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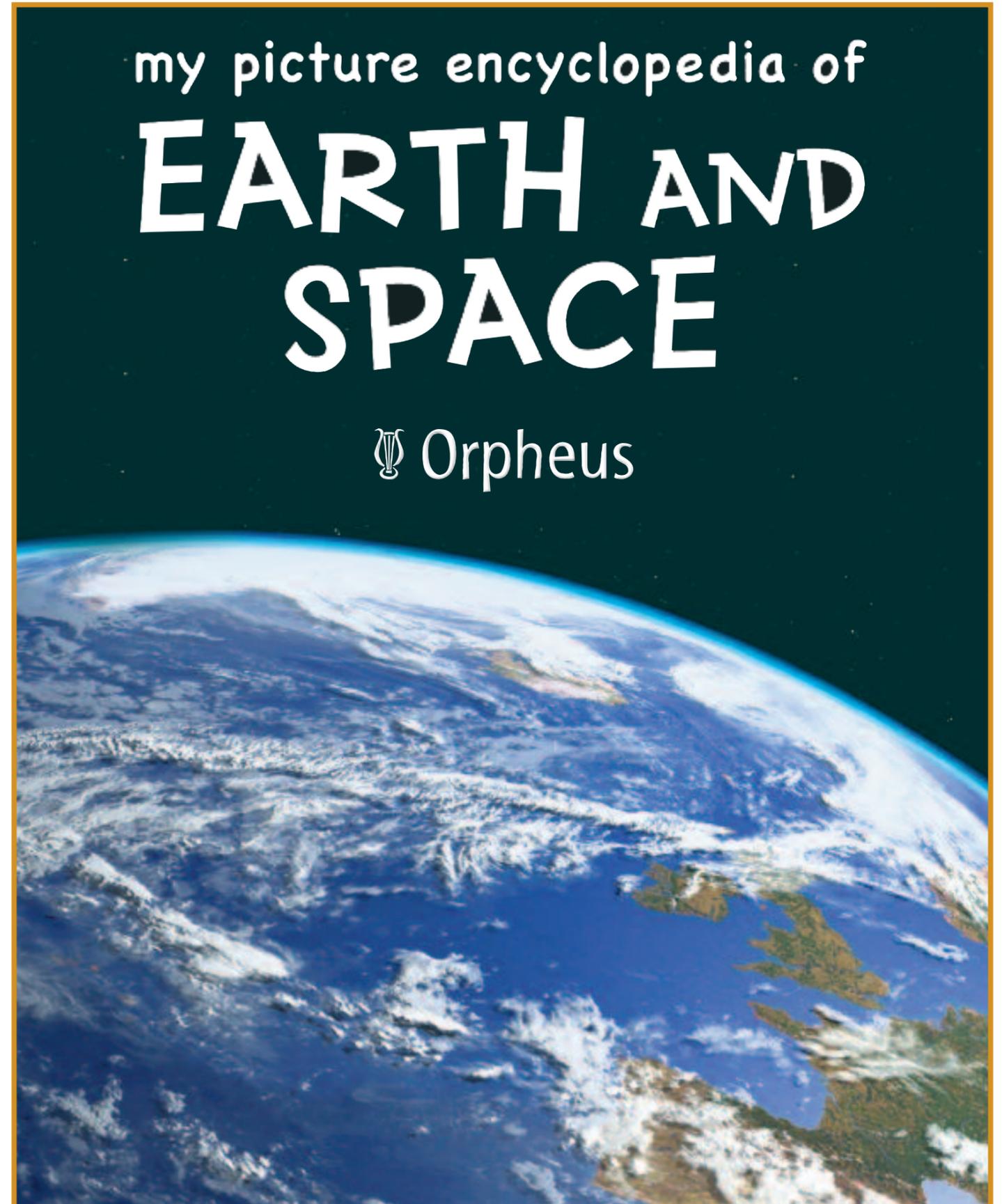
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**I**N THIS ENCYCLOPEDIA, you will find out about the stars and planets—and especially the planet we live on: Earth. The different landscapes around us are shaped by natural forces: for example, rain, snow, ice, wind, rivers and even erupting volcanoes.

Each subject is presented with an introductory text to explain what it is about.

There are lots of things to see in the main illustration that accompanies each subject

Most (but not all) of the items pictured can be found somewhere in the main illustration.

The text that accompanies each item explains what it is and provides more information about it.

