoidance Rule (GAAR) is applied in issues of foreign investment.

The correct answer is c.

125. In devaluation, a country's exports become more competitive in the global market as they become less costly. On the other hand, imports become costly.

The correct answer is b.

126. Digital India programme was introduced in the year 2014 and its objective is to promote technological development in India.

The correct answer is c.

127. Disguised unemployment is also known as invisible unemployment. It is found in the agriculture sector of India. Under this kind of unemployment, if surplus workers are removed from production, the production remains unaffected.

The correct answer is c.

128. Initially, SEBI was a non-statutory body, but it was given statutory status on 30th January 1992 by an ordinance. Its headquarter is located in Mumbai and its regional offices are in Kolkata, Delhi and Chennai.

The correct answer is b.

129. Fiscal policy is the policy that affects the financial system of Union and State governments. Reserve Bank of India is also called the bank of bankers as it has the overall control over banks.

The correct answer is d.

130. The headquarter of Asian Development Bank is located in Manila (Philippines) and the headquarter of ASEAN is located in Jakarta, Indonesia.

The correct answer is d.

131. More issuance of currency is not a monetary measure to control inflation. More issuance of money controls the contraction of currency.

The correct answer is c.

132. ICICI is India's second largest commercial bank (first in private sector). Its revenue is 1300 crores USD, followed by HDFC, Punjab National Bank, Axis Bank, etc.

The correct answer is b.

133. Reference Rate is the minimum rate on which money is borrowed in the capital market. The Reserve Bank of India compiles and publishes on a daily basis, reference rates for four major currencies, that is, US dollar (USD), British Pound (GBP), Japanese Yen (YEN) and Euro (EUR).

The correct answer is b.

134. Foreign direct investment is allowed up to 74% in telecommunication sector.

The correct answer is a.

135. Fiscal policy is used by the government to influence the level of aggregate demand in the economy.

The correct answer is d.

136. The biggest driver of demand of cement is the housing sector. It accounts for about 67% of the total consumption in India.

The correct answer is b.

137. Bharat Electronic Limited is not a Maharatna company. There are seven companies who got Maharatna status. For a company to be declared Maharatna, during the last 3 years, the average annual turnover should be more than Rs. 25,000 crore, average annual net worth should be more than Rs. 15,000 crore, and the average annual net profit after tax should be more than Rs. 5,000 crore.

The correct answer is b.

138. Agriculture, livestock breeding, mining etc. are included in primary sectors.

The correct answer is a.

139. Fiscal Policy is determined by Government. It is not made by the Reserve Bank of India. Fiscal Policy determines the government's revenue collection and expenditure to influence the economy.

The correct answer is d.

140. India Post launched 'Project Arrow', in 2008, for upgradation of post offices in urban and rural areas in terms of both upgrading and enhancing the quality of service in 'core areas' and improving the 'look and feel'.

The correct answer is b.

141. Gas based thermal power plants of the National Thermal Power Corporation Limited are located at Anta (Rajasthan), Auraiya and Dadri (Uttar Pradesh), Kawas and Jhanor-Gandhar (Gujarat), Kayamkulam (Kerala) and Faridabad (Haryana).

The correct answer is a.

142. The rate of the capital formation is the most important among the factors of economic development.

The correct answer is c.

143. FEMA or the Foreign Exchange Management Act was applied in the year 2000. It replaced FERA.

The correct answer is c.

144. The Reserve Bank of India is responsible for the Monetary and Credit Policy in India which is a macroeconomics policy.

The correct answer is d.

145. Underwriting is known as a process in which an individual or institute takes guarantee in case of damage or financial loss. These risks generally involve loans, insurance or investments.

The correct answer is c.

146. Grey revolution is not related to meat production but is related to fertilizers.

The correct answer is c.

147. India's largest, most organized and extensive industry is the textile industry. It is also India's oldest industry.

The correct answer is a.

148. Auto parts – Vijay wada; Food processing – Guwahati; Woollen garments – Kolkata; Engineering goods – Amritsar.

The correct answer is c.

149. A Firm's investment decisions include allotting the investment funds of the firm in the most effective manner to ensure the best possible returns. These decisions are undertaken by the company management and the government seldom has any direct role in it.


The correct answer is c.

150. Rail Wheel – Chhapra; Electric Locomotive Factory – Madhepura; Diesel locomotive factory – Marhowra; Rail coach factory – Rai Bareilly


The correct answer is b.


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