Nelson International Mathematics

Student Book 5

2nd edition

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OXFORD

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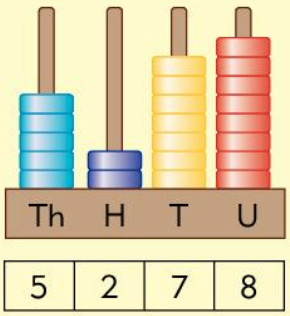
Whole numbers in figures and words

5278 = 5 thousands 2 hundreds 7 tens 8 units

In expanded form: 5000 + 200 + 70 + 8

In words: five thousand, two hundred and seventy-eight



1 Write each of the following numbers in expanded form and in words:

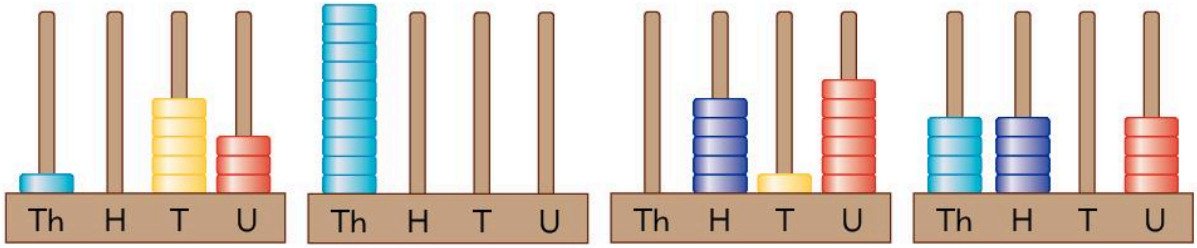
a 4982 **b** 2085 **c** 3126 **d** 6534

e 8080 **f** 4011 **g** 5009 **h** 2904

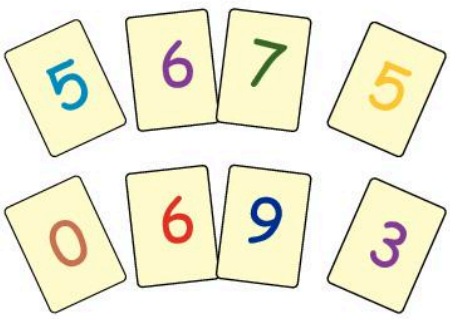
2 What does the underlined digit represent in each number?

a 6<u>7</u>02 **b** 45<u>5</u>0 **c** <u>8</u>999 **d** 20<u>0</u>5

3 Write the number represented on each abacus.



4 Use a set of number cards. Each player takes 4 cards and writes as many four-digit numbers as possible with their numbers. The first player to finish gets one point. The first player to get 10 points is the winner.



Numbers beyond 9999

56 281 is fifty-six thousand, two hundred and eighty-one

Ten thousands 10 000s	Thousands 1000s	Hundreds 100s	Tens 10s	Units 1s
5	6	2	8	1

$(5 \times 10000) + (6 \times 1000) + (2 \times 100) + (8 \times 10) + (1 \times 1)$

1 **Start at 9999. Add or count on these numbers.**

a 2 **b** 10 **c** 125 **d** 491

e 1320 **f** 2357 **g** 5215 **h** 8339

2 **Write these numbers using numerals:**

a twelve thousand, three hundred and eighty-six

b thirty-five thousand, eight hundred and fifty

c seventy thousand, five hundred and ninety-nine

d one hundred and ten thousand, six hundred and forty-five

e two hundred and fifty-seven thousand, three hundred and thirty-eight

f six hundred and fifty thousand, two hundred and nineteen.

3 **Say each number. Then write them in expanded form.**

a 59 802 **b** 45 195 **c** 120 650 **d** 999 999

e 12 005 **f** 172 400 **g** 735 000 **h** 192 090

you can use Workbook pages 4 and 5

Comparing numbers

When you compare numbers, use place value to help you. Start with the digit furthest to the left.

8946 ____ 5968

8 thousands > 5 thousands

8946 is greater than 5968

8946 > 5968 5968 < 8946

Remember: > means 'is greater than' and < means 'is less than'.

1 Write the larger number for each pair.

a

b

c

d

e

f

2 For each pair of numbers above, write a sentence using > or <.

3 Look at the distances these people travelled. Write them in order from shortest to longest.

More ordering and comparing numbers

Pansy compared the digits using place value like this to decide which number is greater:

Can you see that she started with the left-hand digits and compared each place value till she got digits that were different?

8538 8531
8000 = 8000
500 = 500
30 = 30
8 > 1
So, 8538 > 8531

1 **Copy the numbers. Fill in < or >.**

a 595 ☐ 995
b 2484 ☐ 4284
c 1010 ☐ 1100
d 1000 ☐ 10 000
e 10 100 ☐ 11 000
f 8402 ☐ 8765
g 5136 ☐ 5142
h 20545 ☐ 20554
i 35 876 ☐ 35 865
j 46 543 ☐ 465 430
k 51 543 ☐ 51 643
l 124 876 ☐ 124 788

2 **Rewrite each set of numbers in order from smallest to greatest.**

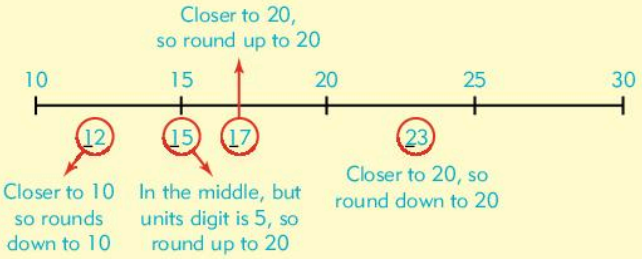
a 13 168 11 927 12 635
b 26 761 26 716 26 671
c 215 430 214 530 213 450
d 129 642 127 849 126 301
e 342 765 342 776 342 767
f 489 987 489 879 489 978
g 876 055 876 505 876 500
h 809 009 800 900 890 009

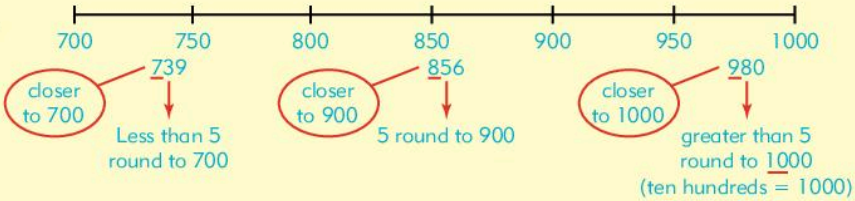
Rounding to the nearest 10 or 100

Do you remember how to round a number to the nearest 10 or 100?

Remember:

- Find the digit with the place value you are rounding to
- Look at the digit to the right of the one you are rounding to
  - If the digit to the right is 5 or greater, round your digit up
  - If the digit to the right is less than 5, your digit does not change
- Write 0 as a place holder for every digit to the right of the one you rounded to when you round a number.





1 **Round each number to the nearest 10.**

a 13	**b** 39	**c** 56	**d** 85
e 129	**f** 342	**g** 987	**h** 995
i 1234	**j** 9876	**k** 9054	**l** 4035

2 **Round each number to the nearest 100.**

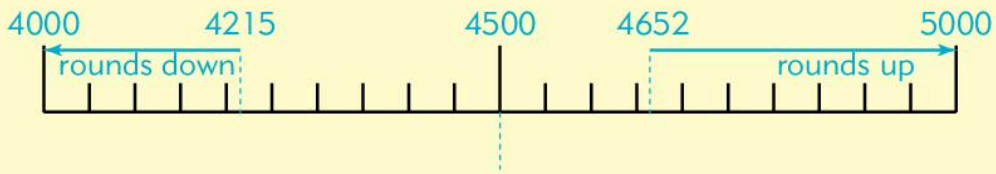
a 387	**b** 332	**c** 550	**d** 980
e 3426	**f** 8765	**g** 1098	**h** 1034
i 7255	**j** 8602	**k** 1199	**l** 3999

3 **Say whether each statement is true or false. If it is false, rewrite it correctly.**

a 529 to the nearest hundred is 600
b 613 the nearest hundred is 600
c 348 to the nearest ten is 350
d 3976 to the nearest hundred is 4000
e 1399 is 1390 to the nearest 10
f 5416 is 5500 to the nearest 100

you can use Workbook page 6

Rounding to the nearest 1000



Numbers from 4001 to 4499 round **down** to 4000.

Numbers from 4500 to 4999 round **up** to 5000.

1 Round each number up to 5000 or down to 4000.

a 4170	**b** 4753	**c** 4500	**d** 4265
e 4851	**f** 4359	**g** 4672	**h** 4499
i 4900	**j** 4820	**k** 4065	**l** 4577

2 Here are some more four-digit numbers. Round up or down to the nearest thousand. Draw a number line if it will help you.

a 2449	**b** 6921	**c** 8689	**d** 3162
e 5863	**f** 7500	**g** 4425	**h** 9267
i 3318	**j** 1282	**k** 4099	**l** 8989

3 These numbers have been rounded to the nearest thousand. What is the smallest, and largest, number they could have been?

a 2000	**b** 5000	**c** 3000	**d** 7000

4 What patterns do you notice in your answers to question 3?

you can use Workbook page 7

Adding and subtracting lots of numbers

What do all the yellow squares add up to?

You could add using grouping:

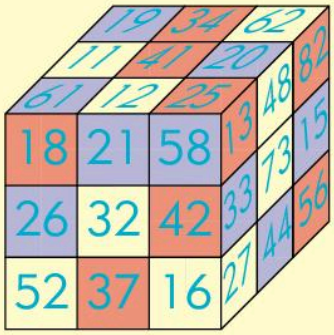
(12 + 48) + (73 + 27) + (62 + 32 + 16) + (52 + 11)

= 60 + 100 + 110 + 63

= 210 + (60 + 63)

= 210 + 123 = 333

Use a calculator to check your answers.



Or you could add in columns:

62
11
12
48
32
73
52
16
27 +
333

1 **Use the number cube above.**

a What do all the blue squares add up to?

b Find two red squares with a difference of 41.

c Which three blue squares (one from each face) add up to 85?

d What do all the red squares add up to?

e Which is the greater total – all the blue squares or all the yellow squares?

2 **Put a + or – between some of the digits to make this sentence true:**

1 2 3 4 5 6 7 8 = 90

Here is one way: 1 + 23 + 45 + 6 + 7 + 8 = 90

a Find at least one other way.

b Use different arrangements of + and – to make other numbers.

Inverse operations

Look at these number sentences:

$45 + 32 = 77$ $\quad$ $77 - 32 = 45$

$32 + 45 = 77$ $\quad$ $77 - 45 = 32$

What do you notice about adding and subtracting?

$25 \times 4 = 100$ $\quad$ $100 \div 4 = 25$

$4 \times 25 = 100$ $\quad$ $100 \div 25 = 4$

What do you notice about multiplying and dividing?

1 **Write a sentence about:**

a the relationship between adding and subtracting

b the relationship between multiplying and dividing

c the relationship between adding and multiplying

d the relationship between subtracting and dividing.

2 **How do you think we can use this understanding to help us check our answers to number problems? Give examples to explain your answer.**

3 **Solve each number sentence. Then use the inverse operation to check your answer. You can use a calculator to help you.**

a $875 + 23$	**b** $684 \div 3$	**c** $245 \div 5$
d 17×6	**e** $1394 + 172$	**f** 147×6
g $1287 \div 9$	**h** 58×6	**i** $1840 + 2789$

you can use Workbook page 8

Order of operations

Ms Chetty asked her class to find the answer to this problem:

$24 + 6 \div 2 - 1 \times 4$

This is how four students worked.

Chandra	Mohinder	Aneesa	Jay
$24 + 6 \div 2 - 1 \times 4$ $= 30 \div 2 - 1 \times 4$ $= 15 - 1 \times 4$ $= 14 \times 4$ $= 56$ ✗	$24 + 6 \div 2 - 1 \times 4$ $= 30 \div 2 - 4$ $= 15 - 4$ $= 11$ ✗	$24 + 6 \div 2 - 1 \times 4$ $= 24 + 3 - 1 \times 4$ $= 24 + 3 - 4$ $= 27 - 4$ $= 23$ ✓	$24 + 6 \div 2 - 1 \times 4$ $= 24 + 3 - 1 \times 4$ $= 24 + 2 \times 4$ $= 26 \times 4$ $= 104$ ✗

Aneesa got the right answer because she did the different parts of the calculation in the correct order.

In mathematics there are special rules for working things out. The three main rules are:

- Always do the parts in brackets first.
- Do the multiplication and division next. Work from left to right to do this.
- Do the addition and subtraction next. Work from left to right to do this.

These rules make sure that everyone solves problems with more than one operation in the same order and gets the correct answers.

1 **Go through the calculations above. Work out where Chandra, Mohinder and Jay got the order wrong.**

2 **Are these statements correct?**

a For $3 + 5 \times 2$, I would work out $3 + 5$ first.

b To get $10 - 3 \times 5$, I would subtract 3 from 10 first.

c To work out $6 + 12 \times 3$, I would first multiply 12×3.

d For $8 + 9 \div 3$, I would work out $9 \div 3$ first then I'd add.

e To find $4 + 5 + 6 + 10$, I could add in any order.

f For $(9 + 6) \div 5 + 2$, I would add $9 + 6$ first.

you can use Workbook pages 9 and 10

Working in order

1 Follow the order of operation rules. Show all the steps in your working.

a $18 + 8 \times 2$ **b** $(18 + 8) \times 2$ **c** $26 - 4 \times 2$

d $(26 - 4) \times 2$ **e** $24 \div 4 + 3$ **f** $28 \div (4 + 3)$

g $49 - (21 \div 3)$ **h** $(49 - 21) \div 2$ **i** $23 - (6 \times 3)$

2 Calculate. Show your working.

a $14 + 8 - 11$ **b** $45 \div 9 \times 3$ **c** $13 - 20 \div 5$

d $20 \times 30 + 23$ **e** $25 \times (3 - 2)$ **f** $40 \times 50 \div 100$

g $104 + 4 \div 2$ **h** $88 \div 8 + 12$ **i** $45 - 23 + 29$

j $40 - 36 \div 3 \times 5 + 24 \div 8$ **k** $50 + 3 \times 2 + 18$

l $42 - 42 \div 6 \times 5 + 24 \div 3$ **m** $(18 - 2) \times (8 + 12)$

3 Calculate.

a $12 \div (4 + 2) \times 3$ **b** $20 - 3 - (2 + 7)$ **c** $8 \times 4 \div (8 \div 2)$

d $24 - (6 - 2) + 8$ **e** $24 + 2 - 3 + 4$ **f** $10 + 2 \times 8 + 4$

g $(12 - 4) \times (8 - 5)$ **h** $40 \div 4 - 24 \div 6$ **i** $18 + 8 - 7 + 3$

4 Aneesa has the correct answers, but her pen has blotched ink on some of the operation signs. Work out what the missing operations are in each calculation. Rewrite the calculations correctly in your book.

a $2 + 21 \ ✷ \ 3 = 9$ **b** $5 \times 3 \ ✷ \ 8 = 7$

c $15 - 6 \ ✷ \ 2 = 12$ **d** $14 - 8 \ ✷ \ 6 = 0$

e $9 \ ✷ \ 6 + 10 = 13$ **f** $12 \times 4 \ ✷ \ 6 = 8$

g $18 \ ✷ \ 8 - 2 = 8$ **h** $36 \ ✷ \ 6 + 2 = 8$

i $15 \div (3 \ ✷ \ 5) + (3 \times 5) = 16$ **j** $6 \ ✷ \ 12 \div (3 \ ✷ \ 1) = 9$

you can use Workbook pages 11 and 12

Three-digit target numbers

1 Use any of the cards in each box to make the target numbers.

You can only use a card once.

You may use brackets and any of the operations.

a

9	25	8	5	6	3

322

b

75	2	7	4	1	8

833

c

50	9	6	2	3	5

485

d

100	6	5	3	4	1

663

e

26	10	7	6	5	2

199

f

50	8	7	4	1	3

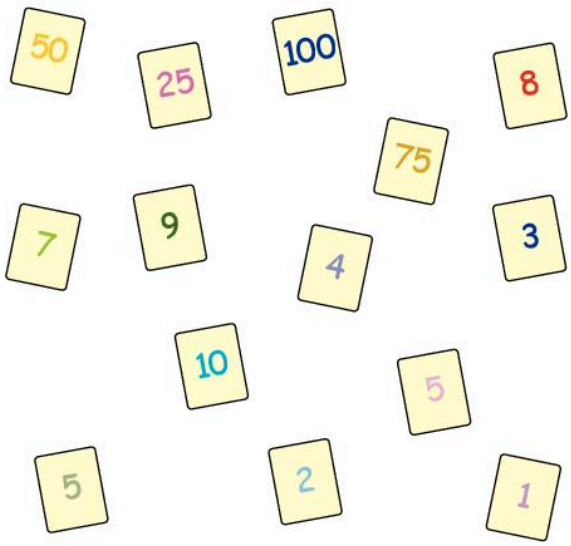
533

2 Make some cards of your own.

Use them to play a game with a friend.

One player chooses six cards.

The other player chooses a three-digit target number. The first person to make the target number wins.

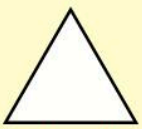


Revising polygons

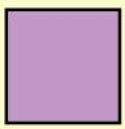
You already know that a **polygon** is a shape with straight sides that meet at corners.

When a polygon has all its sides equal and all its angles equal it is called a regular polygon.

Make sure you remember the names of these polygons.


triangle

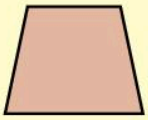

rectangle


square

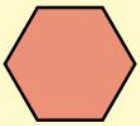

pentagon

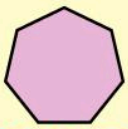

parallelogram


rhombus


trapezium


kite


hexagon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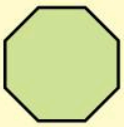
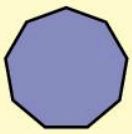

octagon


nonogon

1 **Which of the polygons shown above are regular polygons? Tell your partner how you decided whether each shape was regular or not.**

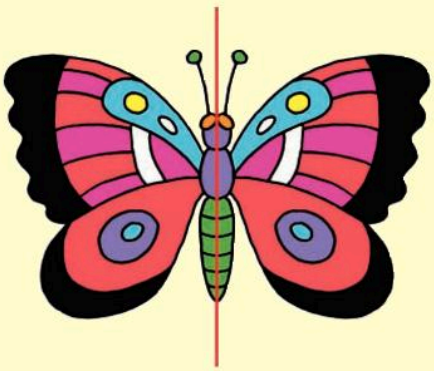
2 **Draw the following polygons in your book. Write the name of each shape you draw.**

a A regular quadrilateral
b An irregular quadrilateral
c An irregular triangle
d An irregular pentagon
e A quadrilateral made from two regular triangles
f A quadrilateral made from two regular quadrilaterals
g A regular quadrilateral made from two rectangles

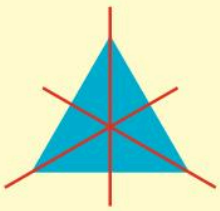
you can use Workbook page 13

Line symmetry

A **line of symmetry** cuts a shape into two identical parts that mirror each other. In other words it looks like a mirror has been placed along the line of symmetry. One side is a reflection of the other.



This butterfly is **symmetrical**. It has one line of symmetry. The equilateral triangle has three lines of symmetry.



Say whether each shape has line symmetry or not. If it does have line symmetry, say how many lines of symmetry it has.

1

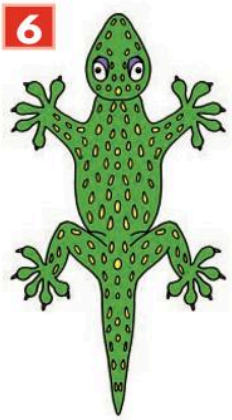
2

3

4

5

6



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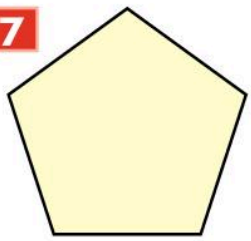

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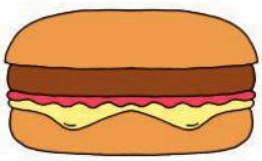
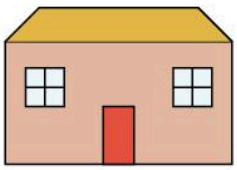


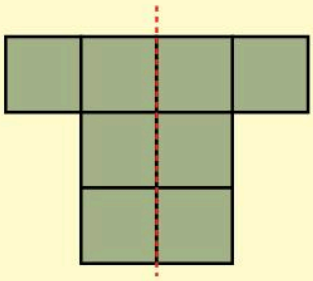
9



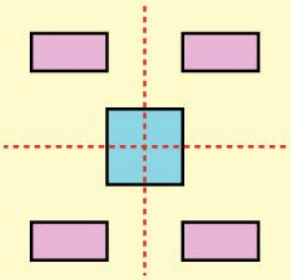
you can use Workbook pages 14 and 15

Symmetry patterns

This pattern has one line of symmetry.

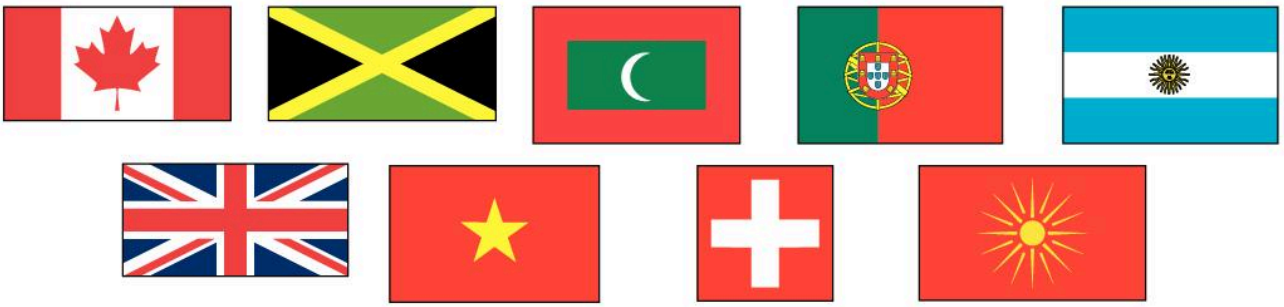


This pattern has two lines of symmetry. You can fold it along either of the mirror lines and it will be symmetrical.



Many of the patterns we see around us have two (or more) lines of symmetry. For example, this design for a carpet has two lines of symmetry. Show your partner where the two lines of symmetry are.

Look at these flags.



1 Which have one line of symmetry?

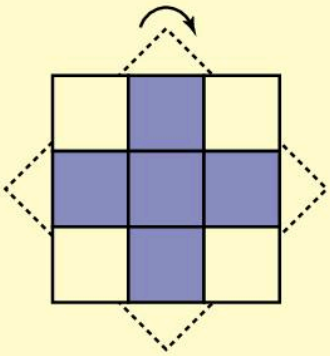
2 Which have two lines of symmetry?

3 Which are not symmetrical?

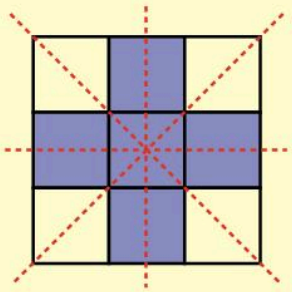
you can use Workbook page 16

Rotational symmetry

If this pattern is turned it will fit into its outline in four different positions, including the starting position. We say the pattern has rotational symmetry of **order 4**.



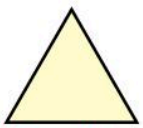
This pattern also has line symmetry. It has four lines of symmetry.



1 **For each of the regular polygons below, answer the questions:**

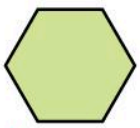
a What order of rotational symmetry does it have?

b Does it have line symmetry? If yes, say how many lines of symmetry it has.



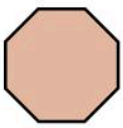
equilateral triangle

pentagon

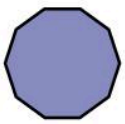


hexagon

square



octagon



decagon

you can use Workbook pages 17 and 18

Rotating squares

You will need:

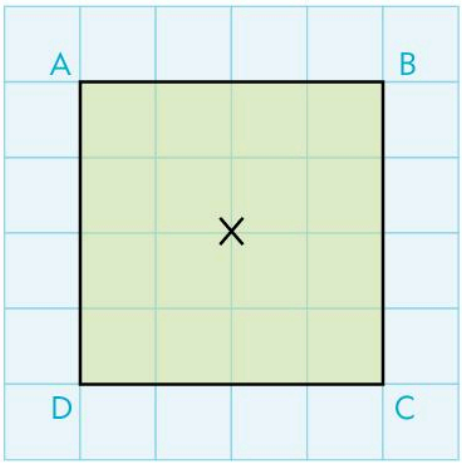
- card
- scissors
- squared paper.

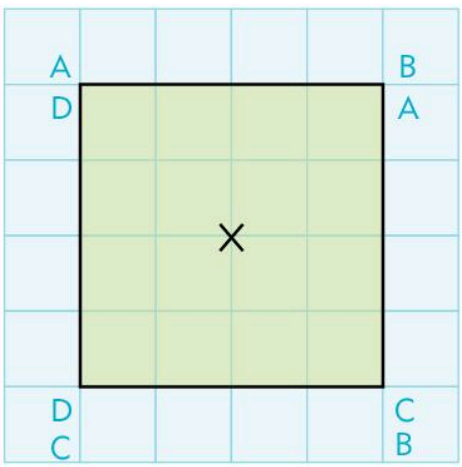
1 Cut out a 4 cm × 4 cm square from card. Find the centre of the square. Write A, B, C and D in each of the corners.

Place the card on squared paper and draw its outline. Write A, B, C and D in the correct corners.

Turn the card clockwise through one right angle. Draw the outline and write the new positions of the letters. Continue until the card returns to its starting position.

The centre of the square is known as the **centre of rotation**.





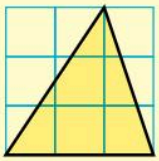
2 Do the same, but this time rotate the square anti-clockwise. What happens to the order of the letters?

3 Rotate the square around one of its corners. Stop each time you have rotated through one right angle and trace around the square.

4 Now do the same, but stop after each half right angle (45 degrees).

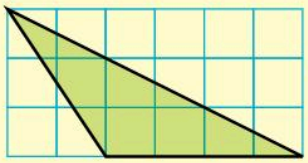
Different triangles

When we describe triangles we can talk about their angles or the lengths of their sides.



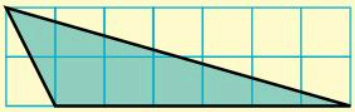
An **acute-angled** triangle has all its angles less than a right angle.

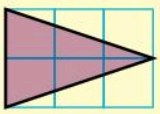
A **right-angled** triangle has one angle of 90°.



An **obtuse-angled** triangle has one angle greater than a right angle.

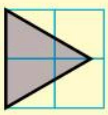
A triangle with no sides the same length is called **scalene**.



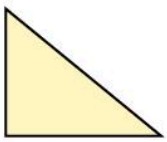


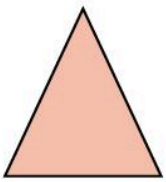
A triangle with two sides the same length is called **isosceles**.

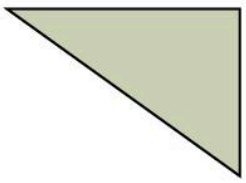
A triangle with three sides the same length is called **equilateral**.

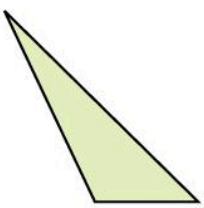


1 For each of these triangles say whether it is acute-, right- or obtuse-angled.

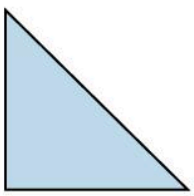
a 

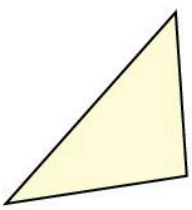
b 

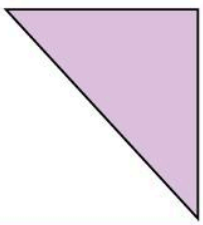
c 

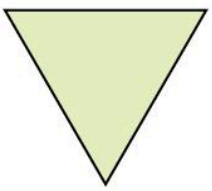
d 

2 For each of these triangles say whether it is scalene, isosceles or equilateral.

a 

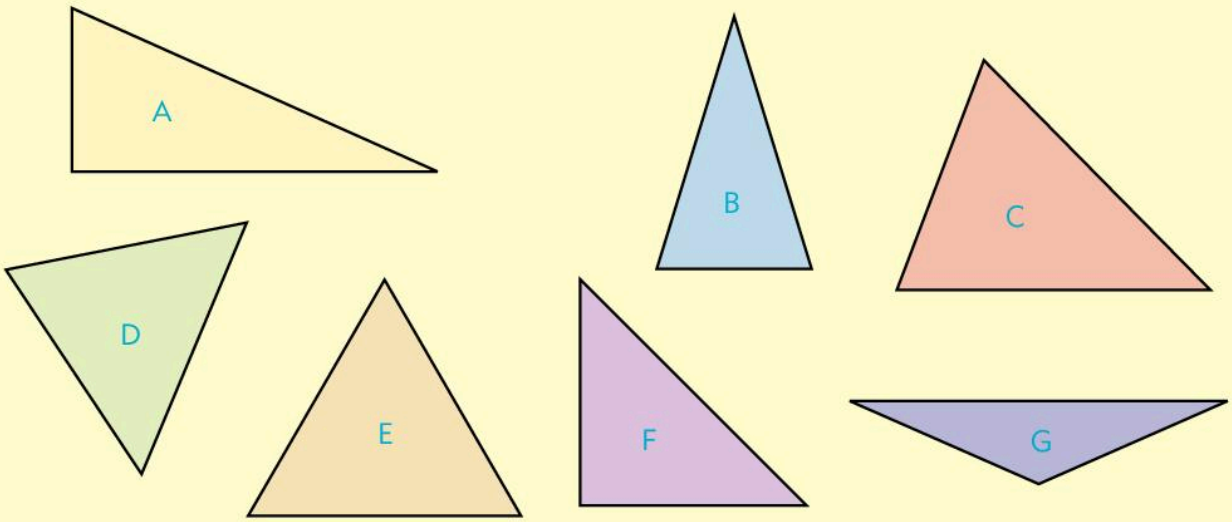
b 

c 

d 

Classifying triangles

We can group and name triangles using the properties of their angles and their sides. For example triangle A is right-angled and it has no equal sides. So, triangle A is a right-angled scalene triangle.



1 Copy and complete this table. Compare the sides and angles of the triangles if you are not sure.

Triangle	Equilateral	Isosceles	Scalene	Right-angled	Obtuse-angled	Acute-angled
A			✓	✓		
B						
C						
D						
E						
F						
G						

2 Use your completed table to name each triangle correctly.

you can use Workbook page 19

The 24-hour clock

Instead of counting hours from 1 to 12 in the morning and 1 to 12 in the afternoon, we can count from 1 to 24. This is called **24-hour notation**.