24 Volcano		VOLCANO		
<p><b>A</b> VOLCANO is an opening in the surface of the Earth through which hot, liquid rock erupts. Usually a volcano is a cone-shaped mountain. During an eruption, the volcano blasts out lava and ash. Some volcanoes are extinct and will never erupt again.</p>	<p><b>Crater</b> When a volcano erupts, the top of the mountain is often destroyed in the force of the explosion. The wide hole that is left at the summit is called the crater.</p>	<p><b>Geyser</b> A geyser is a fountain of hot water that erupts at fixed intervals from the ground. A geyser makes when water that has collected under ground is heated by hot volcanic rocks.</p>	<p><b>Hot spring</b> Hot water so high in temperature that it can be used for bathing.</p>	
	<p><b>Lava</b> Deep inside the Earth, the temperature is so high that even rock melts. Lava is hot, thick liquid, or molten rock. It is called lava because it is called so when it reaches the surface. In a volcanic eruption, lava is forced out through the volcano and flows down its slopes. When it has cooled, it turns into a hard, black rock.</p>	<p><b>Ash</b> As well as lava, a volcano often blows out huge clouds of ash and dust high into the air. Volcanic ash is a fine that has been carried up a few metres by the force of the volcano. When it falls back down it can be very hot and everything in a layer several metres thick. Ash is very good for the soil. It makes it fertile.</p>	<p><b>Earthquake</b> An earthquake is when the Earth trembles. Often the vibrations only last a few seconds. Most earthquakes are so weak that we don't notice them. But sometimes the Earth shakes so violently that the surface of the ground cracks, and houses and bridges collapse. An earthquake is most often caused by a sudden shift in the rocks under the surface. Building structures are so built that they can survive. They can also cause tsunamis in the ocean waves of the sea.</p>	



If you look very carefully, you will find a tiny comet in each of the main illustrations in this book. Turn to page 31 to find out where they are hidden.

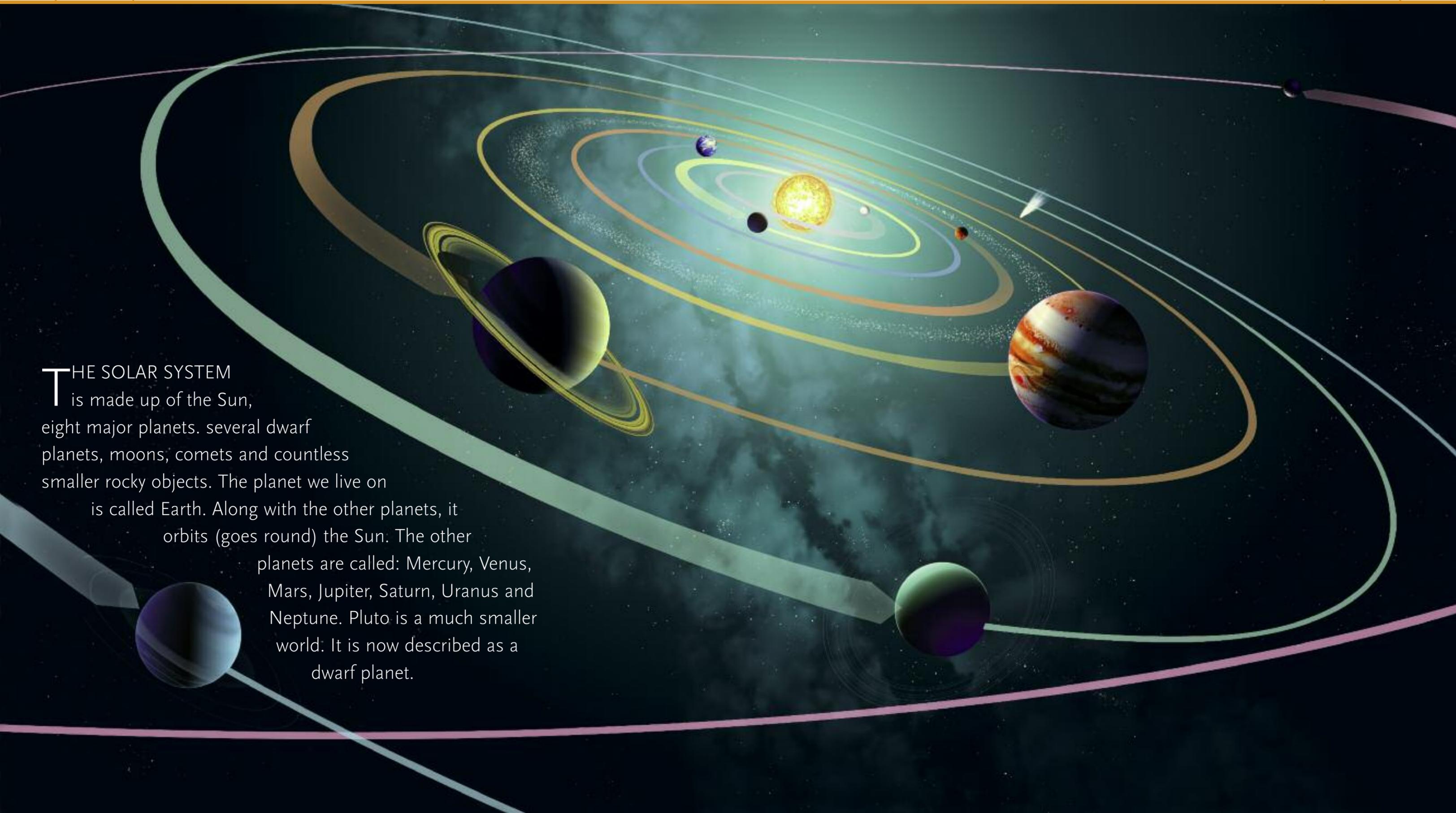


## THE SOLAR SYSTEM

is made up of the Sun, eight major planets, several dwarf planets, moons, comets and countless smaller rocky objects. The planet we live on

is called Earth. Along with the other planets, it orbits (goes round) the Sun. The other

planets are called: Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune. Pluto is a much smaller world. It is now described as a dwarf planet.





