

fact scope


EARTH

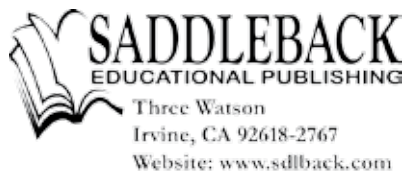


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Blue Planet



Earth appears as a big blue ball from space.

Earth is the only planet in the solar system that has water. Nearly 70 percent of Earth's surface is covered by water. The blue color of Earth comes from large oceans and water bodies on its surface.

Life on Earth

Earth is the only planet in the solar system that has life.

Water as Liquid

Earth is the only planet where water can exist in liquid form.



fact scope

- Earth's distance from the sun is 92,955,820 miles.
- Earth is the 3rd planet from the sun.
- Total surface area of Earth is approximately 197,000,000 square miles.
- Total surface area of land on Earth is approximately 196,937,500 square miles.
- Total surface area of water on Earth is approximately 57,300,000 square miles.
- Highest temperature on Earth was recorded at Al Asisiyah, Libya (136.4° F).
- Lowest temperature on Earth was recorded at Vostok station, Antarctica (-129° F).
- Earth is the densest planet in the solar system.



Earth's Age



Earth is believed to be 4.5 billion years old. The age of Earth is calculated using radioactive decay and carbon dating. These methods are used to calculate the age of rocks and organic matter, which provide us with an approximate idea of the age of Earth.

Eons

The age of Earth is divided into 4 eons: Hadean, Archean, Proterozoic, and Phanerozoic.

Holocene

The Holocene epoch is the present geological period that extends from the present day to about 10000 BCE.



fact scope



- During the Hadean era, there were no oceans on Earth and no oxygen in the atmosphere.
- Life began on Earth around 4 billion years ago.
- Oxygen on Earth was produced as a waste product of photosynthesis.
- The first multicellular plants emerged around 1 billion years ago.
- Supercontinent *Pannotia* was formed around 600 million years ago.
- Fish evolved around 530 million years ago.
- The recent supercontinent *Pangea* existed from 300 to 180 million years ago.
- Modern humans originated around 200,000 years ago.

Shape and Size of Earth



Earth is almost spherical in shape with flattened poles and a bulging equator. The circumference of Earth around the equator is larger than at the poles. The diameter of Earth at the poles is about 7,899.83 miles, but around the equator, it is about 7,926.41 miles.



fact scope

- Earth is the fifth largest planet in the solar system.
- Earth's spin causes it to bulge slightly at the equator.
- The circumference of Earth around the equator is 24,901.55 miles.
- The circumference of Earth around the poles is 24,859.82 miles.
- Earth is slightly pear-shaped.
- Around 200 BCE, Eratosthenes, from the library of Alexandria, was able to determine the size of Earth.

Geodesy

Geodesy is the scientific study of the shape and size of Earth.

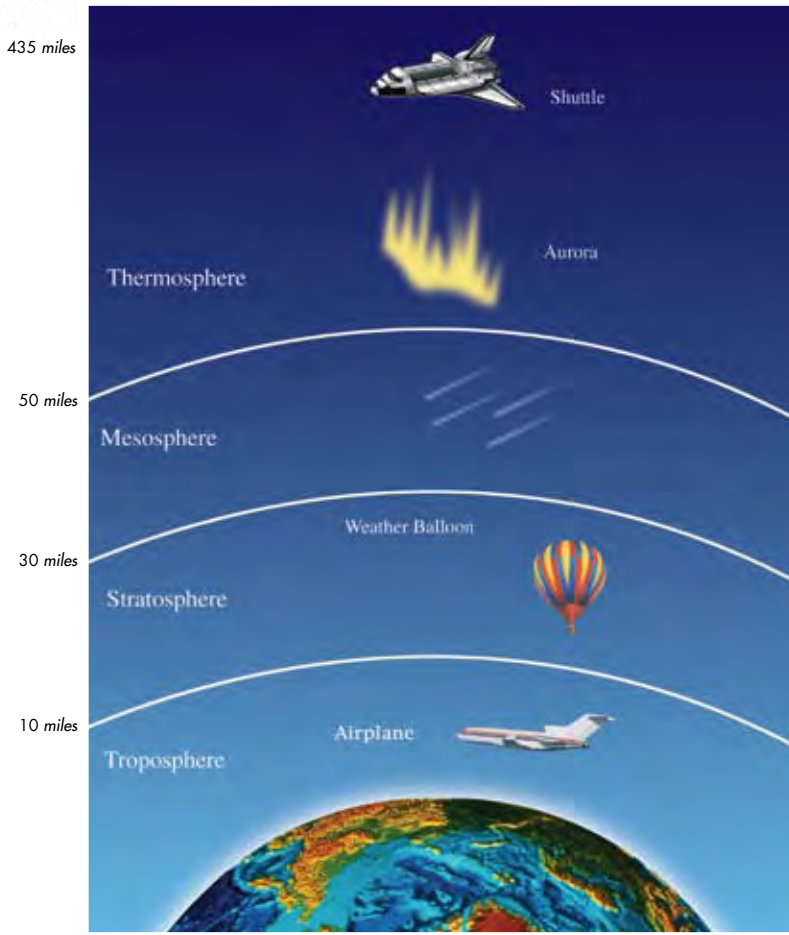
Pythagoras and Earth

In the 6th century BCE, Greek philosopher Pythagoras was the first person to say that Earth was spherical.





Earth's Atmosphere



The atmosphere is the thin layer of gases that surrounds Earth. This layer protects the earth from the harmful rays of the sun and keeps it warm. The atmosphere is composed of 78 percent nitrogen, 21 percent oxygen, 0.9 percent argon, 0.03 percent carbon dioxide, and traces of other gases. It is about 300 miles thick and is divided into several layers.

fact scope

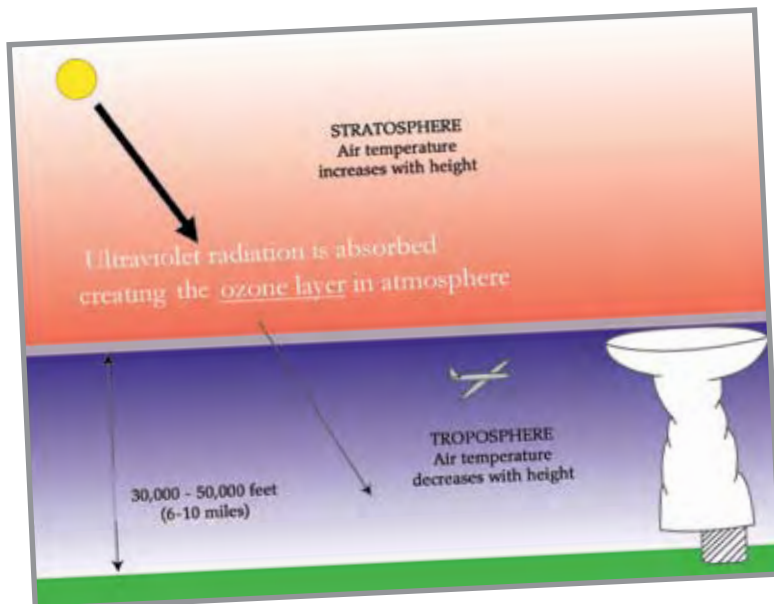
- Earth's atmosphere is divided into four layers:
 1. Troposphere
 2. Stratosphere
 3. Mesosphere
 4. Thermosphere
- The troposphere starts at Earth's surface and extends up to 5 to 10 miles high.
- The stratosphere starts above the troposphere and extends up to 30 miles.
- The mesosphere starts just above the stratosphere and extends up to 50 miles.
- The thermosphere starts above the mesosphere and extends up to 400 miles.
- The exosphere starts above the thermosphere and merges into space.

Planetary Degassing

Planetary degassing is the process by which the atmosphere of Earth was formed.

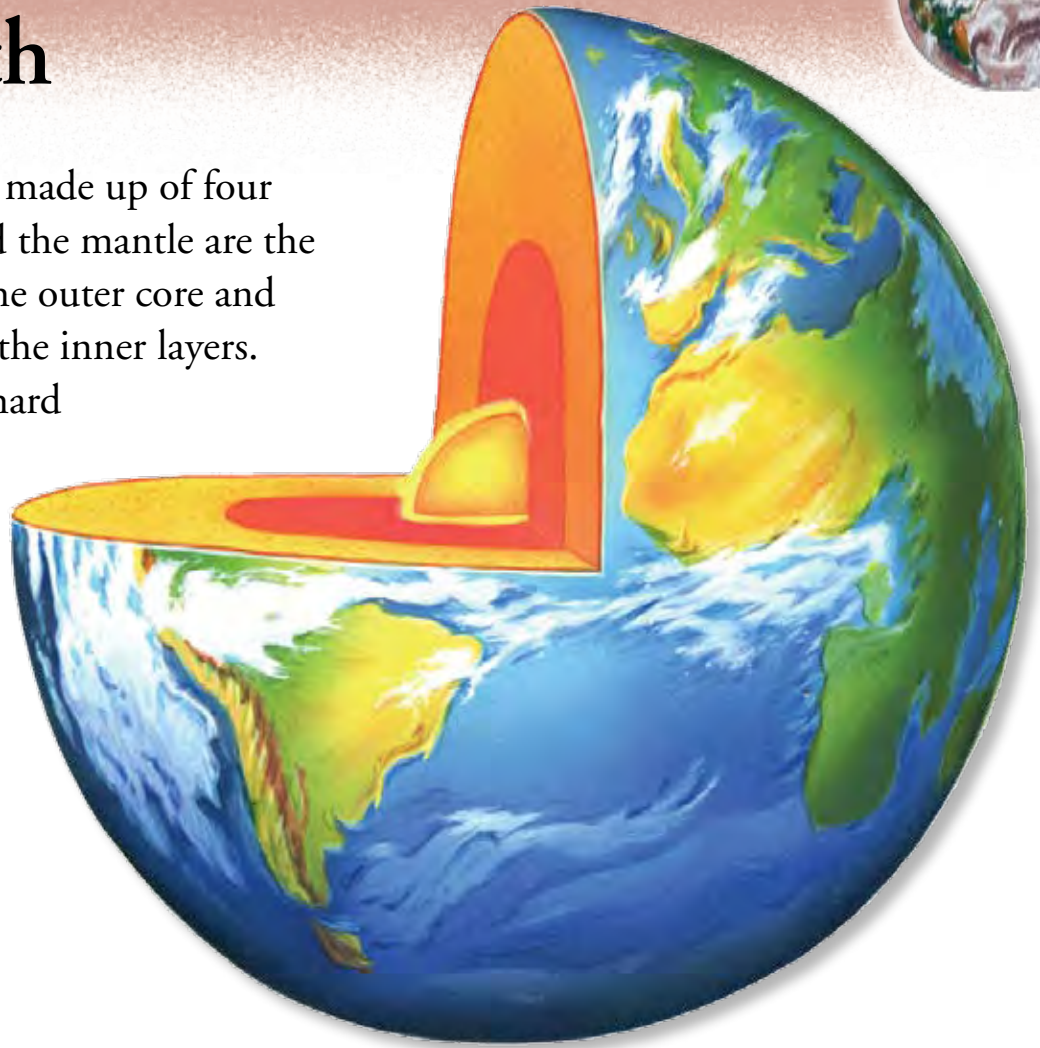
Ozone layer

The ozone layer is situated in the stratosphere layer of Earth's atmosphere.



Inside Earth

The inside of Earth is made up of four layers. The crust and the mantle are the outermost layers, while the outer core and the innermost core form the inner layers. The crust is made up of hard rocks and the mantle is formed of molten rocks and metals. The outer core is liquid iron and the inner core is a solid mixture of iron and nickel.

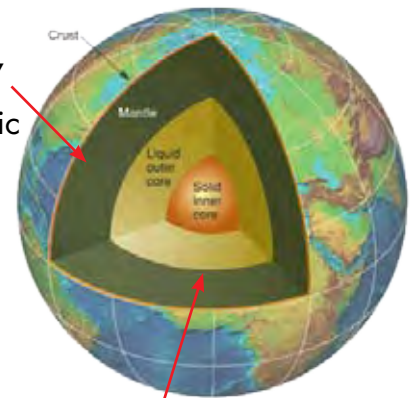


fact scope

- Earth's surface is mostly made of water, basalt, and granite.
- Earth's crust is thin under the oceans (4 to 7 miles) and thick under continents (16 to 56 miles).
- The crust and the rigid part of the upper mantle is called the lithosphere.
- The lithosphere is about 62 to 124 miles thick.
- The asthenosphere is a part of the upper mantle that exhibits plastic properties.
- The mantle is made of silicon, oxygen, magnesium, iron, aluminum, and calcium.
- The mantle is about 1,708 miles thick.
- Earth's core is made of iron and nickel.

Mohorovicic Discontinuity

The Mohorovicic Discontinuity is the boundary between the crust and the upper mantle.

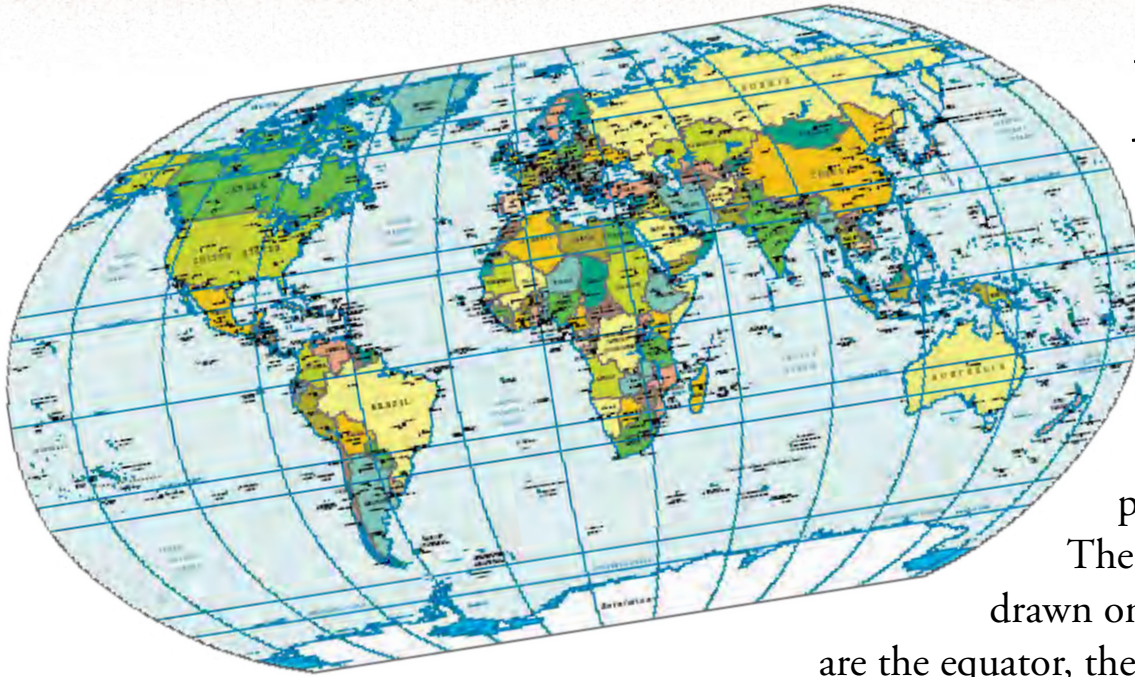


Gutenberg Discontinuity

The Gutenberg discontinuity separates the outer core from the mantle.



Mapping the Earth



Earth has been mapped by drawing imaginary lines on its surface. Mapping has helped us in getting information about places on Earth.