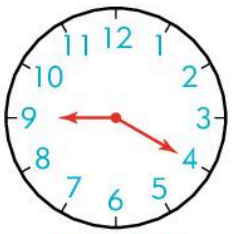
Before noon (a.m.)	After noon (p.m.)
12 midnight until 11.59 a.m. 00:00 until 11:59	12 noon until 11.59 p.m. 12:00 until 23:59

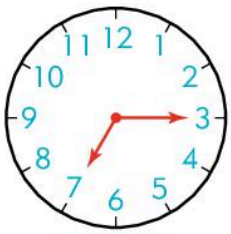
1 **Write these times in words.**

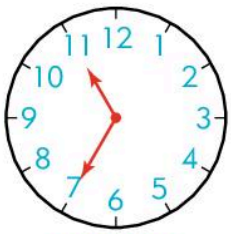
a 13:30 **b** 23:45 **c** 00:00 **d** 04:15

e 17:25 **f** 19:55 **g** 01:10 **h** 20:00

2 **Write these times using 24-hour notation.**

a  morning

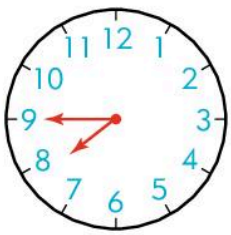
b  evening

c  morning

d  morning

e  afternoon

f  morning

g  evening

h  night

i  evening

j  midday

k  evening

l  evening

you can use Workbook pages 20 and 21

Reading timetables

Timetables often use the 24-hour time system.

Arriving at:	Bus A12	Bus C15	Bus C19	Bus D23
Drummond Street	09:46	11:46	13:46	16:46
Fifth Avenue	10:07	12:07	14:07	17:07
King Street	10:39	12:39	14:39	17:39
Ajman Road	11:16	13:16	15:16	18:16
Hill Street	11:49	13:49	15:49	18:49
Fort Avenue	12:31	14:31	16:31	19:31
Emir Lane	13:04	15:04	17:04	20:04

1 **Answer these questions about the timetable.**

a What time does bus A12 arrive at Drummond Street?

b Which buses arrive at Drummond Street later than 1 p.m.?

c When does bus C19 arrive at Fort Avenue?

d Cara catches a bus at Hill Street at 10 to 4. Which bus is this?

2 **Yolandi catches Bus C15 from King Street to Emir Lane.**

a At what time does the bus arrive at King Street?

b How long does it take to travel from King Street to Ajman Road?

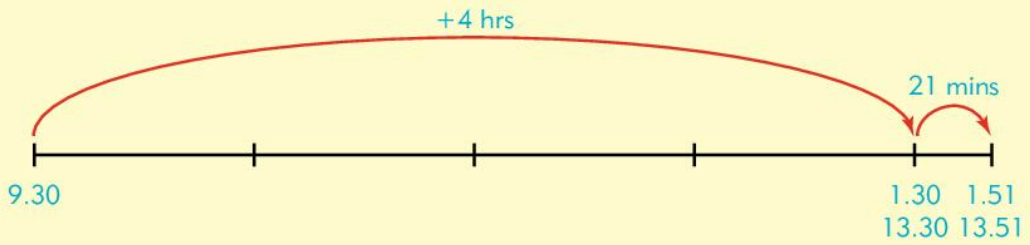
c Does the bus arrive at Emir Lane before or after 3 p.m.?

d One day Yolandi decides to take Bus C19 instead of C15. How much later does it arrive at King Street?

e Yolandi wants to be home by 3.20 p.m. to watch a TV programme. The C15 bus arrives at Emir Lane 3 minutes late and it takes her 8 minutes to walk home. Will she make it on time?

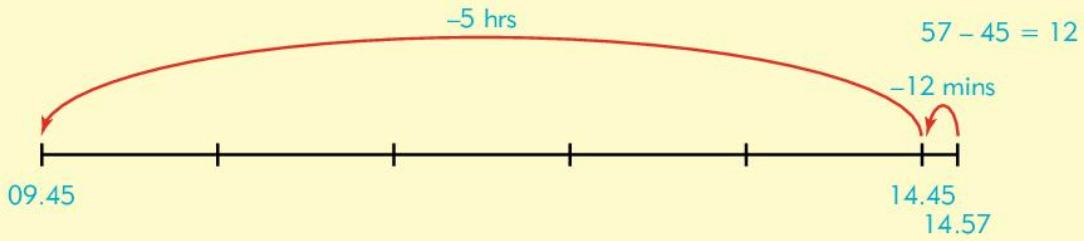
How long did it take?

Clare began the cycle race at 09:30. She finished 4 h 21 min later. What time did she finish?



She finished at 13:51.

Clare's friend began the race at 09:45 and finished at 14:57. How long did he spend cycling?



He cycled for 5 h 12 min.

1 **Here is a chart of starting times, elapsed times and finishing times for four cyclists. Some of the times are missing. Copy the chart and fill in the missing times.**

Runner	Starting time	Elapsed time	Finishing time
A	08:20	5 h 10 min	
B	10:05	6 h 2 min	
C	09:13		16:20
D	08:27		15:50

2 **The race officials started work at 08:15. They worked for 10 h 30 min. What time did they finish work?**

Races and records

1 **This table shows the results of a men's 400 m hurdles race.**

Name	Time in seconds
Keith Young (UK)	48.1
John Masamba (Uganda)	47.8
Michael Lewis (USA)	47.6
Boris Burghardt (Germany)	48.7
Ralph Bell (USA)	47.7
Trevor Williamson (USA)	47.1

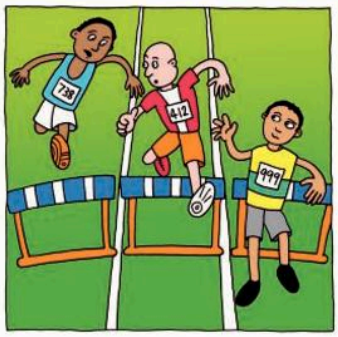
a Put the race times in order from slowest to fastest.

b Who would have won the gold, silver and bronze medals?

c Who finished in fifth place?

d Who finished ahead between Michael Lewis and Keith Young?

e Who took 1.1 seconds longer than Michael Lewis?



You will need:

- sheets of paper
- a stopwatch that can time to $\frac{1}{10}$ of a second.

2 **With a partner, time how long it takes an A4 piece of paper to float to the ground. One person holds the paper horizontally 2 m above the ground. (Stand on a chair if necessary.) The other person times the fall of the piece of paper with a stopwatch. Do this five times. Record your results. Then try tissue paper, tracing paper and card. Compare your results.**

Athletics records

Women

Event	Time	Set by	Date
100 m	10.49	Florence Griffith-Joyner (USA)	1988
200 m	21.34	Florence Griffith-Joyner (USA)	1988
400 m	47.60	Marita Koch (Germany)	1985
800 m	1:53.28	Jarmila Kratochvílová (Czech Republic)	1983
1500 m	3:50.46	Yunxia Qu (China)	1993
10000 m	29:31.78	Junxia Wang (China)	1993

Men

Event	Time	Set by	Date
100 m	9.58	Usain Bolt (Jamaica)	2009
200 m	19.19	Usain Bolt (Jamaica)	2009
400 m	43.18	Michael Johnson (USA)	1999
800 m	1:40.91	David Lekuta Rudisha (Kenya)	1997
1500 m	3:26.00	Hicham El Guerrouj (Morocco)	1998
10000 m	26:17.53	Kenenisa Bekele (Ethiopia)	2005

1 How much faster is the men's record for 100 m than the women's record?

2 Does it take twice as long to run 400 m as 200 m? Check the record times to find out.

3 How much longer does it take the fastest women to run 1500 m than 800 m? Round off to the nearest minute.

4 If Michael Johnson could run 800 m as fast as he can run 400 m, would he break David Lekuta Rudisha's record?

5 How long do you think it takes each of these athletes to run 50 m? Explain how you worked this out.

a Florence Griffith-Joyner **b** Usain Bolt

Days, weeks, months and years

Remember a calendar shows the days by date and how they are organised by week, month and year.

January

M	T	W	T	F	S	S
	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	27
28	29	30	31			

February

M	T	W	T	F	S	S
				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	27	28			

March

M	T	W	T	F	S	S
				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	27	28	29	30	31

April

M	T	W	T	F	S	S
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	27	28
29	30					

May

M	T	W	T	F	S	S
		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
27	28	29	30	31		

June

M	T	W	T	F	S	S
					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	27	28	29	30

July

M	T	W	T	F	S	S
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	27	28
29	30	31				

August

M	T	W	T	F	S	S
			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	27	28	29	30	31	

September

M	T	W	T	F	S	S
						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	27	28	29
30						

October

M	T	W	T	F	S	S
	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	27
28	29	30	31			

November

M	T	W	T	F	S	S
				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	27	28	29	30	

December

M	T	W	T	F	S	S
						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	27	28	29
30	31					

Use this calendar to answer these questions

1 **Calculate how many weeks and days pass from:**

- **a** 12 January to 28 January
- **b** 9 March to 14 April
- **c** 4 June to 30 September
- **d** 1 November to the end of the year
- **e** 20 December to the end of January in the next year.

2 **Sally's gran visited from 1 February till 15 October. How long did she stay? Give your answer in months, weeks and days.**

3 **On 22 November Trey took part in a basketball tournament. He trained for five months for this tournament. When did he start training?**

4 **Jess was born on 4 May 2012. Her sister was born on 4 October 2007. How much younger is Jess than her sister?**

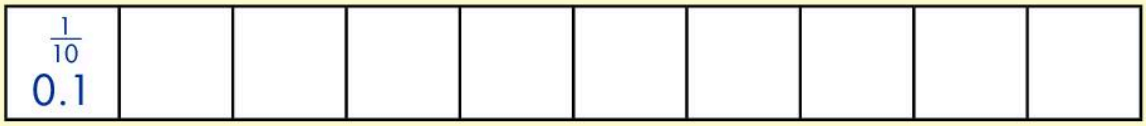
5 **Work out how many months and years it is from:**

- **a** June 2010 to April 2013
- **b** January 1999 to January 2012
- **c** September 2008 to June 2014
- **d** August 2013 to September 2025
- **e** when you were born until now.

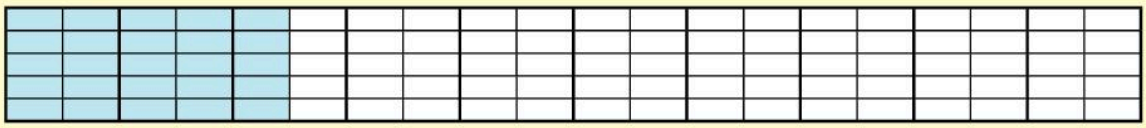
you can use Workbook page 22

Place value to tenths and hundredths

The strip below is divided into ten equal parts. Each part is $\frac{1}{10}$ of the strip. We can write this in decimal notation as 0.1.



In this strip, each tenth has been divided into ten equal parts to give 100 parts in total.



Twenty-five parts have been shaded. This is $\frac{25}{100}$. We write this in decimal notation as 0.25.

Each single part is $\frac{1}{100}$ of the strip. We write this in decimal notation as 0.01.

We can extend the place value system to show decimal fractions.

The place value table shows that $\frac{25}{100}$ is made up of 2 tenths and 5 hundreds.

$\frac{1}{100}$ is made up of 0 tenths and 1 hundredth so we write a 0 in the tenths column as a place holder.

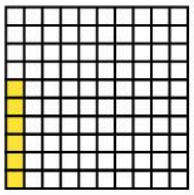
units	tenths	hundredths
0	1	
0	2	5
0	0	1

Each square is divided into 100 parts.

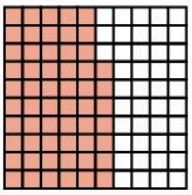
For each one, write decimal fractions to represent the shaded and unshaded parts.

Draw a place value chart if you need one.

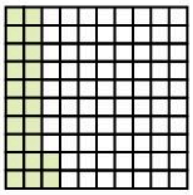
a



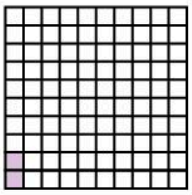
b



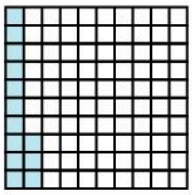
c



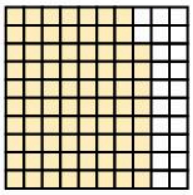
d



e



f

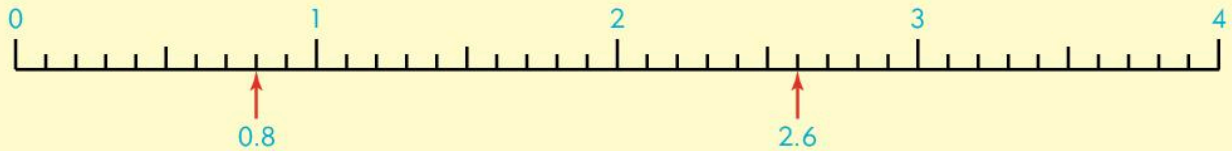


you can use Workbook page 23

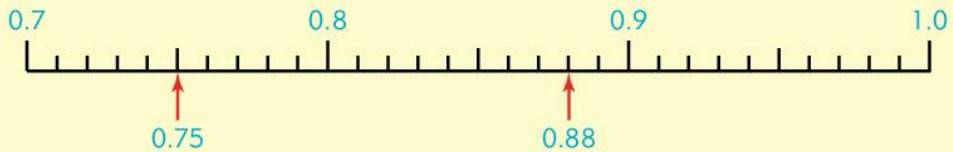
Reading and writing decimal fractions

You can use a number line to show the position of decimal fractions.

This number line is divided into tenths. The arrows show 0.8 and 2.6.



This number line is divided into hundredths. The arrows show 0.75 and 0.88.



1 **Write these numbers in decimal form.**

a 9 units and 4 tenths

b 3 units and 19 hundredths

c $12\frac{3}{100}$

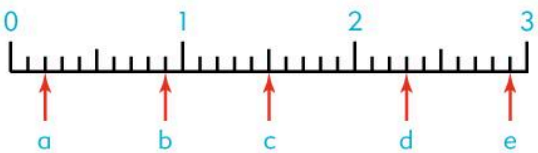
d 45 hundredths

e $\frac{9}{10}$

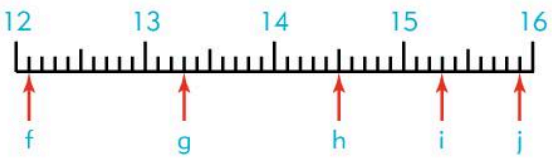
f $\frac{9}{100}$

2 **Write down the decimal fractions shown by the letters on each number line.**

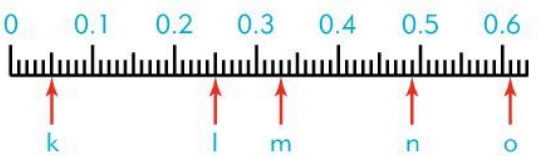
a



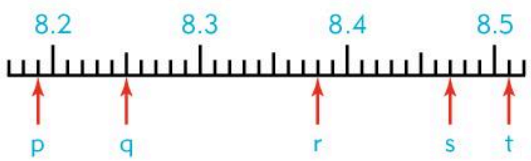
b



c

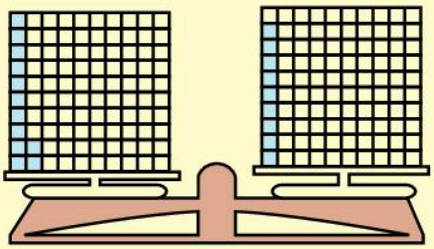


d



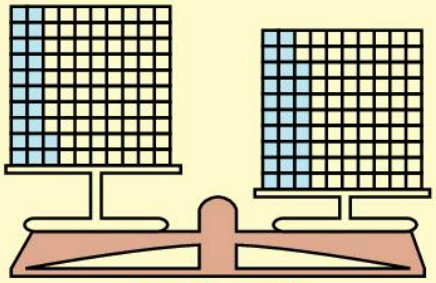
you can use Workbook page 24

Comparing decimals



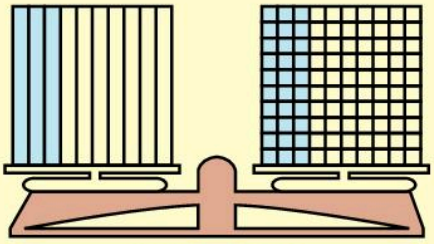
0.12 > 0.09

0.12 is greater than 0.09
0.12 > 0.09



0.22 < 0.28

If the tenths are the same, look at the hundredths.
0.22 is less than 0.28
0.22 < 0.28

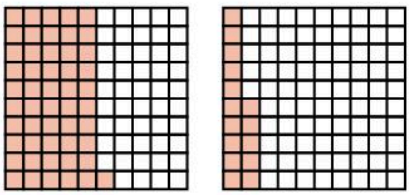


0.3 = 0.30

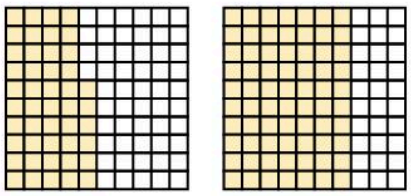
Sometimes numbers are equal.
0.3 = 0.30

1 How much is shaded? Write the decimals. Then use >, <, or = to make true statements.

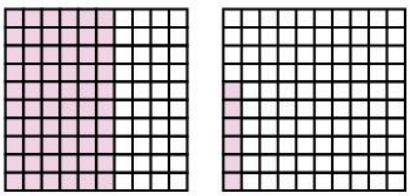
a



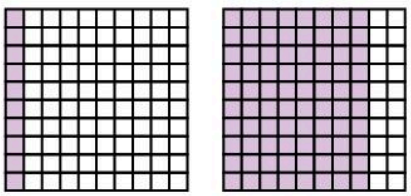
b



c



d



2 Write >, < or = to make true statements.

a 0.26 ___ 0.52

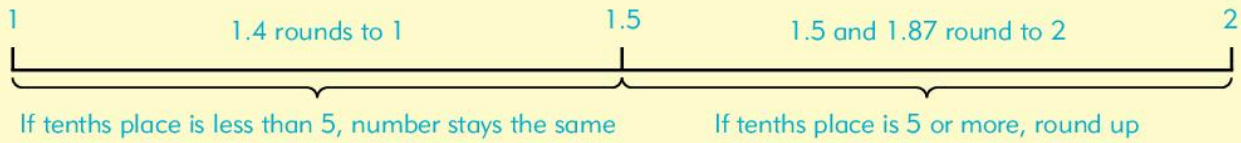
b 0.13 ___ 0.13

c 0.64 ___ 0.46

d 0.07 ___ 0.7

Rounding decimals to the nearest whole number

You can round decimal fractions, including measurements with decimal places, to the nearest whole number using the rules you already know for rounding.



To round a decimal to the nearest whole number, look at the digit in the tenths place.

- If this digit is less than 5, the whole number does not change.
- If this digit is 5 or more, you round up to the next whole number.

1 **Round each decimal to the nearest whole number.**

a 0.9 **b** 1.4 **c** 9.6 **d** 5.4 **e** 12.8 **f** 19.9

2 **Round each decimal to the nearest whole number.**

a 164.21 **b** 234.73 **c** 765.04
d 543.47 **e** 515.89 **f** 599.91

3 **Nathi rounded six masses to the nearest whole kilogram and got these results:**

25 kg	26 kg	24 kg	20 kg	29 kg	30 kg

a Write down the kilogram measurements.

b Match the measurements in the box to the kilogram amounts they would round to.

28.5 kg	25.2 kg	24.5 kg	26.09 kg	29.8 kg	30.09 kg
25.6 kg	25.33 kg	24.98 kg	19.99 kg	20.35 kg	20.3 kg
25.9 kg	26.34 kg	29.45 kg	29.55 kg	25.8 kg	24.49 kg

4 **A delivery van drove 39.5 km on Monday, 123.27 km on Tuesday and 59.59 km on Wednesday.**

a Round each distance to the nearest kilometre.

b Approximately how many kilometres did the van travel altogether on the three days?

More decimals

1 **Write the value of the underlined digits. Then write the next three numbers in these series.**

a 0.<u>2</u>6, 0.2<u>7</u>, <u>0</u>.28, ___, ___, ___

b <u>1</u>.96, 1.<u>9</u>7, 1.9<u>8</u>, ___, ___, ___

c 6.<u>2</u>5, 6.2<u>4</u>, <u>6</u>.23, ___, ___, ___

d <u>8</u>.0<u>4</u>, 8.0<u>3</u>, 8.<u>0</u>2, ___, ___, ___

2 **Write the value of the underlined digits. Then put these numbers in order from least to greatest.**

a 2.<u>2</u>6, 1.<u>8</u>5, 2.<u>9</u>, 1.<u>3</u>5

b 1.0<u>4</u>, 0.<u>4</u>0, 1.0<u>1</u>, <u>1</u>.4

c <u>2</u>.79, 5.1<u>2</u>, 2.<u>1</u>7, <u>1</u>.38

d 1.<u>2</u>5, 3.0<u>3</u>, 2.7<u>1</u>, <u>1</u>.48

3 **Put these prices in order from greatest to least.**

a

Apple juice	$1.39
Mineral water	$0.69
Mayonnaise	$1.09
Fromage frais	$0.45
Orange and passionfruit	$2.32
Satsuma juice	$1.38
Apricot halves	$0.52
Blackberries	$1.50
Half-fat milk	$0.30
Granary loaf	$0.65

b

Bathroom accessories:	
Gold-plated mirror	$22.99
Tumbler and holder	$9.50
Soap dish	$10.99
Shelf	$14.99
Towel rail	$14.95
Towel ring	$9.95
Toilet-roll holder	$9.99
Toilet-brush holder	$24.99

4 **It helps to work out a bill quickly if you 'round' the amounts.**

a Use the food bill in question 3a above. Round all the prices up or down. What is the approximate total cost?

b Now use a calculator to add up the real bill. How close are the two answers?

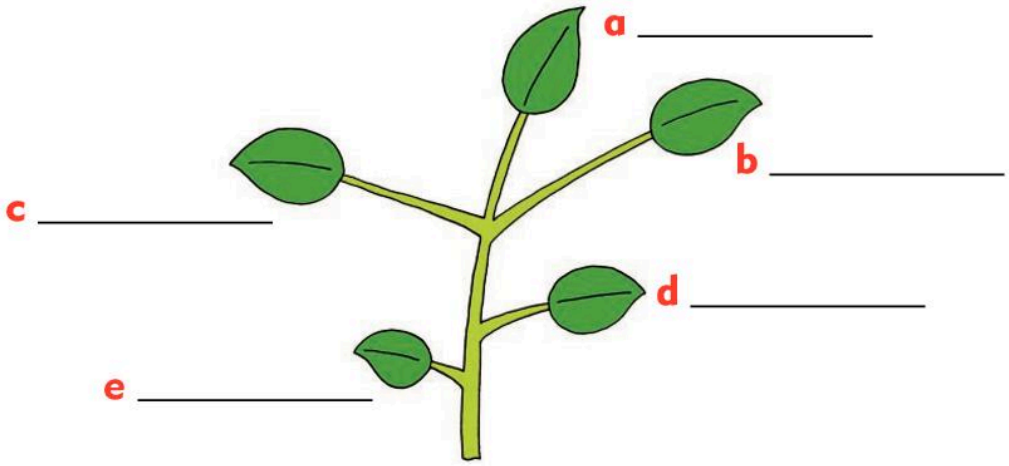
Length

1 metre = 100 centimetres

1 kilometre = 1000 metres

1 centimetre = 10 millimetres

1 **Measure the length of each stem on this plant. Write the lengths in millimetres.**



2 **Which would be the best units of length (km, m, cm or mm) to measure the following?**

a length of a matchstick

b width of a watchstrap

c length of a pigeon

d height of a child

e distance from my house to my neighbour's

f distance from my house to school

3 **Write the following lengths in centimetres.**

a 1 cm 1 mm

b 4 cm 5 mm

c 1 m 28 cm

d 3 m 28 cm 4 mm

e 26 m

f 26.7 m

you can use Workbook pages 25 and 26

Mass

1 kilogram = 1000 grams or 1 kg = 1000 g

1 tonne = 1000 kilograms or 1 t = 1000 kg

1 **Which would be the best unit to use: gram, kilogram or tonne?**

a the amount of glue in a glue stick

b a woman

c a truckload of bricks

d a big bag of potatoes

e a truckload of potatoes

f a cellphone

2 **Rewrite the following amounts in grams (g).**

a 5 kg **b** 3.5 kg **c** 1 kg 143 g

d 7.2 kg **e** 45.5 kg **f** 11.7 kg

3 **Order these masses from heaviest to lightest.**

5 tonnes	250 g	5298 g	4.5 kg	1 kg	980 g
12876 g		5200 kg	92500 g	20 g	

Capacity

We measure how much liquid a container can hold in litres (l) and millilitres (ml).

A millilitre is a small amount. A teaspoon holds about 5 ml of liquid.

1 litre = 1000 millilitres 1 l = 1000 ml

$\frac{1}{2}$ litre = 500 ml 0.5 l = 500 ml

1 **The units l and ml have been left off these measurements. Write the correct units for each container. (Note the objects have not all been drawn to the same scale.)**

250 ___

15 ___

1 ___

750 ___

1.5 ___

500 ___

25 ___

2 **Write each of these litre amounts in millilitres.**

a 1 litre **b** 5 litres **c** 10 litres

d 12.4 litres **e** 4.5 litres **f** 15.8 litres

3 **Write these capacities in order from smallest to greatest.**

3 l	4.5 l	2500 ml	8000 ml	3 l and 250 ml	
976 ml	1200 ml	1.6 l	4 ml	90 ml	0.9 l

Measuring scales

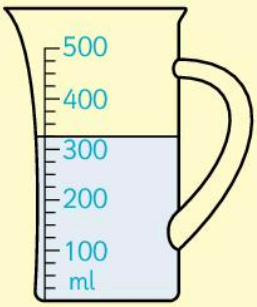
A measuring scale is a set of marks that represent different amounts. The marks may be of different lengths. Usually only the main marks are numbered. You have to work out what the in-between marks represent.

To read a measuring scale you need to know what units are shown and what each mark on the scale means.

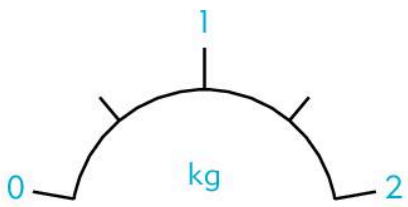
Look at this ruler.

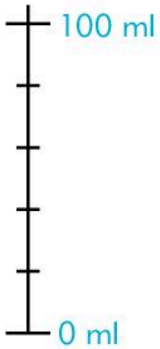
The longest marks on this scale represent centimetres.
Each whole centimetre is labelled with a number.
The in-between marks are shorter. They divide each centimetre into ten equal parts. Each part is $\frac{1}{10}$ of a centimetre or 1 millimetre.
The red line is 4 cm and 8 mm long. This is equivalent to 4.8 cm or 48 mm.

Look at this scale on a measuring jug.
The scale is marked in millilitres.
Each 100 ml is labelled.
Each 100 ml is divided into four equal parts.
100 ÷ 4 = 25, so each smaller line represents 25 ml.
There is 325 ml of liquid in the jug.



Work with a partner. Say what units are shown on each scale and what each division represents.

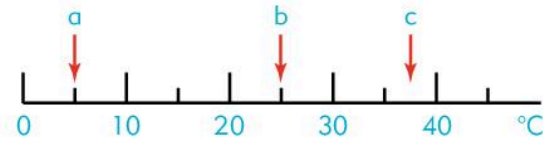


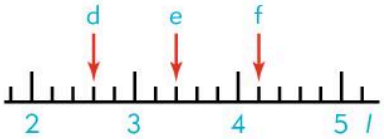


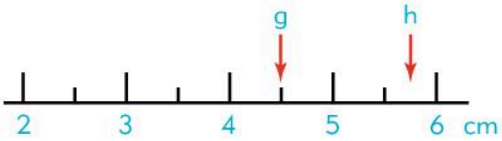
you can use Workbook page 27

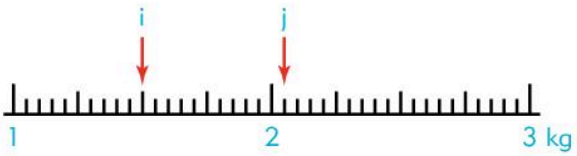
Reading measuring scales

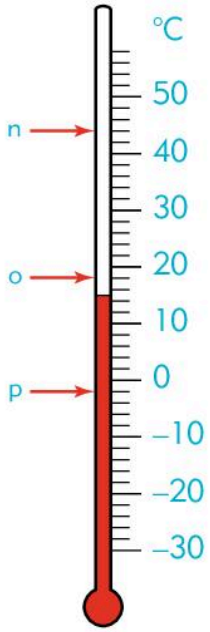
1 Write down the measurements shown on each scale.
Remember to write the units as well.

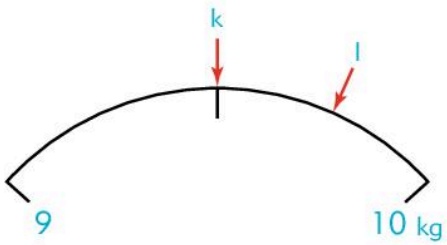


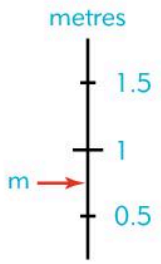


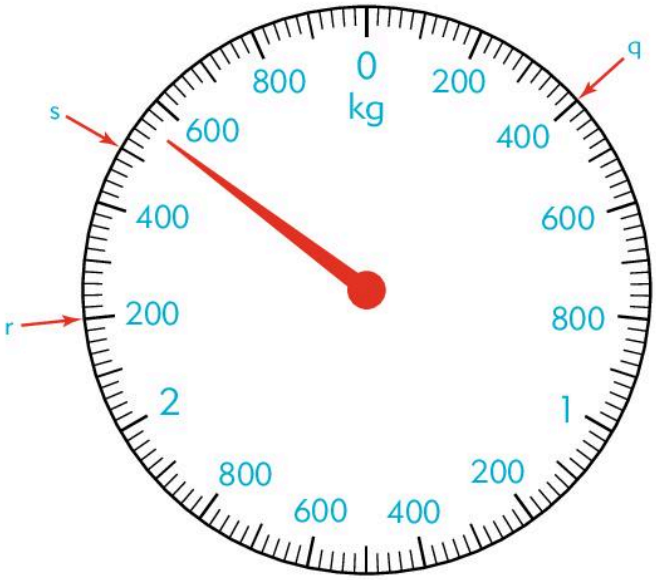












you can use Workbook pages 27 and 28

Measuring and drawing lines

You can use your ruler to measure the length of lines to the nearest centimetre and millimetre.

Remember to place the 0 mark on your ruler on the start of the line.

This line is 2 centimetres long. We write this as 2 cm.

This line is between 3 and 4 centimetres long so we measure it in centimetres and millimetres to get a more accurate measurement. It is 3 cm and 4 mm long.