## Mercury

Mercury is the smallest planet in our Solar System. It is also the closest to the Sun. During the day, it is extremely hot on Mercury. During the night, however, it is bitterly cold. On Mercury's surface there are many deep craters. These were probably made by meteorites—boulders crashing down from space. When a meteorite struck the surface, rock and dust was blasted out in all directions.



## Venus

Venus is nearly the same size as Earth. However, people could not live there. It is extremely hot and its atmosphere is full of unbreathable carbon dioxide. Venus is covered by clouds all year round. These are made from droplets not of water but deadly sulphuric acid. Venus spins round, but in the opposite direction to the other planets. It spins very slowly.



Earth takes 24 hours, or one day, to spin round. A Venusian day lasts 243 Earth days. That's longer than its year, the time it takes to orbit the Sun.



## Earth

The Earth is the only world in the Solar System where there are living things. Life is possible because there is liquid water on our planet. The Sun gives us also exactly the right amount of warmth so that it is not too hot and not too cold. Earth is surrounded by a covering of gas called the atmosphere. This gives us air to breathe, and protects us from bombardment by meteorites.

## Mars

Mars is known as the Red Planet because of the red dust that covers its surface. It is about half the size of the Earth. Scientists have discovered that water probably once flowed on Mars. There are dry river beds, deep ravines and ancient seashores on the planet. If Mars once had liquid water, it is possible life could have existed there in the past. Today, the only water on Mars is frozen at its north and south poles, or just beneath the ground in other areas.



## Jupiter

Jupiter is the largest planet in the Solar System. It does not have a hard, rocky surface like the Earth. The colourful bands of red, white, brown and yellow are thick clouds. These swirl around in Jupiter's stormy atmosphere. The Great Red Spot on Jupiter's surface is three times the size of Earth. The Spot is actually a giant storm that has been raging for 300 years.



## Saturn

Second only in size to Jupiter, Saturn is a huge planet. It is surrounded by vast rings made of lumps of rock and ice.



Saturn is also a "gas giant". Its thick atmosphere is made mostly of hydrogen. Saturn takes over 29 Earth years to complete an orbit of the Sun. But a day on Saturn is much shorter than on Earth as it spins much faster.



## Uranus

Uranus is the third largest planet. It is also made mostly of gas. Uranus is unusual because it spins round on its side. It takes 84 Earth years to orbit the Sun. Like Saturn, it is surrounded by rings, but they are very faint and narrow.



## Neptune

Neptune is the fourth largest gas giant. It also has some very faint, dark rings. Because it is so far from the Sun it is bitterly cold. One of its moons, Triton, is the coldest world in the Solar System.



## Pluto

Pluto is a dwarf planet. It is even smaller than our Moon. Seen from Pluto, the Sun would look like no more than a bright, distant star. Pluto's surface is made of gases that have frozen hard.





**O**N A CLEAR NIGHT, the sky is full of stars. The largest and brightest thing is the Moon. It is much, much smaller than any star, but it looks bigger because it is so close. The nearest star (apart from the Sun) is so far away, the light from it takes several years to reach us—and light travels at 300,000 kilometres a second!



## Stars

Stars are giant balls of gas. They give off huge amounts of light and heat. Stars look like tiny dots of light in the sky because they are so far away. The Sun is a star. It looks bigger than the others because it is much nearer. It provides us with light and warmth.



## Constellation

A constellation is a pattern of stars. People once imagined that these patterns looked like the shapes of gods, heroes or animals from ancient legends. This is the constellation of Orion the Hunter. Three bright stars in a row make the shape of his belt.



## Milky Way

The Milky Way is a misty band that stretches across the sky on a clear night. It is made up of millions of stars. The Milky Way is our view of the galaxy to which we belong. Our galaxy is a massive spiral of 200 billion stars.



## Telescope

A telescope makes things that are far away appear much closer. Inside is a series of dish-shaped mirrors. They reflect light on to an eyepiece. You look through this to see the stars and planets in more detail.



## Shooting stars

The Solar System is full of countless pieces of rock, most no bigger than grains of sand. They hurtle through space. When they come close to Earth, these fragments, called meteors, burn up. The split-second streaks of light that result are called "shooting stars". Sometimes, you can see a large number of shooting stars. This is called a meteor shower. The meteors may flake off comets.



## The Moon

The Moon is our nearest neighbour in space. A large ball of rock, it travels around Earth in about 27 days. The light it "shines" is reflected from the Sun. The Moon's shape changes from a thin crescent to a full disc and back again as it goes round the Earth.



## Comet

A comet is a large lump of rock fragments and ice. Comets travel around the Sun. As they near the Sun, the ice melts and long tails of gas and dust sweep out behind them.