The imaginary lines drawn on Earth's surface are the equator, the latitudes, and the longitudes. They help in the determination of north and south on the globe or map. They are measured in degrees.

Cartography

Cartography is the science of making maps. People who create maps are known as cartographers.



Map after World War II

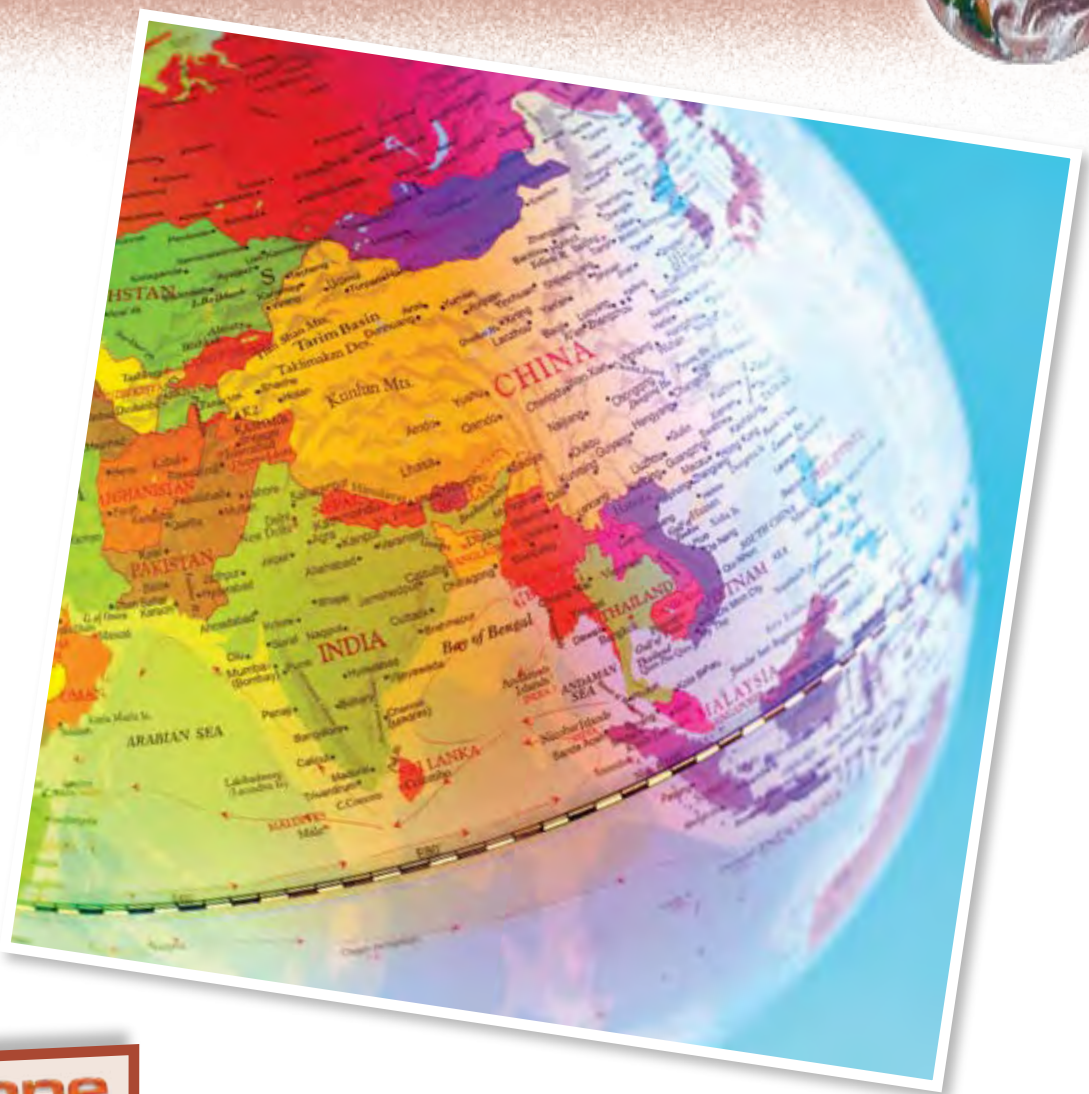
The use of aerial photography after the Second World War led to the development of modern cartography.

fact scope

- The oldest known map was found on a 4,300-year-old Babylonian clay tablet.
- The Greeks had advanced knowledge of cartography.
- Anaximander was the first Greek to create a map of the world.
- Ptolemy, in around 150 CE, made a world map, which depicted location in terms of latitude and longitude.
- Maps became widely available after the invention of printing in the 15th century.
- In 1508, Rosselli's World Map was the first map to show the entire globe.
- Gerardus Mercator of Belgium was a leading cartographer in the mid-16th century.

Equator

The equator is an imaginary line drawn around the center of Earth. It divides Earth's sphere into Northern Hemisphere and Southern Hemisphere. The length of the equator is about 24,901.55 miles. The equator passes through 13 different countries.



fact scope

- The equator is the longest line of latitude on Earth.
- The equator is located at zero degrees latitude.
- The sun is directly overhead at noon at the equator on the two equinoxes: March and September 21.
- The rate of sunrise and sunset is quickest in places near the equator.
- Volcán Cayambe in Ecuador is the highest point on the Equator.
- The word "equator" is derived from latin *aequare* meaning to equalize.

Launch Pad

Launch points for rockets to space are usually near the equator because there is more centrifugal force on the equator than in any other place on Earth.

Equatorial Countries

The equator passes through São Tomé and Príncipe, Gabon, Republic of the Congo, Democratic Republic of Congo, Uganda, Kenya, Somalia, Maldives, Indonesia, Kiribati, Ecuador, Colombia, and Brazil.





Tropical Zone



The tropical zone is the zone between the Tropic of Cancer and the Tropic of Capricorn. It lies between latitudes $23^{\circ}27'$ north and $23^{\circ}27'$ south. These places experience a very hot and humid climate and receive heavy rainfall. The Tropical zone covers around 40 percent of the earth's surface.

Subdivision of Tropic Zone

The tropic zone is subdivided into three major zones: humid tropics, wet-dry tropics, and dry tropics.



Agricultural Products

Agricultural products grown in tropical regions include rubber, tea, coffee, cocoa, spices, bananas, pineapples, nuts, and lumber.

fact scope

- Tropical zone countries include India, China, Australia, Africa, and countries of Central and South America.
- Humid tropics receive around 40 inches of rainfall per year.
- Rainforests lie in the humid tropics.
- Wet-dry tropics receive between 10 and 80 inches of rainfall per year.
- Savannah grasslands are found in the wet-dry tropics.
- Dry tropics receive less than 10 inches of rainfall per year.
- Xerophilous plants are found in dry tropics.

Temperate

The temperate zone is found between the Tropic of Cancer and the Arctic Circle in the Northern Hemisphere and the Tropic of Capricorn and the Antarctic Circle in the Southern Hemisphere. The climate is not extreme in this zone. The weather at times is quite unpredictable with rain and low temperatures being common in the summers.



fact scope

- The temperate zone has two main types of climate: maritime and continental.
- Regions of western Europe and western North America experience a maritime climate.
- The Rocky Mountains in North America separate the maritime climate of the west from the continental climate of the east.
- In Europe, the Alps separate the maritime climate of the west from the continental climate of the east.
- Greek scholar Aristotle was the first to propose the idea of a temperate zone.
- Major tree species of the temperate zone include oak, elm, beech, chestnut, and maple.

Temperate Zone in Northern Hemisphere

In the Northern Hemisphere, the temperate zone includes countries such as Russia, China, Korea, the United States, Canada, and Japan.

Temperate Zone in Southern Hemisphere

In the Southern Hemisphere, the temperate zone includes countries, such as Chile, Australia, and New Zealand.





Polar Regions

Earth is divided into two polar regions: north polar region and south polar region. These regions are very cold and remain covered with snow for most of the year. They include the Arctic Ocean, Greenland, and Siberia in the north polar region and the Antarctic in the south polar region.



Permafrost

The layer beneath the arctic lands is a frozen layer of soil, which is called permafrost.



Muskeg

Low-lying bushes and grasses in the Arctic regions are known as muskeg.

fact scope

- In the polar region, the sun never rises in winter.
- In the polar region, the sun never sets during the summer.
- The southern polar region is called Antarctica.
- The northern polar region is called the Arctic.
- Fram Basin at $-14,070$ feet below sea level is the lowest point in the Arctic.
- Bentley Subglacial Trench at $-8,200$ feet below sea level is the lowest point in Antarctica.
- The Arctic poppy and reindeer moss are plants grown in Arctic regions.
- William Edward Parry, a British naval officer, undertook one of the earliest expeditions to the North Pole in 1827.

Time Zones



Time zones are imaginary divisions of the earth. Earth is divided into 24 time zones, which are separated by 15° in longitude. Each time zone has the same time everywhere within it. The zones start at 0° in Greenwich, England.



fact scope

- Mean solar time is based on the earth's rotation relative to the sun throughout the year.
- British Railways established the first time zone in the world on December 1, 1847.
- Greenwich mean time (GMT) was established in 1675.
- Most major countries had adopted hourly time zones by 1929.
- Sanford Fleming divided the world into 24 time zones, each spaced at 15 degrees in longitude.
- The International Date Line is an imaginary line opposite the Prime Meridian, which offsets the date as one travels east or west across it.

Day of Two Noons

"The Day of Two Noons" is the time zone adopted by the United States and Canadian railroads on November 18, 1883.



Sanford Fleming

In 1878 Canadian Sir Sanford Fleming was the first to propose the system of time zones for the entire world.



Soil



Soil is the surface layer of Earth. It is a mixture of rock particles, organic matters, and water molecules. Physical and biological agents along with climatic conditions generally form soil. Soil is composed of different layers: organic matter, surface soil, subsoil, and substratum.

Composition of Soil Sample

An average soil sample consists of 45 percent minerals, 25 percent water, 25 percent air, and 5 percent organic matter.



fact scope

- Pedology is the scientific study of soil.
- Humus is the top layer of soil, made up mostly of leaf litter and decomposed organic matter.
- Topsoil is the dark-colored layer below the humus, which grow seeds and plant roots.
- The eluviation layer is a light-colored layer beneath the topsoil, which is composed of sand and silt.
- The subsoil is the layer beneath the eluviation layer, made of clay and mineral-like iron, aluminum oxides, and calcium carbonate.
- The regolith is the layer beneath the subsoil, which consists of slightly broken-up bedrock.
- Bedrock is the layer beneath all the other soil layers.

Types of Soil

There are 12 types of soil: Alfisols, Aridisols, Entisols, Histosols, Inceptisols, Mollisols, Oxisols, Spodosols, Ultisols, Gelisols, Andisols, and Vertisols.

Continents

Earth is divided into large pieces of continuous land masses, known as continents. Continents cover around 29 percent of Earth's total area. Asia, Europe, North America, South America, Australia, Africa, and Antarctica are the seven continents. Asia is the largest and Australia is the smallest continent.

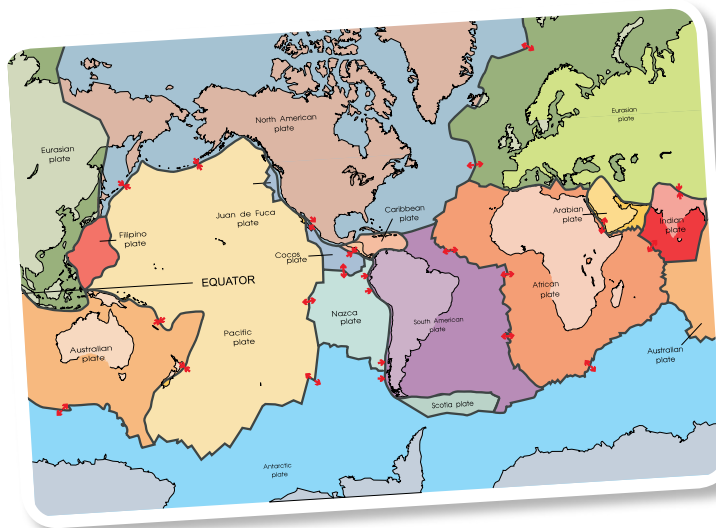


fact scope

- Alfred Wegener, a German geologist and meteorologist, first proposed the theory of continental drift in 1912.
- The continental drift states that the seven continents were formed from a single land mass or super continent, Pangaea.
- During the Jurassic period, Pangaea started to break up into two smaller super continents, called Laurasia and Gondwanaland.
- Modern-day continents formed by the end of the Cretaceous period.
- Plate tectonics theory states that the earth's plates are moving constantly at a rate of about 3.93 inches per year.

Total Number of Continent Plates

The current continental and oceanic plates include: Eurasian plate, Australian-Indian plate, Philippine plate, Pacific plate, Juan de Fuca plate, Nazca plate, Cocos plate, North American plate, Caribbean plate, South American plate, African plate, Arabian plate, Antarctic plate, and Scotia plate.





Sun

The sun is the source light, heat, and other forms of energy on Earth. All weather phenomena occur due to uneven heating of Earth by the sun. This causes temperature differences, which lead to global wind, cloud formation, rain, snow, and thunderstorms. The sun also influences the magnetic properties of the upper atmosphere of Earth, which affects our communication and energy systems.

Use of Solar Energy

Solar energy can be used in a number of applications such as heating, electricity generation, and desalination of seawater.



Natural Greenhouse Gases

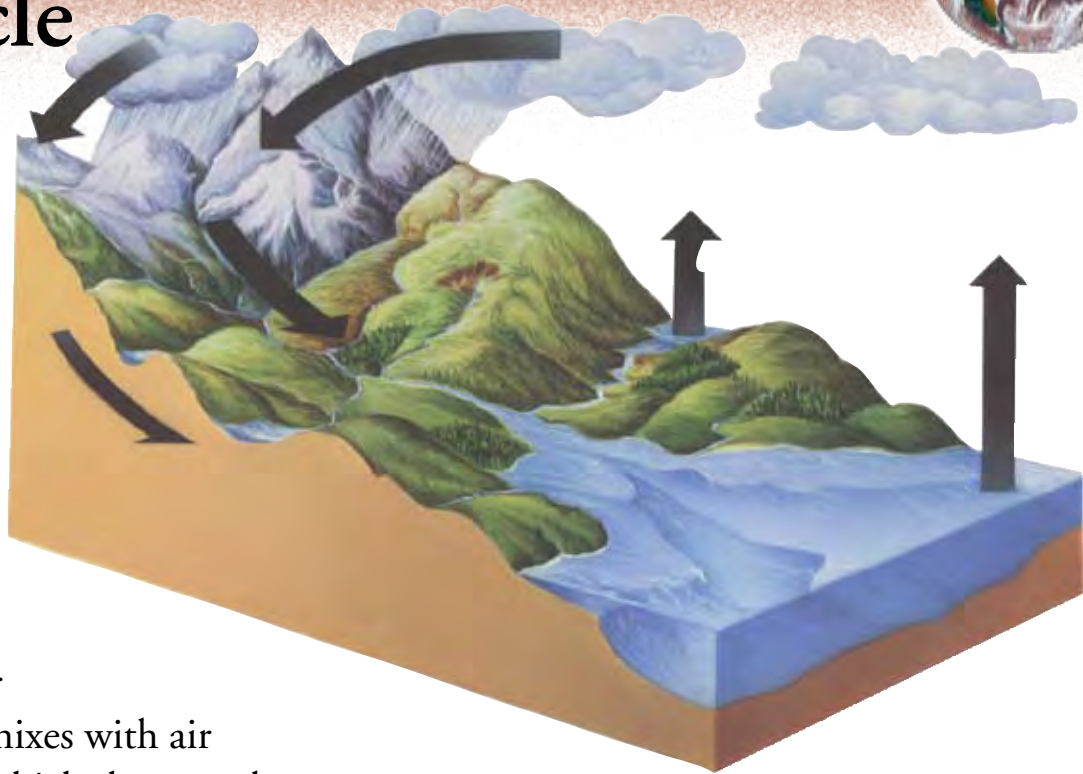
Natural greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

fact scope

- Solar energy reaches Earth in less than 9 minutes.
- About 34% of the solar energy reaching the troposphere is reflected back into space by clouds, dust, and chemicals.
- Solar radiation reaches Earth's upper atmosphere at a rate of 1,366 watts per square meter.
- A Trombe wall is a solar heating and ventilation system.
- A solar box oven traps the sun's energy to cook food.
- In 1767 Horace de Saussure made the first known western solar oven.
- Solar cells generate electricity from sunlight.