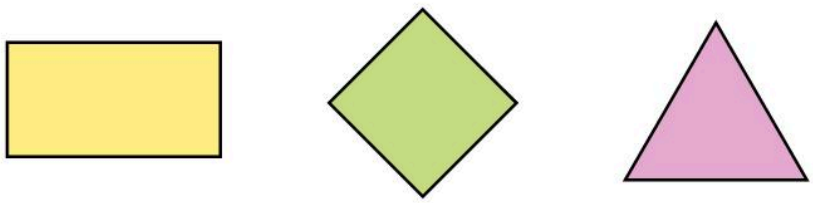
We can also record the length of the line using only millimetres. This line is 34 millimetres long. We write this as 34 mm.

Remember each centimetre is divided into 10 millimetres.

1 **Estimate and then measure the length of each line to the nearest centimetre.**

2 **Use a pencil and ruler to draw lines that are 2 cm longer than each of the lines above.**

3 **Estimate and then measure the length of each side of these shapes. Record your measurements in centimetres.**



More measuring and drawing

1 Measure the length of each line to the nearest millimetre.

2 Draw lines of the following lengths.

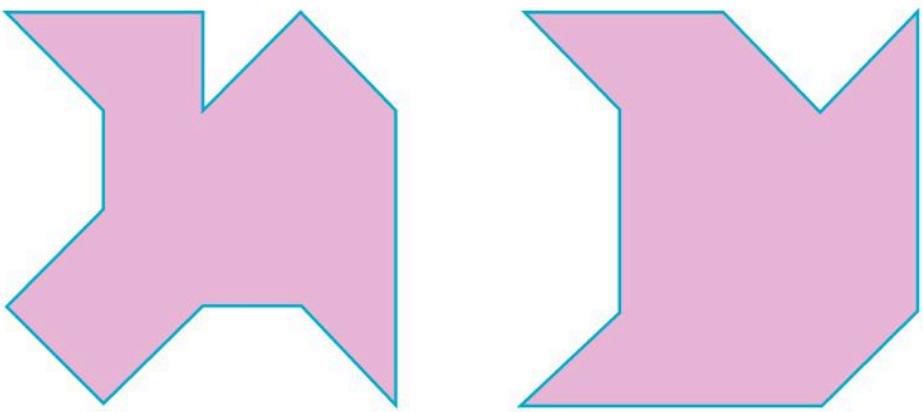
a 47 mm **b** 28 mm **c** 19 mm

d 53 mm **e** 13 mm **f** 55 mm

3 Measure the distance around each shape. Give the total distance in:

a centimetres and millimetres

b millimetres



4 Draw two unusual shapes in your book.

a Exchange shapes with a partner. Measure the lengths of the sides of your partner's shapes and record them to the nearest millimetre.

b Check your partner's measurements.

Counting in steps

You already know how to count forwards and backwards in steps.

For example:

Counting on in steps of 5:
0, 5, 10, 15, 20, …

Counting back in steps of 6:
36, 30, 24, 18, …

You also know that you can count back through 0 using negative numbers.

For example:

Counting back in steps of 2:
6, 4, 2, 0, –2, –4 …

Counting back in steps of 11:
44, 33, 22, 11, 0, –11, –22 …

1 **Start at 0. Count on in the given steps until you are one step past 100. List the numbers as you count them.**

a count in 6s **b** count in 10s **c** count in 4s
d count in 12s **e** count in 25s **f** count in 15s

2 **Start at 50. Count back in the given steps until you are one step past 0. List the numbers as you count them.**

a count back in 5s **b** count back in 10s **c** count back in 8s
d count back in 7s **e** count back in 20s **f** count back in 9s

3 **Work out in what steps the person counted in each set of numbers. Copy the set and fill in the missing numbers.**

a	12	25	☐	51	☐	☐
b	135	124	☐	102	☐	☐
c	12	5	–2	☐	☐	☐
d	19	13	☐	☐	☐	–11
e	–4	–2	0	☐	☐	6
f	–25	–15	☐	5	15	☐

4 **Write down three two-digit numbers between 50 and 60.**

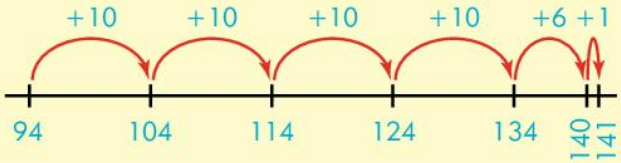
a Count on in 20s from the first number until you pass 120
b Count back in 10s from the second number until you pass –10.
c Count on in 19s from the third number until you pass 150.

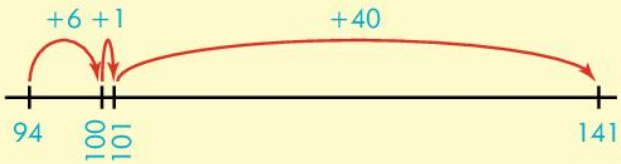
you can use Workbook page 29

Counting on to add

You can use counting in different steps to help you add numbers. It helps to draw a number line to show the steps.

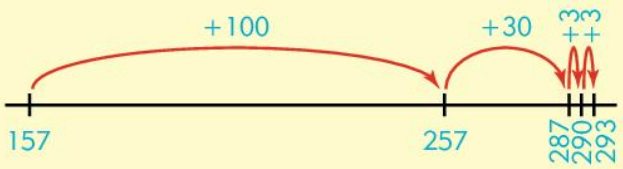
Read through the examples carefully. Remember it is easier if you start with the bigger number.





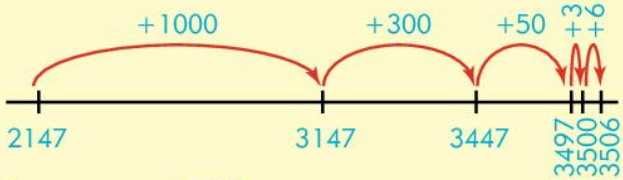
Count on in 10s
Count on 6
Count on 1
94 + 47 = 141

Or Count on 6 to get to 100
Count on 1
Count on 40



Count on 100
Count on 30
Count on 6
157 + 136 = 293

You can use this method to add bigger numbers by counting on in thousands, hundreds, tens and units.



Count on 1000
Count on 300
Count on 50
Count on 9
1359 + 2147 = 3506

1 **Count on using a blank number line to add these numbers as quickly as possible.**

a 65 + 93 **b** 38 + 67 **c** 87 + 96
d 34 + 112 **e** 65 + 196 **f** 876 + 84

2 **Add. Show your working.**

a 342 + 276 **b** 512 + 356 **c** 487 + 213
d 654 + 987 **e** 345 + 876 **f** 765 + 508

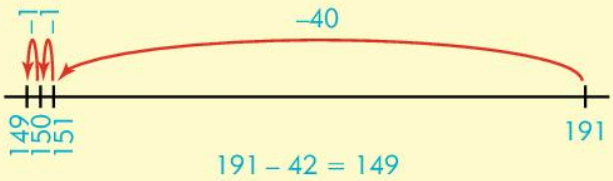
3 **Add. Show your working.**

a 1234 + 1142 **b** 1345 + 2366 **c** 1276 + 3129
d 2367 + 2876 **e** 1987 + 1328 **f** 2789 + 4762

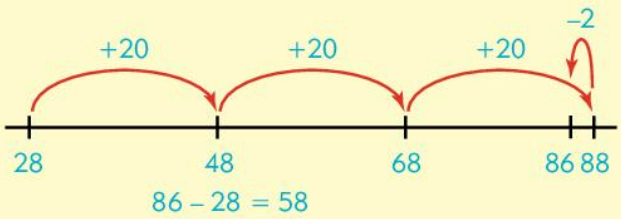
Counting on and back to subtract

You can also use counting in different steps to subtract numbers. You can do this by counting on from the smaller number or by counting back from the larger number.
Read through the examples carefully.

Counting back
191 – 42

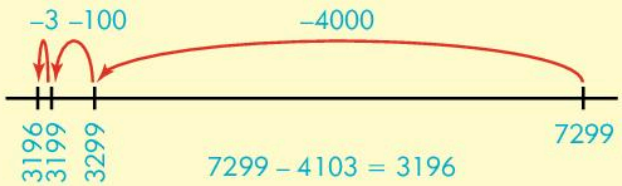


Counting on
86 – 28

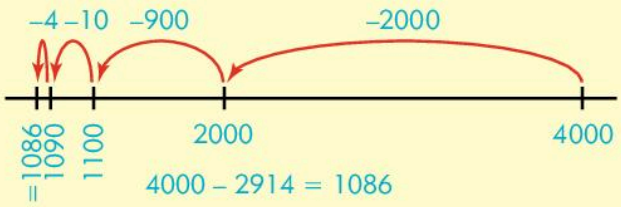


You can subtract bigger numbers by counting on or back in hundreds or thousands.

7299 – 4103



4000 – 2914



1 **Count on using a blank number line to subtract these numbers.**

a 97 – 25 **b** 112 – 86 **c** 108 – 37

2 **Count back using a blank number line to subtract these numbers.**

a 198 – 56 **b** 287 – 122 **c** 345 – 189

d 1234 – 1004 **e** 3267 – 1034 **f** 3487 – 1876

3 **Subtract. Show your working.**

a 800 – 328 **b** 6543 – 3415 **c** 5000 – 876

d 4987 – 397 **e** 1678 – 1066 **f** 2987 – 1999

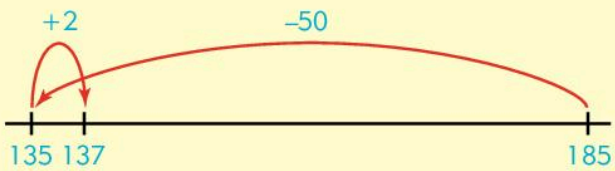
you can use Workbook page 30

Rounding numbers to add and subtract

When the numbers you have to add or subtract are near multiples of 10, 100 or 1000 you can round them off and use compensation to make it easier to add or subtract the numbers.

185 – 48 Estimate 190 – 50 = 140

Use a blank number line



185 – 48 = 137

or calculate mentally.

185 – 50 = 135
so 185 – 48 = 135 + 2
= 137

Maria says '185 – 48 gives the same answer as 187 – 50.
My answer is 137.'
Discuss with your partner how Maria might work out 5026 – 3998.

1 **Estimate and then add. Use the method you find easiest.**

a 345 + 795 **b** 1234 + 899 **c** 3199 + 999
d 1002 + 1765 **e** 988 + 1001 **f** 2999 + 4012

2 **Estimate and then subtract. Use the method you find easiest.**

a 602 – 141 **b** 425 – 299 **c** 500 – 299
d 6003 – 4597 e 4200 – 598 **f** 2800 – 1003

3 **Calculate. Show your working.**

a 143 + 598 **b** 479 – 236 **c** 468 – 297
d 1867 + 1088 **e** 2099 – 1995 **f** 4506 – 2180

4 **The Nile River is 6825 km long. The Congo River is 4375 km long. How much shorter is the Congo River than the Nile River?**

Find the pairs

In this grid some pairs of numbers add up to 1000. Some pairs make 2000 and some pairs make 5000.

462	856	3836	262
658	819	1144	959
1254	1164	181	1071
2646	4041	929	738
538	3746	1342	2354

For example, 462 + 538 = 1000

1 Copy the grid into your exercise book. Find the pairs that add up to 1000, 2000 and 5000. Do them in your head first, or on rough paper.

2 Make up a grid like this for a friend to try.

3 From each list below, find the pair of numbers that adds up to any multiple of 1000. Try to complete this as fast as you can. The first person to find all 5 pairs is the winner.

a	1215	3057	3000	3785
b	2080	1099	3021	4901
c	3084	3089	4276	5724
d	2000	1487	4000	2854
e	1100	4865	2847	1900

4 Explain what patterns you noticed in question 3.

Addition and subtraction problems

Always look at the numbers you have to add or subtract. This will help you choose the most appropriate method.

1 **Estimate and then add. Use the strategy you find easiest in each case.**

a 1529 + 376	**b** 2584 + 864	**c** 2328 + 4618
d 6913 + 101	**e** 5055 + 599	**f** 2361 + 7085
g 508 + 5008	**h** 4090 + 5110	**i** 8999 + 1999

2 **Estimate and then subtract. Use the strategy you find easiest in each case.**

a 276 – 159	**b** 943 – 287	**c** 1000 – 145
d 2765 – 359	**e** 9997 – 48	**f** 8120 – 2099

3 **Solve these problems.**

a A printer has to print 1445 copies of one map and 938 copies of another. How many sheets of paper does she use altogether?

b An office makes 3476 phone calls in one week and 1248 in the next week. How many phone calls are made altogether?

c A secretary types out two documents. The first has 3485 words and the second has 12346 words. How many words does he type altogether?

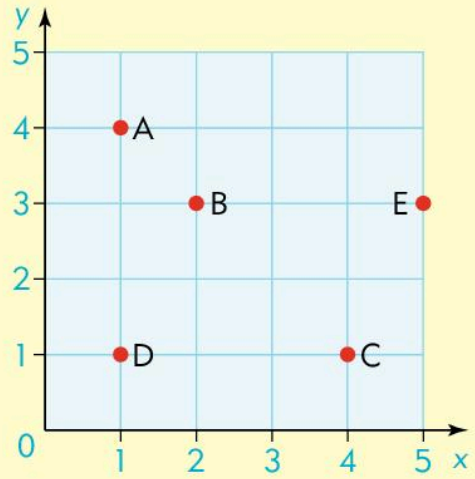
d Anil has 578 songs on his MP3 player. Aparna has 1495 songs. How many more songs does Aparna have than Anil?

e Anil gets some more songs. Now he has 705 songs. How many more did he get?

f How many songs do Anil and Aparna have altogether?

Position on a grid

Do you remember how to give the position of a point on a grid where the rows and columns are numbered?



- Each position can be given using two co-ordinates.
- The co-ordinates are written between brackets as a pair. For example, point A is in position (1, 4).
- The co-ordinates indicate where a horizontal and a vertical line cross each other.
- The order of the points matters. Point A is at (1, 4), point C is at (4, 1).
- The horizontal value (x co-ordinate) is always given first.
- The vertical value (y co-ordinate) is given second.

Can you give the positions of the other points on the grid?

1 **What point is found in each of these positions? Write the letters only.**

a (9, 1) **b** (1, 7)

c (6, 5) **d** (6, 3)

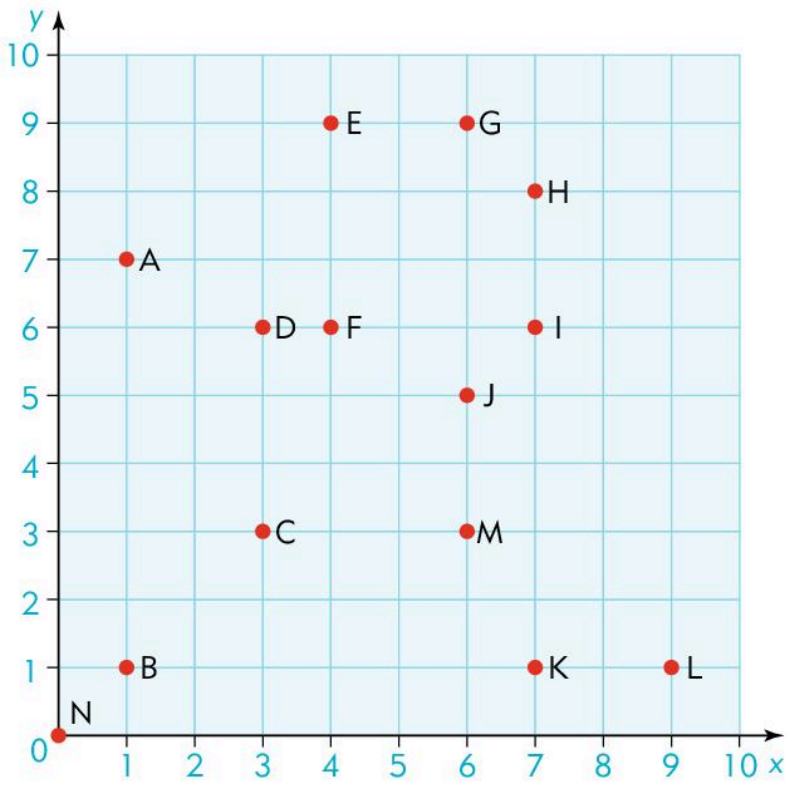
e (3, 6) **f** (7, 8)

2 **Give the co-ordinates of the following points.**

a B **b** C

c E **d** G

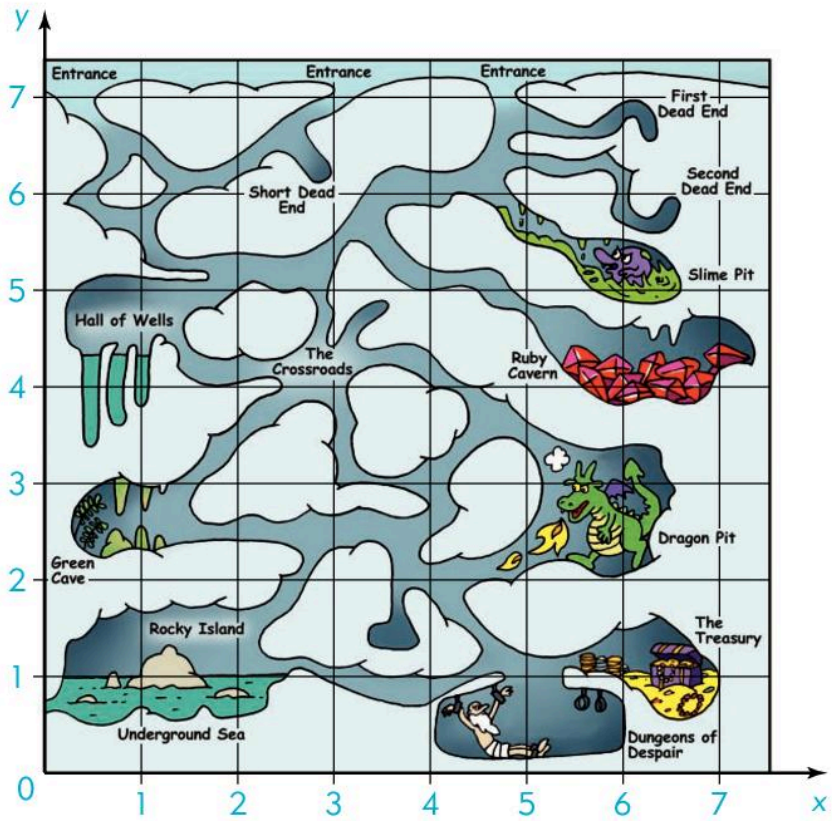
e I **f** N



you can use Workbook page 31

Position on maps

Use the map of Goblin Caves to answer the questions.



1 **What would you find at:**

a (5, 1)

b (3, 6)

c (1, 1)

2 **Write a pair of co-ordinates of a position in:**

a Ruby Cavern

b Hall of Wells

c Green Cave

d The Crossroads

3 **Simone is at the entrance at (5, 7). She moves one block down and then two blocks to the left.**

a In what position is she now?

She then moves two blocks down.

b What is her new position?

c What does she find there?

d Simone wants to get from there to the Dragon Pit. How many blocks down and to the right should she move to get there?

Multiplication and division facts

You should already know some of your times tables by memory and you should be able to use them to find the division facts for different numbers.

Memorising the times tables from 2× to 10× will help you to multiply and divide bigger numbers quickly and easily.

Here is a multiplication table for the 2× to 5× tables. Work with your partner to test each other on these tables.

×	2	3	4	5
1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20
5	10	15	20	25
6	12	18	24	30
7	14	21	28	35
8	16	24	32	40
9	18	27	36	45
10	20	30	40	50

$4 \times 7 = 28$
$7 \times 4 = 28$
$28 \div 7 = 4$
$28 \div 4 = 7$
28 is the product of 4 and 7.
28 is a multiple of 4.
28 is a multiple of 7.

1 **Do these multiplications. Write the answers only.**

a 2×8 **b** 3×9 **c** 4×2 **d** 5×5

e 4×8 **f** 5×9 **g** 4×5 **h** 4×7

i 9×3 **j** 8×3 **k** 9×5 **l** 2×9

m 2×10 **n** 5×6 **o** 4×4 **p** 6×3

2 **Write the first six multiples of:**

a 3 **b** 5 **c** 4

3 **Find the missing numbers.**

a $3 \times \square = 24$ **b** $2 \times \square = 18$ **c** $7 \times \square = 28$

d $24 \div 3 = \square$ **e** $18 \div 9 = \square$ **f** $28 \div 4 = \square$

g $4 \times \square = 36$ **h** $5 \times \square = 40$ **i** $3 \times \square = 27$

j $36 \div 4 = \square$ **k** $40 \div 8 = \square$ **l** $27 \div 9 = \square$

you can use Workbook pages 32 and 33

More multiplication and division facts

Here is a multiplication table for the 6× to 10× tables. Work with a partner to test each other's knowledge of these tables.

×	6	7	8	9	10
1	6	7	8	9	10
2	12	14	16	18	20
3	18	21	24	27	30
4	24	28	32	36	40
5	30	35	40	45	50
6	36	42	48	54	60
7	42	49	56	63	70
8	48	56	64	72	90
9	54	63	72	81	90
10	60	70	80	90	100

$8 \times 7 = 56$
$7 \times 8 = 56$
$56 \div 8 = 7$
$56 \div 7 = 8$

56 is the product of 7 and 8
56 is a multiple of 7
56 is a multiple of 8

1 **Do these multiplications as quickly as possible. Write the answers only.**

a 6×5 **b** 3×9 **c** 9×4 **d** 6×6
e 9×7 **f** 8×9 **g** 8×3 **h** 5×8
i 7×7 **j** 6×8 **k** 6×7 **l** 8×9
m 6×4 **n** 3×7 **o** 7×9 **p** 6×9
q 10×6 **r** 9×9 **s** 10×10 **t** 8×10

2 **Complete these number sentences.**

a $6 \times \square = 54$ **b** $\square \times 3 = 36$ **c** $9 \times \square = 45$
d $54 \div 6 = \square$ **e** $36 \div 3 = \square$ **f** $45 \div 9 = \square$
g $5 \times \square = 60$ **h** $\square \times 8 = 56$ **i** $7 \times \square = 49$
j $60 \div 5 = \square$ **k** $56 \div \square = 7$ **l** $49 \div 7 = \square$
m $7 \times \square = 63$ **n** $9 \times \square = 54$ **o** $8 \times \square = 72$
p $63 \div 7 = \square$ **q** $54 \div 9 = \square$ **r** $72 \div 8 = \square$

you can use Workbook pages 32 and 33

Multiples

You already know that when you multiply two numbers, the product is a multiple of both numbers.

Here are the first ten multiples of 3 and the first ten multiples of 5.
Multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
Multiples of 5: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

All multiples of 3 can be divided by 3.
All multiples of 5 can be divided by 5.

1 **Look at this set of multiples.**

24	28	48	56	72	45	70	49	54	36	32	60

Write the numbers from the set which are:

a multiples of 6
b multiples of 7
c multiples of 8
d multiples of 9
e multiples of both 6 and 8
f multiples of both 6 and 7
g multiples of both 8 and 9
h not multiples of 8 or 0

2 **Look at the multiplication table for the 10× table again. How can you tell quickly whether a number is a multiple of 10?**

3 **Copy and complete these number sequences.**

a 12, 18, _ _ _ _ _
b 21, 28 _ _ _ _ _
c 81, 72, _ _ _ _ _
d 72, 64, _ _ _ _ _

4 **List the first ten multiples of 6.**

a Which of these are also multiples of 2?

b Which of these are also multiples of 3?

c Calculate 6 × 8 and then calculate 2 × 3 × 8. What do you notice?

Multiple problems

Clare changes the oil in her motorbike every 3 weeks. She changes her spark plugs every 5 weeks.

To find out how often she does both jobs together you can use multiples.

First, list the multiples of 3 and 5.

Multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, …

Multiples of 5: 5, 10, 15, 20, 25, 30, 35, …

Notice that 15 and 30 are multiples of both 3 and 5.

Multiples common to two numbers are called **common multiples**.

So 15 and 30 are common multiples of both 3 and 5.

15 is the **lowest common multiple** of 3 and 5.

Clare changes the oil and the spark plugs together every 15 weeks.

1 **List the first 10 multiples of 4 and 6.**

a Which multiples are common?

b Which is the lowest common multiple?

2 **Find the lowest common multiple of these pairs of numbers:**

a 6, 8 **b** 3, 14 **c** 9, 15 **d** 4, 5 **e** 5, 7 **f** 3, 9

3 **In music, common multiples can help us to understand how some rhythms work. Use common multiples to help you solve these problems.**

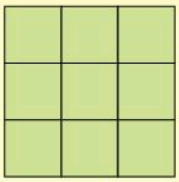
a Priya is learning to play the drums. Her teacher challenges her to play 3 beats with her right hand while playing 2 beats with the left. Try this out. On which beats do both hands play together?

b Now try the same challenge but try playing 3 beats with one hand and 4 with the other hand. On which beats do both hands play together?

Square numbers

Some numbers can be organised into equal rows and columns to make a square.

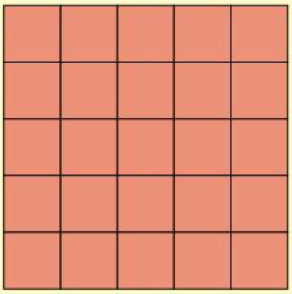
9 and 25 are called **square numbers**.



$3 \times 3 = 9$

A square number is formed when you multiply any number by itself.

When you multiply a number by itself, you say the number is **squared**.



$5 \times 5 = 25$

In mathematics, there is usually a short way of writing things down. The short way of writing 3×3 is 3^2 and the short way of writing 5×5 is 5^2.

The little 2 above the number is a **power** and it tells you how many times to multiply the number by itself.

You read 3^2 as 'three squared' or 'three to the power of two'.

You read 5^2 as 'five squared' or 'five to the power of two'.

1 Draw rough sketches of squares with blocks to show:

a 4 squared **b** 10 squared **c** 6 squared **d** 2^2

e 4^2 **f** 7^2 **g** 1^2 **h** 5^2

2 List the first twelve square numbers.

3 Copy these statements and fill in the missing numbers.

a 9 = ☐ squared **b** 1 = ☐ squared **c** 4 = ☐ squared

d 81 = ☐ squared **e** 64 = ☐ squared **f** 49 = ☐ squared

g 144 = ☐ squared **h** 100 = ☐ squared **i** 16 = ☐ squared

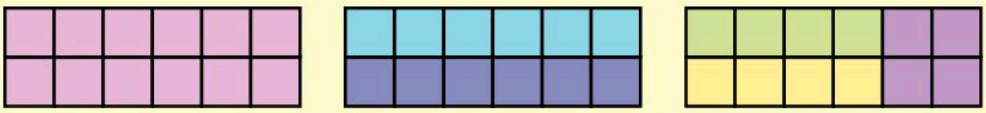
j 25 = ☐ squared **k** 121 = ☐ squared **l** 36 = ☐ squared

4 How is 4^2 different from 4×2? Discuss this with a partner.

5 I have three packs of square tiles. One has 16 tiles, one has 24 tiles and one has 36 tiles. Which packs can be laid out to make a larger square?

Factors

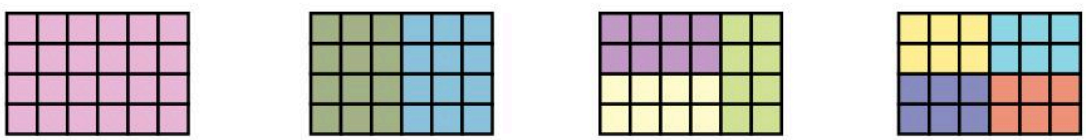
Some numbers cannot be organised into square shapes but they can be organised into rectangles.
Look at these ways of organising the number 12. Each colour represents a different factor.



$1 \times 12 = 12$ $2 \times 6 = 12$ $3 \times 4 = 12$

The number pairs 1 and 12, 2 and 6 and 3 and 4 are all factors of 12.
A factor is a number that divides exactly into another number.
We can say the factors of 12 are 1, 2, 3, 4, 6 and 12.

1 **Use these rectangles made from 24 blocks to complete the number sentences.**



a $1 \times \square = 24$ $2 \times \square = 24$ $\square \times 8 = 24$ $\square \times 6 = 24$

b The factors of 24 are: 1, 2, __ __ __ __ and __.

2 **Write one pair of factors for each of these numbers.**

a 16 **b** 20 **c** 18 **d** 32

3 **Write two pairs of factors for each of these numbers.**

a 30 **b** 40 **c** 50 **d** 60

e 100 **f** 56 **g** 68 **h** 81

4 **Work with a partner.**

a Find a number less than 40 that has ten different factors.

b List the factors.

you can use Workbook page 34

More factors

Remember: The factors of a number can be multiplied to make that number. For example, the factors of 6 are 1, 2, 3 and 6. $1 \times 6 = 6$ $2 \times 3 = 6$

A teacher has 24 students in her PE lesson.
She uses factors of 24 to group them for different exercises.
Here is an organised method for finding all the factors of 24.

Try 1: $1 \times 24 = 24$ 1 and 24 are factors of 24.
Try 2: $2 \times 12 = 24$ 2 and 12 are factors of 24.
Try 3: $3 \times 8 = 24$ 3 and 8 are factors of 24.
Try 4: $4 \times 6 = 24$ 4 and 6 are factors of 24.
Try 5: $5 \times ? = 24$ 5 is not a factor of 24.
Try 6: 6 is already known to be a factor of 24.

The factors of 24 are therefore 1, 2, 3, 4, 6, 8, 12 and 24.

1 **On squared paper, draw all the possible rectangles that can be made from 36 squares.**

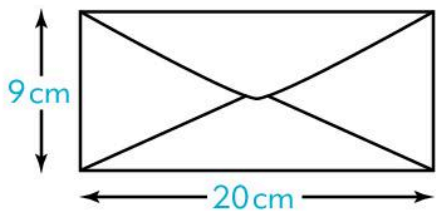
2 **There will be 40 guests at a dinner. All the tables must have the same number of people at them. What are the possible seating arrangements?**

3 **Use the picture to help you answer these questions.**

a What is the area of the front of this envelope?

b Find all the possible dimensions for envelopes with the same area.

c Which of the answers to part b are practical for envelopes?



Fun with factors

6 is a **perfect number**.

The factors of 6, apart from 6 itself, are 1, 2 and 3.

Because the factors of 6 also add up to 6, we call it a perfect number.

1 **There is another perfect number between 10 and 30.**

a Find it and explain how it is perfect.

b There is another between 490 and 500.

Try to find this one.

12 is an **abundant number**.

The factors of 12, apart from 12 itself, are 1, 2, 3, 4 and 6. These factors add up to more than 12, so we call 12 an abundant number.

10 is a **deficient number**.

The factors of 10, apart from 10 itself, are 1, 2 and 5. These add up to less than 10, so 10 is called a deficient number.

2 **Which numbers between 2 and 20 are abundant?**

3 **Which numbers between 90 and 100 are deficient?**

Divisibility rules

The patterns made by factors and multiples can help you decide whether a number can be divided exactly by another number.

All even numbers can be divided by 2. So, if the final digit is 0, 2, 4, 6 or 8, the number will divide by 2. For example, 12 and 26.

All multiples of 5 end with 5 or 0. So, if the final digits are 5 or 0, it will divide by 5. For example 25 and 40.

All multiples of 10 end with 0. So, if the final digits are 5 or 0, it will divide by 5. For example 25 and 40.