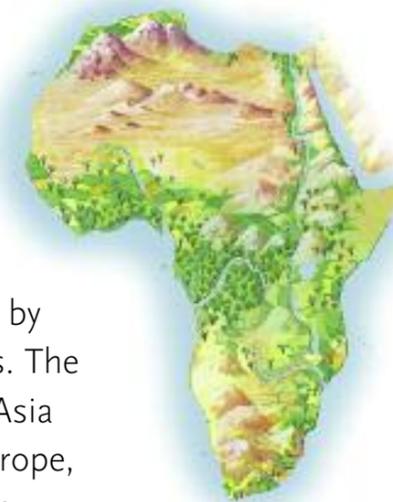
**T**HE EARTH, the planet where we live, is a sphere. But it is not perfectly round. It is fatter round its middle, the Equator, than at the Poles.

The Earth takes 24 hours to spin round once. It takes about 365 days to travel around the Sun. It is not perfectly upright, but is slightly tilted.



## Continent

Continents are the land masses of the Earth. They are separated from each other by oceans and seas. The continents are: Asia (the largest), Europe, North and South America, Africa (pictured here), Australasia and Antarctica. The continents make up less than one third of the Earth's surface. The rest is ocean. (See the map on pages 16-17.)



## Ocean

An ocean is a vast expanse of salt water. Earth has five oceans: Pacific Ocean (the largest), Atlantic Ocean, Indian Ocean, Arctic Ocean and Southern Ocean. Some areas of ocean close to land are called seas.

## The Poles

The top and the bottom of the Earth are known as the Poles. The Sun is lower in the sky at the Poles, so it is very cold throughout the year. In winter, it is dark all the time. The North Pole lies in the icy Arctic Ocean. The South Pole is on the continent of Antarctica.



## Island

An island is an area of land that is surrounded by water, in the sea or in a lake. Some islands are actually the upper part of a mountain that rises from the ocean bed above the water's surface.





## Polar regions

At the Poles, the oceans are covered by floating ice, including icebergs (ice “mountains”). Tiny plants, called plankton, live in the water. They are eaten by tiny animals, who are in turn eaten by fish, seals, birds and whales.



## Woodlands

Woodlands have many trees growing close together. They are often made up of different kinds of trees. They are found in parts of the world that have a temperate climate: the summers are warm, but winters are cool.



## African grasslands

The African grasslands are also called the savannah. The grassy landscape is dotted with bushes and trees. The climate is hot, with a dry season followed by a wet season.



## Desert

A desert is very hot and dry all year round. There is almost no water or plants. The ground is just bare rock or sand. Winds may cause the sand to pile up in dunes.



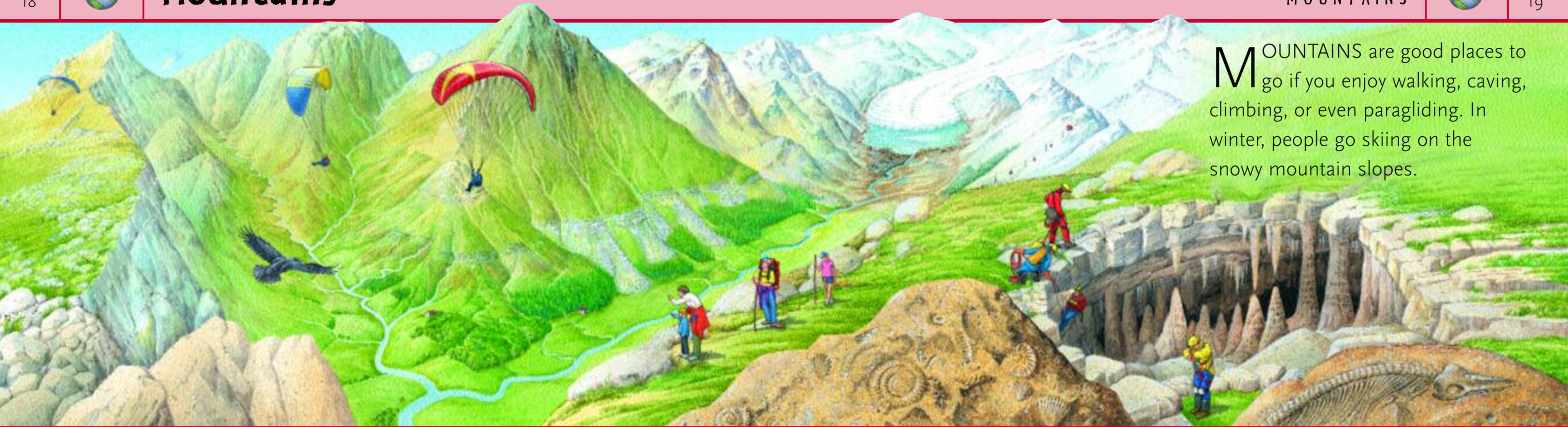
## Tropical rainforest

Rainforests grow near the Equator. The largest rainforest is in the basin of the River Amazon in South America. It is always very hot and wet. Many animals and plants live in rainforests.



## Mountain range

A mountain range is an area of mountains and deep valleys. The highest mountaintops are covered with snow all year round, even in tropical regions.



**M**OUNTAINS are good places to go if you enjoy walking, caving, climbing, or even paragliding. In winter, people go skiing on the snowy mountain slopes.