Water Cycle

The water cycle is the continuous recycling of water on Earth. Water passes through all its forms in a water cycle. The water cycle is also known as hydrological cycle. Water from water bodies evaporates and mixes with air forming water vapors, which then condense to form clouds. The clouds then bring rain and return the water onto Earth's surface.



fact scope

- 90% of the total fresh water on Earth is found in Antarctica.
- Transpiration is the process by which plants lose water to the air.
- About 90% of atmospheric water comes from evaporation.
- About 10% of atmospheric water comes from transpiration.
- About 86% of the global evaporation occurs from the oceans.
- Water is the only thing in nature that can be a gas, liquid, or solid.
- Advection is the movement of water through the atmosphere.
- About 0.0001% of water on Earth is found in the rivers and streams.

Earth's Water Supply

97% of Earth's water supply comes from the oceans, icecaps, and glaciers.

The remaining 1% comes from fresh ground water.



Parts of the Water Cycle

The water cycle is made up of a few main parts such as evaporation, transpiration, condensation, precipitation, and collection.



Clouds



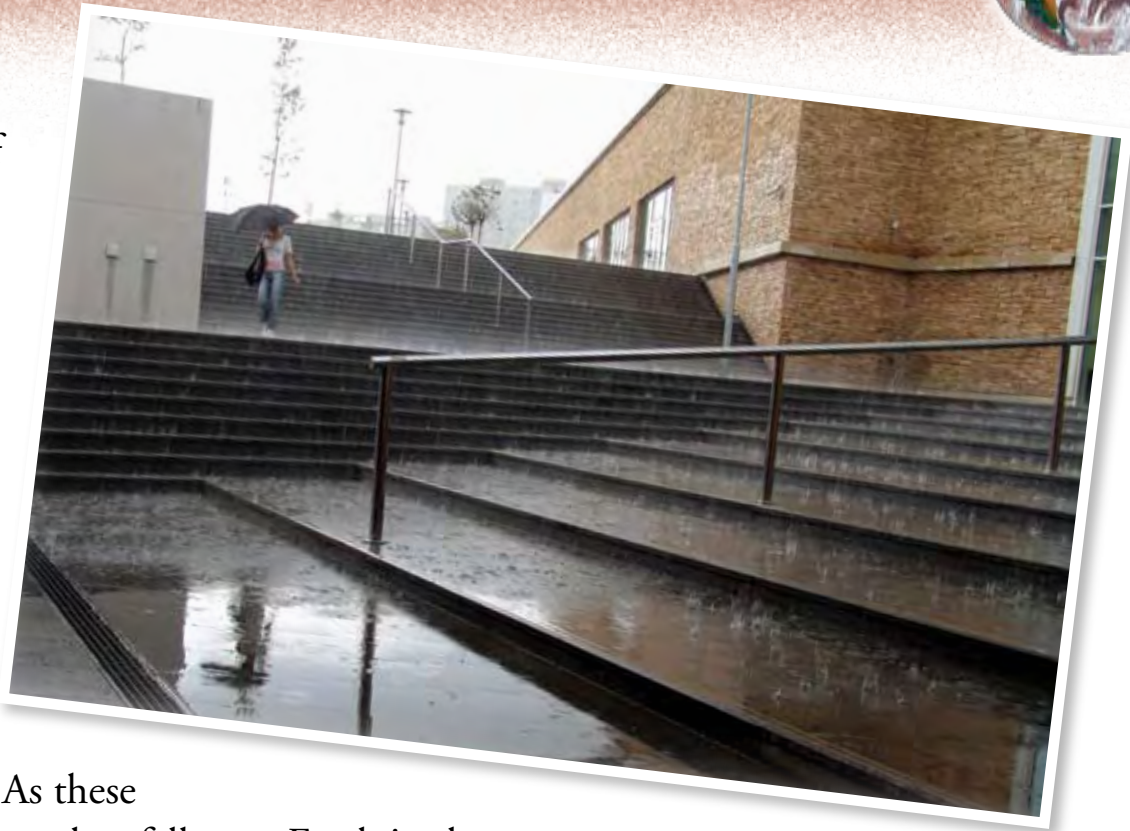
A cloud is a visible mass of condensed water vapor. Clouds are suspended in the atmosphere or in the higher layers of the atmosphere. Air contains water. When warm air containing water rises, it expands and cools. This cool air condenses into tiny water droplets or ice crystals. These droplets aggregate to form a visible cloud.

Type of Cloud (Genus)	Appearance	Altitude (height)
Cumulo nimbus	Can cause lightning, thunder, hail, strong rains, strong winds, and tornadoes	Near ground up to 75,000 feet
Cirro stratus	Thin, wispy, appears in sheets	Above 17,998 feet
Cirrus	Thin, wispy, filamentous, or curly	Above 17,998 feet
Cirro cumulus	Small, puffy, patchy and/or with a wavelike appearance	Above 17,998 feet
Alto cumulus	Medium-sized puffy, patchy, scattered clouds often in linear bands	6,499–20,000 feet
Alto stratus	Thin, uniform	6,499–20,000 feet
Strato cumulus	Broad and flat on the bottom, puffy on top	Below 6,499 feet
Cumulus	Puffy and piled up	Below 6,499 feet
Stratus	Uniform, flat, thick to thin layered clouds with ill-defined edges	Below 6,499 feet
Nimbo stratus	Uniform, dark, flat, low, featureless clouds that produce precipitation	Below 6,499 feet

Rain

Rain is a form of precipitation.

The process of evaporation and condensation leads to the formation of rain. Water from the rivers, lakes, and oceans evaporate and condense to form liquid droplets, which form clouds. As these droplets become heavy they fall onto Earth in the form of rain.



fact scope

- Drizzle is a type of rainfall with raindrops having a diameter of less than half a millimeter.
- The wettest place in the world is Mawsynram in India.
- The Atacama Desert of Chile has an average annual rainfall of less than .03 inches.
- One inch of rain falling over an area of one acre has a weight of one ton.
- The biggest raindrops on the earth were recorded over Brazil and the Marshall Islands in 2004, as large as .39 inches.
- The Bergeron process is the scientific explanation of how rain forms and falls.
- Small raindrops are nearly spherical in shape.

Rain Gauge

A rain gauge is used to measure the amount of rainfall.

Types of Rain

There are three general types of rain: orographic, frontal, and convective.





Snow



Snow is a form of precipitation. Snow is formed when the water vapor in the clouds turn into tiny ice crystals. It is formed in the atmosphere at temperatures below freezing point.

fact scope

- Flurries are short-period snowfalls.
- Coarse, granular wet snow is also known as corn.
- Powder is freshly fallen, uncompacted snow.
- A snowstorm is a heavy storm of snow for a relatively long period.
- A snow squall is a very intense snowstorm for a brief period of time.
- Slush is snow which partially melts upon reaching the ground.
- Penitentes are tall blades of snow and spiked ice found at high altitudes.
- Freezing rain is rain that freezes on impact with a sufficiently cold surface.

Blizzard

A blizzard is a long-lasting snowstorm, where visibility is reduced to less than 3.2 feet.



Snowflake

Snowflakes are a collection of ice crystals.

Weather and Climate



Weather is the state or condition of the atmosphere of a place that exists over a short period of time. It is characterized by change in temperature, wind, atmospheric pressure and the rainfall of a place at any given time. Climate is the average weather of a place over a period of several years. Different places have different climates. The climate of a place can be affected by some major factors such as latitude, altitude, and distance from the sea.



fact scope

- Weather occurs mostly in the troposphere.
- A barograph is a device used to measure air pressure.
- An anemometer is a device used to measure wind speed.
- There are about 11,000 weather stations in the world.
- In 1648 Blaise Pascal discovered that atmospheric pressure decreases with height.
- Benjamin Franklin observed the link between volcanic eruption and weather.
- TIROS-1, the first successful weather satellite, was launched in 1960.
- Francis Beaufort and Robert Fitzroy are credited with the birth of weather forecasting as a science.

Meteorology

Meteorology is the study of weather and climatic conditions.

Factors Affecting Weather

The three key factors that determine weather conditions are air temperature, air pressure, and humidity.



Flood and Drought



A flood is the overflowing of water over areas that are normally dry. A flood generally occurs because of heavy rainfall, onshore waves, or rapid snow melting. Crops and people are greatly affected by floods.



A drought is a condition of no rainfall with extreme dry weather. It occurs for a long period, sometimes for months or years, wiping out all plant and animal life. Severe droughts generally occur in deserts and areas bordering deserts.

China's Sorrow

Hwang Ho or "Yellow River" is called "China's sorrow," because it has caused more destruction than any other river in the world.

Gift of the Nile

For thousands of years, the Egyptians referred to the annual flooding of Nile River as the "Gift of the Nile."



fact scope

- In the last 2,000 years, the Yangtze River in China has flooded more than 1,000 times.
- In 1970 the Aswan High Dam was constructed to stop the annual floods of Nile River.
- A meteorological drought is drought caused by prolonged periods of less than average rainfall in a specific region.
- An agricultural drought is caused when there is insufficient moisture for crop production.
- A hydrological drought is caused when water reserves in the lakes and reservoirs fall below normal.
- The Great Leap Forward famine that occurred in 1958–61 in China is regarded as the largest famine of all time.

Earthquake

An earthquake is a sudden vibration of the planet's surface. The movements of tectonic plates deep inside Earth cause earthquakes. Earthquakes can last from a few seconds to a few minutes. They can be very mild or cause great destruction.



Charles Richter, in collaboration with Beno Gutenberg, developed the Richter scale in 1935.

Richter Magnitudes	Earthquake Effects
Less than 2.0	Micro-earthquakes, not felt.
2.0–2.9	Generally not felt, but recorded.
3.0–3.9	Often felt, but rarely causes damage.
4.0–4.9	Noticeable shaking of indoor items, rattling noises. No significant damage.
5.0–5.9	Can cause major damage to poorly constructed buildings over small regions. At most, slight damage to well-designed buildings.
6.0–6.9	Can be destructive in areas up to about 99 miles across in populated areas.
7.0–7.9	Can cause serious damage over larger areas.
8.0–8.9	Can cause serious damage in areas over several hundred miles across.
9.0 or greater	Devastating in areas several thousand miles across.

Seismic Scale

The seismic scale is used to measure and compare the relative severity of earthquakes.

Richter Scale

The Richter magnitude test scale or Richter scale is used to assign a single number to quantify the size of an earthquake.



Hurricanes and Tornadoes



Hurricanes are strong cyclones that originate in the oceans, near the tropics. They are accompanied by heavy rainfall and winds blowing at speeds of 75 mph.



A tornado is a rotating violent wind that extends towards the ground from the clouds. Tornadoes are funnel-shaped with their narrow end towards the ground.

Categories of Hurricane

Hurricanes are classified into five categories, based on their wind speeds and potential to cause damage.

Hurricanes	Wind velocity
Category One	Winds 74–95 mph
Category Two	Winds 96–110 mph
Category Three	Winds 111–130 mph
Category Four	Winds 131–155 mph
Category Five	Winds greater than 155 mph

fact scope

- The World Meteorological Organization gives names to hurricanes.
- Hurricanes that form in the western Pacific Ocean are called typhoons.
- Hurricane season is the time when most Atlantic Ocean hurricanes occur.
- The weather symbol for a hurricane is 
- The eye is the calm and roughly circular center of a hurricane.
- Some tornadoes can have wind speeds of more than 300 mph.
- The word tornado comes from the Spanish word tronada, which means thunderstorm.

Tsunami

Tsunamis are tidal waves that occur on the surface of the ocean. They are caused by earthquakes and volcanic eruptions under the sea.



fact scope

- Tsunamis are surface gravity waves.
- Tsunami waves can travel across the ocean at speeds of more than 500 mph.
- Japan is a nation with the most recorded tsunamis in the world.
- The 2004 Indian Ocean tsunami is the deadliest tsunami in recorded history.
- Tsunamis are most prevalent in the Pacific Ocean.
- 3.5 billion years ago, an asteroid collision created a giant tsunami that swept around Earth several times.
- When the ocean is deep, tsunamis can cross the entire ocean in a day or less.
- It is believed that a tsunami sounds like a freight train.
- Tsunamis can even travel up rivers and streams that lead to the ocean.

Megatsunami

A megatsunami is an informal term used to describe a very large tsunami wave.

Rising High

Once the tsunami wave reaches the coast, its top moves faster than the bottom, which causes the sea to rise dramatically.





Oceans



Oceans were formed as a result of the redistribution of mantle materials within Earth, as they rose to the surface. Millions of years ago, as Earth warmed, lava, gases, and water vapor locked in Earth's crust were released. These were carried to the surface by volcanic activity and formed the early atmosphere. Water vapor condensed into clouds bringing the first rain on Earth. Once the water cycle began, oceans starting forming.

Tides

Tides are the periodic rise and fall in the ocean's surface caused by the gravitational attraction between Earth and the moon.



Oceanic Ridge

Oceanic ridges are mountains under the oceans formed by the movement of tectonic plates.

fact scope

- The highest tides on Earth are found in the Bay of Fundy east of New Brunswick, Canada.
- The largest waterfall on Earth is actually underwater, found in the Denmark Strait.
- About 97% of all of Earth's water is saltwater found in oceans.
- The temperature of most ocean water is about 39° F.
- 90% of all volcanic activity occurs in the oceans.
- The pressure at the deepest point in the ocean is more than eight tons per square inch.
- The top ten feet of the ocean hold as much heat as the entire atmosphere.

Ocean Zones

Oceans are divided into different zones. These zones are separated according to the amount of sunlight that penetrates the ocean. The three major zones are the sunlit zone, twilight zone, and the midnight zone. These zones contain a variety of marine life. The open sea consists of 65 percent ocean water.



fact scope

- The sunlit zone is the bright ocean zone that extends to about 650 feet.
- There is enough light in the sunlit zone for photosynthesis to take place.
- Animals in the sunlit zone include most ocean fish, jellyfish, sea turtles, seals, coral, and zooplankton.
- Eelgrass and thalassia are flowering plants found in the sunlit zone.
- There are no plants in the twilight zone.
- Octopus, squid, and the hatchet fish are some of the animals found in the twilight zone.
- Some animals in the midnight zone don't have eyes.
- William Beebe and Otis Barton were the first people to travel to the twilight zone.

Counterillumination

Counterillumination is a method of camouflage adopted by some animals in the twilight zone.



Photophores

Some animals in the twilight zone make light with special organs in their bodies called photophores.