If the final digit is 0, it will divide by 10.
For example, 20 and 120.

All multiples of 100 end with 00. So if the final two digits of a whole number are zeros, the number can be divided by 100.

For example, 400, 4500 and 9800.

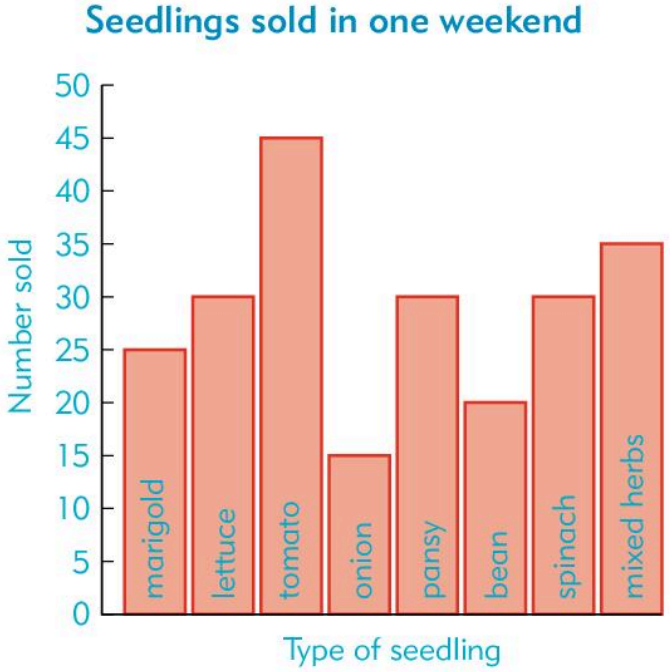
Test these numbers. For each number say whether it can be divided by 2, 5, 10 and 100.

1. 522
2. 720
3. 1806
4. 4455
5. 2100
6. 1001
7. 736
8. 8613
9. 1136
10. 1762
11. 729
12. 111
13. 9724
14. 6561
15. 771
16. 2450
17. 1270
18. 10000

you can use Workbook page 35

Seedling sale

A market had a sale on seedlings. This graph shows how many seedlings they sold in one weekend.



1 **Use the graph to answer these questions.**

a Which was the most popular sale item?

b Which was the least popular?

c Which three types were equally popular?

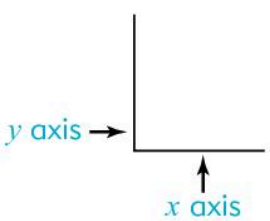
d How many more mixed herbs seedlings were sold than spinach?

2 **Make up two of your own questions to ask about the graph.**

3 **In the graph above say:**

a what is shown on the x-axis

b what is shown on the y-axis.



4 **How do you think the person who drew the graph decided which numbers to put on the y-axis?**

How many words per day

Four students wanted to find out how many words they wrote in a day at school.

On Friday they had five lessons: Pottery, Science, Design and Technology, Religious Studies and Geography. After each lesson they wrote down the number of words they had written.

Here are their results:

Emma:	0, 66, 10, 105, 82
Claire:	0, 81, 23, 75, 86
Sean:	0, 52, 8, 99, 128
Tony:	0, 34, 11, 53, 62

1 **Copy this table and complete it by filling in the total number of words that each student wrote.**

Student	Emma	Claire	Sean	Tony
Total number of words				

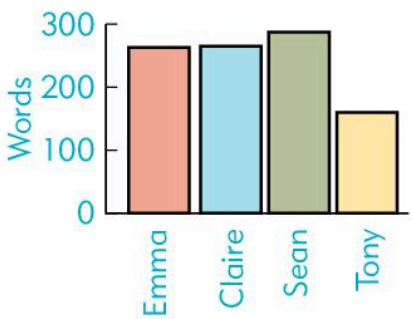
2 **Use your table to answer these questions:**

a Who wrote the most words that day?

b Who wrote the fewest words that day?

c How many words did the four students write altogether?

3 **Emma decided to draw a bar graph to show this data. This is the graph she drew.**



a Is the graph correct?

b Why does Emma's graph look so odd?

c Redraw this graph using a more suitable scale on the vertical axis.

you can use Workbook page 36

Adventure camp activities

On an adventure camp, students could choose any six of these activities:

1 abseiling

2 canoeing

3 wind-surfing

4 pony-trekking

5 parachuting

6 archery

7 orienteering

8 climbing

9 dinghy sailing

10 water-skiing

The students' choices are shown on the next page.

Show choices on a pictogram

These are the activities that the students chose:

Simon:	2	4	1	8	10	6
Sarah:	10	1	5	3	9	7
Kim:	7	4	3	10	9	2
Umeed:	10	4	6	2	7	5
Rachel:	4	8	9	3	2	10
Timmy:	9	6	7	10	4	3
Nina:	5	4	6	9	2	1
Kerry:	1	4	2	7	5	9
Kirk:	4	6	2	3	8	10
Lee:	10	7	6	3	4	9

Use the grids and tables on Workbook page 37 to complete these activities.

1 Draw a pictogram to show how many students chose each activity. Use the symbol 🧍 to represent 2 students.

2 Which three activities were chosen by most students? How do you know this?

3 Which two activities were least popular? How do you know this?

4 Survey ten students in your class to find out which six activities they would choose. Record your results in the table in your Workbook.

5 Draw a pictogram to show the results from your class. Use the symbol 🧍 to represent 2 students.

6 Compare the two pictograms you have drawn. Are the same activities popular amongst both groups of students?

you can use Workbook page 37

The mode

A Grade 5 class grew six seedlings. After a week, they measured how much each seedling had grown.

Plant	A	B	C	D	E	F
Length grown	10 cm	14 cm	10 cm	11 cm	11 cm	10 cm

They arranged the lengths in order: 10, 10, 10, 11, 11, 14.
The length that occurred the most often was 10 cm.
We say 10 is the **mode**.
The mode is the value that appears most often in a set of data.

1 **Look at the pictograms you drew in the previous lesson.**

a Which activity was the mode in the first set of data?

b Which activity was the mode in your survey?

c How can knowing the mode be helpful to the organisers of the adventure camp? Explain your answer.

2 **Find the mode in each of the following sets of data.**

a 100 95 90 85 80 75 75 75 70 65

b 4 4 4 8 7 6 6 6 6 7

c 

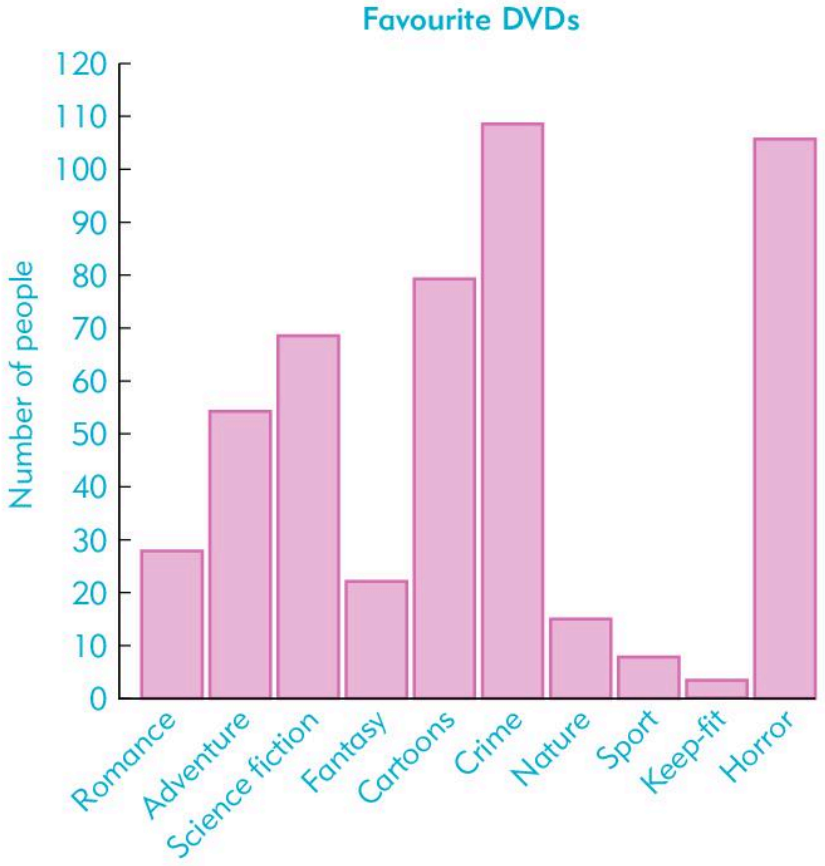
d red blue red yellow brown red green blue blue red blue

e jeans shorts shorts jeans skirt skirt skirt jeans jeans shorts

f soccer basketball basketball hockey track and field track and field soccer track and field track and field soccer hockey track and field

What do you watch?

Mr Mahmood wanted to stock his DVD-hire shop with DVDs people liked. He asked his customers to fill in a form to show the kinds of DVD they preferred.



1 **Use the results to answer these questions.**

a How many people preferred adventure DVDs?

b What kind of DVD was the mode?

c Which three kinds of DVD were least popular?

2 **Ask your friends about their DVDs.**

3 **Draw a bar graph to show your results. What are the most and the least popular?**

Positive and negative numbers

The blue car is three levels above ground level. This can be shown as +3 (**positive** three).

+3 is a positive number.

+1, +2, +3 and +4 are positive numbers (They can also be shown as 1, 2, 3, 4, ….)

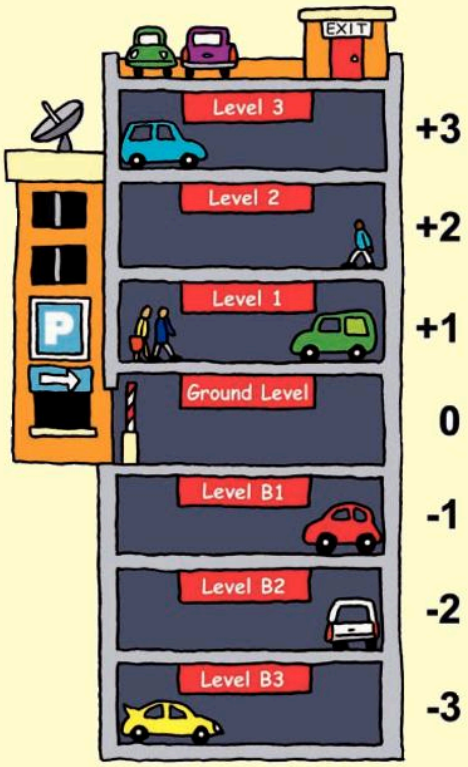
The yellow car is three levels below ground level. This can be shown as –3 (**negative** three).

–3 is a negative number.

–1, –2, –3, –4, … are negative numbers. (The negative sign is always shown.)

0 is neither positive nor negative.

+3 and –3 are **opposites**.

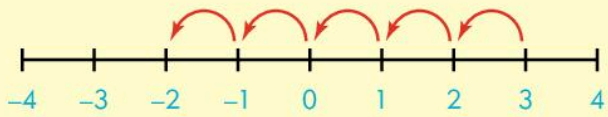


Which sign would you use for these?

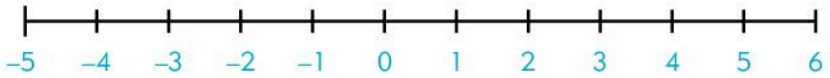
1. 7°C below freezing point.
2. 6 floors above ground level.
3. 50 m below sea level.
4. I owe 25c.
5. You are six steps in front of me.
6. A golfer was four under par.
7. $300 over the estimate.
8. The cook was 8 school dinners short.

Comparing positive and negative numbers

If you start at 3 on this number line and count back 5, you land on –2.



1 **Use this number line to work out which number you land on when you follow the directions below.**



a Start on three, count back 6.
b Start on –4, count on 3.
c Start on –2, count on 7.
d Start on 5, count back 5.
e Start on –1, count on 2.
f Start on 2, count back 4.
g Start on 4, count back 2.
h Start on –5, count on 4.

If you count along a number line from left to right, the numbers get bigger.

If you count back from right to left, the numbers get smaller.

For example, –3 < 1 (negative three is less than one).

2 **Use < or > to make these statements true:**

a –4 ☐ –2
b 3 ☐ –1
c –1 ☐ –3
d 2 ☐ 5
e –4 ☐ 2
f –2 ☐ 0

you can use Workbook page 38

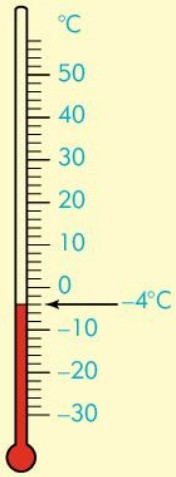
Temperature changes

This thermometer shows the temperature in degrees Celsius. The short way of writing degrees Celsius is °C.

Temperatures below 0 °C are shown as negative numbers.

This thermometer shows a temperature of 4 degrees below 0. We read this as minus 4 degrees Celsius. We write –4 °C.

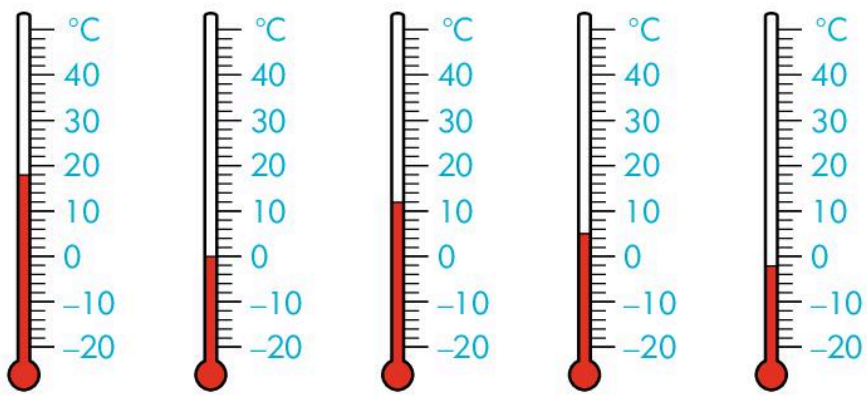
You can use the scale on the thermometer like a number line to work out changes in temperature.



1 **Here are five thermometers. For each one:**

a write what the temperature would be if it was 10 °C warmer.

b write what the temperature would be if it was 12 °C colder.



2 **One night in Calgary, Canada, the temperature dropped to 8 degrees below 0.**

a What temperature would the thermometer show?

b By noon, the temperature had risen 15 degrees. What was the new temperature?

c By 8 p.m. that night, the temperature had dropped 7 degrees since noon. What was the temperature then?

d At midnight, the temperature was –3 °C. How much had it dropped since 8 p.m.?

you can use Workbook page 39

Number sequences

A number sequence is a set of numbers that follow a rule.

- If the rule is 'start at 0, count in tens', the number sequence is: 0, 10, 20, 30, 40, 50, 60 and so on.
- If the rule is 'start at 48 and count back in threes', the number sequence is: 48, 45, 42, 39, 36, 33 and so on.

1 **Work with a partner. Say what rule was used to make each number sequence. Then, work out the next three numbers in each sequence.**

a 2, 4, 6, 8, 10 __ __ __

b 9, 11, 13, 15, 17 __ __ __

c 40, 37, 34, 31 __ __ __

d –4, –2, 0, 2 __ __ __

e 5, 0, –5, –10 __ __ __

f 125, 150, 175, 200, __ __ __

g 500, 450, 400, 350 __ __ __

h 12, 5, –2, –9, __ __ __

2 **Fill in the missing numbers in these sequences. When you have finished, tell a partner what rule you used to find the missing numbers.**

a 8 __ 24, 32 __ __ 56

b 27, 38 __ __ 71 __

c 88 __ 70, 61 __ __

d 80 __ __ 56 __ 40

e –18 __ –36, –45 __ __

f 1, 4 __ 16 __ 36 __

3 **Use this number grid to help you answer the questions.**

a Start at 0. Count on in 7s. List the numbers as you count them.

b Look at your list. What patterns can you see in the numbers?

c If you carried on counting in sevens, would you count the following numbers? Say why or why not.

101 105 107 140

d If you started counting at 5 instead of 0, how would your pattern change?

0	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	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

More number sequences

1 **Write the next five numbers in each sequence. Complete the sentences.**

a 125, 130, 135, 140
These are all multiples of __.

b 340, 350, 360, 370
These are all multiples of 2, __ and __.

c 425, 450, 475, 500
These are all multiples of __ and __.

d 550, 600, 650, 700
These are all multiples of 2, __ , __ and __.

e 200, 300, 400, 500
These are all multiples of 2, 5, __, __ and __.

2 **Use these rules to make number sequences.**

a list multiples of 25 between 800 and 900

b list multiples of 50 between 400 and 800

c list multiples of 100 from 0 to 1000

d list numbers that are multiples of 10 and 25 between 100 and 250

3 **Write down the rule that was used to make each of these number sequences.**

a 20, 24, 28, 32, 36

b 100, 81, 64, 49, 36

c 250, 220, 190, 160, 130

d 20, 200, 2000, 20 000

e 128, 64, 32, 16, 8, 4

f –18, –14, –10, –6, –2

4 **Use your calculator to make up five new number sequences. Each sequence should have six numbers in it.**

a Write your number sequence on a piece of paper.

b Jot down the rule you used to make each sequence in your book.

c Swap your number sequences with a partner. Continue your partner's sequence for three more numbers.

d Check each other's work. Tell your partner what rules you used to find the next number in their sequence.

Odd and even numbers

Even numbers can be grouped in twos.

Odd numbers will always have one left over if you group them in twos.

1 **Work with a partner. Discuss these questions.**

a How can you tell if a number is odd just by looking at it?

b How can you tell if a number is even just by looking at it?

2 **Which of these numbers are even?**

2345	18766	254988	127	9000
4804	12762	125318	980	3330

3 **Draw a dot diagram to show why you always get an even number when you add two odd numbers together.**

4 **Say whether your answer will be odd or even if you:**

a add two even numbers

b multiply an odd number by an odd number

c subtract an odd number from an even number

d subtract an odd number from an odd number

e multiply an odd number by an even number

f multiply an even number by an even number

g add three odd numbers together.

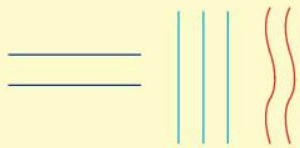
5 **Is it possible to have an odd number that is a multiple of 8? Explain your answer.**

6 **Is it possible to have an even number that is a multiple of 7? Explain your answer.**

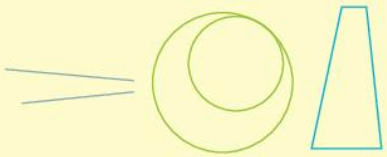
Parallel lines

Parallel lines stay the same distance apart and never meet.

✓ Parallel



✗ Not parallel



1 **Say whether each set of lines is parallel or not.**

a The opposite edges of this maths book.

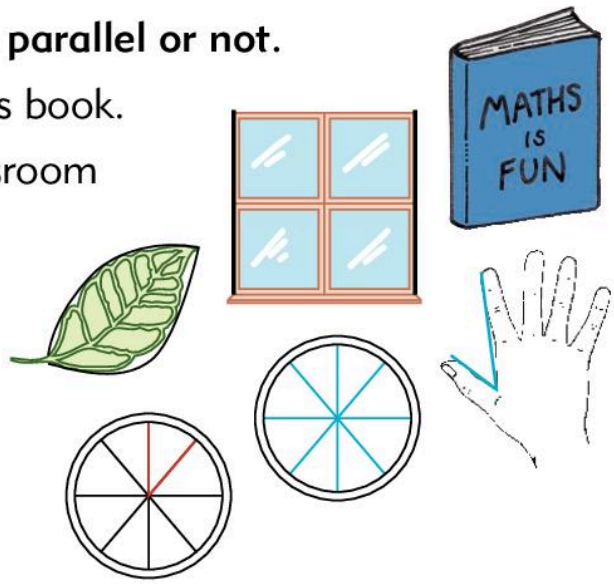
b The opposite edges of your classroom window.

c Your thumb and forefinger.

d The outer edges of a leaf.

e The outer and inner rings of a bicycle wheel.

f The spokes of a wheel.



2 **Find as many sets of parallel lines as you can in this picture.**

you can use Workbook pages 40–41

Perpendicular lines

Perpendicular lines meet at a right angle (90 degrees).
The symbol for perpendicular lines is ⊥

✓ Perpendicular

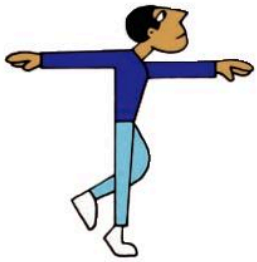
✗ Not perpendicular

1 Find a set of perpendicular lines in each picture.

a

b

c



d

e

f

2 For each picture above, find a set of:

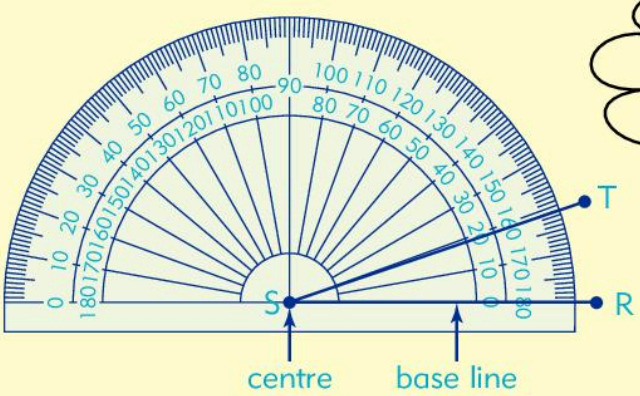
- parallel lines
- lines that are neither parallel nor perpendicular.

3 Look at this picture of a furniture shop. Find as many parallel and perpendicular lines in the picture as you can.

you can use Workbook page 41

Measuring angles accurately

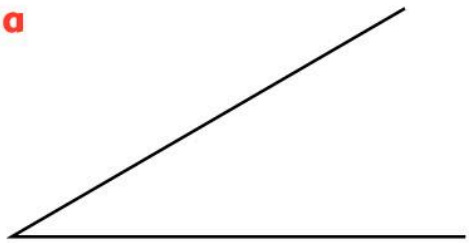
There are ten divisions between the 10° markers on a protractor. They are used to measure angles more accurately. Each fifth division is made slightly longer to help you read the measurement to the nearest 5°.



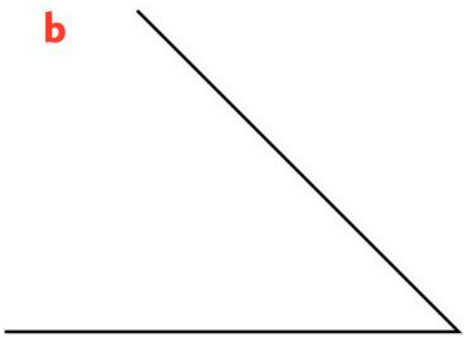
We can write the angle joining line RS to line ST as RST. RST is about 20°

1 **Estimate, to the nearest 5°, the size of these angles. Then measure them. Write your estimate and measurement in a chart.**

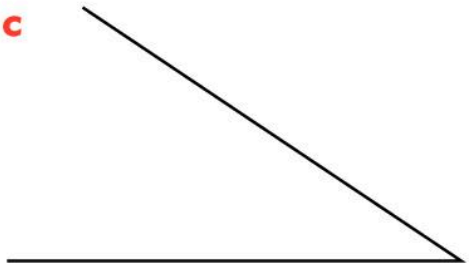
a



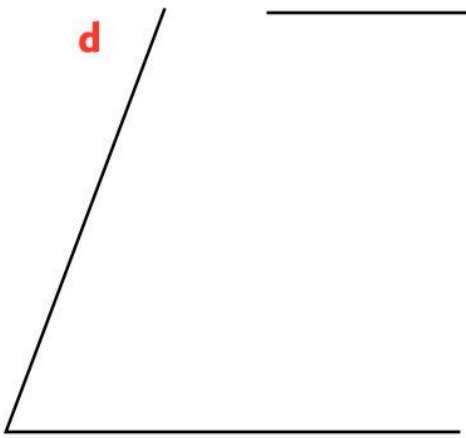
b



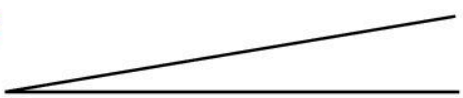
c



d



e

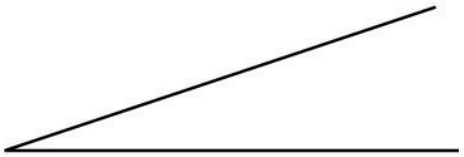


Drawing angles

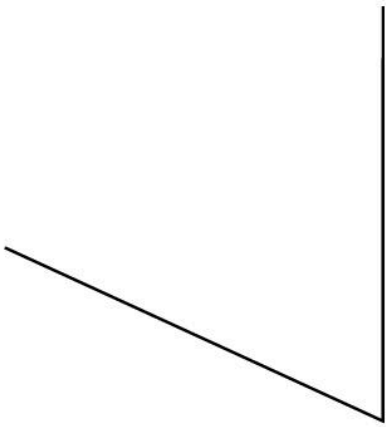
You will need: a protractor and ruler

1 Measure these angles and lines carefully. Then draw them.

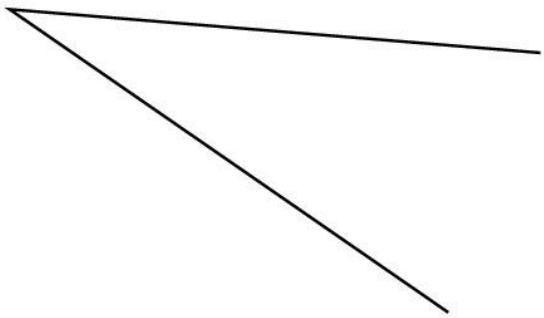
a



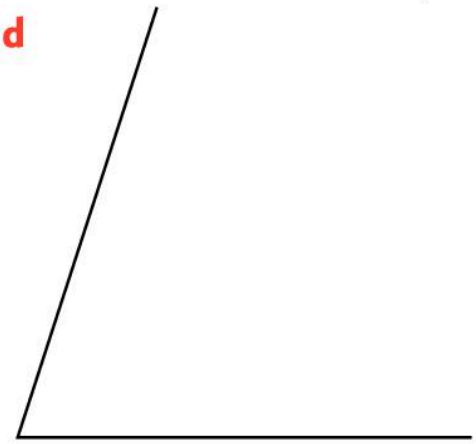
b



c



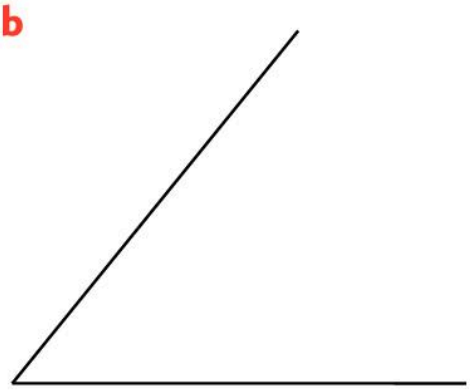
d



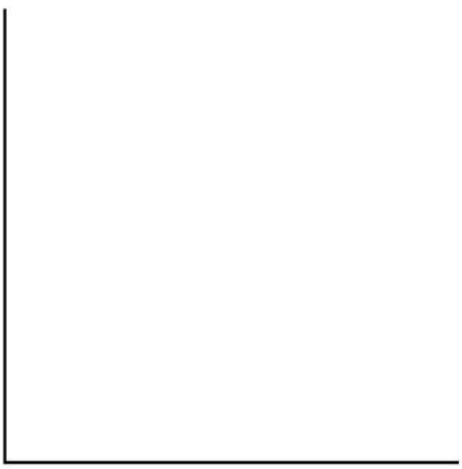
2 Measure these angles.

a

b

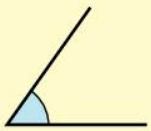


c

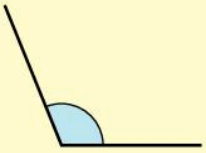


Classifying angles

right angle
90°

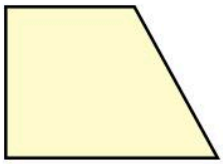


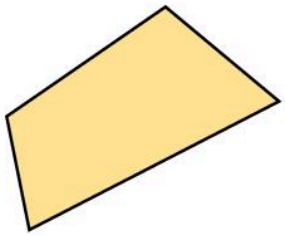
acute angle
less than 90°

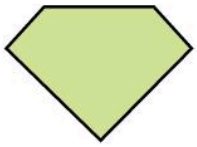


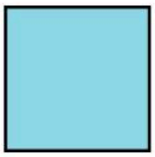
obtuse angle
greater than 90°

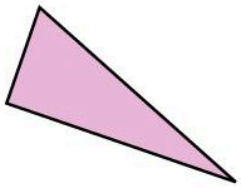
1 Write down how many acute, obtuse and right angles each shape contains.

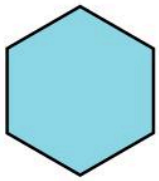
a 

b 

c 

d 

e 

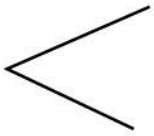
f 

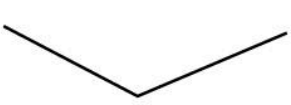
2 Are these angles 90°, less than 90° or more than 90°?

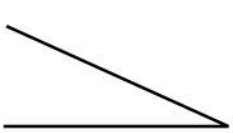
Estimate how many degrees each angle has.

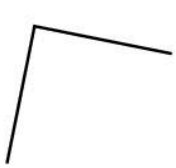
a 

b 

c 

d 

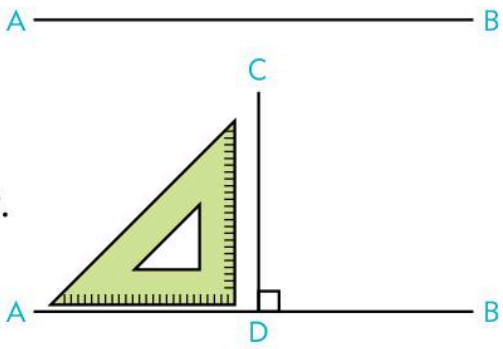
e 

f 

you can use Workbook pages 42 and 43

Angles on a straight line

1 **Draw a straight line AB.**



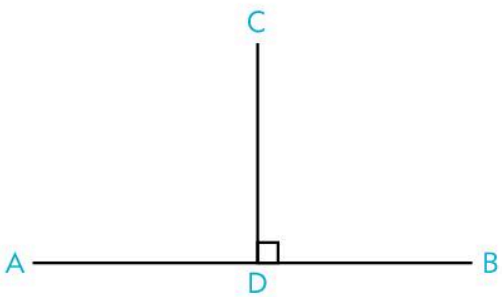
a Now draw a line CD perpendicular to your straight line AB.

You can use a set square or protractor.

b What are the sizes of the angles CDA and CDB?

c Work out the sum of angles CDA + CDB.

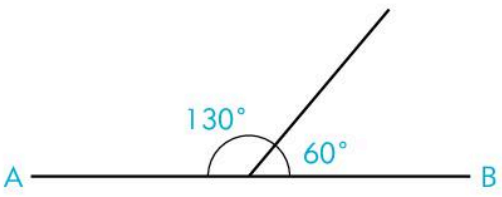
d Complete the rule about angles on a straight line: Angles on a straight line add up to … degrees.