## Mountain

A mountain is larger, steeper and higher than a hill. The top is called the summit. It may be a sharp

peak. As you climb higher up a mountain, it gets colder. There are fewer and fewer trees. Near the summit, there may be bare rock. Often there is ice and snow.



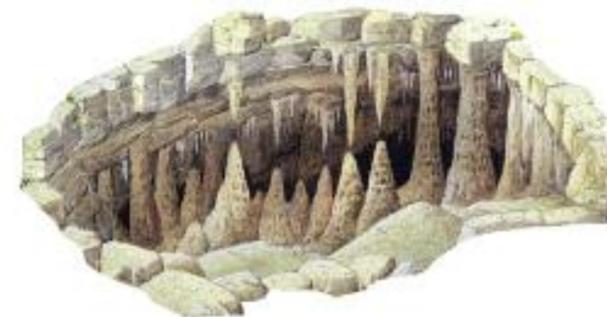
## Valley

A valley is a long basin. As they flow down mountain slopes, rivers and glaciers carve channels in the rocks. Over a very, very long time these channels widen into deep valleys. Valleys in highland areas usually have steep sides.

In lowlands, valleys are wide with gentle slopes and flat bottoms.

## Cave

Underground streams may form caves. Bit by bit, the water nibbles away at the rocks until large hollows open up. Sometimes the water dissolves the rock. When it drips from the cave ceiling it makes stone “icicles” called stalactites. Stalagmites are formed where the drips fall on the ground.



## Glacier

A glacier is a mass of ice that flows slowly down high mountain valleys. It is like a river made completely of ice. At the end of the glacier, its “snout”, the ice melts.

## Rocks

The Earth is made mostly of rock. If you look down a deep hole in your garden or in the street, you might see rock.

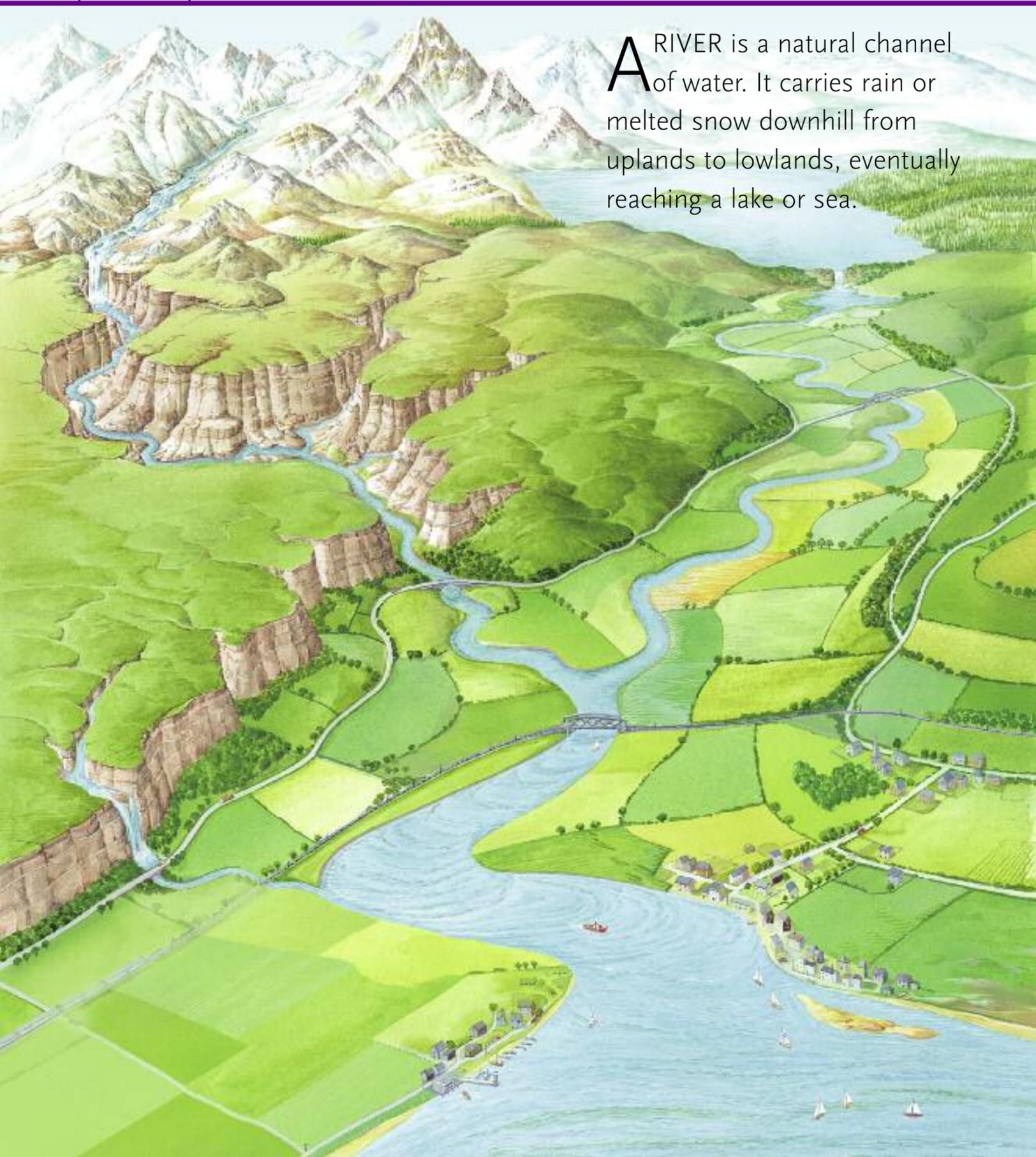
If you go to the mountains you can find rocks on the ground. Stones and pebbles are small pieces of rock.