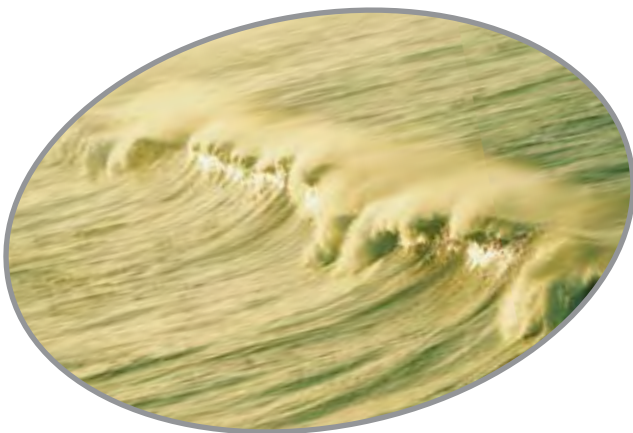
Ocean Currents

An ocean current is the directed movement of ocean water. Ocean currents can flow for thousands of miles. Ocean currents are caused by wind and Earth's movement. They are mostly permanent or continuous. Ocean currents play an important role in determining climates of the continents.



Density Currents

Density currents are ocean currents that flow as result of the differences in the density of water.



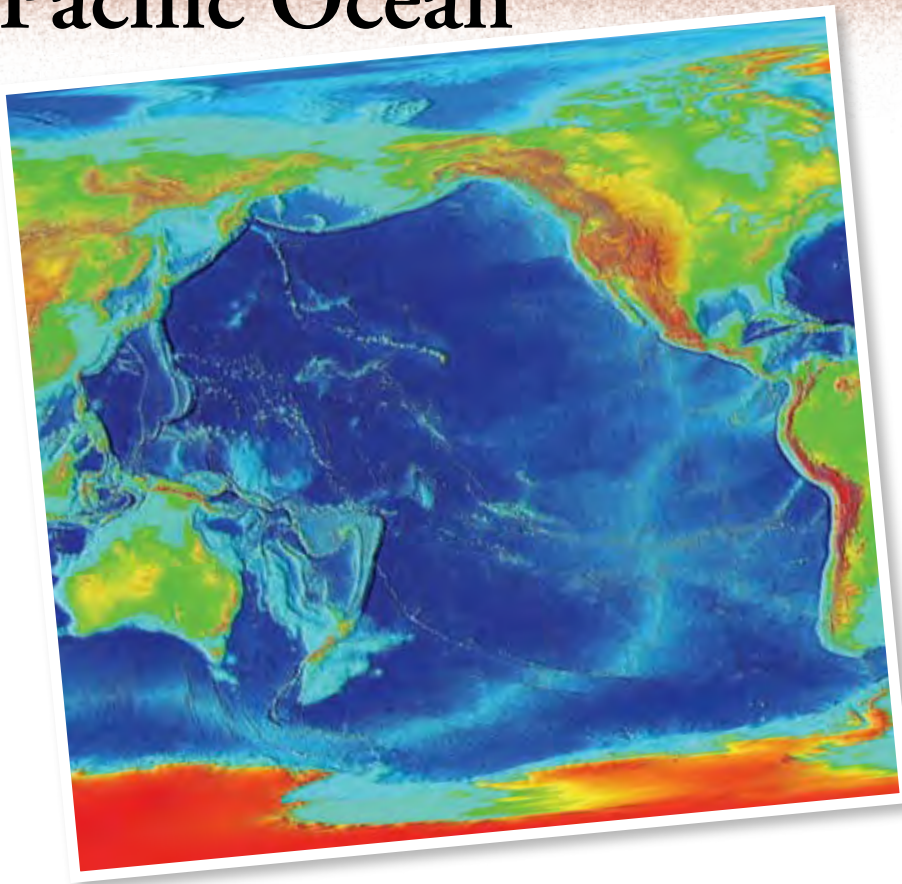
Equatorial Counter Currents

Equatorial counter currents are currents that flow from the west to east in the Pacific, Atlantic, and Indian Oceans.

fact scope

- The Gulf Stream is the world's largest ocean current.
- The Kuroshio current is the world's second-largest ocean current.
- The Humboldt current flows along the west coast of South America from northern Peru to the southern tip of Chile.
- The west wind drift is the dominant current of the Southern Ocean.
- The Somali current, off Africa's eastern coast, reverses its direction twice a year.
- Cold currents come from polar and temperate latitudes and tend to flow towards the equator.
- Warm surface currents flow from the tropics to the higher latitudes.
- Ocean currents are measured in Sverdrup or Sv.

Pacific Ocean



The Pacific Ocean is the world's largest ocean. It makes up one-third of Earth's surface and has an area of about 64 million square miles. The Pacific Ocean extends from the Arctic in the north to the Antarctic in the south. On its west is Asia and Australia and to its east lies North and South America.

fact scope

- The name Pacific is derived from the Latin name *Mare Pacificum* meaning "peaceful sea."
- The Bering Land Bridge is a land bridge that existed over the Bering Strait during the Ice Age.
- The deepest point in the Pacific Ocean is Challenger Deep, located in the Mariana Trench at a depth of 35,838 feet.
- The Pacific Ocean has 20,000 to 30,000 islands.
- The Pacific Ocean has more underwater volcanoes than any other ocean.
- The Pacific Ocean makes up half the water surface of Earth.

Bering Strait

The Bering Strait lies between the Cape Dezhnev in Russia and Cape Prince of Wales in Alaska and connects parts of the Arctic Ocean with a part of the Pacific Ocean.

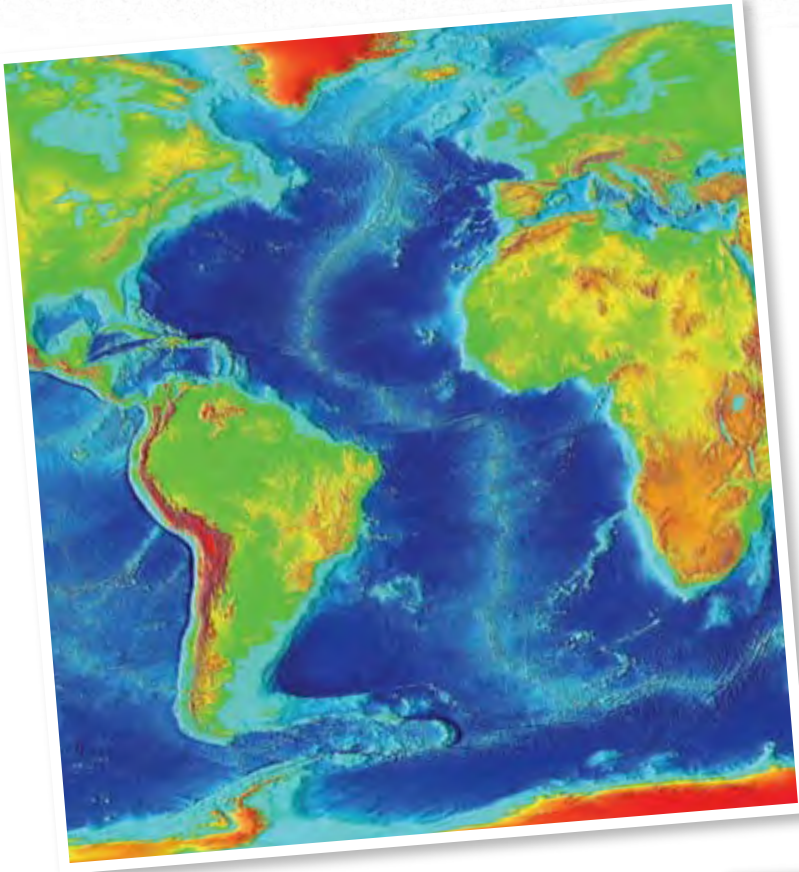
Ring of Fire

The "Ring of Fire" is a zone in the Pacific Ocean that witnesses frequent earthquakes and volcanic eruptions. It is about 25,000 miles long.





Atlantic Ocean



The Atlantic Ocean is the second-largest ocean. It encompasses a fifth of Earth's surface and has an area of about 31,830,000 square miles. The Atlantic Ocean extends from the Arctic Ocean in the north to the Antarctica in the south. North America, South America, and Europe lie to its east and Africa lies to its west.

Sargasso Sea

The Sargasso Sea is a region in the North Atlantic Ocean surrounded by strong ocean currents of the Gulf Stream, the North Atlantic current, and the Canary current.



Bermuda Triangle

The Bermuda Triangle, located off the southeastern Atlantic coast of the United States, is famous for the mysterious disappearances of many ships and aircrafts.

fact scope

- The Atlantic Ocean is the saltiest ocean.
- The Panama Canal connects the Atlantic and Pacific oceans.
- The Mid-Atlantic Ridge is a mountain range in the Atlantic Ocean.
- The Atlantic Ocean averages 11,810 feet deep.
- The deepest point in the Atlantic Ocean is the Puerto Rico Trench that lies at a depth of 28,231 feet.
- The Atlantic Ocean appears to be the second youngest of the world's oceans.
- In 1998 Ben Lecomte was the first person to swim across the Atlantic Ocean.
- Greenland is the largest island in the Atlantic Ocean.
- The coastline of the Atlantic Ocean is 69,510 miles long.

Indian Ocean

The Indian Ocean is the third largest ocean. It is around 6,213 miles wide at some places and encompasses an area of about 28.3 million square miles. The Indian Ocean lies mostly in the southern hemisphere. It extends from Asia in the north to Antarctica in the south. Africa lies to its west and Australia lies to its east.



fact scope

- Approximately 40% of the world's offshore oil production comes from the Indian Ocean.
- The sand in the beaches of the Indian Ocean is rich in heavy minerals.
- The Indian subcontinent divides the Indian Ocean into the Arabian Sea and Bay of Bengal.
- The floor of the Indian Ocean has an average depth of 12,800 feet.
- The Java Trench is the deepest point in the Indian Ocean.
- The coastline of the Indian Ocean is 41,337 miles long.
- Eudoxus of Cyzicus was the first Greek to cross the Indian Ocean in the 2nd or 1st century BCE.

Cape of Good Hope

The Cape of Good Hope, located in southwest South Africa, is the transition point between the Indian Ocean and the South Atlantic Ocean.



Monsoon

A monsoon is a periodic wind that prevails in the Indian Ocean and causes heavy rainfall.



Southern Ocean

The Southern Ocean is the fourth largest ocean in the world. It encircles the continent of Antarctica and has an area of 7.8 million square miles. The Southern Ocean experiences some of the strongest winds and largest waves among all oceans. In winter, the ocean freezes to form sea ice and doubles the size of Antarctica.



South Sandwich Trench

The South Sandwich Trench is a 599 miles long trench that extends from the South Atlantic Ocean to the Southern Ocean.



Drake Passage

The Drake Passage, located in the Southern Ocean, has some of the worst sea weather in the world.

fact scope

- The floor of the Southern Ocean has an average depth of 14,700 feet.
- Southern Ocean is home to the longest current in the world, the Antarctic Circumpolar current.
- The sea temperature of the Southern Ocean varies from 28°F to 50°F.
- The South Sandwich Trench is the deepest point in the Southern Ocean at a depth of 23,737 feet.
- The coastline of the Southern Ocean is about 11,165 miles long.
- The Drake Passage offers an alternative to transit through the Panama Canal.

Arctic Ocean



The Arctic Ocean is the smallest ocean in the world with an area of 5.4 million square miles.

Most of the Arctic Ocean remains covered in ice. The Arctic Ocean extends from the North Pole to Europe, Asia, and North America. It is almost landlocked and surrounded by Russia, Norway, Greenland, Canada, and Alaska.



fact scope

- The Arctic Ocean provides the shortest air route between the Pacific coast of North America and Europe.
- Baffin Bay, East Siberian Sea, Greenland Sea, Hudson Bay, and White Sea are some of the seas that border the Arctic Ocean.
- The Arctic Ocean is the shallowest ocean.
- The average depth of Arctic Ocean is 3,407 feet.
- The Eurasian Basin is the deepest point in the Arctic Ocean with an average depth of 17,881 feet.
- Wally Herbert led the first surface crossing of the Arctic Ocean in 1969.
- Much of the Arctic Ocean is covered by sea ice.

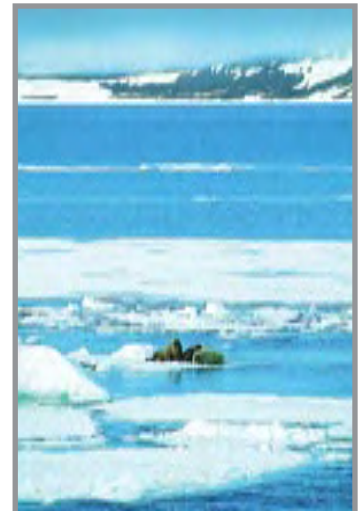


Sun in Arctic

The sun never sets during summers in the regions of the Arctic Ocean.

Natural Resources

The Arctic Ocean is abundant in natural resources such as petroleum, gas fields, and fish.





Gulfs and Bays

A gulf is a part of an ocean or sea that extends into the land. The Gulf of Mexico, Persian Gulf, and Gulf of Aden are examples of a gulf. A bay is a body of water that has an outlet to the sea. It is partly enclosed by land and is smaller than a gulf. The Bay of Pomerania, Bay of Biscay, and Bay of Bengal are examples of bays.



Headland

A headland is an area of land adjacent to water on three sides.



Bay of Bengal

The Bay of Bengal is a bay that forms the northeastern part of the Indian Ocean.

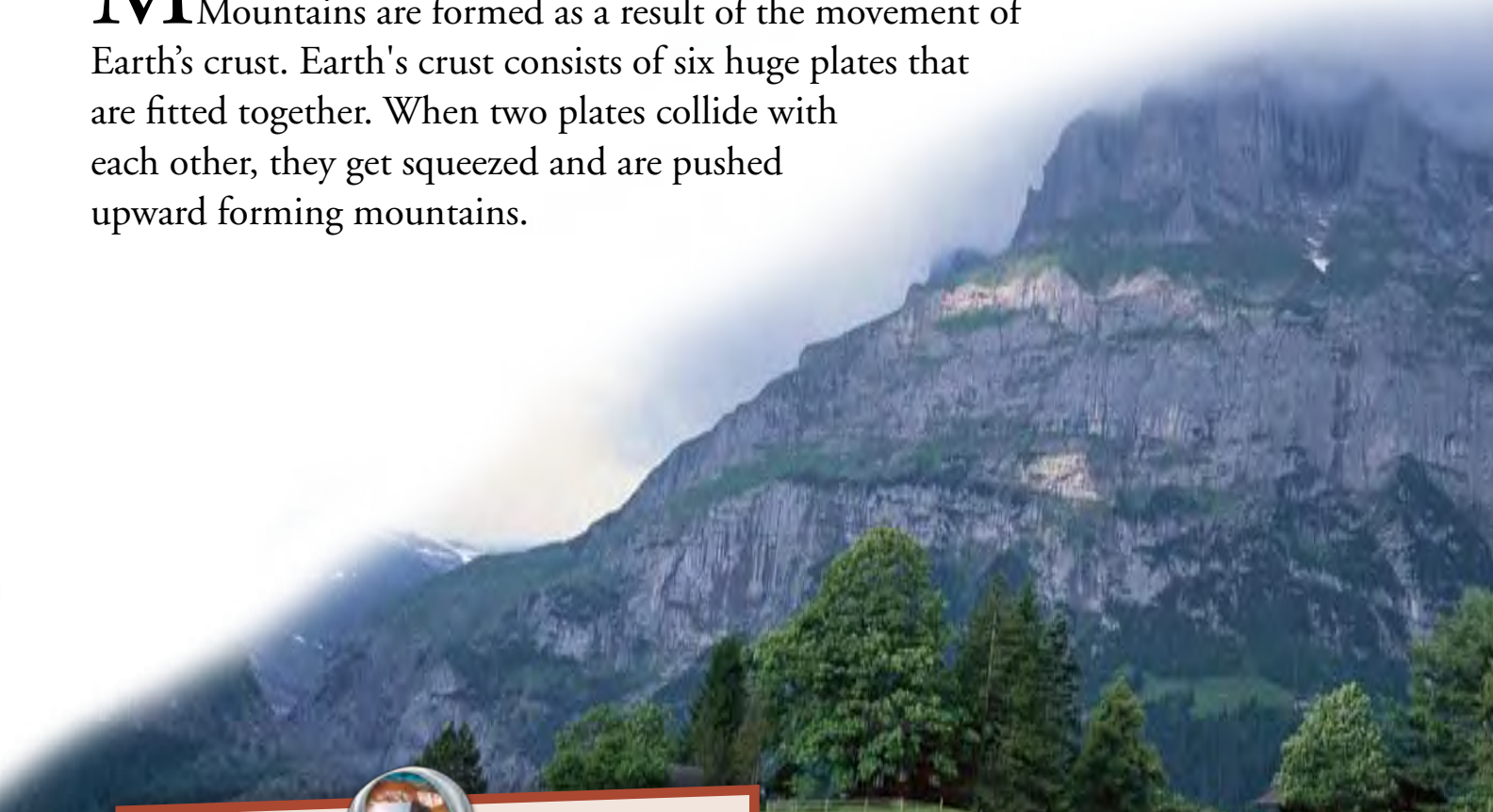
fact scope

- The Bay of Biscay is a bay of the North Atlantic Ocean.
- The Gulf of Guinea is considered to be the geographic center of Earth.
- Halong Bay consists of a cluster of 1,969 limestone monolithic islands.
- The Persian Gulf is an extension of the Gulf of Oman.
- Baffin Bay is a sea between the Atlantic and Arctic oceans.
- The Gulf of Mexico is a major body of water nearly landlocked by North America.
- Massachusetts Bay is one of the large bays of the Atlantic Ocean.
- The Gulf of Oman connects the Arabian Sea with the Persian Gulf.