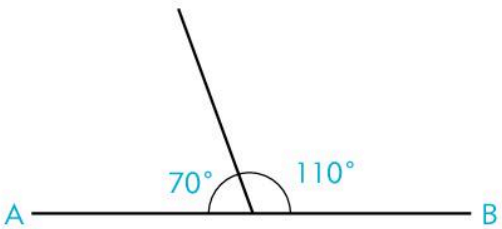
2 **Test your rule by drawing some straight lines with a ruler and measuring them using a protractor.**

3 **Have the correct angles been given below? Without using a protractor, calculate and say yes or no.**

a

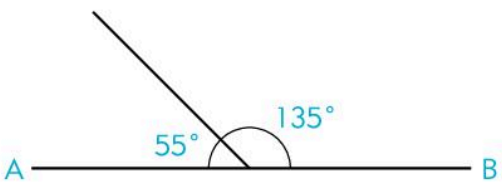


b

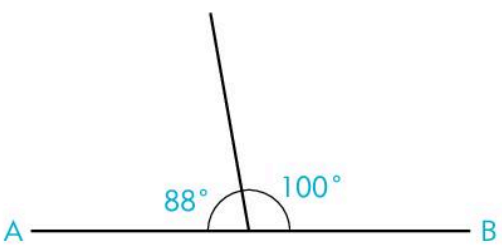


c

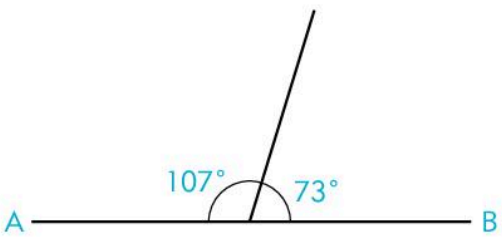
d



e



f



you can use Workbook pages 42 and 43

Review of fractions

Remember

Fractions show part of a whole or part of a group.

$\frac{3}{4}$ means 3 out of 4 parts.

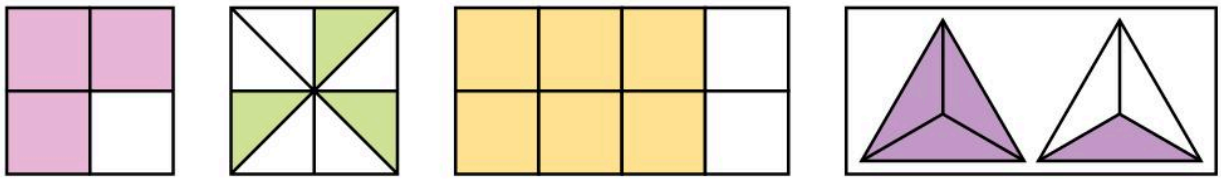
3 is the **numerator** – it tells how many parts are included.
4 is the **denominator** – it tells how many parts are in the total.

When the numerator is greater than the denominator the fraction is called an **improper fraction**. For example $\frac{11}{4}$ means 11 quarters.

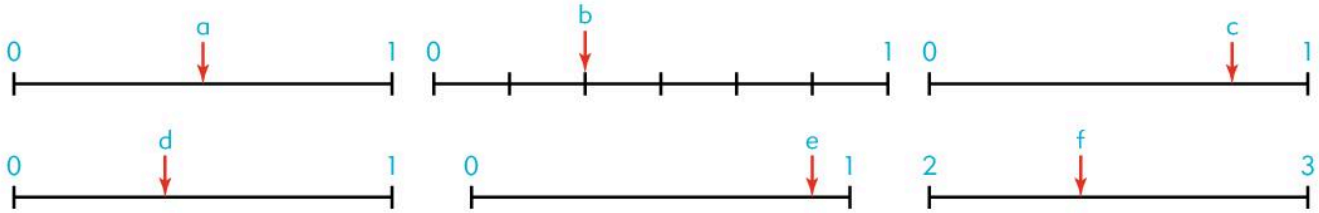
1 **For each diagram:**

a Write the fraction that is shaded.

b Write the fraction that is unshaded.



2 **Write the fraction shown by the arrow on each number line.**



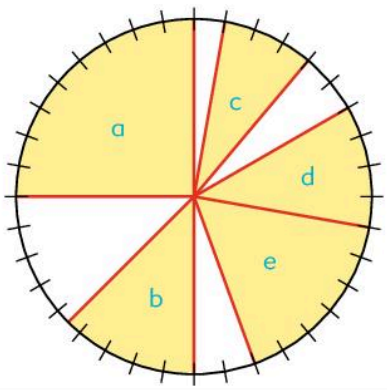
3 **How many fractions can you write with a denominator of 6 and a value of less than 1?**

4 **Look at the circle.**

a Into how many parts is it divided?

b What fraction is shown by each shaded portion?

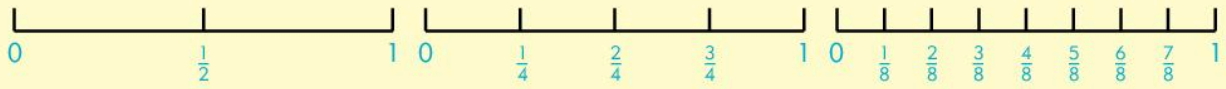
c Is the sum of the unshaded portions greater or smaller than $\frac{1}{4}$ of the circle?



Equivalent fractions

Equivalent fractions have the same value.

The number lines show equivalent fractions.

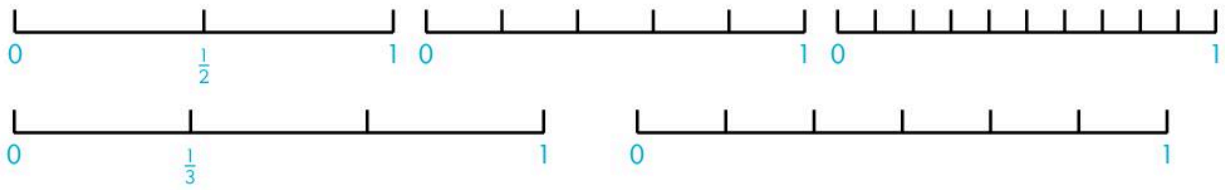


$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$ $\frac{1}{4} = \frac{2}{8}$ and $\frac{3}{4} = \frac{6}{8}$

The number lines also show that:

$\frac{1}{4}$ is half of $\frac{1}{2}$ $\frac{1}{8}$ is half of $\frac{1}{4}$

1 What do these number lines show? Discuss with your group.



2 Use the appropriate number lines to find an equivalent fraction for:

a $\frac{1}{6}$ **b** $\frac{3}{6}$ **c** $\frac{2}{3}$ **d** $\frac{4}{6}$

e $\frac{8}{10}$ **f** $\frac{2}{8}$ **g** $\frac{2}{5}$ **h** $\frac{6}{8}$

i $\frac{1}{5}$ **j** $\frac{6}{10}$ **k** $\frac{3}{6}$ **l** $\frac{3}{5}$

3 Fill in <, = or > to make each statement true.

a $\frac{1}{2} \square \frac{3}{5}$ **b** $\frac{1}{2} \square \frac{4}{8}$ **c** $\frac{1}{2} \square \frac{3}{4}$

d $\frac{3}{4} \square \frac{6}{8}$ **e** $\frac{5}{10} \square \frac{2}{5}$ **f** $1 \square \frac{9}{10}$

4 Rewrite the fractions:

a $\frac{2}{8}, \frac{6}{8}, \frac{1}{2}$ as quarters **b** $\frac{8}{10}, \frac{6}{10}, \frac{2}{10}$ as fifths

5 Write the next three fractions in each sequence.

a $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}$ **b** $\frac{1}{3}, \frac{2}{6}, \frac{3}{9}$ **c** $\frac{1}{5}, \frac{2}{10}, \frac{3}{15}$ ___ ___ ___

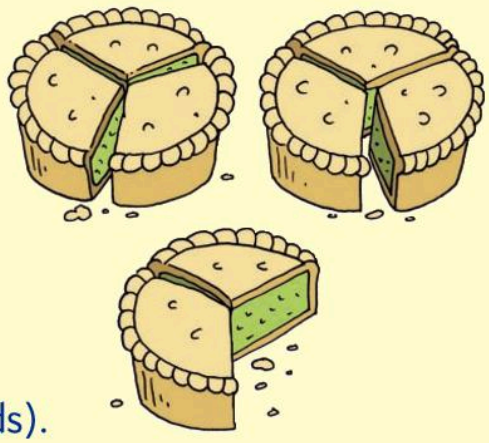
6 Write a fraction that is half of:

a $\frac{1}{2}$ **b** $\frac{1}{4}$ **c** $\frac{1}{3}$ **d** $\frac{1}{5}$

you can use Workbook page 44 and 45

Improper fractions and mixed numbers

Look at these pieces of pie.



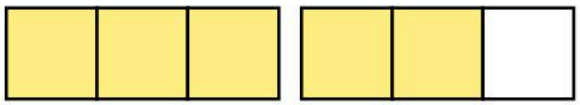
The pies have been cut into thirds. There are eight thirds which make two whole pies with two thirds left over.

To show a fraction greater than 1, we can write it in two ways:

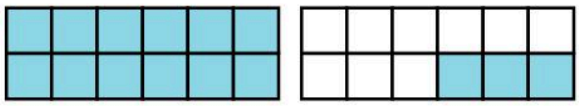
- as an improper fraction: $\frac{8}{3}$ (eight thirds)
- as a mixed number $2\frac{2}{3}$ (two and two thirds).

1 **Write an improper fraction and a mixed number to describe the parts shaded in each diagram.**

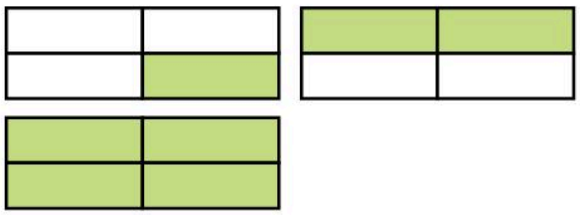
a



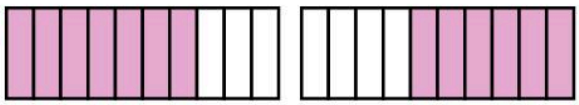
b



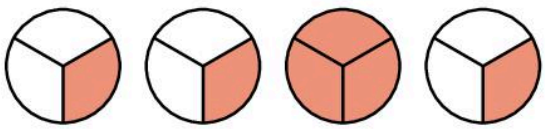
c



d

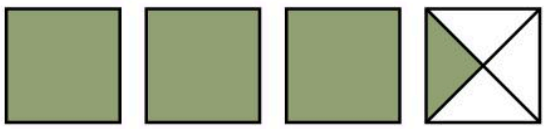


e

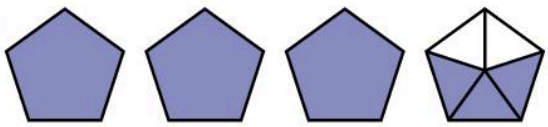


f

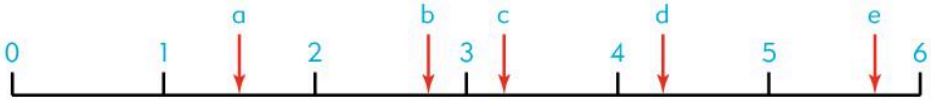
g



h



2 **The arrows on this number line indicate mixed numbers. Write the mixed number shown by each arrow.**



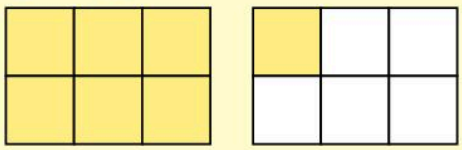
you can use Workbook page 46

Changing improper fractions to mixed numbers

It is often easier to work with and to compare improper fractions if you write them as mixed numbers.

Read through these examples to see two ways of converting $\frac{7}{6}$ to a mixed number.

Using diagrams

$\frac{7}{6} =$ 

This is $\frac{6}{6} + \frac{1}{6}$

$= 1 + \frac{1}{6}$

$= 1\frac{1}{6}$

Using division

$\frac{7}{6}$ means $7 \div 6$

7 divided by 6 is 1 with 1 left over.

The 1 that is left over is 1 of 6 pieces or $\frac{1}{6}$

$\frac{7}{6} = 1\frac{1}{6}$

1 Write each of these improper fractions as mixed numbers.

a $\frac{3}{2}$ **b** $\frac{4}{3}$ **c** $\frac{5}{4}$ **d** $\frac{7}{4}$

e $\frac{9}{4}$ **f** $\frac{15}{7}$ **g** $\frac{12}{5}$ **h** $\frac{13}{3}$

i $\frac{19}{4}$ **j** $\frac{7}{3}$ **k** $\frac{11}{6}$ **l** $\frac{25}{6}$

2 Which fraction is bigger in each of these pairs?

a $5\frac{1}{2}$ or $\frac{7}{2}$ **b** $2\frac{3}{4}$ or $\frac{7}{4}$ **c** $1\frac{3}{5}$ or $\frac{9}{5}$

d $3\frac{2}{7}$ or $\frac{17}{7}$ **e** $\frac{4}{3}$ or $1\frac{2}{3}$ **f** $\frac{14}{4}$ or $3\frac{3}{4}$

g $7\frac{1}{2}$ or $\frac{20}{2}$ **h** $\frac{19}{8}$ or $2\frac{3}{8}$ **i** $12\frac{1}{3}$ or $\frac{40}{3}$

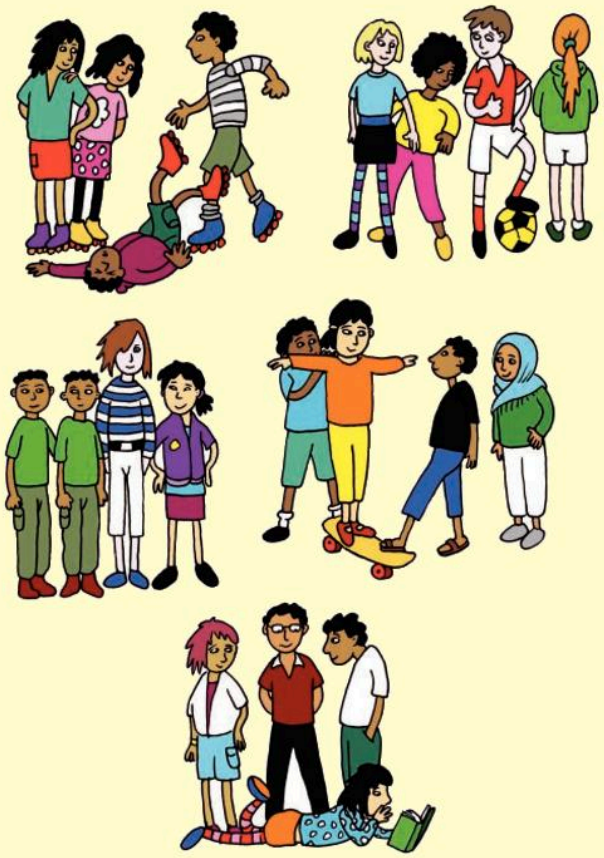
j $\frac{19}{5}$ or $3\frac{3}{5}$ **k** $7\frac{2}{7}$ or $\frac{48}{7}$ **l** $\frac{50}{8}$ or $6\frac{7}{8}$

3 Write each set of fractions in order from smallest to greatest.

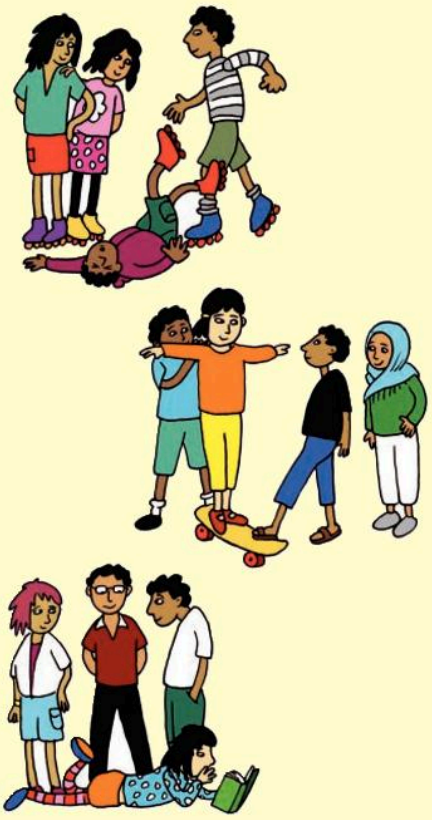
a	$1\frac{1}{2}$	$\frac{7}{3}$	$\frac{9}{5}$	$2\frac{1}{4}$	$\frac{15}{6}$
b	$\frac{9}{2}$	$\frac{3}{4}$	$\frac{12}{5}$	$\frac{19}{6}$	$\frac{21}{5}$
c	$\frac{12}{5}$	$\frac{7}{3}$	$\frac{3}{2}$	$\frac{9}{4}$	$\frac{12}{8}$

Find the fraction

Remember: To find $\frac{3}{5}$ of 20, first find $\frac{1}{5}$ by dividing by 5.
$\frac{1}{5}$ of 20 is 4, so $\frac{3}{5}$ is $3 \times 4 = 12$.



The whole set of 20



$\frac{3}{5}$ of the set is 12

Write these amounts:

1. $\frac{1}{2}$ of \$2.50
2. $\frac{1}{4}$ of a metre
3. $\frac{3}{10}$ of 2 l
4. $\frac{3}{8}$ of 32 kilograms
5. $\frac{3}{4}$ of \$4.80
6. $\frac{7}{8}$ of a kilometre
7. $\frac{6}{10}$ of 60c
8. $\frac{2}{3}$ of \$39
9. $\frac{5}{6}$ of 480 g
10. $\frac{5}{8}$ of 100 m

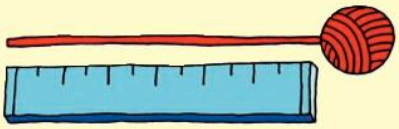
you can use Workbook page 47

Perimeter

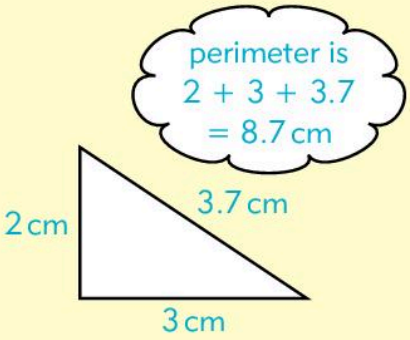
The distance around a shape is called its **perimeter**.

We can use a ruler to measure straight sides.

We can use string to measure curved shapes, as shown below.

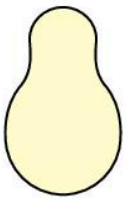


We can find the perimeter by adding up the measurements of the sides.

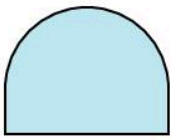


1 **Use string to measure the perimeter of each curved shape. Use a ruler to measure the perimeter of each shape with straight sides.**

a

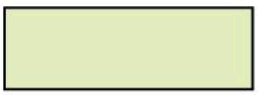


b

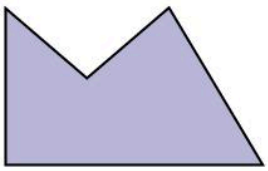


c

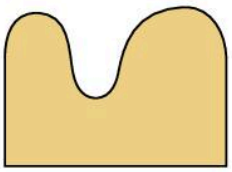
d



e

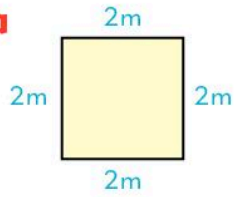


f

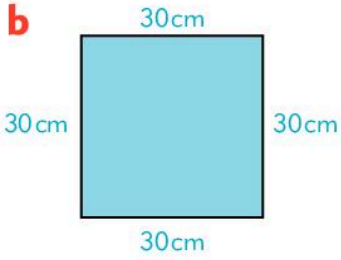


2 **Calculate the perimeter of these squares.***

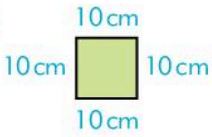
a



b



c



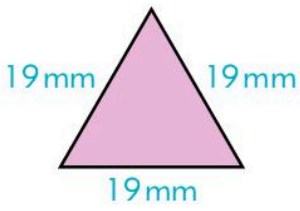
***Not drawn to scale.**

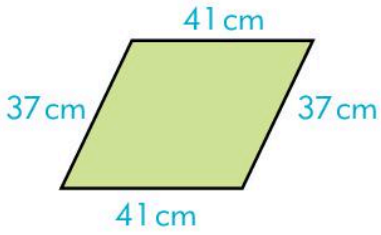
you can use Workbook page 48

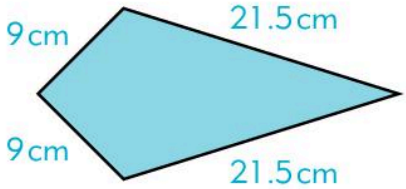
More perimeter

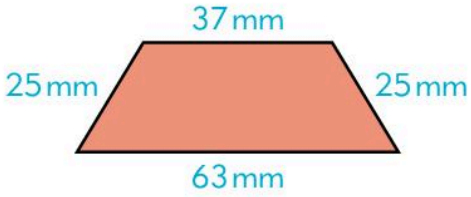
1 **a** Calculate the perimeter of each shape* in centimetres.

b Rewrite each perimeter in millimetres.

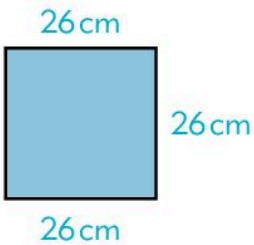




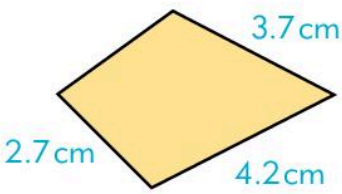




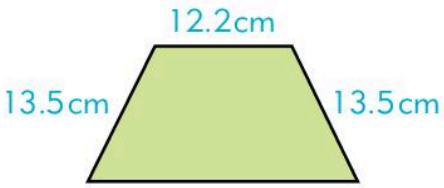
2 **The perimeter of each shape* is given. Work out the length of the missing sides in each case.**



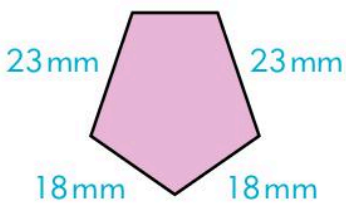
Perimeter = 104 mm



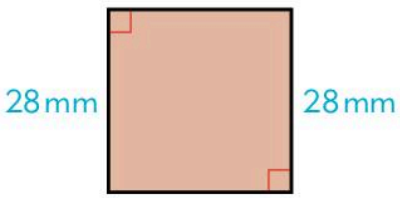
Perimeter = 13.5 cm



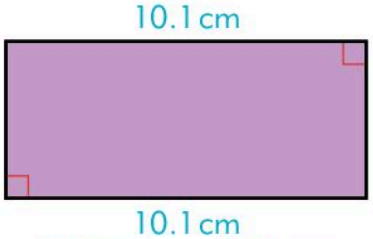
Perimeter = 63.2 cm



Perimeter = 97 mm



Perimeter = 112 mm



Perimeter = 24.6 cm

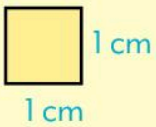
*Not drawn to scale.

you can use Workbook page 49

Finding the areas of rectangles

Remember: Area is the amount of surface covered by a shape.

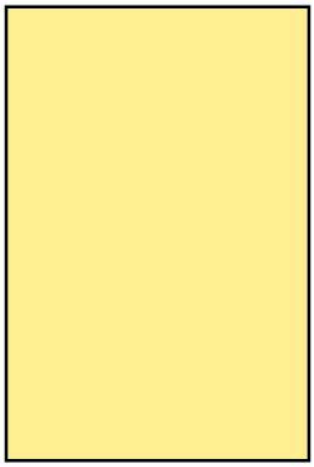
The area of this square is one square centimetre ($1\ cm^2$).



The area of a rectangle can be calculated by multiplying the length by the breadth.

1 **Measure the sides of each rectangle in centimetres. Then calculate its area.**

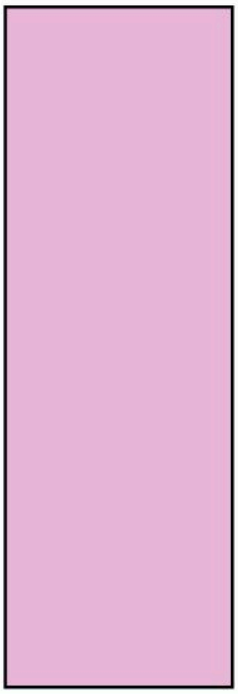
a



b

c

d

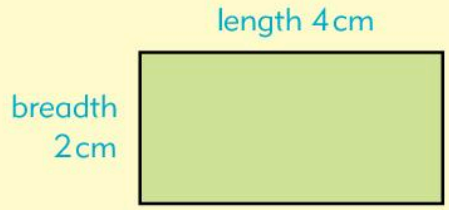


e

Using the formula

You already know that the area of a rectangle is the surface it covers. The area can be found by multiplying the length by the breadth.

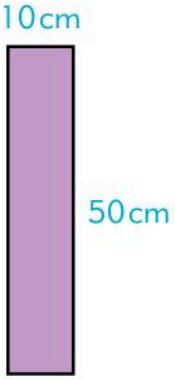
We say: Length × breadth is the **formula** for area.

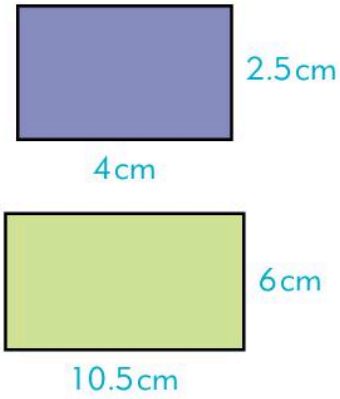


$l \times b = a$

$4\text{cm} \times 2\text{cm} = 8\text{cm}^2$

1 **Use the formula to calculate the area of each of these rectangles.***





*Not drawn to scale.

2 **Here is a chart of dimensions for some rectangles. Copy it and fill in the missing information.**

Length	Breadth	Area
5cm	3cm	
	2cm	
9cm		36cm^2
	8cm	
7cm		
15cm		90cm^2
	6cm	72cm^2
	4cm	

3 **Find some rectangles in the classroom. Measure them and find their area.**

you can use Workbook page 49

Mulitplying by 10 and 100

You can use the number facts you already know to help you multiply any number by 10 or 100.

- You already know the 10× table.
- You know that all multiples of 10 end with a 0.
- You know that all multiples of 100 end with 00.
- You know how to use place value tables to write numbers.

Each place on the place value table is 10 times the value of the place to the right of it. This means that you can use a place value table to find quick methods of multiplying by 10 and 100.

T th	Th	H	T	U
			9	1
		9	1	0
	9	1	0	0

91 × 10 – move the digits one place left, fill in one zero as a place holder

91 × 100 – move the digits two places left, fill in two zeros as place holders

1 **Try to do these multiplications mentally. Write the answers only. Check them with a calculator.**

a 4 × 10 **b** 19 × 10 **c** 88 × 10
d 132 × 10 **e** 400 × 10 **f** 987 × 10
g 1098 × 10 **h** 8500 × 10 **i** 9999 × 10

2 **Find the product.**

a 9 × 100 **b** 28 × 100 **c** 90 × 100
d 425 × 100 **e** 800 × 100 **f** 762 × 100
g 1208 × 100 **h** 1800 × 100 **i** 8050 × 100

3 **How many apples are there in 10 bags if each bag contains 12 apples?**

4 **100 children each pay $23 for a school trip. What did they pay together?**

5 **How many months are there in 100 years?**

6 **A factory produces 2486 pieces of clothing per day. How many pieces would they produce:**

a in 10 days? **b** in 100 days?

you can use Workbook page 50

What happens when you divide by 10 or 100?

Remember division is the inverse of multiplication.

$125 \times 100 = 12\,500$ So, $12\,500 \div 100 = 125$

This means that you can also use a place value table to find quick methods of dividing by 10 and 100.

$2300 \div 10 = 230$

Th	H	T	U
2	3	0	0
	2	3	0

Each digit moves 1 place to the right. Zeros are used to hold the place value.

$230 \div 10 = 23$

Th	H	T	U
	2	3	0
		2	3

Each digit moves 1 place to the right.

To work out $2300 \div 100$ you can divide by 10, and then divide by 10 again or save time by moving each digit 2 places to the right.

$2300 \div 100 = 23$

Th	H	T	U
2	3	0	0
		2	3

Each digit moves 2 places to the right.

1 **Do these divisions mentally. Write the answers only. Check them using a calculator.**

a $670 \div 10$ **b** $800 \div 10$ **c** $420 \div 10$

d $9900 \div 10$ **e** $8760 \div 10$ **f** $2000 \div 10$

g $5000 \div 100$ **h** $3200 \div 100$ **i** $9900 \div 100$

2 **Find one tenth of:**

a 340 **b** 590 **c** 800 **d** 3400

3 **What is one hundredth of:**

a 500 **b** 4400 **c** 9000 **d** 8900

you can use Workbook page 51

Multiplying tens and hundreds

Look at these two multiplications:

50×6 400×8

You can use your times tables facts and the methods you know for multiplying by 10 and 100 to help you do multiplications like these quickly and easily.

You know that $50 = 5 \times 10$
$5 \times 10 \times 6$ is the same as
$5 \times 6 \times 10$
$= 30 \times 10$
$= 300$

You know that $4 \times 100 = 400$
$4 \times 100 \times 8$ is the same as
$4 \times 8 \times 100$
$= 32 \times 100$
$= 3200$

1 **Multiply. Try to work out the answers mentally.**

a 3×20 **b** 6×30 **c** 5×80
d 7×40 **e** 6×80 **f** 2×70
g 9×60 **h** 5×50 **i** 6×40
j 8×80 **k** 9×90 **l** 4×90

2 **Multiply. Try to work out the answers mentally.**

a 200×4 **b** 200×8 **c** 9×200
d 300×5 **e** 6×300 **f** 9×400
g 7×500 **h** 600×8 **i** 900×7
j 800×9 **k** 900×2 **l** 700×8

3 **Write how many animals there are altogether in:**

a 6 flocks of 90 seagulls **b** 3 schools of 400 fish
c 8 nests of 800 ants **d** 6 herds of 80 elephants
e 9 groups of 400 antelopes **f** 7 swarms of 800 locusts
g 4 groups of 50 caterpillars **h** 400 nests with 4 birds in each

you can use Workbook page 51

Doubling and halving

To double a number you multiply it by 2. Double 8 is $8 \times 2 = 16$.

To halve a number you divide it by 2. Half of $12 = 12 \div 2 = 6$.

For bigger numbers you can use place value and factors to help you find double or half of the number.