## Fossil

A fossil is the remains of a living thing turned to stone. The plant or animal lived many millions of years ago. When it died, its soft parts rotted away. The hard parts—bones, teeth or shell—became part of the rock as it formed around them.





**A** RIVER is a natural channel of water. It carries rain or melted snow downhill from uplands to lowlands, eventually reaching a lake or sea.



### Spring

When it rains, the water seeps into the soil. Some water may find its way into the rocks underneath. A spring is the place where water that has collected underground flows out on to the surface. A spring may be the source of a river.



### Lake

A lake is where water has collected in a large hollow or basin. In mountainous areas, lakes may be found in valleys where glaciers once flowed. Rivers often flow into and out of lakes. Some lakes are man-made. A dam is built across a river. Water builds up behind the dam to form the lake.



### Stream

A stream is a small, fast-flowing river. Streams flow down steep slopes often in a series of small waterfalls called rapids. The channel is dotted with boulders and stones.

### Gorge

A gorge is a narrow river valley with steep cliffs as sides. A gorge forms when the rivers flows swiftly and powerfully. Over many years, the force of the river wears away the rocks and cuts deep into the ground.



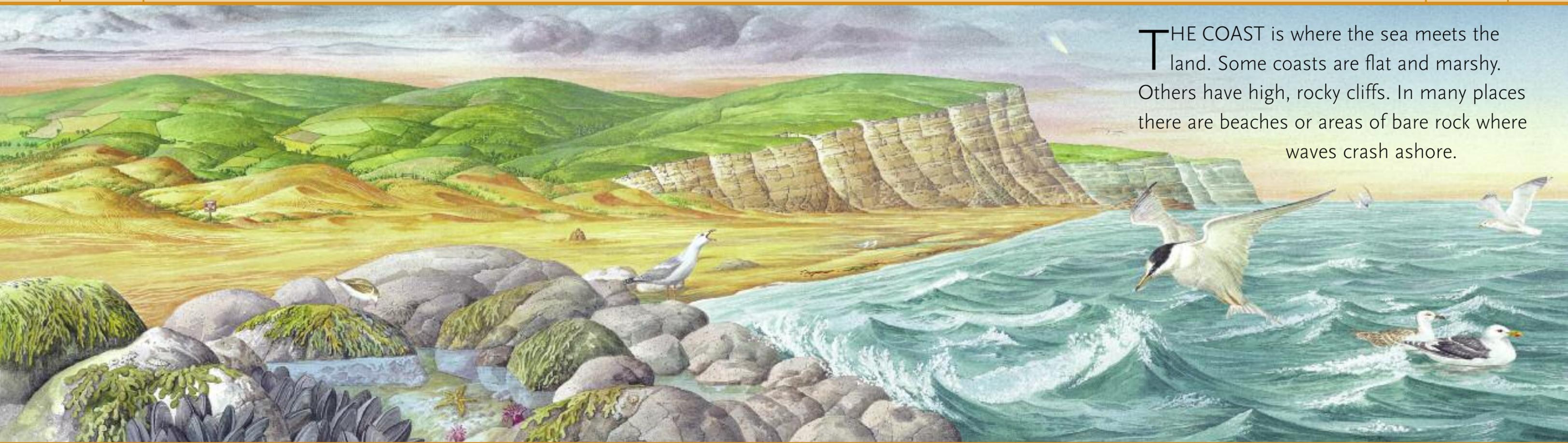
### Waterfall

A waterfall forms where a river or stream flows over a cliff or down a very steep slope. In some waterfalls, the water plunges over a "lip" of hard rock. The Angel Falls in South America are the highest in the world. They are nearly a kilometre high.

### Mouth

The mouth is the opening at the end of a river where it flows out into a lake or sea. Sometimes the river divides into many narrower channels. This is called a delta.





**T**HE COAST is where the sea meets the land. Some coasts are flat and marshy. Others have high, rocky cliffs. In many places there are beaches or areas of bare rock where waves crash ashore.



### Beach

Beaches are stretches of sand, shingle or pebbles on the seashore. Sand is made up of tiny fragments of rock. Over many years, the waves wear away the cliffs and break down the rocks into sand.



### Tides

Every day the sea comes up the shore and goes out again. This is because the sea level is always rising and falling. The tides, as they are called, are caused by the Moon. It has a pulling force (gravity) which makes the ocean waters rise as it orbits the Earth.

### Sand dunes

Sand dunes are hills of sand. Over many years, the wind may pile up sand on the beach, producing dunes. Grasses may later grow and fix the dunes in place. You also find sand dunes in the desert where strong winds blow in the same direction.