Mountains



Mountains are major elevations on the planet's surface. Mountains are formed as a result of the movement of Earth's crust. Earth's crust consists of six huge plates that are fitted together. When two plates collide with each other, they get squeezed and are pushed upward forming mountains.



fact scope

- Generally, mountains are landforms that rise above 1,900 feet.
- The Andes is the longest mountain range in the world.
- The Himalayas is the highest mountain range in the world.
- The Appalachian Mountains are an example of fold mountains.
- The Black Hills of South Dakota are dome mountains.
- The Catskills of New York are plateau mountains.
- Mount Everest, part of the Himalayas, is the highest point on Earth, with a height of 29,035 feet.

Eight-thousanders

Eight-thousanders are the fourteen mountains on Earth that are higher than 8,000 meters or 26,246 feet measured from sea level.



Types of Mountains

Mountains can be of several types, such as dome mountains, fold mountains, fault-block mountains, volcanic mountains, and plateau mountains.



Valley

Valleys are surface depressions formed between mountains. Valleys are generally V-shaped or U-shaped. Some valleys are formed by fast flowing rivers moving downhill, while some are formed by meandering rivers. Valleys formed by the fast flowing rivers are V-shaped, while meandering rivers form river plain valleys. Glaciers also form valleys, which are U-shaped.



Hollow

A hollow is common term for a valley in areas, such as New England, Missouri, and western Pennsylvania.

Rift Valley

Rift valleys are formed by the expansion of Earth's crust due to tectonic activity beneath Earth's surface.



fact scope

- The Grand Canyon is a steep-sided valley carved by the Colorado River.
- The Great Rift Valley is a 3,700 mile valley in Africa that was named by the explorer John Walter Gregory.
- The name Rhine may come from the Celtic word *renos*, which means "that which flows."
- The Sonoma Valley is the birthplace of the California wine industry.
- The Valley of the Kings is a valley in Egypt where tombs were built for the Pharaohs and powerful nobles of Ancient Egypt.
- The Santa Clara Valley is also known as the "Valley of Heart's Delight" for the miles and miles of fruit trees blossoming in the spring.

River



Rivers are large natural streams of water that flow into other water bodies. They are formed in watershed areas, which are bounded by hilltops or ridges. As rain falls and snow melts on the hillsides, the water runs downhill forming a river channel. The size of a river depends on the amount of rainfall and snowfall in the watershed areas.

fact scope

- The Amazon River is the largest river in the world in terms of volume and water.
- A meander is a bend in a river.
- A youthful river is a river with a steep gradient that flows quickly and has very few tributaries.
- A mature river is a river with a less steep gradient and flows more slowly than youthful rivers.
- An old river is a river with a low gradient and low erosive energy.
- The Rhine River is one of the longest and most important rivers in Europe.
- The Ganges River is worshipped by Hindus as a goddess.
- The Yellow River is also called the "Mother of China."

The World's Ten Longest Rivers

River	Length
Nile	4,160 miles
Amazon	4,000 miles
Chang Jiang (Yangtze)	3,964 miles
Huang He (Yellow)	3,395 miles
Ob-Irtysh	3,362 miles
Amur	2,744 miles
Lena	2,734 miles
Congo	2,718 miles
Mackenzie	2,635 miles
Mekong	2,600 miles

Dams

Dams are built to control the flow of the river, store water, or extract energy.



Lakes

Lakes are fresh water bodies surrounded by land. They are mainly formed by the process of glacial action. During the Pleistocene epoch, the glaciers brought in large ice sheets eroding the land. Lakes are also formed by collapsing volcanic craters and the movement of tectonic plates in the earth's crust. Lakes can be man-made too.



Land of the Thousand Lakes

Finland is known as the land of the thousand lakes. It has about 187,888 lakes.



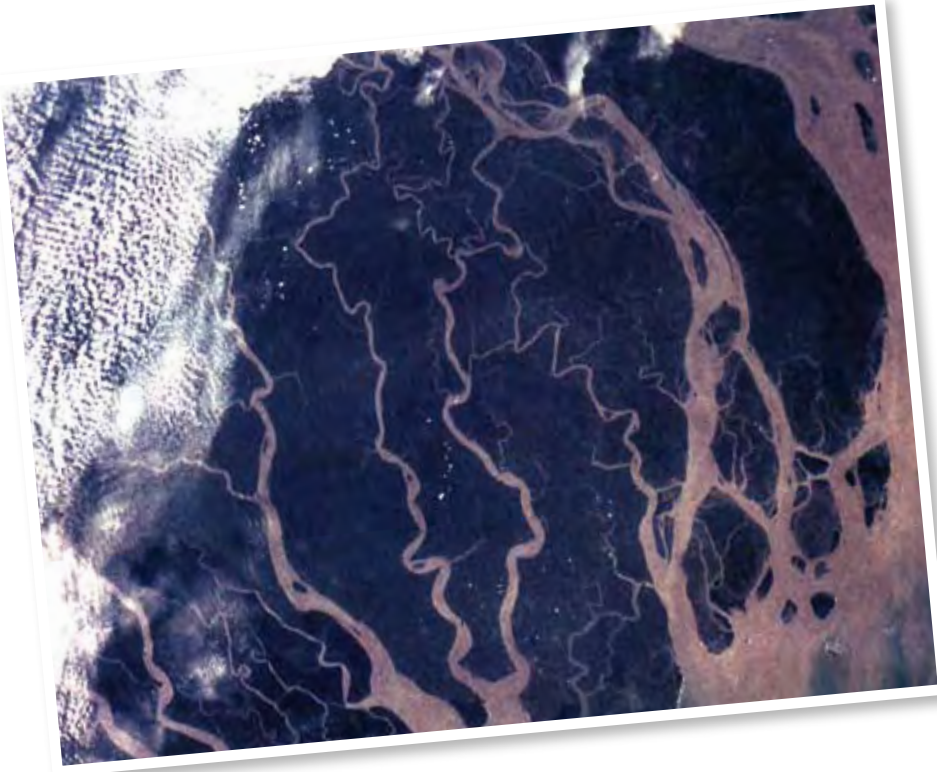
Great Lakes

The Great Lakes are a group of five large lakes in North America: Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

fact scope

- Subglacial lakes are lakes permanently covered by ice.
- Artificial lakes are also called reservoirs.
- Endorheic lakes are lakes that have no significant outflow.
- Meromictic lakes are lakes which have layers of water that do not intermix.
- An oxbow lake is formed from the meandering of river.
- Rift lakes are lakes formed as a result of the movement of Earth's tectonic plates.
- A crater is a lake, which may form in volcanic craters.
- The largest lake in the world by surface area is the salty Caspian Sea.
- The deepest lake in the world is Lake Baikal in Siberia.

Delta



A delta is a triangular area at the mouth of a river before it merges with the sea or ocean. River currents deposit alluvial soil at deltas before flowing into the sea or ocean. Ancient Greek historian, Herodotus, was the first to use the term delta for the Nile River Delta.

fact scope

- Where delta formation is river-dominated, it resembles the shape of a bird's foot.
- The Niger Delta is an inland delta.
- An inverted river delta converges downstream rather than diverging.
- The Ganges River is largely covered with a swamp forest known as the Sunderbans, which is home to the Royal Bengal Tiger.
- The Mississippi River Delta provides 16 to 18 percent of the US oil supply.
- The Niger River Delta is also called the Oil Rivers because it was once a major producer of palm oil.
- The Yukon-Kuskokwim Delta is one of the biggest river deltas in the world.

The Nile Delta

The Nile Delta is one of the world's largest river deltas.



Inland Delta

An inland delta is formed when a river divides into multiple branches in an inland area, only to rejoin and continue to the sea.



Grasslands

Grasslands are large rolling terrains covered with grass. They receive only enough rainfall to support grasses; therefore other plants and trees are rare in grasslands. Grasslands are drier than forests but not as dry as deserts. Tropical grasslands and temperate grasslands are two types of grasslands.

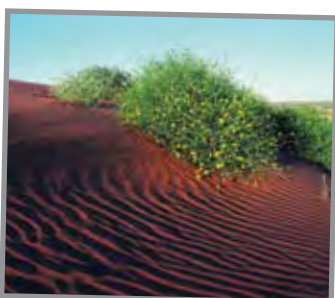


fact scope

- Grasslands receive about 20 to 36 inches of rain per year.
- Average temperatures in the grasslands are about -4 to 36 degrees Fahrenheit.
- Prairie clover, salvia, oats, wheat, barley, and coneflowers are some of the plants found in the grasslands.
- Llanos is a tropical grassland situated at the east of the Andes in northwestern South America.
- A prairie is the temperate grassland in North America.
- Pampas are grasslands found in Argentina.
- Steppes are the temperate, semiarid areas of treeless grasslands in Europe and Asia.

Anthropogenic Grasslands

Grasslands created and maintained by human activity are called anthropogenic grasslands.



Xeric Grasslands

Xeric grasslands are sparse grasslands located in deserts.

Deserts



Deserts are extremely dry regions. Deserts receive less than 10 inches of rainfall every year. Deserts can sizzle at a temperature of more than 131° F during daytime and freezes at night. The sand absorbs much heat during the daytime and releases it at night.



fact scope



- Deserts cover at least one-fifth of the earth's land surface.
- Antarctica is the largest cold desert in the world.
- The largest hot desert in the world is the Sahara.
- Sand is found in only about 20 percent of Earth's deserts.
- Saguaro is a large, tree-sized cactus species native to the Sonoran Desert in the United States and Mexico.
- The largest crescentic sand dunes are found in China's Taklamakan Desert.
- Camels are called the "ship of the desert."
- The Atacama Desert is the driest desert on Earth.

Montane Deserts

Montane deserts are arid places at a very high altitude.

Ergs

Large sand dune fields in the deserts are known as ergs.





Forests

Forests are large areas that are densely covered with trees. They are found all over the world and provide human beings with a lot of natural resources. Forests

cover about 30 percent of Earth's total land area. They are home to many species of plants and animals and form a complex ecosystem.



Types of Forests

There are four major types of forests: rain forest, taiga, temperate hardwood forest, and tropical dry forest.

Rainforests

Rainforests are very dense, warm, wet forests, with normal annual rainfall between 6 feet and 9 feet.

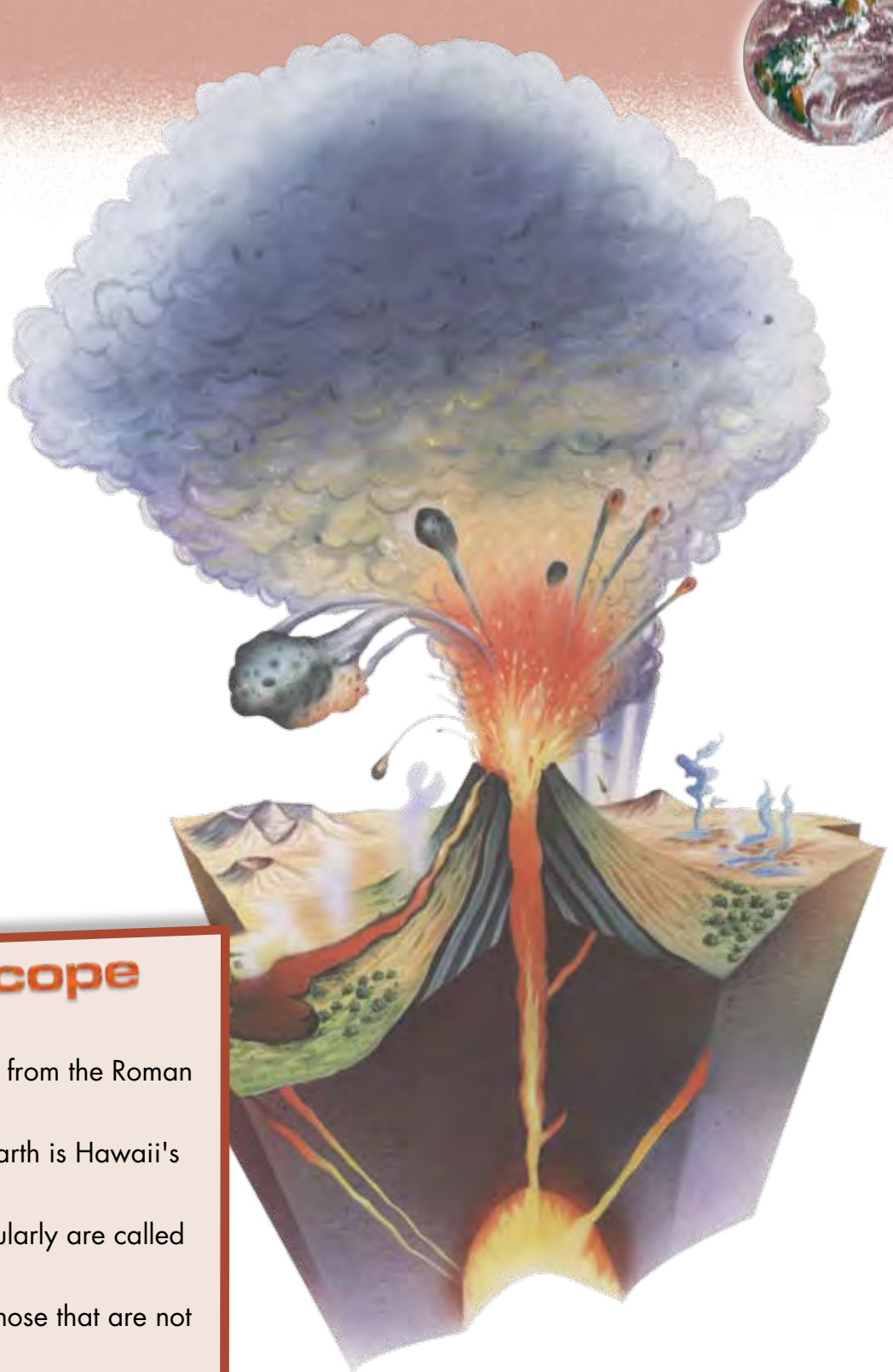


fact scope

- By the Triassic period, gymnosperms dominated Earth's forests.
- Forests occupy approximately one-third of Earth's land area.
- Taiga forests are also known as boreal forests.
- Insects are the most common animals in rainforests.
- Tropical rainforests are found in areas around the equator.
- Temperate rainforests are found along the Pacific coast of the USA, Canada, New Zealand, Tasmania, Chile, Ireland, Scotland, and Norway.
- Soil of a tropical rainforest is only about 3 to 4 inches thick.
- Tropical rainforests cover about 7% of Earth's surface.