Find $\frac{1}{2}$ of 360

This is the same as $\frac{1}{2}$ of (36×10)

$\frac{1}{2}$ of $30 = 15$

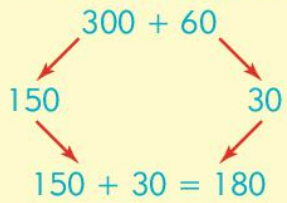
$\frac{1}{2}$ of $6 = 3$

$15 + 3 = 18 \times 10 = 180$

You can also think of this as $\frac{1}{2}$ of $300 + \frac{1}{2}$ of 60

$= 150 + 30$

$= 180$



Double 5200

This is the same as double (52×100)

Double 52 is $50 \times 2 + 2 \times 2$

$= 100 + 4$

$= 104 \times 100$

$= 10400$

You can also think of this as double 5000 + double 200

$= 10000 + 400$

$= 10400$

1 **Double each number.**

a 12	**b** 19	**e** 61	**h** 99
i 120	**j** 330	**m** 1200	**n** 2400

2 **Find half of:**

a 46	**b** 68	**g** 184	**h** 196
i 380	**j** 460	**o** 4700	**p** 8300

3 **Find the missing values.**

a $180 \times \frac{1}{2} = \square$	**b** $900 \div \square = 450$	**c** $300 \times \square = 600$
d $\square \times \frac{1}{2} = 325$	**e** $\square \times \frac{1}{2} = 420$	**f** $\square \times \frac{1}{2} = 275$
g $\square \times 2 = 4200$	**h** $\square \times 2 = 6400$	**i** $\square \times 2 = 2900$

you can use Workbook page 52

Using factors to multiply

Writing a number as the product of its factors can make multiplication easier.

For example:

6×13 $\quad 6 = 2 \times 3$

$= 2 \times 3 \times 13$

$3 \times 13 = 3 \times 10 + 3 \times 3 = 30 + 9 = 39$

$2 \times 39 = 2 \times 30 + 2 \times 9 = 60 + 18 = 78$

Here is another example:

16×5

$8 \times 2 \times 5$ or $4 \times 4 \times 5$ Multiplying the red numbers first

$= 8 \times 10$ $\quad = 4 \times 20$

$= 80$ $\quad = 80$

1 **Complete the number sentences to show how you can use factors to do each multiplication.**

a 14×7

$= 2 \times \square \times 7$

$= 2 \times \square$

$= \square$

b 12×8

$= 2 \times \square \times 8$

$= 2 \times \square$

$= \square$

c 6×17

$= \square \times 3 \times 17$

$= 3 \times \square$

$= \square$

d 9×23

$= 3 \times \square \times 23$

$= 3 \times \square$

$= \square$

e 6×15

$= 2 \times \square \times 15$

$= 2 \times \square$

$= \square$

f 4×19

$= 2 \times \square \times 19$

$= 2 \times \square$

$= \square$

2 **Multiply.**

a 6×23 **b** 8×19 **c** 12×13

d 9×15 **e** 6×31 **d** 12×22

Multiplying by 19 or 21

It is fairly easy to multiply a number by 20 because you can double the number and then multiply it by 10. For example:

$9 \times 20 = 9 \times 2 \times 10 = 18 \times 10 = 180$
$32 \times 20 = 32 \times 2 \times 10 = 64 \times 10 = 640$

We can use this fact to find quick methods of multiplying by 19 or 21.
19 is one less than 20.

6×19
$(6 \times 20) = 120$
$120 - 6 = 114$
Adjust by taking away the extra 6

13×19
$13 \times 20 = 13 \times 2 \times 10$
$= 26 \times 10 = 260$
$260 - 13 = 250 - 3 = 247$
Adjust by taking away the extra 13

21 is one more than 20.

6×21
$(6 \times 20) = 120$
$120 + 6 = 126$
Adjust by adding the other 6

41×21
$41 \times 20 = 41 \times 2 \times 10 =$
$82 \times 10 = 820$
$820 + 41 = 861$
Adjust by adding on the other 41

1 **Multiply. Show any working that you do.**

a 9×19 **b** 8×21 **c** 11×19
d 13×21 **e** 32×21 **f** 19×19
g 21×42 **h** 21×58 **i** 19×63

2 **A farmer has 21 rows of peach trees. There are 35 trees in each row. How many trees does she have altogether?**

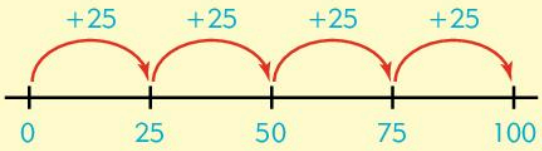
3 **There are 19 houses in my road. There are 15 paving stones in front of each house. How many paving stones are in the road?**

4 **You are told that $83 \times 20 = 1660$. Explain how you can work out the following without doing any multiplication or division.**

a 21×83 **b** 19×83 **c** $1660 \div 20$ **d** $1660 \div 83$

Multiplying by 25

If you count on in 25s you can see that $25 + 25 + 25 + 25 = 100$



In other words $4 \times 25 = 100$ and $100 \div 4 = 25$

So, to multiply by 25 we can multiply by 100 and then divide the answer by 4.

12×25
$12 \times 100 = 1200$ Remember this is four times what we need.
$1200 \div 4 = 300$

38×25
$38 \times 100 = 3800$ To divide by 4 we can halve a number, then halve it again
$\frac{1}{2}$ of $3800 = 1500 + 400 = 1900$
$\frac{1}{2}$ of $1900 = 500 + 450 = 950$

1 **Calculate. Show your working.**

a 24×25 **b** 32×25 **c** 19×25
d 16×25 **e** 48×25 **f** 27×25
g 62×25 **h** 81×25 **I** 72×25

2 **An artist plans to send out 900 invitation cards for an exhibition. He buys 35 sets of cards each containing 25 cards. Will this be enough?**

3 **A lift at Burj Khalifa, the tallest building in the world, can carry 25 passengers at a time. The lift went up to the top of the building 42 times on one day. What is the maximum amount of passengers it could have carried on that day?**

4 **Jess wants to divide 800 by 25. This is what she writes in her book:**

$800 \div 25$
$800 \div 100 = 8$
$8 \times 4 = 32$

a Is her answer correct?
b Discuss her method.

Reflections

Layla held up a triangle against a mirror.

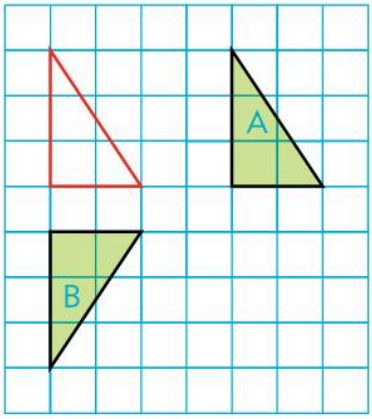
The reflection showed the same triangle pointing in the opposite direction.

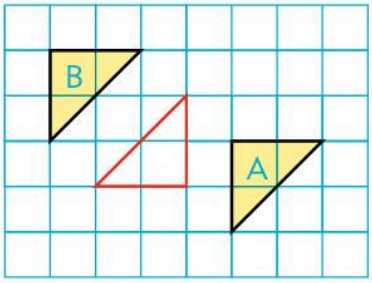
In maths, a **reflection** is a change in the position of a shape. It is also known as a 'flip', because the shape looks like it has been flipped over to the opposite direction.

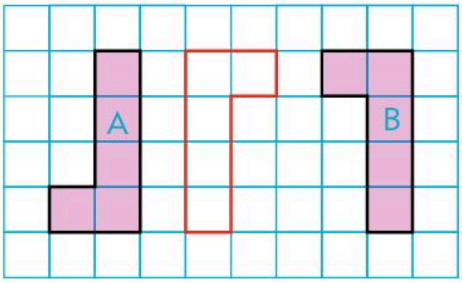
The dotted line in the diagram is called the **mirror line**.

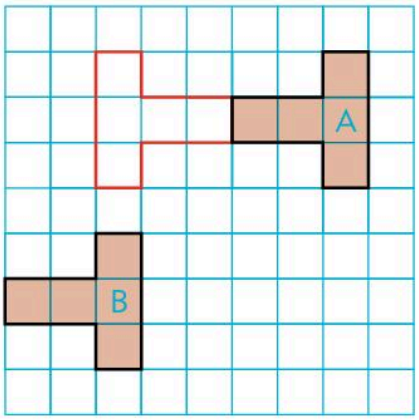
Matching points on a shape and its reflection are exactly the same distance from the mirror line.

1 **Which shape is a reflection of the red shape in each set?**









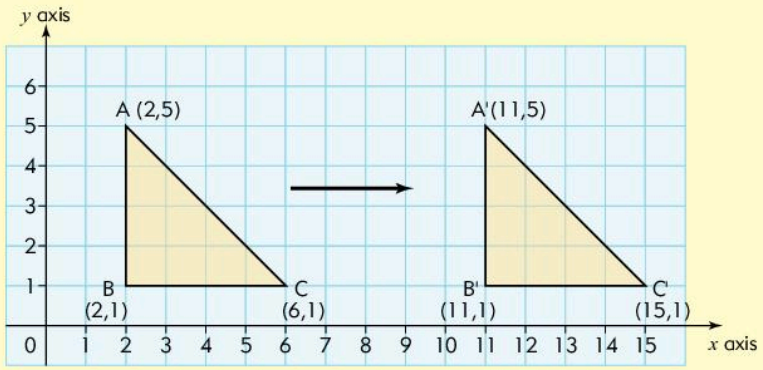
2 **Explain why the other shape in each set is not a reflection of the red shape.**

you can use Workbook page 53

Translations

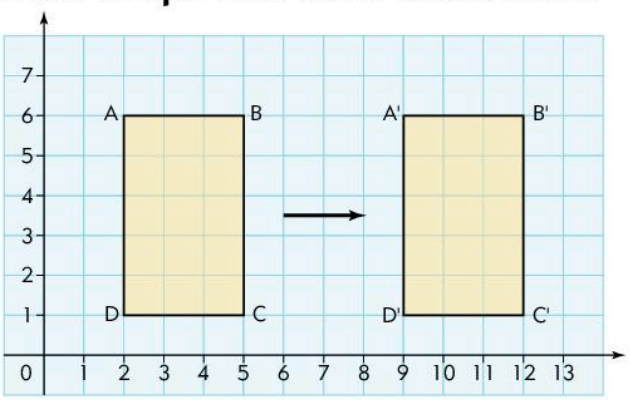
A translation is also called a **slide**. We can slide (or translate) a shape forwards, backwards, up or down.

In this translation, triangle ABC has been translated 9 blocks to the right.

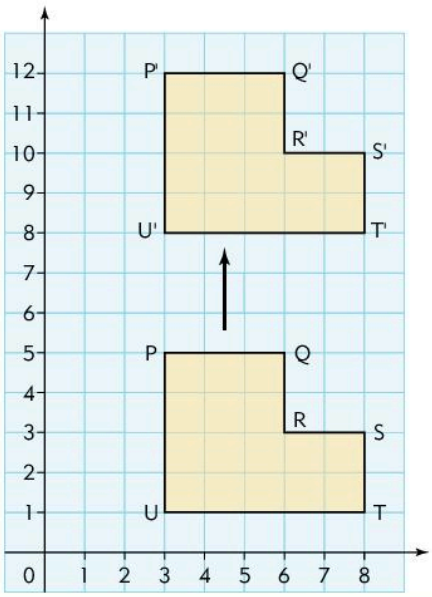


1 Say how many blocks right, left, up or down each shape has been translated.

a



b



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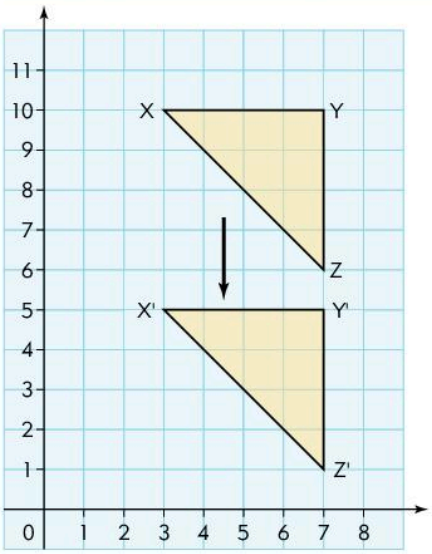
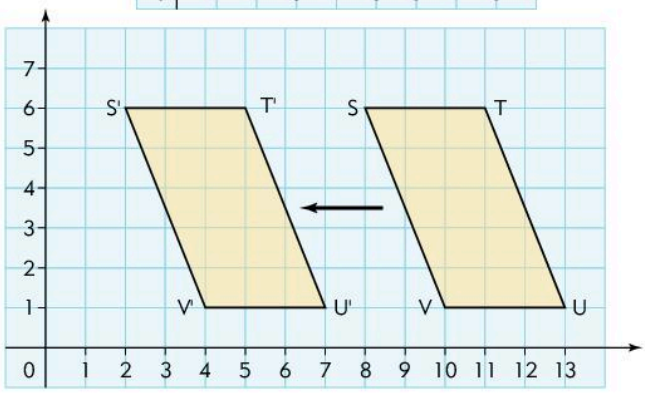


d



2 Write the co-ordinates of the corners of each shape before and after translation.

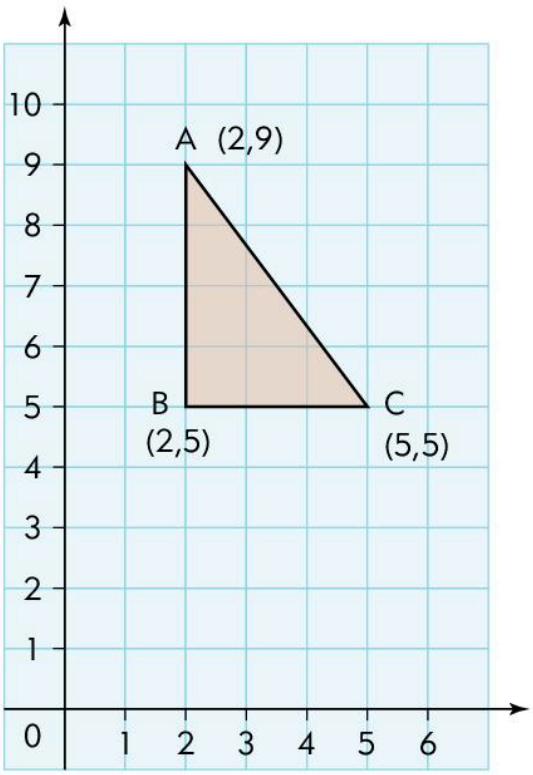
More translations

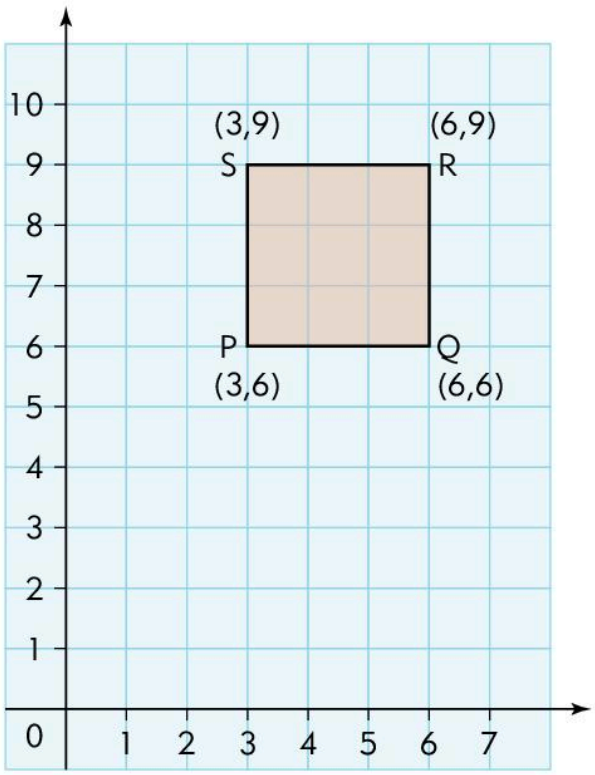
1 **Write the co-ordinates that the corners of the new shape will have after each translation.**

a Move ABC right 2 units.

b Move ABC down 4 units.

c Move PQRS down 2 and right 2.





2 **On your own axes draw the shape EFGH:**

a E(4,10), F(9,10), G(9,6), H(4,6)

b What shape have you drawn?

c Move EFGH down 3 and back 2 to create shape MNOP. Write the co-ordinates of the new shape after translation.

you can use Workbook page 54

Pairs of decimals that make 1

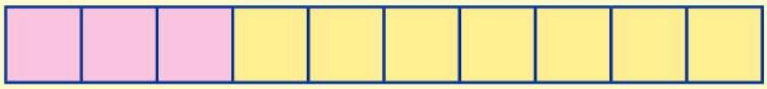
You already know the addition facts for whole numbers to 10.

$1 + 9 = 10$ $2 + 8 = 10$ $3 + 7 = 10$ $4 + 6 = 10$ $5 + 5 = 10$

You can use these facts to derive facts for adding decimals. For example.

$3 + 7 = 10$ so $0.3 + 0.7 = 1.0$

Look at the example to help you understand why this works.
This number stick has been divided into ten equal parts.
Each part is $\frac{1}{10}$ or 0.1 of the whole.



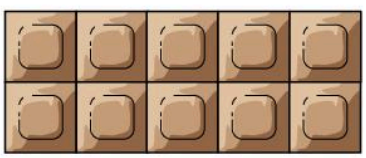
Three parts are shaded pink. This is 0.3 of the whole. Seven parts are shaded yellow. This is 0.7 of the whole. So, 0.3 + 0.7 = 1 whole
You need to know the addition facts for one place decimals that add up to 1 by heart.

$0.1 + 0.9 = 1$ $0.2 + 0.8 = 1$ $0.3 + 0.7 = 1$
$0.4 + 0.6 = 1$ $0.5 + 0.5 = 1$

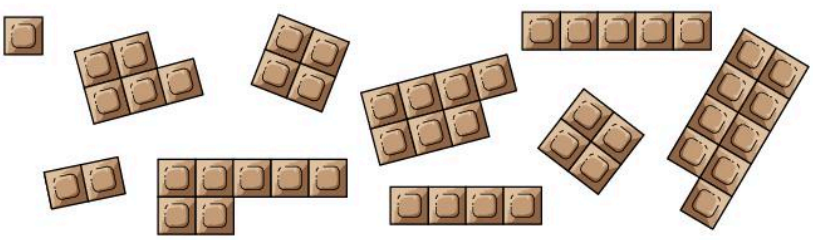
1 **Copy and complete these number sentences.**

a $0.1 + \square = 1$ **b** $1 - 0.7 = \square$ **c** $1 - 0.5 = \square$
d $\square + 0.8 = 1$ **e** $1 - 0.6 = \square$ **f** $1 - 0.2 = \square$
g $0.3 + \square = 1$ **h** $1 - \square = 0.8$ **i** $\square + 0.6 = 1$
j $0.5 + 0.5 = \square$ **k** $1 - \square = 0.1$ **l** $1 - 0.5 = \square$

2 **Naadira needs five chocolate bars this size to bake chocolate brownies.**



She has these broken pieces. Does she have enough to make the brownies? Explain how you decided.

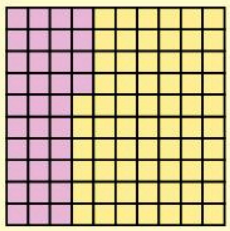


More pairs of decimals that make 1

You can use whole number facts to derive facts for two-place decimal fractions as well. For example:

34 + 66 = 100 So, 0.34 + 0.66 = 1.00

Remember 1.00 means 1 whole, 0 tenths and 0 hundredths, so we don't need to write the zeros. 1.00 = 1



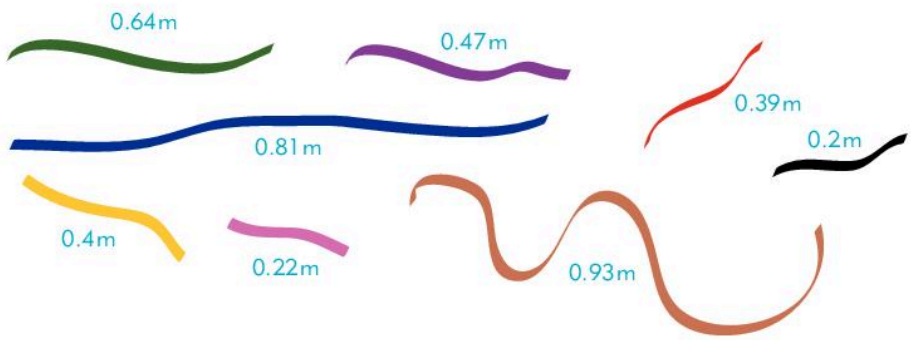
Look at this example to help you understand why this works.
This square has been divided into 100 blocks.
Each block is 1/100th or 0.01 of the whole.

Thirty-four parts are shaded pink. This is 0.34 of the whole.
Sixty-six parts are shaded yellow. This is 0.66 of the whole.
So, 0.34 + 0.66 = 1 whole

1 **Copy and complete each pair of number sentences.**

a	27 + ☐ = 100	0.27 + ☐ = 1
b	55 + ☐ = 100	0.55 + ☐ = 1
c	83 + ☐ = 100	0.83 + ☐ = 1
d	39 + ☐ = 100	0.39 + ☐ = 1
e	68 + ☐ = 100	0.68 + ☐ = 1
f	92 + ☐ = 100	0.92 + ☐ = 1

2 **For each length of ribbon, say how much more would be needed to make 1 metre.**



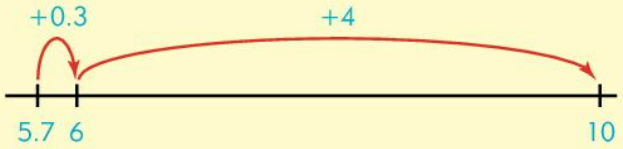
you can use Workbook page 55

Making 10s

You know how to combine one- and two-place decimals to make a whole number. Now you are going to use those facts and what you already know about adding whole numbers to add decimals that are greater than 1 to make groups of 10.

$57 + 43 = 100$
So, $5.7 + 4.3 = 10.0$

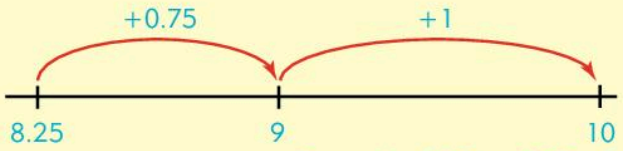
5.7 + 4.3 = 10



Remember 0.7 + 0.3 = 1

$825 + 175 = 1000$
So, $8.25 + 1.75 = 10.00$

8.25 + 1.75 = 10

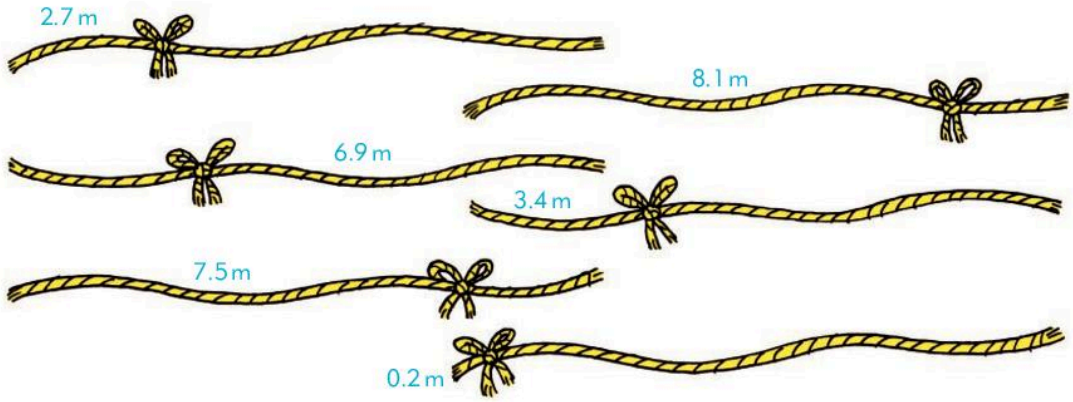


Remember 0.25 + 0.75 = 1

Remember 10.0 = 10 and 10.00 = 10

Look at the examples to help you understand why this works.

1 **Each rope is 10 m long. Work out the missing lengths.**



2 **Raewyn and her friends are trying to save $10 each. The money-boxes show how much each one has saved How much more does each one need to save to get to $10.00?**

you can use Workbook page 56

Doubling and halving decimals

You already know how to double and halve whole numbers.

- To double a number you add it to itself or multiply it by 2.
- To halve a number you divide it by 2.

You can use the same methods to double and halve decimals as long as you pay attention to the position of the decimal point.

Double 8.4

I know that double 84 = 168
and double 8 = 16

So double 8.4 = 16.8

Half of 6.8

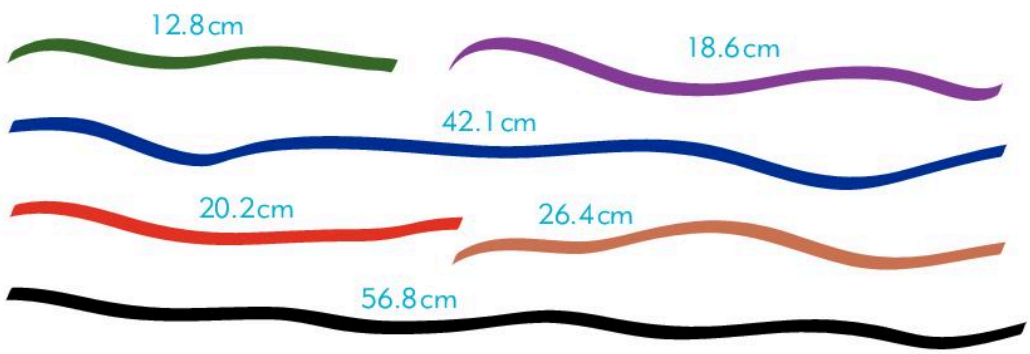
I know that half of 68 = 34
and half of 6 = 3

So half of 6.8 = 3.4

1 **Double each number.**

a 8.1	**b** 9.4	**c** 7.8	**d** 9.9
e 9.2	**f** 45.3	**g** 18.5	**h** 61.5

2 **Find half the length of each piece of ribbon.**



Adding and subtracting decimals

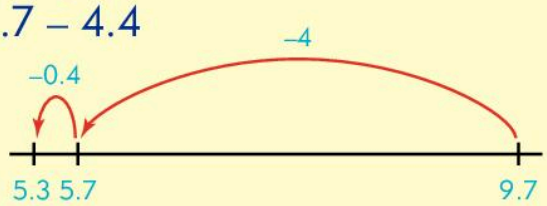
You can use the methods that you already know for adding and subtracting whole numbers to add and subtract decimals. For example:

Using place value and number facts

$8.2 + 9.8 = 8 + 0.2 + 9 + 0.8$
$= (8 + 9) + (0.2 + 0.8)$
$= 17 + 1$
$= 18$

Using a number line

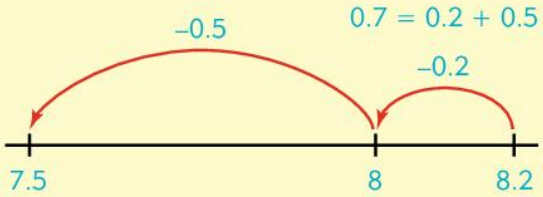
$9.7 - 4.4$



Or
$9 - 4 = 5$
$0.7 - 0.4 = 0.3$
5.3

Subtracting in parts

$8.2 - 0.7$



Using written methods

$12.23 + 9.5$

$$\begin{array}{r} 12.23 \\ 9.50 + \\ \hline 21.73 \\ 1 \end{array}$$

Make sure the decimal places are lined up correctly.

Write 0 as a place holder for empty tenths or hundredths.

1 **Add. Show your working.**

a 2.13 + 3.14 **b** 3.20 + 1.59 **c** 3.4 + 2.9
d 12.25 + 34.24 **e** 32.12 + 19.45 **f** 12.09 + 9.98

2 **Subtract. Show your working.**

a 6.96 – 3.45 **b** 9.77 – 3.25 **c** 8.95 – 4.64
d 5.43 – 2.39 **e** 9.53 – 6.17 **f** 8.14 – 6.51

3 **A pair of shorts costs $8.45 and a T-shirt costs $4.99.**

a What would it cost to buy a pair of shorts and a T-shirt?
b What is the difference in price between the two items?
c How much change would you get from $15 if you bought both items?

you can use Workbook page 57

Frequency tables

Harprit counted the number of letters in each of 50 words in his library book.

He drew this frequency table to organise his results.

Here are 50 words from a library book.

> John answered, "I am a merchant." and opening his napkin, he showed her its contents. Then she exclaimed, "Oh, what beautiful golden things!" and, setting the pails down, she looked at the cups one after another and said, "The king's daughter must see these; she is so pleased with anything…"

Harprit's book

Number of letters	Tally	Frequency
1	𝍸	3
2	𝍸 |	7
3	𝍸 𝍸	10
4	𝍸 𝍸 |	11
5	𝍸 |	7
6	𝍸 |	7
7	𝍸	3
8	|	1
11	|	1

1 **How many letters were there in:**

a the longest word

b the shortest word?

2 **What was the mode (most common) size of word?**

3 **Count the number of letters in each word. Draw up your own frequency table to record the results.**

4 **How many letters were there in:**

a the longest word

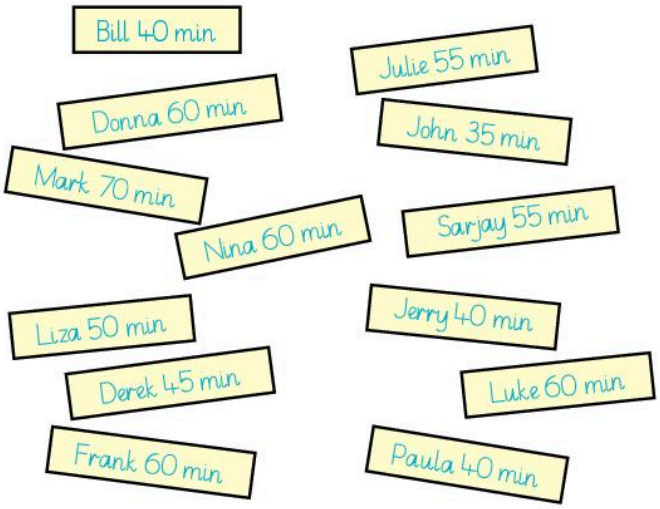
b the shortest word?

5 **What number of letters is the mode?**

6 **Which book do you think has the longest words, Harprit's or the one above? Say why you think this.**

Frequency tables with groups

Linda surveyed some students in her class about the number of minutes they spent on homework the previous evening. They gave her their times on slips of paper.



1 Copy this table and complete it.

Time (minutes)	Number of students
0 – 20	
21 – 40	
41 – 60	
61 – 80	

Students in a small village school each grew a sunflower to see how tall the plants would grow.