### Cliff

A cliff is a steep drop from the land to the beach or the sea. During a storm, waves may batter a cliff and loosen the rocks. It can be dangerous to walk under cliffs because of this.

### Seashells

Shellfish have to be able to cope with being submerged in salt water when the tide is high—then left to dry out in the sun at low tide. Some have soft bodies, so they have an outer shell to protect themselves. Many shellfish cling on to rocks.



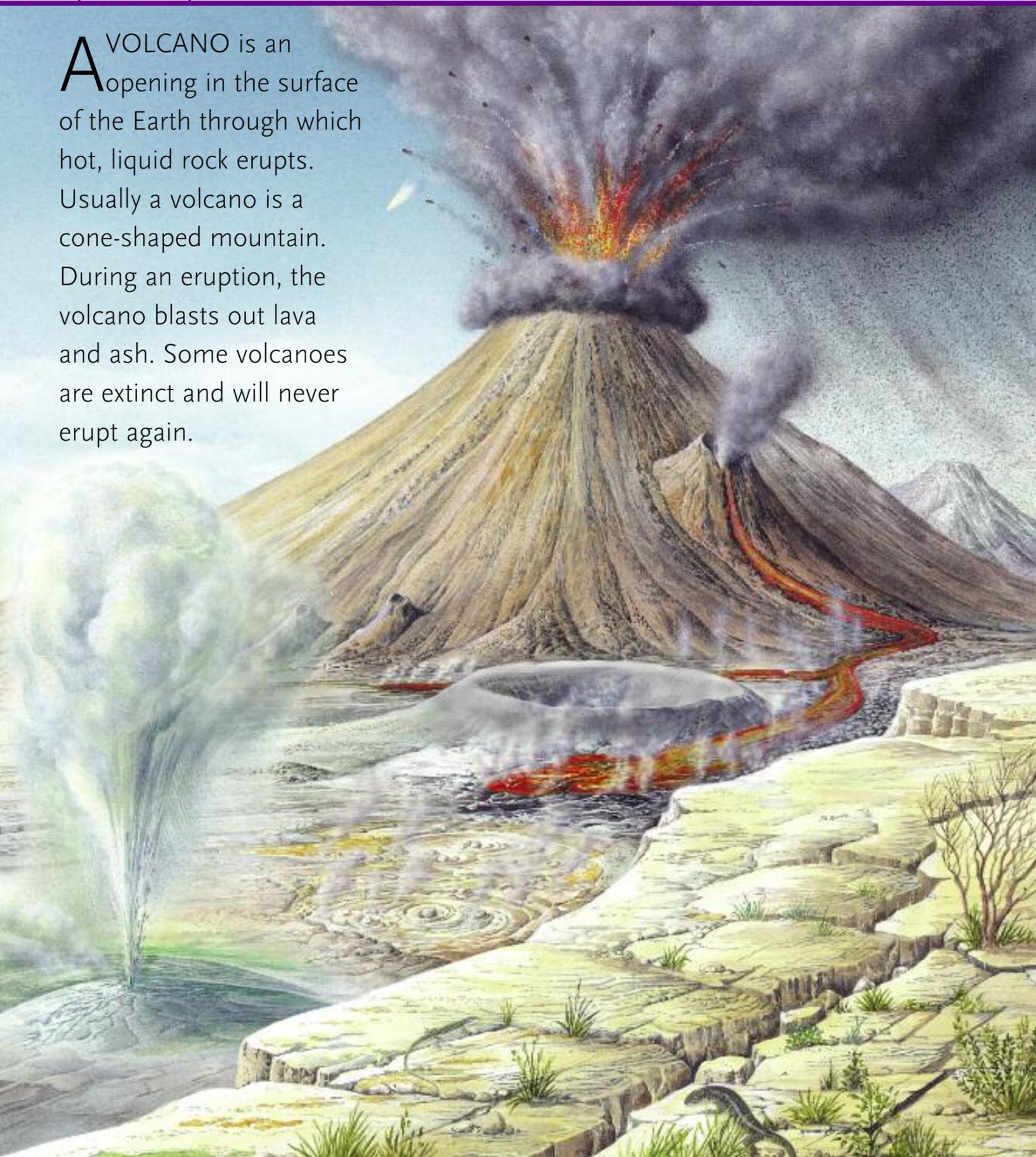
### Wave

Waves are caused by winds out to sea. The water turns over and over in circles. As waves approach the shallower waters of the coast, the upper part of the wave topples over, or “breaks”, on the seashore.



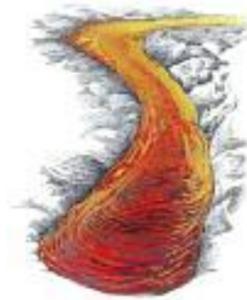


**A** VOLCANO is an opening in the surface of the Earth through which hot, liquid rock erupts. Usually a volcano is a cone-shaped mountain. During an eruption, the volcano blasts out lava and ash. Some volcanoes are extinct and will never erupt again.



## Crater

When a volcano erupts, the top of the mountain is often destroyed in the force of the explosion. The wide hole that is left at the summit is called the crater.