Volcano

A volcano is a geological landform, usually in the shape of a mountain. It forms the opening in Earth's surface through which molten lava and gases erupt. Volcanoes are of three types: active, dormant, and extinct. Mount Vesuvius, Mauna Loa, and Mount Unzen are examples of volcanoes.



fact scope

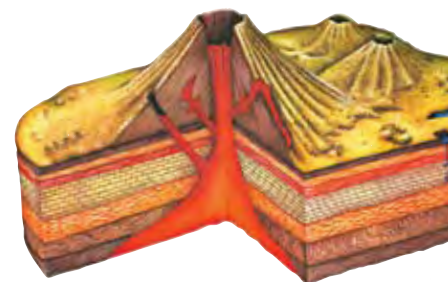
- The word volcano comes from the Roman god of fire, *Vulcan*.
- The largest volcano on Earth is Hawaii's Mauna Loa.
- Volcanoes that erupt regularly are called active.
- Dormant volcanoes are those that are not currently active.
- Extinct volcanoes are those that are unlikely to erupt again.
- Yellowstone Caldera volcano is at least 2 million years old and has been dormant for approximately 640,000 years.
- There are more than 500 active volcanoes in the world.
- Mount Etna is thought to be the oldest active volcano in the world.

Lava

When magma erupts through the planet's surface it is called lava.

Magma

Magma is molten rock within the planet's crust.





Waterfall

A waterfall is a geological formation that is a result of erosion. It forms when the water of a river suddenly falls over a rock cliff. Waterfalls are formed more often in mountain regions because the process of erosion is rapid. Some types of waterfalls are block, cascade, and cataract.



fact scope

- A block is a waterfall formed when water descends from a relatively wide stream or river.
- A cascade is a waterfall formed when water descends a series of rock steps.
- A fan is a waterfall formed when water spreads horizontally as it descends while remaining in contact with the bedrock.
- A horsetail is a waterfall formed when descending water maintains some contact with the bedrock.
- A plunge is a waterfall formed when water descends vertically, losing contact with the bedrock surface.
- A punchbowl is a waterfall formed when water descends in a constricted form, then spreads out in a wider pool.

Angel Falls

Angel Falls, located in Venezuela, is the world's highest waterfall at 3,000 feet.



Jurong Falls

Jurong Falls, located in Singapore, is said to be the highest man-made waterfall in the world.

Glacier



Glaciers are masses of ice and snow that accumulate at high altitudes and flow like a river. When the yearly snowfall exceeds the amount of snow that melts in the summers, in a particular region, then layers of snow are formed. This mass of snow grows bigger and heavier over the years and starts moving slowly under its own weight and gravity. This moving mass of ice is called a glacier.

fact scope

- The largest glaciers are continental ice sheets, found in Antarctica and Greenland.
- Tidewater glaciers are glaciers that flow into the sea.
- Glaciers erode the terrain principally through two methods: scouring and plucking.
- Glacial surges are short-lived events where a glacier moves 100 times faster than its normal speed.
- A cirque is an amphitheatre-like valley formed by glacial erosion.
- Glaciers store about 75% of the world's freshwater.
- During the last Ice Age, glaciers covered 32% of the total land area.

Temperate Glacier

A temperate glacier is a glacier that is at the melting point throughout the year from the surface to the base of the glacier.



Polar Glacier

A polar glacier is a glacier that is always below the freezing point with maximum mass loss due to sublimation.



Canyons

A canyon is a deep narrow valley. They are usually formed from the action of rivers. They have very steep sides and are usually made of sandstones or granite. The term “canyon” is used in the United States. In Europe, however, the word “gorge” is more commonly used to describe canyons.



Submarine Canyons

Submarine canyons are those which are formed underwater, generally at the mouths of rivers.

Slot Canyons

Slot canyons are very narrow canyons, often with smooth walls.

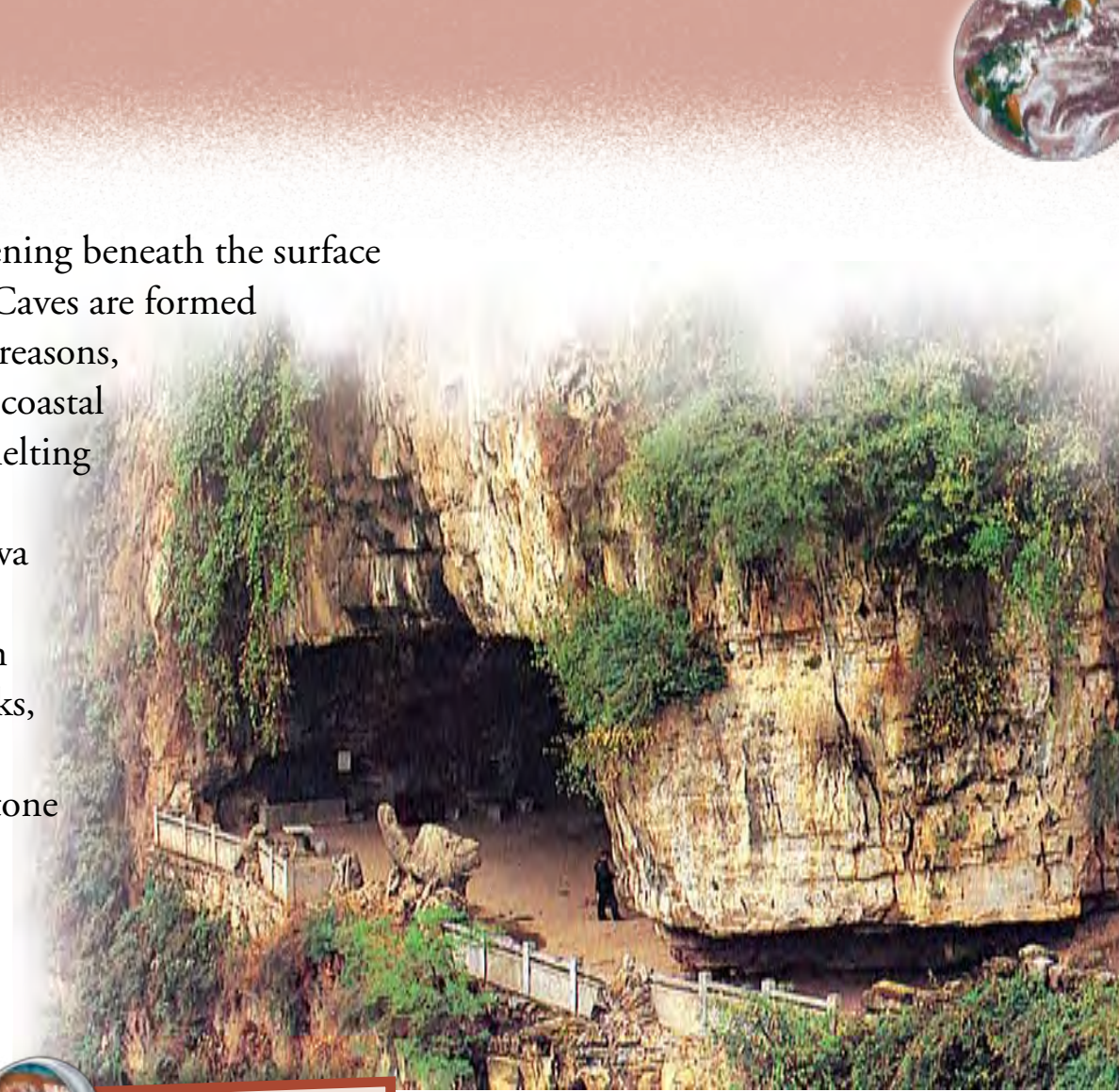


fact scope

- Canyons often form in areas of limestone rock.
- The deepest canyon in the world is Yarlung Tsangpo Canyon in China.
- The Grand Canyon was formed by erosions of water and wind.
- The Three Gorges region is located along the Yangtze River in China.
- The Taroko Gorge is well known for its abundant supply of marble.
- The Valles Marineris on Mars is the largest known canyon in the solar system.
- The Verdon Gorge in southeastern France is considered Europe's most beautiful gorge.

Caves

A cave is an opening beneath the surface of the earth. Caves are formed because of several reasons, such as erosion of coastal bedrock, partial melting of glaciers, and solidification of lava into hollow tubes. Caves are found in many types of rocks, but they are most common in limestone and gypsum.



fact scope

- Caves are found throughout the world.
- The cave system with the greatest total length of passage is Mammoth Cave in Kentucky with a length of 360 miles.
- The Optymistychna system is a cave system in Ukraine with a total length of 133 miles.
- The deepest known cave is Voronya Cave in Abkhazia, Georgia, with a depth of 1.3 miles.
- Santa Cruz Island in California, has one of the largest concentrations of large sea caves.
- Blind cave fish and cave crickets are troglobites.
- The Great Cave of Niah contains evidence of human habitation dating back 40,000 years.

Troglobite

A troglobite is an animal that lives entirely in the dark parts of caves.

Speleology

Speleology is the scientific exploration and study of all aspects of caves.



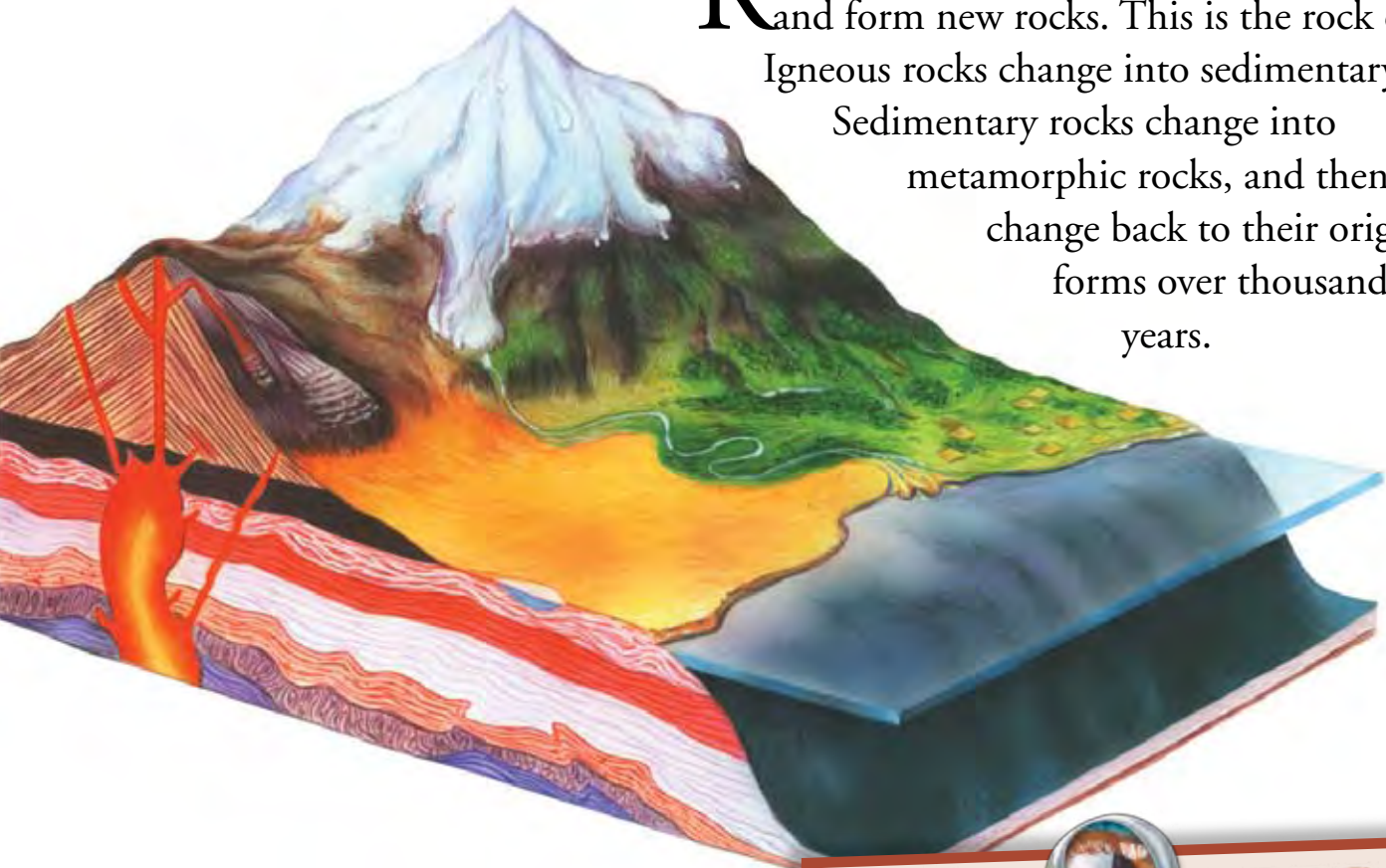


Rock Cycle

Rocks break and undergo many changes and form new rocks. This is the rock cycle.

Igneous rocks change into sedimentary.

Sedimentary rocks change into metamorphic rocks, and then they change back to their original forms over thousands of years.



Erosion

Erosion causes rocks to wear away. Water and wind are the chief eroding forces.



Sediment

Sediment is deposited by running water into lakes and oceans, which as a result of compaction and compression can become consolidated sedimentary rocks.