Here are the heights (in centimetres) after six months:

98, 102, 155, 220, 253, 94, 149, 190, 192, 234, 251, 112, 165, 249, 252, 132, 171, 230, 250, 127, 186, 201, 105, 175, 111, 173, 207, 150, 185, 200, 206, 119, 162, 198, 204, 142, 176, 154, 205, 189, 173, 144, 200, 164, 190, 100, 178, 151, 112, 156

2 Copy and complete the frequency table.

Height (cm)	Frequency
50–100	
101–150	
151–200	
201–250	

you can use Workbook page 58

Bar-line graphs

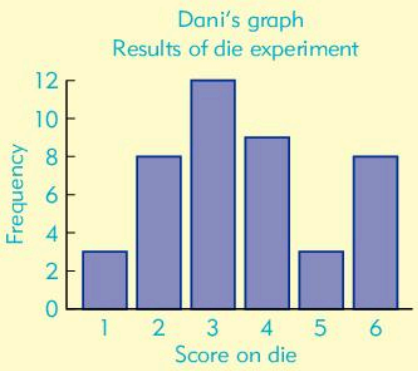
A group of students took turns to roll a die. They recorded how many times each number was rolled in a frequency table.

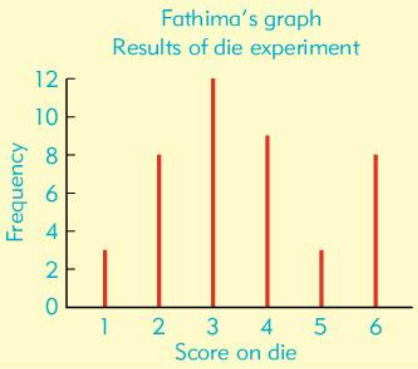
Score on die	1	2	3	4	5	6
Frequency	5	8	12	9	3	8

Their teacher asked them to draw a graph to show this data. These are the graphs that Dani and Fathima drew.

Dani drew a bar graph. The height of the bars shows how many times each number was rolled.

Fathima drew a slightly different graph. This type of graph is called a bar-line graph. It is similar to a bar graph, except the bars have been replaced by lines. The height of each line shows how many times each number was rolled.





1 **Draw separate bar-line graphs to show each of these sets of data.**

a Number of marbles picked up with one hand.

Name	Marbles
Paul	14
Alan	11
Katie	10
Chris	13
Ian	16
Nina	12
Bhuddi	15
Alex	12
Monique	13
Laura	14

b Number of pencils of each colour left in stock.

Colour	Number
Red	25
Orange	18
Yellow	14
Green	22
Purple	19
Blue	12
Pink	28
Brown	16

you can use Workbook page 59

More bar-line graphs

1 **Draw separate bar-line graphs to show each set of data. Use a scale of 1 cm per 5 items on the frequency axis.**

a

Newspapers delivered	
Sunday	43
Monday	35
Tuesday	35
Wednesday	36
Thursday	37
Friday	35
Saturday	37

b

Class	Number in class
1a	30
2a	27
3b	28
4a	29
5c	30
6a	30
6b	29

2 **This frequency table shows how many cans a class collected each month for a year.**

a What is the highest number of cans collected in a month?

b What number is the mode?

c Draw a bar-line graph to show this data. Use a scale of 1.5 cm per 100 cans on the frequency axis.

Cans collected for recycling	
January	200
February	300
March	300
April	100
May	300
June	400
July	400
August	0
September	300
October	300
November	100
December	100

Line graphs

The data showing how many cans were collected can also be shown on a different type of graph like this.

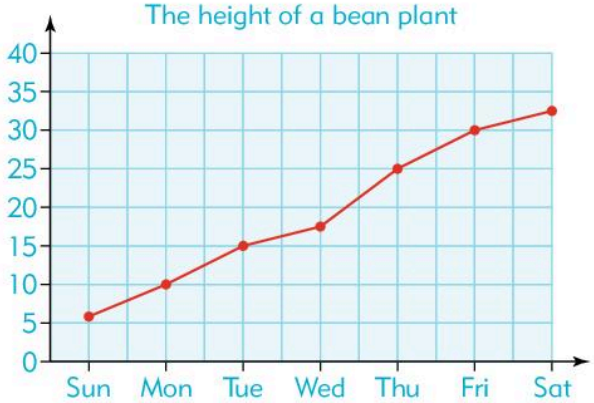
This type of graph is called a line graph. Can you see that each point on this graph is the same as the ones at the tops of the lines on the bar-line graph?

When you draw a line graph remember:

- Both axes must be clearly labelled
- Points are marked on the graph using dots
- The points are joined to each other using straight lines
- The graph must have a heading.

Line graphs are often used to show how things change over a period of time. In this graph you can see how the number of cans collected went up and down over a period of a year. Time is normally shown on the horizontal axis.

1 **Study this line graph and then answer the questions.**



a What does this graph show?

b What is shown on the horizontal axis? What units are used?

c What is shown on the vertical axis? What units are used?

d How tall was the plant on Sunday?

e How many millimetres did the plant grow from Sunday to Tuesday?

f When did the plant reach a height of 2.5 cm?

g When do you think the plant reached a height of 20 mm? Give a reason for your answer.

More line graphs

1 **This table gives the temperature in a classroom during a school day.**

Draw a line graph to show this data. Use Grid A on Workbook page 60.

Time	Temperature
8.00	22
9.00	24
10.00	26
11.00	27
12.00	27
13.00	28
14.00	28
15.00	26

2 **Use your graph to answer these questions.**

a What temperature was it at 10 a.m.?

b What happened to the temperature between 1 p.m. and 2 p.m.?

c Why does the line go down from 14.00 to 15.00?

d Estimate when you think the temperature in the classroom reached 25 °C. Explain how you worked this out from the graph.

3 **This table gives data about the number of people in a school hall during an art exhibition at the school.**

Time	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.
No. of people in hall	2	12	56	68	100	100	0

a Draw a line graph to show this data. Use Grid B on Workbook page 60.

b Write a few sentences describing what the graph tells you.

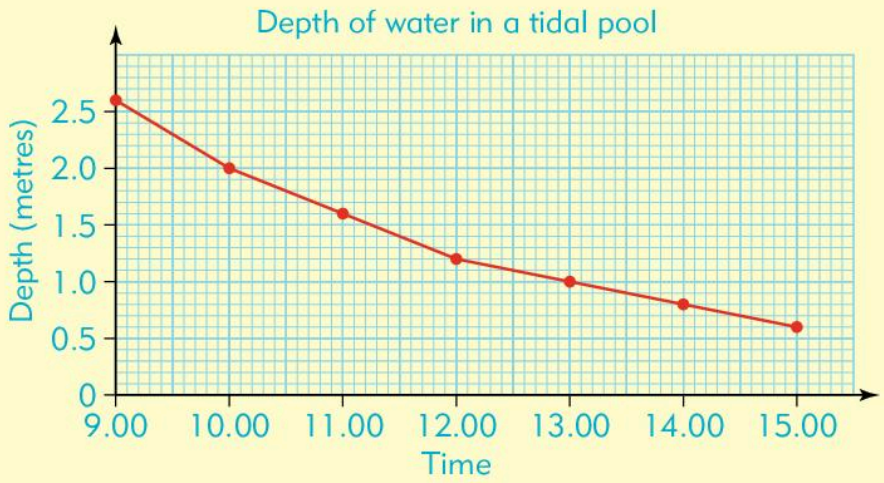
c What time do you think the exhibition opened? Why?

d At what time do you think the exhibition closed? Why?

you can use Workbook page 60

Making sense of line graphs

This line graph shows how the depth of water in a tidal pool changed over a period of six hours.



The graph slopes downwards because the water got shallower and shallower as the tide went out.

The depth of the water was measured at the start and then each hour (seven times in all). These depths were plotted to make the points on the graph.

But think about what happens to the depth of the water in between the times it was measured. As the tide goes out, the water gradually gets shallower. It does not suddenly drop from 2.6 m to 2.0 m. This means that we can use the lines on the graph to estimate the depth of the water in between the hours. So, for example, we can use the graph to estimate that the water was 2.3 m deep at 9.30 am. We can also estimate that when the water was 1.5 m deep the time was about 11.00 a.m.

When data can be measured in decimals, you can normally estimate inbetween values from the graph. When the data can only be measured in whole numbers the lines between points should not be used to make estimates.

1 **Answer these questions using the line graph above.**

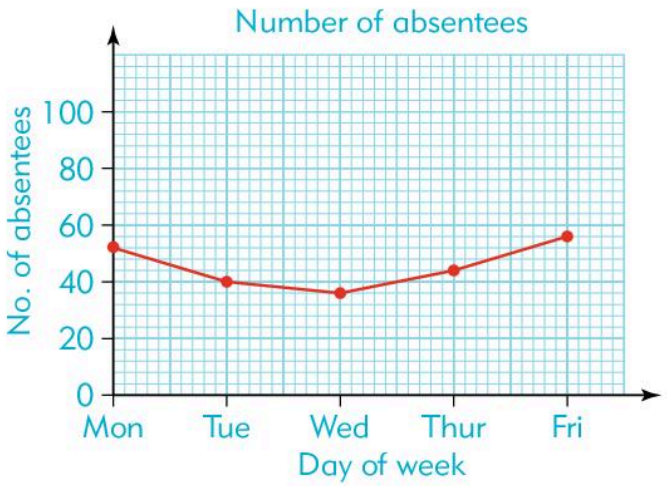
a How do you know the water got shallower over this period?

b Estimate the depth of the water at:
i 11.30 **ii** 13.30

c Estimate at what time the water reached a depth of less than 1.5 m.

d At 15.00 the tide turned and began to come in. What do you think will happen on the graph after this? Give a reason for your answer.

2 **This graph shows the number of students who were absent over a period of one week in a large school.**



a Describe what the graph tells you about absenteeism this week.

b Why can't you estimate inbetween values from this graph?

c Which type of graph would be better suited to show this data?

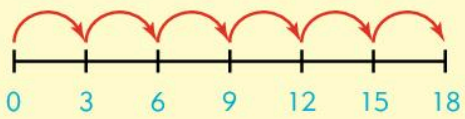
Revise division facts

When you know your multiplication and division facts you can use them to do division quickly using mental methods.

Remember:

You can think of division as repeated subtraction.

For example, to work out 18 ÷ 3 you can ask yourself 'How many threes make 18?'



You can also think of division as the opposite of multiplication.

For example, to work out 42 ÷ 6 you can ask yourself 'What multiplied by 6 will give me 42?'

□ × 6 = 42 You know from your times table facts that 6 × 7 = 42.
So, 42 ÷ 6 = 7

When you divide by 10, the digits move one place to the right.
So 110 ÷ 10 = 11

When you divide by 100, the digits move two places to the right.
4200 ÷ 100 = 42

1 **Do these divisions.**

a 16 ÷ 4	**b** 16 ÷ 8	**c** 16 ÷ 2
d 48 ÷ 6	**e** 48 ÷ 8	**f** 48 ÷ 2
g 64 ÷ 8	**h** 64 ÷ 4	**i** 64 ÷2
j 45 ÷ 5	**k** 45 ÷ 9	**l** 45 ÷ 3
m 90 ÷ 10	**n** 90 ÷ 5	**o** 90 ÷ 2
p 100 ÷ 10	**q** 100 ÷ 100	**r** 100 ÷ 50

2 **There are 48 children in a group. The teacher wants to arrange them in smaller groups of 8. How many children will there be in each group?**

3 **Callie has 54 sweets to share equally among 6 friends. How many sweets will each friend get?**

you can use Workbook page 61

More division

It takes a long time to divide a larger number when you subtract the number you are dividing by in steps of one. It is much quicker to subtract in chunks.

Always estimate first to make sure your answer is reasonable.

For example:

81 ÷ 3
Estimate: 30 × 3 = 90
So the answer must be close to 30

81	
−30	3 × 10
51	
−30	3 × 10
21	
−21	3 × 7
	27

81 ÷ 3 = 27

132 ÷ 6
Estimate: 6 × 20 = 120
So the answer must be close to 20

132	
−60	6 × 10
72	
−60	6 × 10
12	
−12	6 × 2
	22

132 ÷ 6 = 22

1 **Estimate first. Then divide and show your working.**

a 85 ÷ 5	**b** 96 ÷ 6	**c** 76 ÷ 4
d 92 ÷ 4	**e** 84 ÷ 6	**f** 84 ÷ 7
g 96 ÷ 8	**h** 57 ÷ 3	**i** 91 ÷ 7

2 **Estimate first. Then divide and show your working.**

a 156 ÷ 6	**b** 282 ÷ 3	**c** 564 ÷ 4
d 144 ÷ 6	**e** 155 ÷ 5	**f** 176 ÷ 8
g 196 ÷ 4	**h** 208 ÷ 8	**i** 195 ÷ 5

3 **Mrs Singh wants to put 132 eggs into boxes. Each egg box holds 6 eggs. How many boxes can she fill?**

you can use Workbook page 62

Dividing with a remainder

Some divisions leave a remainder.

For example: How many times does 4 go into 169?

169 ÷ 4

Estimate: 4 × 40 = 160, so the answer must be close to 40

169	
− 40	4 × 10
129	
− 40	4 × 10
89	
− 40	4 × 10
49	
− 40	4 × 10
9	
− 8	4 × 2
1	42

Answer 42 r. 1

You can use more compact methods to record your working:

169	
− 160	4 × 40
9	
− 8	4 × 2
1	

Or

$$4\overline{)169^{1}}$$

42 r 1

1 **Divide. Use the method you find easiest. Estimate.**

a 407 ÷ 3	**b** 572 ÷ 4	**c** 577 ÷ 4	**d** 325 ÷ 4
e 253 ÷ 5	**f** 217 ÷ 3	**g** 169 ÷ 2	**h** 400 ÷ 9
i 256 ÷ 6	**m** 500 ÷ 7	**n** 328 ÷ 7	**o** 649 ÷ 8

2 **A coach needs 7 students to make each netball team.**

a How many teams can she make if there are 136 students?

b How many students will be left over?

3 **Sammy has 199 metres of rope. He wants to cut it into 4 m lengths.**

a How many 4 m pieces can he cut?

b How much rope will be left over? Write this in centimetres.

4 **A farmer has 237 maize plants. He wants to plant them in three rows. How many plants should he put in each row?**

you can use Workbook page 63

Can you divide the remainder?

Sometimes it is possible to write the remainder as a fraction. At other times it is more sensible to leave it as a whole number remainder.

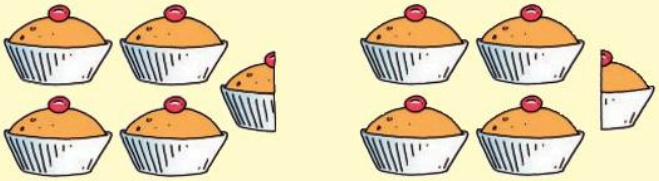
These 9 children were divided into two teams. One person was left over. You cannot divide him up!

$9 \div 2 = 4$ r. 1

Sometimes you can divide the remainder into smaller pieces, sometimes you cannot.

Nine cakes are to be shared between two children. The last cake can be shared between the two children.

$9 \div 2 = 4\frac{1}{2}$ cakes



Answer these division questions. Decide when to leave a remainder and when to write the remainder as a fraction.

1. 12 marbles between 5 children.
2. 3 lettuces between 2 rabbits.
3. 15 chairs between 4 people.
4. 25 metres of skipping rope between 20 children.
5. 40 boiled sweets between 13 children.
6. 500 g of cake mix between 8 cake tins.
7. 50 cows between 3 herds.
8. 15 brushes between 6 artists.

What will you do with the remainder?

Work out these problems. Choose your own method. Decide whether to round the remainder up or down depending on the problem.

1 Apples are packed into boxes of 24. There are 845 apples to pack. How many boxes are needed?

2

375 g of cheese is cut to make 12 sandwiches. How much cheese is in each sandwich?

3 A ship travels 750 km in a day. What is its average speed in km/h?

4

The pirate ship at a fair holds 42 people. How many rides are needed if there are 257 people in the queue?

4 $12.90 was left over after a school trip. It was shared equally between 29 students. How much did each student get?

you can use Workbook page 64

More division

1 **Solve these problems. Show your method.**

a 804 ÷ 4	**b** 309 ÷ 3	**c** 500 ÷ 5
d 999 ÷ 9	**e** 639 ÷ 3	**f** 602 ÷ 2
g 770 ÷ 7	**h** 282 ÷ 2	**i** 936 ÷ 3
j 600 ÷ 5	**k** 990 ÷ 3	**l** 900 ÷ 9

2 **Solve these division problems.**

a I have $906. I share it equally between 3 envelopes. How much do I put into each envelope?

b 840 people attend a sports match. They enter the stadium through 4 gates, with an equal number of people coming through each gate. How many people enter through each gate?

c I have 2 boxes of stickers, each with the same number of stickers. There are 628 stickers altogether. How many are there in each box?

3 **Solve these problems.**

a I have 147 sheets of paper. I divide the sheets equally among 5 printers. How much do I put into each printer? How many sheets will be left over?

b Amanda shares 292 ml of soda among 9 people. How much soda does each person get?

c A group of 6 hikers have 488 g of food between them. They share the weight out equally between their packs. How much does each person carry? Is there any food left over?

Division problems

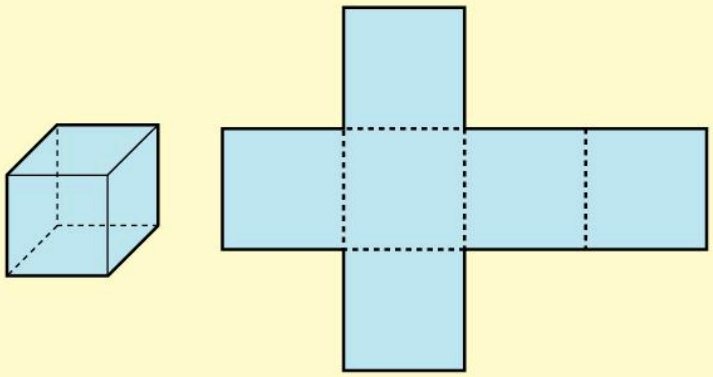
Choose your own method to solve these problems.
Do them in your head if you can.

1. 500 metres of cable are cut into 6-metre lengths. How many lengths are there?
2. 126 cm of fabric was left at the end of a roll. The shop owner cut it into 5 equal scraps. How long was each scrap of fabric?
3. How many 8 page sections are put together to make a book of 448 pages?
4. The books are packed into boxes of 10. How many boxes are needed for 264 books?

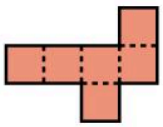
5. Jo needs $450.00 to pay for a holiday. If she saves $8.00 per week, how long will it take her to get the holiday?
6. Sally wants to save her digital photographs onto a CD. Each digital photograph is 4 megabytes of information. The CD can hold up to 50 megabytes of information. How many photographs can she fit onto the CD?
7. Carly needs to print her school newsletters. Each newsletter is 4 pages long. A ream of paper holds 500 pages. How many newsletters can she print (single-sided) from one ream?

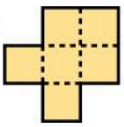
Shapes and nets

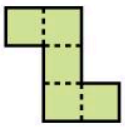
A solid shape or box can be made from a pattern of flat shapes called a net. When you cut open a box and flatten the pieces, you can see the net of the box. This diagram shows a cube and one of the nets you can use to make a cube.

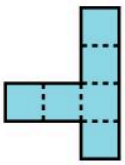


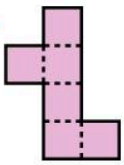
1 **Which of these nets can be used to make a cube? If you are not sure, draw each net on squared paper, cut it out and fold it up to see if it works.**

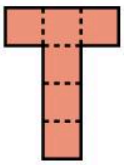
a 

b 

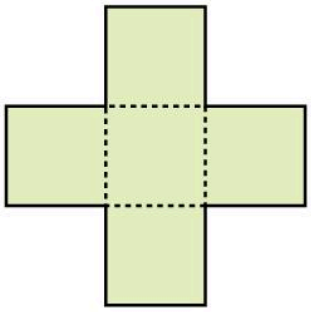
c 

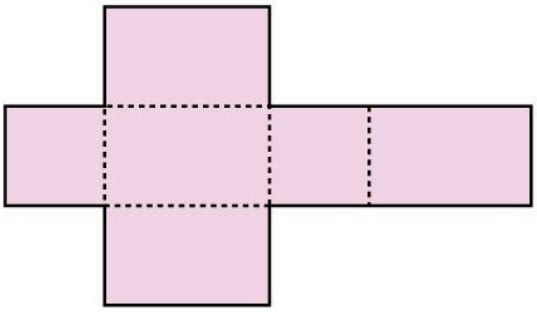
d 

e 

f 

2 **Compare each of these nets with the net of a cube. Answer the questions about each net.**





a How is it similar?

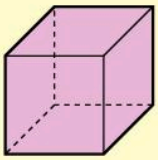
b How is it different?

c What shape will you get if you fold up this net?

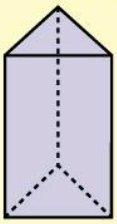
you can use Workbook page 65

Matching shapes to their nets

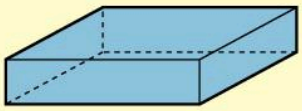
Here are five solid shapes.



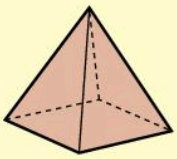
cube



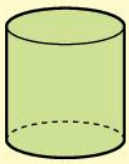
triangular prism



cuboid



square pyramid



cylinder

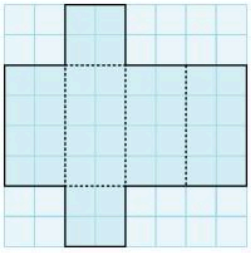
Remember:

- the flat surfaces of a solid are called faces
- the places where two faces meet are called edges
- the corners are called vertices

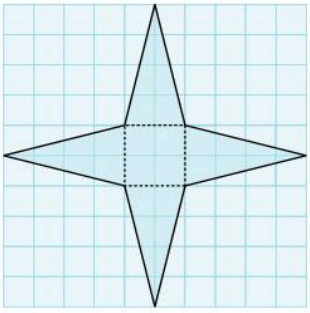
1 How many faces, vertices and edges does each of the solid shapes above have?

2 Match each net to one of the solid shapes above.

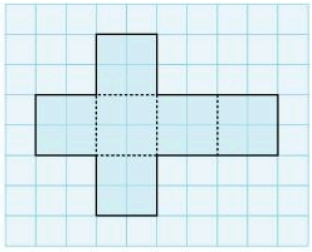
a



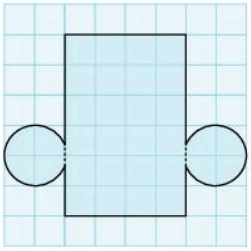
b



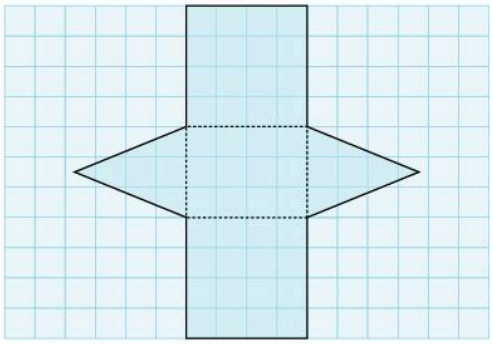
c



d



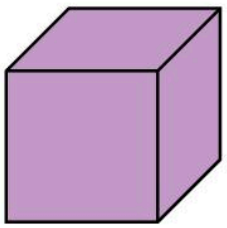
e



3 Explain how you decided which net would make each solid shape.

Making cubes and cuboids

1 A cube has edges which are 4 cm long. It measures 4 cm × 4 cm × 4 cm. Draw the net for the cube and make it.



2 Draw nets for these cubes and cuboids in the same way.

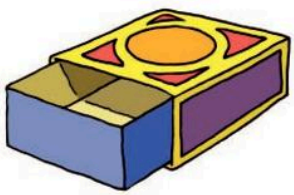
a 8 cm × 8 cm × 8 cm

b 4 cm × 6 cm × 2 cm

c 3 cm × 7 cm × 3 cm

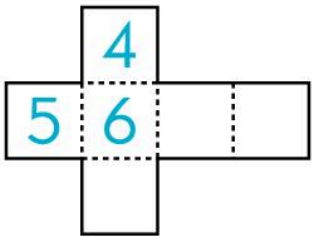
d 5 cm × 5 cm × 5 cm

3 The inside part of a matchbox must be able to slide in and out of its cover. Draw a net you could use to make the inside part of a matchbox.



4 These are nets of dice with some of the numbers missing. Copy them and write in the missing numbers. Use a real die to help you work out the position of each number. Real dice may have the numbers in a clockwise or anti-clockwise direction. But no matter where the numbers are, the numbers on opposite faces on dice always add up to 7. So if you have 6 on one face, the number on the opposite face will be 1.

a



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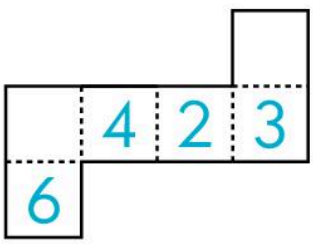
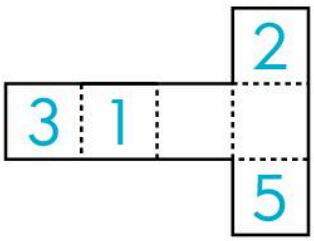
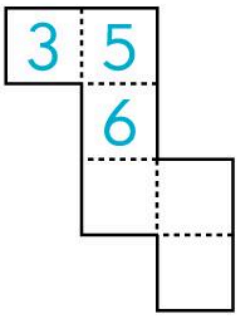


c



d

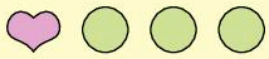


5 Choose one of the nets and make a die.

Comparing amounts

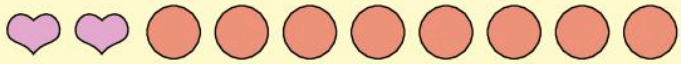
A ratio is a way of comparing two different amounts.

Here is 1 heart and 3 circles.

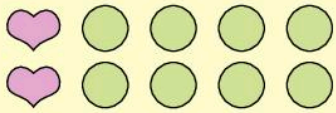


We say the ratio of hearts to circles is 1 to 3. This means there is one heart for every three circles.

Here are 2 hearts and 8 circles.



The ratio of hearts to circles is 2 to 8. This means there are two hearts for every eight circles. This means the same as 1 to 4. You can see this if you group the shapes like this



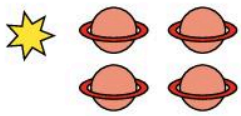
Sometimes a ratio does not have a 1.

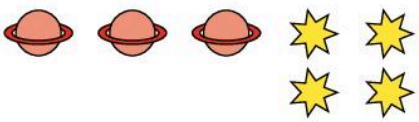
This set has 2 squares and 3 hearts. The ratio of squares to hearts is 2 to 3.

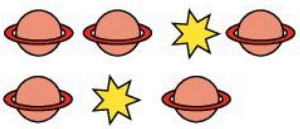
1 Write the ratio of stars to planets in each picture.

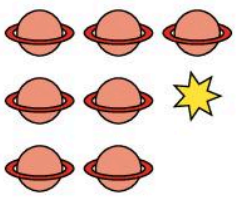
a 

b 

c 

d 

e 

f 

2 Write the ratio of planets to stars in each picture.

you can use Workbook page 66

Comparing parts to the whole set

Look at the set of hearts and circles again.

$\frac{1}{4}$ of the shapes are hearts and $\frac{3}{4}$ of the shapes are circles. This tells us what proportion of the set is hearts and what proportion of the set is circles.

1 **These are Mike's socks.**

a How many socks are there altogether?

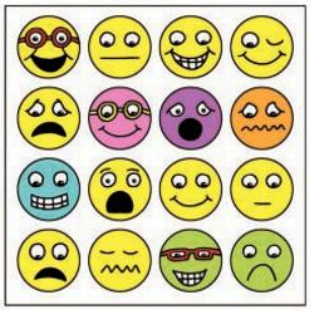
b What proportion of the socks is red?

c What proportion of the socks is striped?

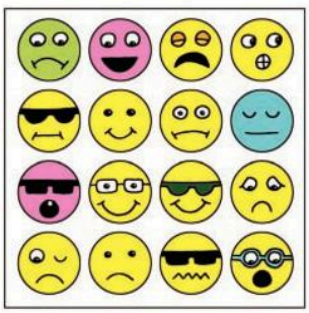
d What proportion of the socks is green?

2 **Salma and Marie collected these sets of smiley face stickers.**

Salma's set



Marie's set



Answer these questions for each set. Give your answers as fractions.

a What proportion of the faces is yellow?

b What proportion of the faces is smiling?

c What proportion of the faces is wearing glasses?

d What proportion of the faces is neither yellow, nor smiling, nor wearing glasses.

you can use Workbook page 67

More about ratios

Ratios help us to compare amounts. They also help us to understand the relationship between the parts that make up a whole.

On this bottle the ratio '1 to 5' tells us that the orange squash is made from *one* part orange to *five* parts water.

1 **We often use ratios in recipes and other instructions for making mixtures. Change each set of instructions into a ratio.**

a For 1 cup of oats add 2 cups of water.

b Cook 1 cup of rice in 5 cups of water.

c You will need 250 ml of milk per 15 ml of chocolate powder.

2 **We also use ratios to help us represent large areas on maps. Write these as ratios. Remember to make sure both numbers in the ratio are expressed in the same units.**

a 1 centimetre on the map represents 1 metre.

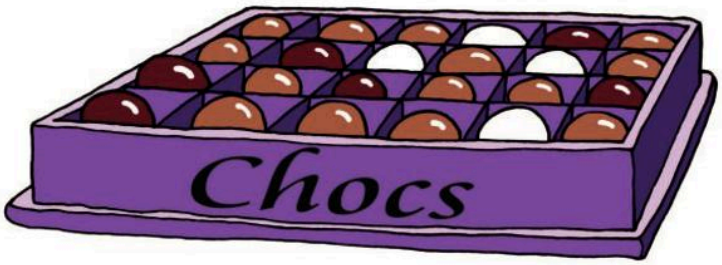
b 25 cm represents 50 cm.

c 2 cm on the map represents 400 cm in real life.

3 **Write the ratio of girls to boys in your classroom. Do you think other classes have the same ratio of girls to boys? Why?**

Remember: 3 to 1 means 'for every 3 of one kind there is 1 of another kind'.

This box contains dark chocolates, milk chocolates and white chocolates.



1 **What proportion of the whole box is:**

a dark chocolates

b milk chocolates

c white chocolates

2 **What is the ratio of:**

a dark chocolates to milk chocolates

b white chocolates to milk chocolates

c dark chocolates to white chocolates?

3 **There are 23 jelly babies in a bag.**

There are 3 colours: yellow, red and black.

There are 3 times as many yellows as blacks.

There are 5 times as many yellows as reds.

How many jelly babies are:

a yellow

b red

c black?

School ratios

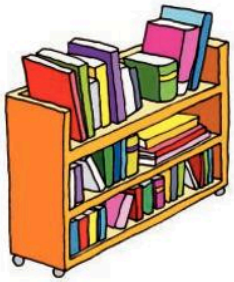
32 students use this classroom.

14 are boys and 18 are girls.

They have 16 tables and 32 chairs.

In the painting area there are 12 palettes and 40 brushes.

The class library has 120 books.



The resource area has 50 felt-tipped pens, 48 crayons and 10 erasers.

1 **Write these ratios.**

a students to tables

b students to chairs

c books to students

d brushes to students

e crayons to students

f students to palettes

g felt-tipped pens to students

h students to erasers

2 **Carry out a survey of your own classroom and write ratios for how many students there are to each kind of resource.**

3 **There are the following fruits in a bowl: 5 apples, 10 oranges, 2 grapefruit, 4 pineapples and 8 peaches. What is the ratio of:**

a apples to oranges?

b grapefuit to pineapples?

c pineapples to peaches?

you can use Workbook page 68

Mixing paint

To make three tins of pink paint, you need to mix two tins of white paint with one tin of red paint.

The proportion of white paint in the mixture is $\frac{2}{3}$

The proportion of red paint in the mixture is $\frac{1}{3}$

We can also write this as a ratio. The ratio of white to red is 2 to 1.

To make more pink paint, you need more white paint and more red paint.

For example:
To make 6 tins of pink you need double as much white and double as much red.

To make 6 pink you need 4 white + 2 red.

To make 30 tins of pink you need ten times as much white and ten times as much red.

To make 30 pink you need 20 white and 10 red.

The amount of each colour you need is in proportion to how much paint you want to make. You will always need $\frac{2}{3}$ white and $\frac{1}{3}$ red.

1 **A painter makes green paint by mixing blue and yellow paint in the ratio 2 to 3. That is 2 tins of blue for every 3 tins of yellow.**

- **a** What proportion of the green paint is blue?
- **b** If you start with 6 tins of blue paint, how much yellow will you need?
- **c** If you start with 6 tins of yellow paint, how much blue will you need?
- **d** If you have only one tin of blue paint, how much yellow will you need to make green?
- **d** If you want to make 30 tins of green, how much of each colour will you need?

2 **To make orange paint you mix red and yellow paint in the ratio two to five.**

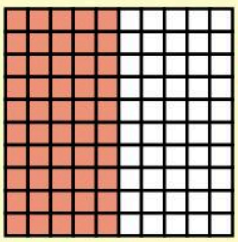
- **a** Make up five ratio and proportion problems using this information.
- **b** Exchange problems with a partner and try to solve each other's problems.
- **c** Discuss your answers and how you worked to solve each problem.

you can use Workbook page 69

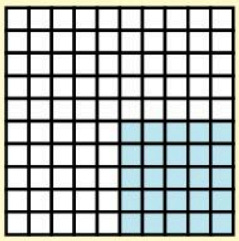
Percentages

Per cent means 'for each hundred'.

The symbol % means 'per cent'.

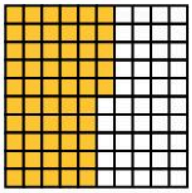


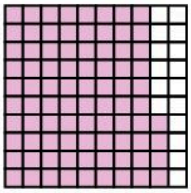
50% (or $\frac{1}{2}$) of this square is coloured red.

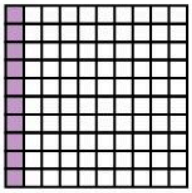


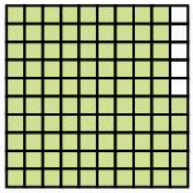
25% (or $\frac{1}{4}$) of this square is coloured blue.

1 **What percentage of each square is shaded?**

a 

b 

c 

d 

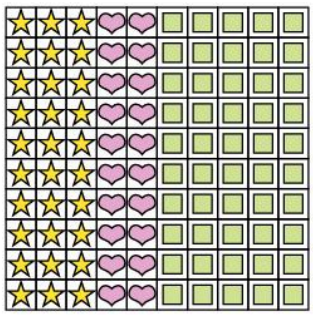
2 **What percentage of each square is not shaded?**

3 **Richard answered 86 out of 100 questions correctly. What percentage did he score?**

4 **This sheet has 100 stickers.**

a What percentage of the stickers is stars?

b What percentage of the stickers is neither stars nor squares?



5 **Jenny has 100 stickers in her album; 63 of them are swaps that she made with her friends. What percentage of the stickers are not swaps?**

you can use Workbook pages 70 and 71

Percentages, decimals and fractions

Percentages, decimals and fractions are different ways of showing the same value.

Look at these flowers:

3 out of the 6 flowers are red. We can say:

- 50% of the flowers are red
- 0.5 of the flowers are red
- $\frac{1}{2}$ of the flowers are red

The table shows equivalence between percentage, decimal and fraction forms of halves and tenths.

50%					50%				
$\frac{1}{2}$					$\frac{1}{2}$				
0.5					0.5				
10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

1 **Copy and complete this table by filling in the equivalent forms.**

Percentage	1%	10%					
Decimal				0.75			0.98
Fraction			$\frac{6}{10}$		$\frac{83}{100}$	$\frac{9}{10}$	

2 **Rewrite each set of fractions in order from smallest to greatest.**

a	0.6	50%	$\frac{27}{100}$	$\frac{3}{4}$
b	0.4	$\frac{1}{4}$	4%	$\frac{1}{2}$
c	$\frac{3}{10}$	0.9	0.03	33%
d	$\frac{1}{2}$	0.2	0.02	$\frac{22}{100}$
e	15%	0.5	$\frac{5}{100}$	$\frac{3}{4}$

you can use Workbook page 72

Finding percentages of an amount

Remember: A percentage is a fraction out of 100.
50% of an amount is $\frac{1}{2}$ the amount.
25% of an amount is $\frac{1}{4}$ the amount.
10% of an amount is $\frac{1}{10}$ of the amount.

1 **We got 12 questions in a test.**

a Sam got 25% of the question wrong.
How many questions did he get wrong?

b Amira answered 75% of the questions correctly.
How many questions did she get correct?

c Dan only managed to complete 50% of the questions.
How many questions did he complete?

2 **Nuresh has 30 marbles in a bag.**

a 50% of the marbles are blue. How many is that?

b 20% of the marbles are red. How many is that?

c 10% of the marbles are yellow. How many is that?

d How many marbles are neither blue, red nor yellow?
Tell your partner how you worked this out.

3 **These are the ticket prices for a show at school. Class 5 sold 200 tickets for the show.**

TICKET PRICES

Full price	$10.00
Student price	$7.00

Tuesdays: 2 tickets for $10
NO STUDENT DISCOUNT ON TUESDAYS!

a 45% of the tickets were sold to students.
How many of the 200 tickets is this?

b The remaining 55% of the tickets were sold at full price. How many tickets is this?

c How much money in total should the class have collected for the tickets they sold?

Express fractions as percentages

You already know that a percentage is a fraction out of 100.

You can write other fractions as percentages by finding an equivalent fraction with a denominator of 100.

For example

There are 100 students in a school. $\frac{1}{2}$ of them are girls.
What percentage are girls?

You know that $\frac{1}{2}$ of 100 = 50

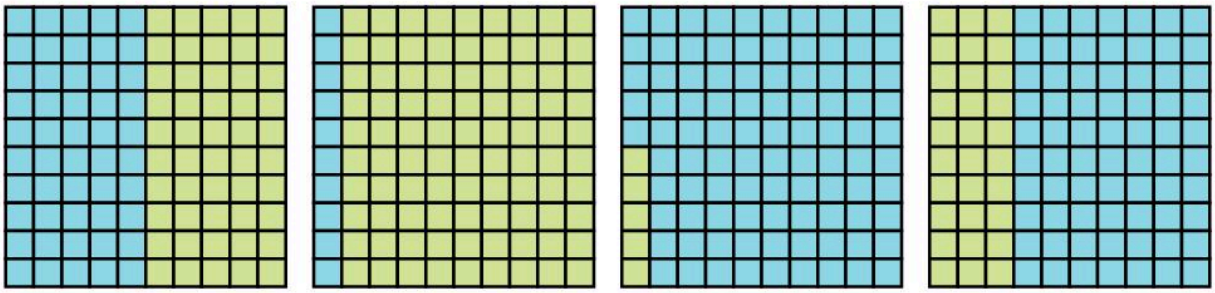
So, $\frac{1}{2} = \frac{50}{100}$ which is equivalent to 50%

This means that 50% of the students are girls.

1 **For each square, write:**

a the percentage shaded green **b** the fraction shaded green

c the percentage shaded blue **d** the fraction shaded blue



2 **The labels on clothes tell you what percentage of each material was used to make them. Remember, when you add the percentages the total must be 100.**

a Find the percentage of cotton in each item of clothing.

b What fraction of each item is cotton?

Linen	50%	Cotton		Cotton		Linen	80%	Cotton		Cotton	
Cotton		Polyester	25%	Lycra	3%	Wool	15%	Linen	12%	Polyester	2%
		Nylon	12%			Cotton		Elastane	33%	Lycra	8%

More equivalent fractions

In a school survey, sixty 11-year-old children were asked some questions. Here are the results:

Question	Percentage who answered 'yes'
Do you go to bed before 10 p.m.?	50%
Do you watch more than two hours of TV per day?	75%
Do you have your own door key?	20%
Do you have a pet?	60%
Do you go abroad for holidays?	40%
Do you have a brother or sister?	85%
Do you have a family car?	90%
Do you use a computer at home?	50%

1 **What percentage of children:**

a watch less than two hours of TV per day?

b do not own a pet?

c have a computer at home?

d go to bed after 10 p.m.?

2 **What fraction of children:**

a have their own door keys?

b do not have brothers or sisters?

c have a family car?

d go abroad for their holidays?

3 **Write a decimal fraction to show what fraction of children:**

a go to bed before 10 p.m.

b own a pet.

4 **How many of the sixty children do not own a pet?**

you can use Workbook pages 73 and 74

How likely?

1 **Look at the pictures and read the sentences.**

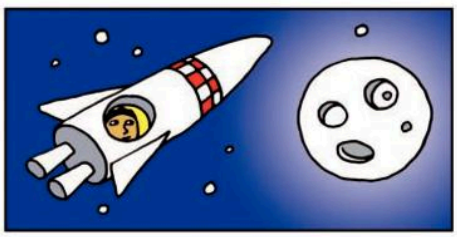
Write down whether these things are:

certain likely to happen unlikely to happen impossible

Give reasons for your answers.

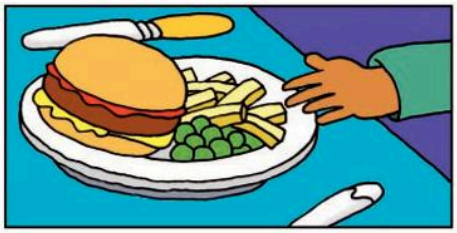
a I will get some presents for my birthday.

b I will go to the moon one day.



c The Sun will come out tonight.

d We will have burgers for lunch this week.



e A dragon will visit my school.

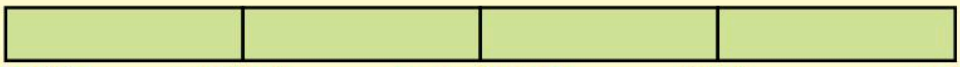
2 **Write and draw pictures of two things that are likely to happen to you.**

3 **Write and draw pictures of two things that are unlikely to happen to you.**

Likely and unlikely events

You have seen that you can describe the chance of different things happening using words like impossible, unlikely, even chance, likely and certain.

These words can be shown on a scale like this one:



impossible (no chance) — unlikely — even chance (fifty-fifty) — likely — certain

An even chance means that something is just as likely to happen as it is to not happen. For example, a dog is just as likely to bark as it is to not bark.

1 **Use words from the scale to describe the chance of each of these things happening.**

a You will go to bed early tonight.
b It will rain tomorrow.
c You will be younger tomorrow.
d You will travel by train next week.
e If you toss a coin, it will land on heads.
f It will get dark tonight.
g If you throw a die you will get a number lower than 7.
h In 100 years' time people will be able to fly.
i Your next lesson will be English.
j There is ice at the North Pole.

2 **Tell your partner one thing in your life that is:**

a impossible
b certain
c likely
d unlikely.

you can use Workbook page 75

Good chance, poor chance

In this sock drawer there is a good chance of pulling out a striped sock, a poor chance of pulling out a spotted sock and no chance of pulling out a plain sock.

You have three more drawers containing gloves, hats and scarves. What are the chances of pulling these items out from each drawer?

1

a spotted
b plain
c striped

2

a plain
b spotted
c striped

3

a plain
b striped
c spotted

4 **You will need a bag or box and different coloured marbles or counters.**

Put some different coloured marbles in a box. Pull them out one at a time and keep a tally.

Always put the marble back before the next dip. Do it 50 times.

Colour	Tally
Red	𝍸 ||
Yellow	|||
Blue	𝍸

a What is the colour with the best chance of being picked?

b What is the colour with the lowest chance of being picked?

Revising multiplication

You already know some strategies for multiplying whole numbers. Read through these examples to see different written methods for multiplying 43 × 7.

Always estimate first. Use rounding to do this.

43 rounds to 40

$7 \times 40 = 7 \times 4 \times 10 = 28 \times 10 = 280$

Partitioning

43×7
$= (40 \times 7) + (3 \times 7)$
$= 280 + 21$
$= 301$

Grid method

×	7
40	280
3	21
	301

Working in columns

$$\begin{array}{r} 40 + 3 \\ \times\ 7 \\ \hline 280 \\ 21 \\ \hline 301 \end{array}$$

$40 \times 7 = 280$
$3 \times 7 = 21$

1 **Use the method you find easiest to do these multiplications. Remember to estimate first.**

a 81×5 **b** 6×28 **c** 7×38

d 7×67 **e** 9×88 **f** 75×9

g 8×59 **h** 6×49 **i** 3×93

2 **Solomon delivers 83 newspapers every day of the week. How many does he deliver altogether in a week?**

3 **Sam delivered 5 boxes with 48 bottles of juice and 3 bags with 65 oranges in each bag to a school tuck shop. How many items is this altogether?**

Multiplying bigger numbers

You can use the methods you already know to multiply even bigger numbers.

For example

What is 438 × 3 Estimate first: 400 × 3 = 4 × 100 × 3 = 1200

Partitioning

438 × 3 = (400 × 3)
+ (30 × 3) + (8 × 3)
= 1200 + 90 + 24
= 1290 + 24
= 1300 + 14
It is easier to add
1290 + 24 in parts
= 1314

Grid method

×	3
400	1200
30	90
8	24
	1314

1290 + 24
= 1300 + 14
= 1314

Column method

438
× 3
1200 400 × 3
90 30 × 3
24 8 × 3
1314

1 **Use the method you find easiest to do these multiplications. Remember to estimate first.**

a 48 × 3 **b** 79 × 9 **c** 142 × 5 **d** 358 × 3

e 297 × 3 **f** 123 × 7 **g** 132 × 2 **h** 463 × 5

2 **Solve each word problem using long multiplication.**

a A chicken farm produces 185 eggs each day. How many eggs does it produce in a week?

b A father gave $462 to each of his three children. How much did he give away altogether?

c Each carriage on a train has 54 seats. How many seats are there if the train has eight carriages?

you can use Workbook page 76

Multiplying by two-digit numbers

You can extend the methods you already know to multiply numbers by numbers that are greater than 10.

32×16 Estimate: $30 \times 20 = 300 \times 2 = 600$

Using factors to multiply

$32 \times 16 = 32 \times 10 + 32 \times 6$

$32 \times 10 = 320$

$32 \times 6 = (30 \times 6) + (2 \times 6) = 180 + 12 = 192$

$320 + 192 = 420 + 92 = 500 + 12 = 512$

Using an extended grid

×	10	6	
30	300	180	480
2	20	12	32
			512

Using a column method

$$\begin{array}{r} 32 \\ \times\ 16 \\ \hline 12 \\ 180 \\ 20 \\ 300 \\ \hline 512 \end{array} \quad \begin{array}{l} \\ \\ 6 \times 2 \\ 6 \times 30 \\ 10 \times 2 \\ 10 \times 30 \\ \\ \end{array}$$

The 3 in 32 is in the tens place, so it has a value of 30

1 **Use the method you find easiest to do these multiplications. Remember to estimate first.**

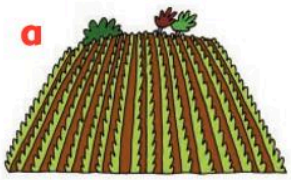
a 15×13 **b** 20×45 **c** 25×37

d 18×66 **e** 19×39 **f** 23×86

g 66×12 **h** 54×23 **i** 19×91

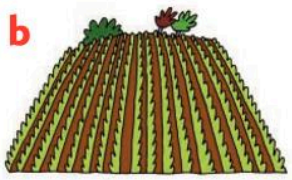
2 **Work out how many maize plants on each farm.**

a



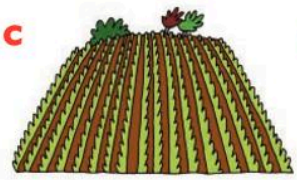
27 rows
55 plants per row

b



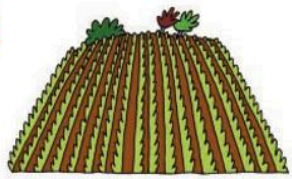
92 rows
23 plants per row

c



61 rows
50 plants per row

d



81 rows
49 plants per row

you can use Workbook page 77

Other methods of multiplication

Over thousands of years, different cultures have devised their own methods of multiplying large numbers.

The ancient Egyptians used doubling.

To multiply 96×21 they would make a list which doubled.

	96×1	$= 96$
doubled	96×2	$= 192$
doubled	96×4	$= 384$
doubled	96×8	$= 768$
doubled	96×16	$= 1536$

To find the answers they would add the products of the numbers which added to 21. In this case,

$$16 + 4 + 1 = 21$$

so the answer is $1536 + 384 + 96 = 2016$

1 **Use the ancient Egyptian method to solve these problems:**

a 47×23 **b** 58×37

c 76×26 **d** 25×32

2 **Use the ancient Egyptian method to solve this problem:**

A family spends $89 per week on groceries. How much do they spend in a year?

Practise multiplying

Look at the numbers before you do each of these calculations to help you decide which strategy to use to find the answer. Remember to estimate first and show your working out.

1 **Calculate.**

a 299×10	**b** 25×19	**c** 19×35
d 125×4	**e** 624×2	**f** 127×9
g 299×8	**h** 350×6	**I** 12×21

2 **Work out how many or how much.**

a Nisha has 427 stickers. Pete has 4 times as many.
b Farmer Joe has 327 cows. Farmer Mavis has twice as many.
c Palesa planted 6 rows with 126 plants in each.
d Pete has $419. His brother has 5 times as much.
e Samantha has 269 stickers. Sandra has ten times as many.
f Josh saved $124. But he needs 8 times as much to buy a car.
g A school ordered 12 sets of 65 blocks.
h A stadium has 65 rows of 42 seats.

3 **A toll gate estimates that 378 cars pass over a bridge each hour. If this is correct, how many cars would pass over the bridge:**

a in an eight-hour shift **b** in 12 hours

4 **Jessie's school is 381 metres from her house. She walks to school and back each day.**

a How far does she walk to school and back in a day
b How far does she walk in total in five days?

5 **Tayo charges $83 dollars to transport passengers to the airport. How much will he earn if he does the journey 55 times in one month?**

6 **Robert says 526 times 3 is 1568. Is he correct?**

7 **A primary school has 27 classes with 32 students in each. The principal estimates she will need to order 850 chairs for the students.**

a Is 850 too many or too few chairs?
b How should the principal change her order?

8 **A leaking water tank loses 89 litres per day. How much water will it lose in:**

a 10 days **b** 2 weeks

Multiplying decimals

$31 \times 3 = 93$ So, what is 3.1×3?

Estimate first:

3.1 rounds to 3

$3 \times 3 = 9$

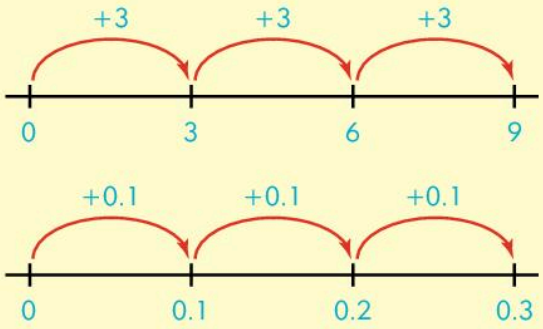
So 3.1×3.1 must be close to 9

Work it out like this:

$3.0 \times 3 = 9.0$

$0.1 \times 3 = \underline{0.3}$

9.3



When you write your calculations like this, remember to keep the decimal points lined up underneath each other.

1 **Estimate the answer to these first, then calculate. Compare your estimate with the answer.**

a 1.8×3 **b** 5.1×5 **c** 2.3×4 **d** 6.9×2

e 9.9×6 **f** 4.5×3 **g** 7.7×4 **h** 2.2×8

2 **Estimate and then check the answers to these:**

a Mrs Downes collected $2.50 from each of eight children. How much did she collect altogether?

b Six children each made a paper chain decoration 1.5m long. When the pieces were joined together, how long was the whole decoration?

you can use Workbook page 78

More multiplying decimals

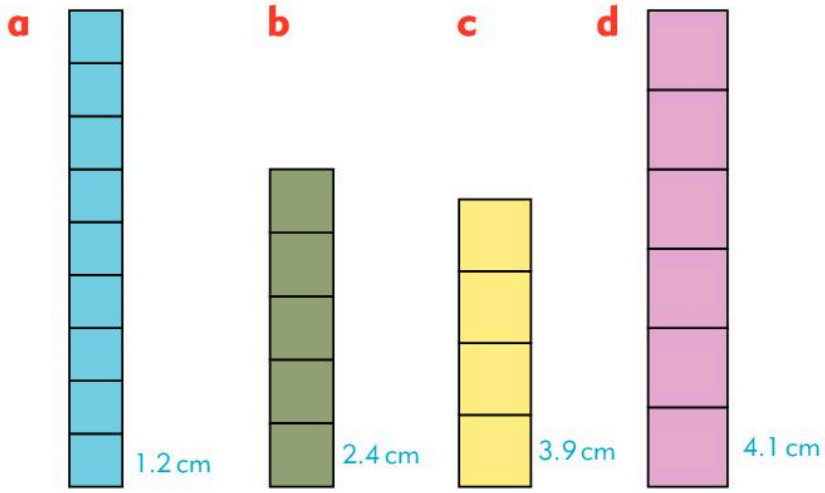
1 **Estimate then calculate.**

a 3×4.2 **b** 5×6.1 **c** 9×3.1

d 5.2×4 **e** 6.9×7 **f** 4.4×2

g 2.4×9 **h** 9.3×7 **i** 8.4×5

2 **Work out the height of each stack of blocks.**
All the blocks in a stack are the same height.
(Note that the blocks are not drawn to scale.)



3 **This is Kate's recipe for a large bowl of fruit salad.**

Work out how much of each fruit she would need to make:

a 2 bowls

b 5 bowls

c 8 bowls

1.2 kg watermelon
1.7 kg apple
1.1 kg pineapple
0.5 kg grapes
1.8 kg mango

you can use Workbook page 79

Decimal problems

1 **Mike buys 7 planks that are 1.3 m long. He pays $9 per metre for the planks.**

a What is the total length of all the planks?

b What does it cost for all the planks?

2 **A load of concrete contains 4.3 kg of sand, 2.8 kg of cement and 1.6 kg of gravel.**

a What is the total mass of a load of concrete?

b How much sand would you need to make 5 loads?

c How much cement would you need to make half a load?

d How much would 9 loads of concrete weigh?

3 **Work out the amount of liquid in 8 of each container.**

4 **Ned's dog eats 2.5 cups of food per day.**

a How many cups of food does the dog eat in a week?

b The vet tells Ned that the dog is overweight. He says the dog should only get $1\frac{3}{4}$ cups a day. What is $1\frac{3}{4}$ as a decimal?

5 **A square has sides of 3.8 m.**

a What is the perimeter of the square?

b Work out the perimeter of a square with sides that are half as long.

c Work out the perimeter of a square with sides twice as long.

Mixed operations

1 **Solve each number sentence. Pay careful attention to the order of operations.**

a $(2 \times 10) \div \frac{1}{2}$ of $20 + 15 + 20$

b $\frac{1}{4}$ of $(70 + 30) - (\frac{1}{2}$ of $20)$

c $(5 + 7 + 10 + 5) + (18 \div 3) + (21 \div 7)$

d $10 \times (2 + 4 + 10 + \frac{1}{2}$ of $8)$

2 **Write 'true' or 'false' for each number sentence.**

a $4 \times 8 = 8 \times 4$

b $12 \div 3 = 12 \div 4$

c $18 + 5 = 5 + 18$

d $18 - 5 = 5 - 18$

3 **Solve. Then write the inverse operation to check each number sentence.**

a $150 + 200$

b $45 \div 9$

c 25×4

d $90 \div 10$

e $\frac{1}{2}$ of 16

f double 50

g $\frac{1}{4}$ of 100

h 12 squared

4 **Start at 9999. Add or count on these numbers.**

a 1000

b 5

c 15

d 120

5 **Solve using any of the strategies you have learned.**

a $627 + 159$

b $434 + 8$

c $1947 + 516$

d $2871 + 1086$

e $5038 + 234$

f $9999 + 2150$

More mixed operations

1 **Solve these problems.**

a I give $635 to each of my four children. How much do I give away altogether?

b Julia earns $375 each week. How much does she earn in a month?

c I have 5396 CDs, stored in four boxes. Each box contains an equal number of CDs. How many CDs are in each box?

2 **Use any method to solve these.**

a 138×57	**b** 4212×30	**c** 7190×23
d 5010×13	**e** 1049×21	**f** 305×45
g $1554 \div 9$	**h** $1944 \div 4$	**i** $21603 \div 3$

3 **Carry out the following:**

a Write three different addition sums each with a total of 1. Use fractions or decimals in all three sums.

b Write three different addition sums each with a total of 100. Use fractions in one sum, decimals in the next and whole numbers in the third.

c Write three different addition sums each with a total of 1000. You can use whole numbers in all three sums.

4 **Find the fraction of each amount.**

a $\frac{1}{2}$ of 30 beads

b $\frac{3}{4}$ of 40 plums

c $\frac{2}{3}$ of $45

d $\frac{7}{8}$ of 56 pencils

you can use Workbook page 80

Brain power

Some people have astounding abilities for mental calculations.

Mrs Shakuntala Devi multiplied
7 686 369 774 870 by 2 465 099 745 779
correctly in 28 seconds.

These examples show some ways to group or write numbers to make mental calculations easier.

19 + 52 + 28
= 19 + (52 + 28)
= 19 + 80
= 99

6 × 14 × 5
= (6 × 5) × 14
= 30 × 14
= 420

Group into multiples of 10

72 × 102
102 = 100 + 2
So 72 × 102
72 × (100 + 2)
= 72 × 100 + 72 × 2
= 7200 + 144
= 7344

19 × 43
19 = 20 – 1
So 19 × 43
= (20 – 1) × 43
= 20 × 43 – 1 × 43
= 860 – 43
= 817

Write as a multiple of 10 and a single digit

1 **Which numbers could be grouped to make mental calculations easier?**

a 43 + 76 + 224
b 11 × 18 × 5
c 79 + 82 + 21
d 15 × 7 × 6

2 **Try to work out the answers to these mentally.**

a 25 × 71 × 4
b 31 × 45 × 0
c 11 + 45 + 49
d 48 × 101
e 92 – 58 – 32
f 99 × 8

Glossary

A

Analogue clock – a clock that shows the time using hands which point to numbers arranged in a circle

Array – all the items in a set laid out so you can see them all, for example an array of multiplication sums with the product 24

B

Bar graph – a graph where bars are used to show numbers or measurements

Block graph – a graph where columns are in blocks, each block shows one thing

C

Centimetre (cm) – a unit of length, your thumb is about 1 cm wide

Circle – a round, flat shape

Clockwise – the direction in which the hands move forwards in a circle around the face of an analogue clock; the opposite direction is called anti-clockwise

Cone – a solid shape with a pointed end and flat circle face

Co-ordinate – point on a grid

Cube – a solid shape with all its faces square

Cuboid – a solid shape with six faces; all the faces are rectangles

Cylinder – a solid shape with two circular end faces; a can is a cylinder

D

Database – a chart containing information arranged in fields

Degree – the unit we use for measuring angles and temperature

Diagonal – line connecting the opposite corners of a polygon

Digital clock – a clock that shows the time using only numbers

F

Frequency – how often something occurs

G

Geo-board – board with a grid of nails or pegs for making polygons

Gram (g) – a unit of mass used for light objects

H

Hexagon – a six-sided flat shape

Horizontal – a line that goes from one side to the other, parallel to the horizon

Hour – a measure of time; there are 60 minutes in an hour

K

Kilogram (kg) – a unit of mass used for heavy objects

L

Litre (l) – a unit of capacity, how much a container holds

M

Metre (m) – a unit of length used for larger measurements

Glossary

Millimetre (mm) – a unit of length used for small measurements

Minute – a measure of time, there are 60 minutes in one hour

Mixed number – a number containing a whole number and a fraction

N

Negative numbers – numbers less than zero

Net – a flat shape that folds to enclose a 3-D solid

P

Pentagon – a flat shape with five sides

Pictogram – a type of graph where pictures are used to show information

Polygon – a flat shape with straight sides

Prism – a solid shape that is the same all the way through

Protractor – an instrument we use to measure angles

Pyramid – a solid shape with a flat base and faces that meet at a point

Q

Quadrilateral – a four-sided flat shape

Quarter – one of four equal parts of a whole; when you divide something into four equal parts each part is one quarter

R

Rectangle – a four sided shape with four right angled corners and opposite sides equal

Reflection – a mirror image or flip

Remainder – the number left over after division

Right angle – a quarter turn, like the corner of this page

Round off – change a number to a lower place value to make it easier to work with, for example, we can round a number to the nearest ten, 100 or 1000

S

Second – a unit of time, there are 60 seconds in one minute

Sphere – a solid round shape, a ball is a sphere

Square – a four-sided flat shape with all sides equal

Subtract – take away or minus

Symbol – a picture used to represent something on a pictogram

Symmetrical – able to be divided into two identical parts

T

Tally – a small mark used to count one object; every fifth mark is drawn across the previous four tallies 𝍸

Third – a fraction, one of three equal parts; when you divide something into three equal parts, each part is one third

Triangle – a flat shape with three sides

V

Vertical – a line that goes straight up and down, perpendicular to the horizon

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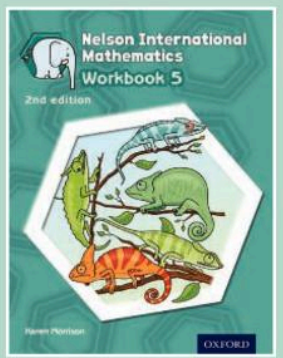

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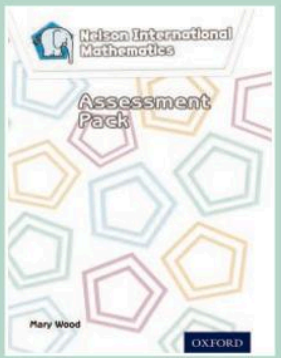

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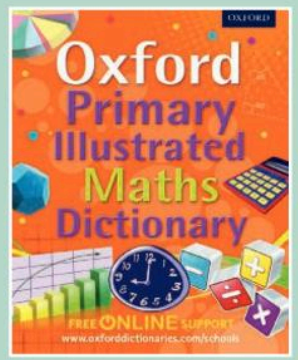

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