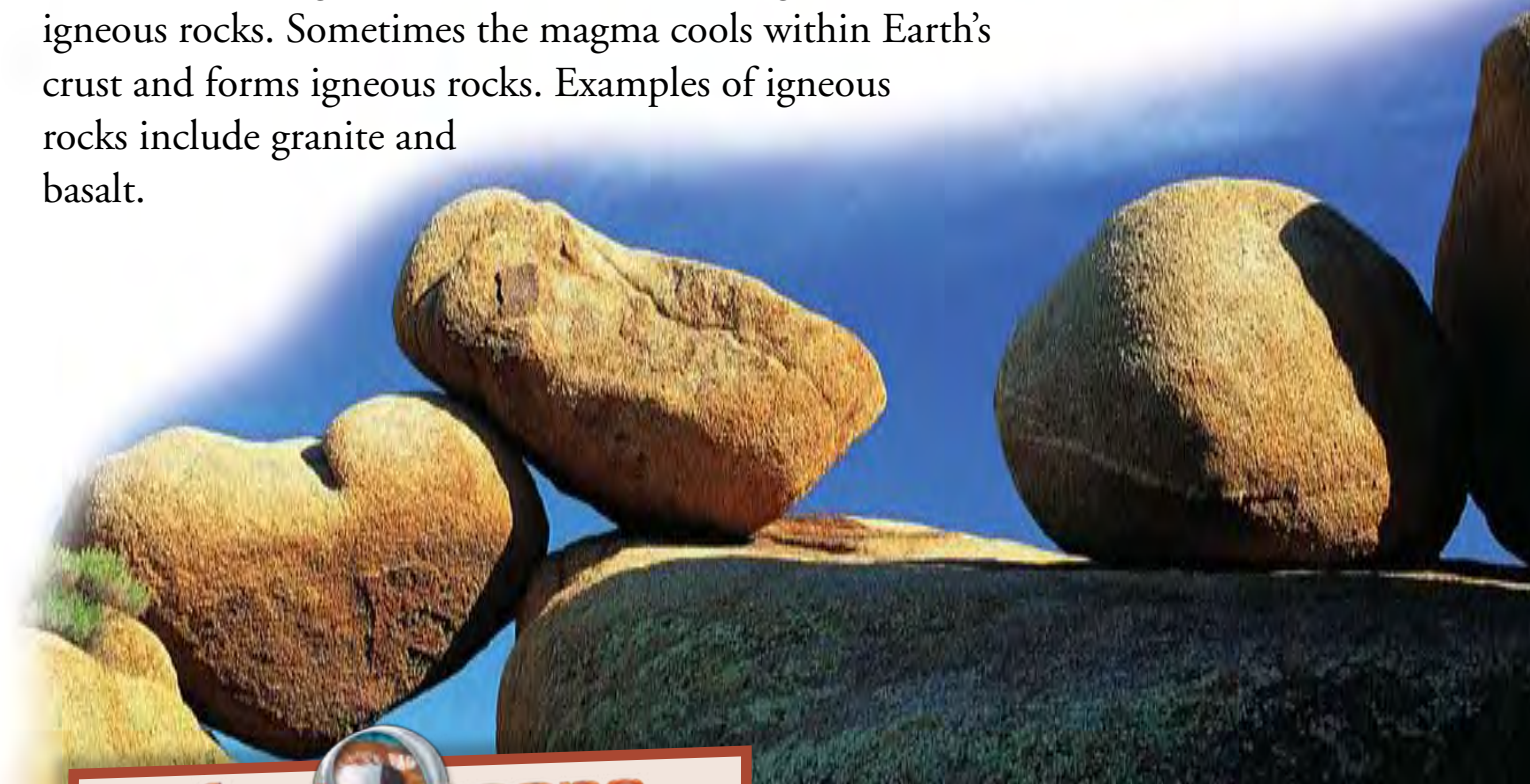
fact scope

- Rocks are formed from minerals.
- Everything in the natural world that is not plant, animal, liquid, or gas is mineral.
- About 3,000 different minerals have been identified in Earth's crust.
- Each mineral is a natural substance with a definite chemical composition and specific physical characteristics.
- Water is also a special case: as naturally frozen ice, it too, is considered a mineral.
- Many of the rocks that make up the world's mountains contain quartz.
- A mineral is never pure. Gold, for example, always contains impurities.
- Four elements: iron, magnesium, silicon, and oxygen make up 90% of the planet.

Igneous Rock



Igneous rocks are formed by the cooling of molten rocks. Deep inside the planet high temperature and pressure melts the rocks. This molten rock or magma comes out during volcanic eruptions, which gradually cool down to form igneous rocks. Sometimes the magma cools within Earth's crust and forms igneous rocks. Examples of igneous rocks include granite and basalt.



fact scope

- Over 700 types of igneous rocks have been described.
- Batholiths, stocks, laccoliths, sills, and dikes are examples of intrusive igneous rocks.
- Central cores of major mountain ranges consist of intrusive igneous rocks, usually granite.
- Hypabyssals are intrusive igneous rocks formed near the surface of the planet.
- Phaneritic rocks are igneous rocks with crystals large enough to be seen by the naked eye.
- Aphanitic rocks are igneous rocks with crystals too small to be seen.
- Acid igneous rocks contain high silica content greater than 63%.

Intrusive Igneous Rocks

Intrusive igneous rocks are formed from magma that cools and solidifies within Earth.



Extrusive Igneous Rocks

Extrusive igneous rocks are formed at Earth's surface when hot magma from inside Earth flows out onto the surface as lava.



Metamorphic Rock



Metamorphic rocks are formed from igneous and sedimentary rocks when they change. The changes in these rocks take place due to the high temperature and pressure inside Earth. Examples of metamorphic rocks are slate and marble.

Metasomatism

Metasomatism is the drastic change in the chemical composition of a rock during the process of metamorphism.



Metamorphic Rock Textures

There are five basic metamorphic textures: slaty, schistose, gneissose, granoblastic, and hornfelsic.

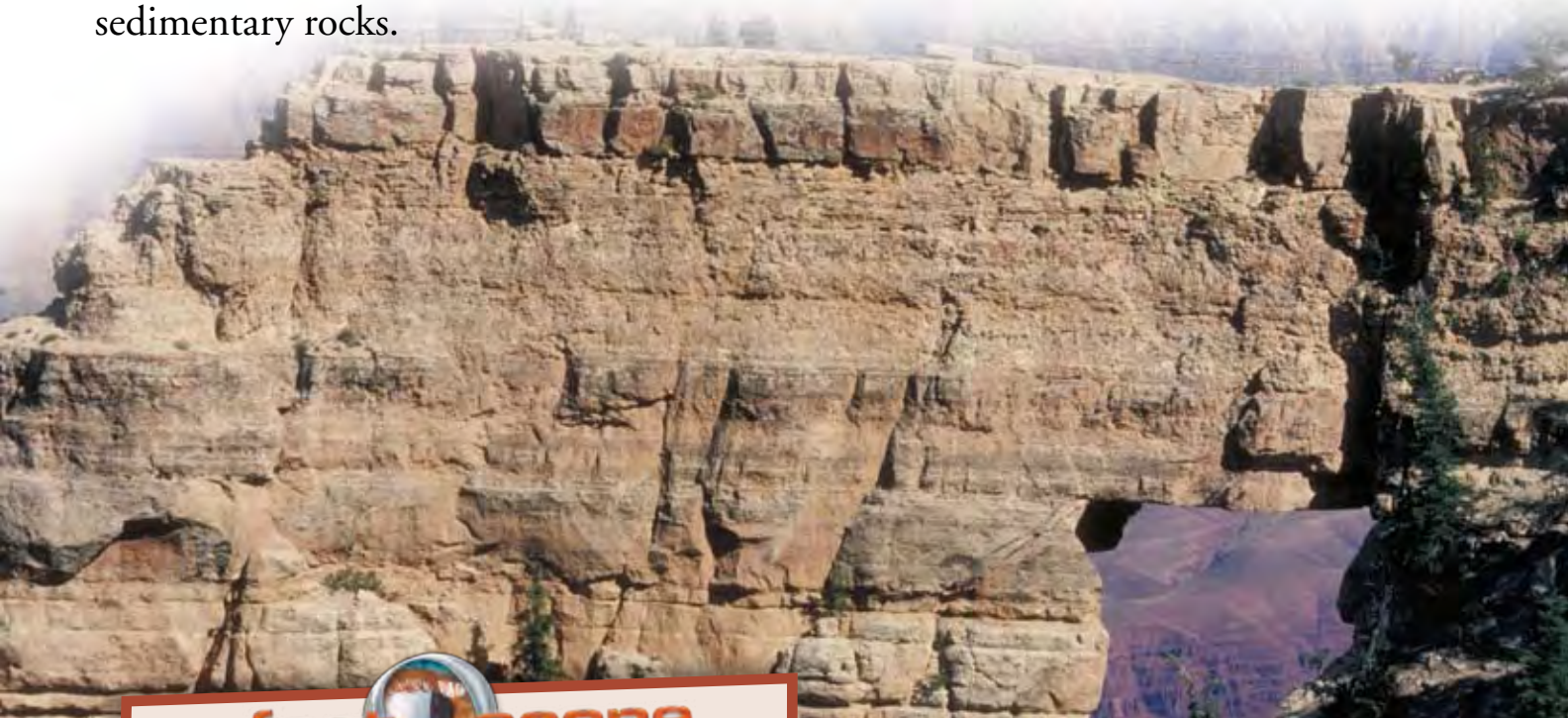
fact scope

- Metamorphic rocks make up a large part of Earth's crust.
- Some examples of metamorphic rocks are gneiss and schist.
- The layering within metamorphic rocks is called foliation.
- Slate is a foliated metamorphic rock.
- Most of the building foundations built in the 1920s and 30s within New York used schist.
- Phyllite is a fine-grained metamorphic rock.
- Migmatite is a very high grade metamorphic rock that has been subjected to high temperatures.
- Marble is a metamorphic rock formed from limestone.

Sedimentary Rock



Sedimentary rocks are formed of loose rock particles, minerals, plants, and animal materials that accumulate together. They can form on the surface of Earth or under the oceans. Chalk, limestone, and sandstone are some of the common sedimentary rocks.



fact scope

- Sedimentary rocks cover 75% of Earth's surface.
- Sedimentary rocks are laid down in layers called beds or strata.
- Sedimentary rocks contain fossils, the preserved remains of ancient plants and animals.
- Sedimentary rocks can be classified as clastic, biogenic, or precipitate.
- Coal is an example of organic sedimentary rocks.
- Gypsum is an example of precipitate sedimentary rocks.
- The White House in Washington, D.C., is made of sandstone, a sedimentary rock.
- Arkose is a variety of sand with large amount of feldspar.

Formation of Sedimentary Rock

Sedimentary rocks are formed in four main ways. They are:

- deposition of the remains of other rocks;
- accumulation and the consolidation of sediments;
- deposition of the results of biogenic activity; and
- precipitation from solution.



Diagenesis

Diagenesis describes all the types of changes undergone by sediment after its initial deposition.



Plants on Earth



Plants are a major group of living things. They have existed on the planet since prehistoric times. More than 300,000 species of plants are known to exist on Earth. Plants are immovable organisms. They are made of different parts such as roots, stems, flowers, fruits, and leaves. The roots of a plant are attached to the soil.

fact scope

- Embryophytes are a group of plants that include trees, flowers, ferns, mosses, and various other green land plants.
- Bryophytes are a group of plants that include mosses and liverworts
- A flower is the reproductive structure found in flowering plants.
- Flowering plants are also called angiosperms.
- Conifers are cone-bearing seed plants that include cedars, cypresses, firs, and yews.
- Weeds are unwanted plants.
- The first modern tree, *Archaeopteris* evolved during the Devonian period.



Photosynthesis

Photosynthesis is the process by which green plants make carbohydrates using light, carbon dioxide, and water with oxygen as a waste product.

Autotroph

An autotroph produces organic compounds from carbon dioxide and energy and is known as a producer in a food chain. Plants are autotrophs.

Coral

A coral is a small marine animal. Live corals are made of polyps, while dead corals are hard and stony. Young corals are larvae that flow along with the oceanic currents. Once they find a hard bottom they attach themselves and quickly change into polyps.



fact scope

- Hermatypic corals are reef-building corals.
- A coral "head" is formed of thousands of individual polyps.
- Corals first appeared in the Cambrian period.
- The Great Barrier Reef is the world's largest coral reef system.
- Coral will die if the water temperature changes by more than a degree or two beyond its normal range.
- Corals are found in seas around the world.
- It is estimated that about 60% of the world's reefs are at risk due to human-related activities.

Zooxanthellae

Algae that live inside corals and help form the coral's stony exoskeleton are known as zooxanthellae.

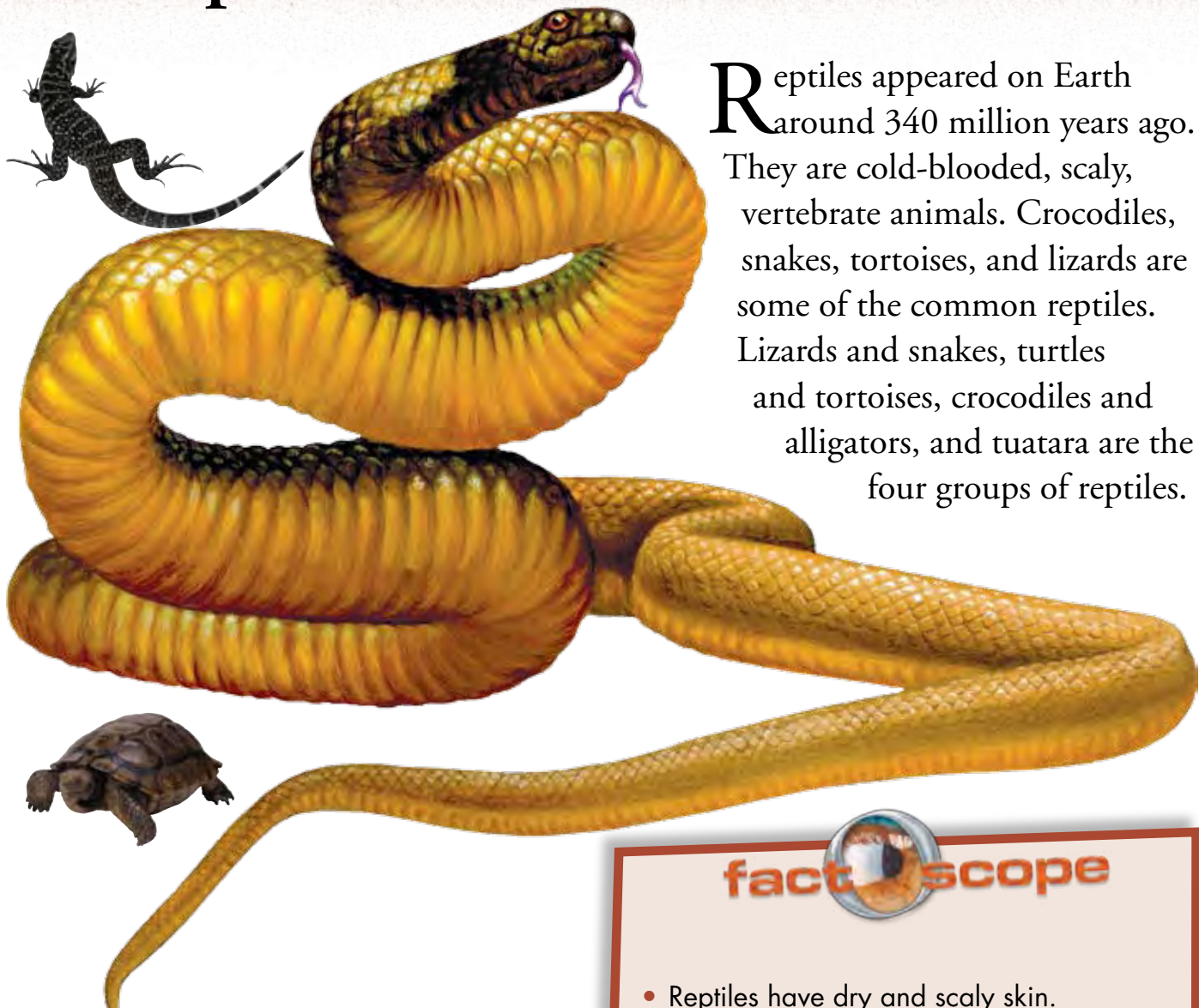
Coral Reefs

Coral reefs are structures consisting of coral skeletons built upon coral skeletons.





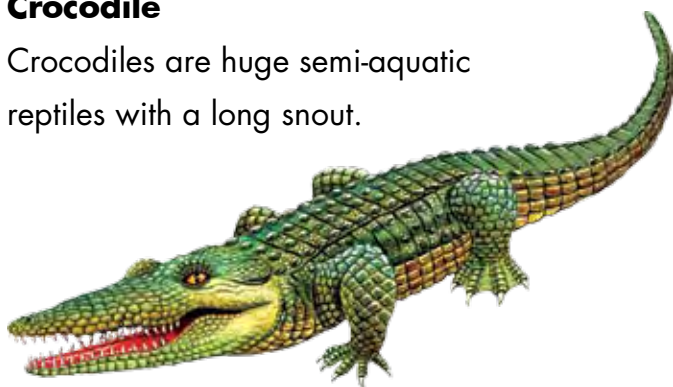
Reptiles on Earth



Reptiles appeared on Earth around 340 million years ago. They are cold-blooded, scaly, vertebrate animals. Crocodiles, snakes, tortoises, and lizards are some of the common reptiles. Lizards and snakes, turtles and tortoises, crocodiles and alligators, and tuatara are the four groups of reptiles.

Crocodile

Crocodiles are huge semi-aquatic reptiles with a long snout.



Alligators

Alligators are like crocodiles but have a shorter and broader snout.

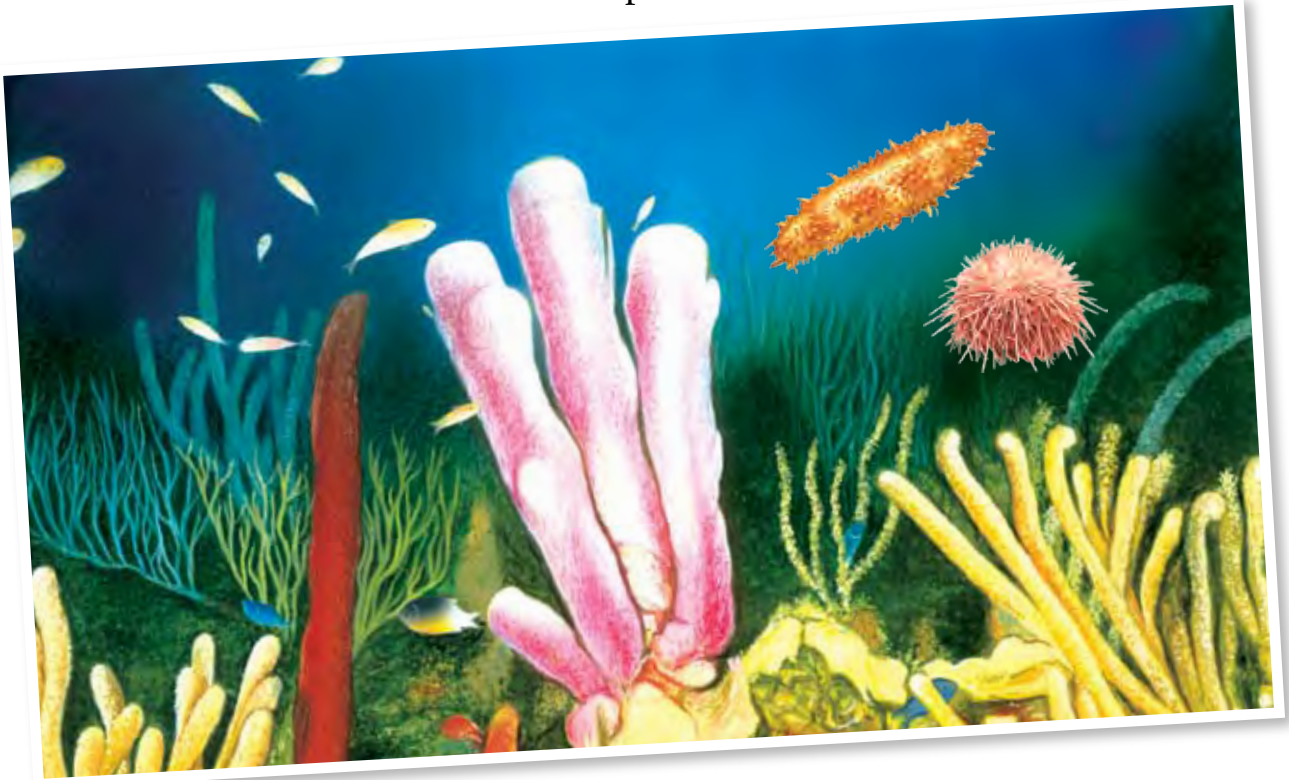
fact scope

- Reptiles have dry and scaly skin.
- Snakes do not have limbs.
- The Gila monster is a venomous lizard.
- The saltwater crocodile is the largest reptile on Earth.
- Crocodiles store fat in their tails.
- Tuataras can live up to 100 years.
- Tortoises use their hard jaws to chew their food.
- The cobra, python, and viper are varieties of snake.
- Lizards have fused lower jawbones.
- The British Virgin Islands gecko is the smallest reptile in the world with a length of just over half an inch.

Sea Animals



Oceans are rich in animal life. They are home to several organisms from tiny fish to the gigantic blue whales. More than a hundred mammals are also found in the oceans. These include whales and dolphins.



fact scope

- Sponges are one of the most primitive animals in the sea.
- Echinoderms lack a brain and complex sensing organs.
- The great white shark, found in the Pacific Ocean, is an aggressive and ruthless hunter.
- The Hawksbill turtle gets its name from its hawk-like beak.
- The Leatherback is the largest of the sea turtles.
- The Marine iguana is a lizard that dives and spends large amounts of time underwater to feed on algae.

Porpoise

Porpoises are toothed whales that are smaller than dolphins and have round snouts.



Whale

Whales are marine mammals that are of two types: toothed and baleen.



Polar Animals



Polar animals are animals that live in the polar regions. Some of these animals have thick coats of white fur. Some of the polar animals hibernate during the cold season. Some animals, such as the Arctic tern, migrate during the extreme cold winters.

Polar Bear

The polar bear, a large bear native to the Arctic, is also known as the white bear, northern bear, or sea bear.



Arctic Fox

The Arctic fox is a furry mammal that lives in the tundra and coastal areas of North America, Iceland, Greenland, Scandinavia, and Siberia.



fact scope

- The emperor penguin lives in colonies in Antarctica.
- Salmon shark are sharks found in Alaskan waters.
- The Weddell seal is a large, nocturnal pinniped found in Antarctica.
- The spectacled porpoise is a toothed whale that lives in Antarctica.
- The Arctic tern is a small bird that flies from the Arctic to the Antarctic and back again each year.
- Some of the polar animals have an insulating layer of fat to protect them from the cold.
- The narwhal is a whale from the Arctic.

Amphibians on Earth



Amphibians are vertebrates that include animals such as frogs, toads, newts, and salamanders. They appeared on the earth in the Devonian period. They are believed to be the first vertebrates to live on land. Amphibians are found throughout the world.



fact scope

- Amphibians appear to have evolved from lobe-finned fish.
- There are around 6,000 known living species of amphibians.
- Amphibians are cold-blooded.
- Frogs have long, powerful jumping legs and a very short backbone.
- Toads do not have any teeth.
- Frogs catch insects with their long, sticky tongue.
- Caecilians are amphibians that resemble earthworms or snakes.
- Toads have poison glands behind their eyes.
- A salamander is an amphibian with a slender body, short legs, and long tail.
- The goliath frog is the largest frog in the world.

Herpetology

The study of amphibians and reptiles is known as herpetology.



Tadpole

A tadpole is a larva of an amphibian, the juvenile form of a frog, toad, newt, salamander, or caecilian.



Carnivorous Animals

Carnivores are meat-eating animals such as wolves, lions, tigers, and cheetahs. Carnivorous mammals are divided into two groups: the pinnipedia and fissipedia. Pinnipedia have fin-like feet while fissipedia have paw-like feet. Some carnivores such as bears and procyonids are meat and plant eaters.

They also eat plant material. Carnivores usually feed on herbivores but many carnivores often attack and eat other carnivores too.



Insectivores

Carnivores that eat insects primarily or exclusively are called insectivores.



Piscivores

Carnivores that eat fish primarily or exclusively are called piscivores.

fact scope

- Leopard seals eat small seals and penguins.
- Polar bears are the largest carnivores, with lengths exceeding 8.2 to 9.8 feet.
- Pandas are bear-like mammals that eat small invertebrates, mammals, and birds.
- Tigers are the largest and most powerful living cat species in the world.
- Lions usually hunt at night or dawn.
- Wolves function as social predators and hunt in packs.
- When hyenas hunt an animal that is bigger than themselves, they hunt in packs.
- When hyenas hunt smaller prey, they hunt alone.

Extinct Animals



Extinct animals are those animals that are no longer in existence. Extinction may be the result of natural causes or human interventions such as habitat destruction and hunting. Dinosaurs became extinct due to natural causes.



fact scope

- Mastodons were closely related to the mammoths and the elephant.
- The arsinoitherium was an early, rhinoceros-like mammal that lived about 38 to 23 million years ago.
- Woolly mammoths were large elephants that lived from about 120,000 to 4,000 years ago.
- The smilodon was the largest saber-toothed tiger that first appeared about 1.6 million years ago.
- The Tasmanian tiger was a large, carnivorous marsupial that is probably extinct.
- Dinosaurs were reptiles that lived from about 230 million to 65 million years ago.

Dodo

The dodo is an extinct and flightless bird from Mauritius.



Quagga

The quagga is an extinct species of zebra.



Primates

Primates are placental mammals. They include human beings, apes, monkeys, lemurs, and prosimians or lesser primates such as lorises and aye-ayes. Primates are social animals and live in families. There are many living species of primates and still many remain to be discovered.



New World Monkey

New World monkeys are the four families of primates that are found in Central and South America.



Old World Monkeys

Old World monkeys are a group of primates which usually have tails that cannot be curled or wrapped.

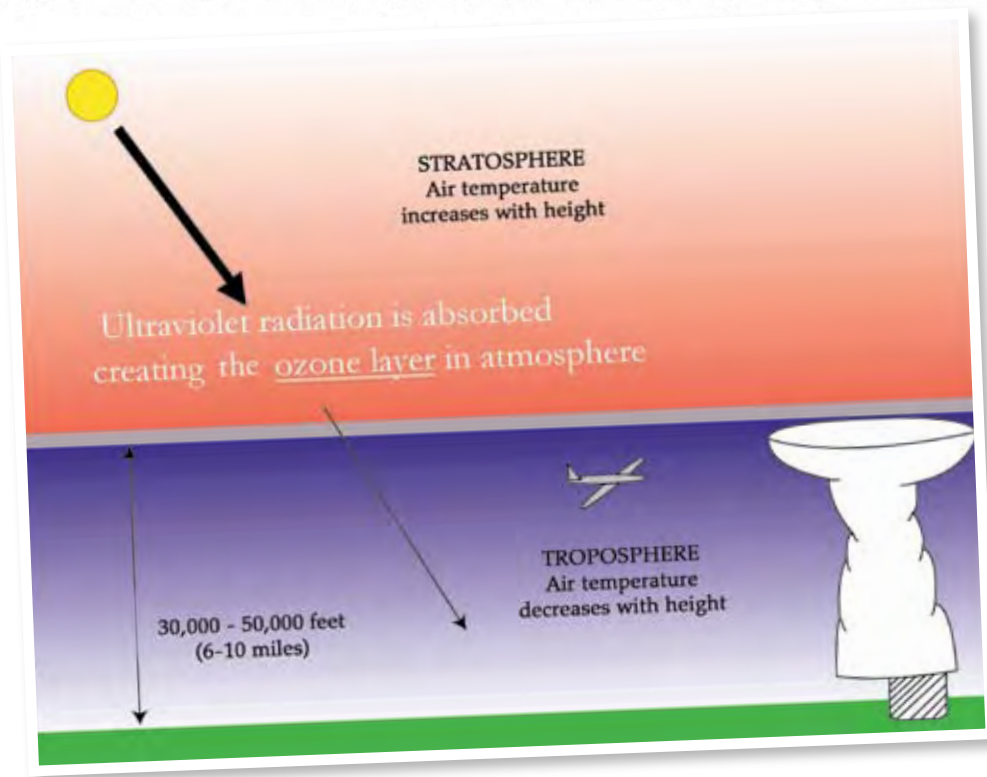


fact scope

- The pygmy mouse lemur is the smallest primate in the world.
- True apes are native to Africa and Asia.
- There are 264 known extant species of monkeys.
- The mandrill is found in the tropical rainforests of Cameroon, Gabon, Equatorial Guinea, and Congo.
- Prosimians are the most primitive extant primates found only in Madagascar and Southeast Asia.
- The bonobo or pygmy chimpanzee is found in the forests of the Democratic Republic of the Congo.
- Tarsiers are primates that have enormous eyes and long feet.

Ozone Layer

The ozone layer is the layer of ozone gas that covers our atmosphere. It protects Earth from harmful ultraviolet radiation from the sun. The ozone hole is the thinning of the ozone layer over the Antarctic region. Various weather satellites have indicated that the overall percentage of ozone in the Antarctic and the Arctic ozone layer is actually decreasing at an alarming rate.



fact scope

- Ozone is a colorless gas.
- Ozone smells something like burning electrical wiring.
- French physicists Charles Fabry and Henri Buisson discovered the ozone layer in 1913.
- G. M. B. Dobson, a British meteorologist, explored the properties of the ozone layer in detail.
- In 1974 M.J. Molina and F.S. Rowland demonstrated the ability of chlorofluorocarbons to breakdown ozone in the presence of high frequency ultraviolet light.

Dobson Units

Dobson units (DU) are the standard way to express ozone amounts in the atmosphere.



Chlorofluorocarbons

Chlorofluorocarbons were first created in 1928, and were first produced commercially in the 1930s by DuPont Inc.



Natural Resources



Natural resources are resources that occur in nature. Water, air, land, forests, fish, topsoil, oil, natural gas, and minerals are some of the natural resources. Some of these resources are renewable and some are non-renewable.

Renewable Resources

Renewable resources, such as oxygen, fresh water, solar, timber, and biomass are natural resources that have the ability to regenerate themselves.



Non-renewable Resources

Non-renewable resources such as coal, petroleum, and natural gas are natural resources that cannot be re-made or re-grown.

fact scope

- Mining is the extraction of minerals or other geological materials from Earth.
- Hotelling's rule is an economic model of non-renewable resource management proposed by Harold Hotelling.
- Biotic natural resources are derived from animals and plants.
- Abiotic natural resources are derived from the non-living world such as land, water, and air.
- Soil is a renewable natural resource.
- Oil is produced by the decay of organic matter deep under Earth's surface.
- South Pars is the largest natural gas field located between Iran and Qatar.

Earth in Danger



Earth is going through various ecological changes, mostly because of the activities of human beings. These changes pose a grave danger to the survival of life on Earth. The effect of all these changes have led to the rising of the ocean level, shrinking of mountain glaciers, eroding of low-lying coastal areas, change in the timings of seasons, and more.



fact scope

- Global warming is the gradual rise in temperature of Earth.
- Pollution is the contamination of biological, physical, and chemical agents of the environment.
- Acid rain is rainfall of harmful chemicals mixed in water.
- Since 1978 the ice area of the Arctic sea has become thinner and is still shrinking by some 9 percent every 10 years.
- U.S., Russia, Mexico, China, and Japan are the world leaders in air pollution emissions.
- Pollutants can cause diseases such as cancer, lupus, immune diseases, allergies, and asthma.

NEO

NEO or Near Earth Objects are comets or asteroids, which come near enough to the earth's orbit, threatening possible collisions.



Greenhouse Effect

The greenhouse effect is the process by which atmospheric gases like carbon dioxide, nitrous oxide, chlorofluorocarbons, etc. warm up and form a blanket in the atmosphere preventing heat from escaping from Earth's atmosphere.



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