## Lava

Deep inside the Earth, the temperature is so high that even rock melts. Lava is what this liquid, or molten, rock is called when it reaches the surface. In a volcanic eruption, lava is forced out through the volcano and flows down its slopes. When lava cools, it turns into a hard, black rock.

## Ash

As well as lava, a volcano blasts out huge clouds of ash and dust high into the air. Volcanic ash is lava that has been turned to a fine powder by the force of the explosion. When it falls back down to earth, ash may blanket everything in a layer several metres thick. Ash is very good for the soil. It makes it fertile.



## Geyser

A geyser is a fountain of hot water or steam that blasts out of the ground. A geyser erupts when water that has collected under ground is heated by hot, volcanic rocks.



## Hot spring

Hot water springs are often found near volcanoes.

The water gushes from under the ground, where it has been heated by volcanic rocks. Sometimes the water is mixed with mud and clay. This is known as a mud pot. The mud often smells of rotten eggs!



## Earthquake

An earthquake is when the Earth trembles. Often the vibration only lasts a few

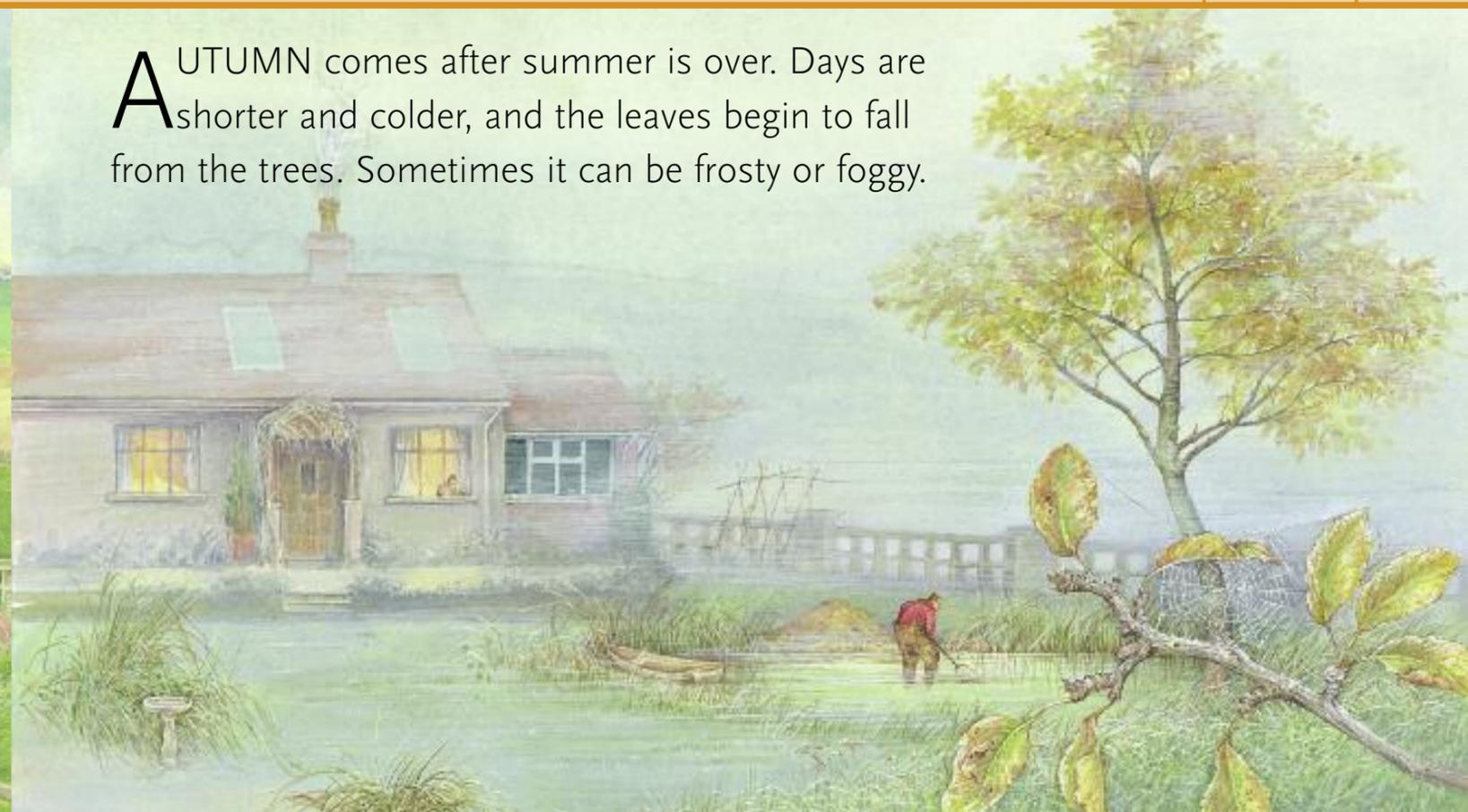
seconds. Most earthquakes are so weak that we do not notice them. But sometimes the Earth shakes so violently that the surface of the ground cracks, and houses and bridges collapse. An earthquake is most often caused by a sudden jolt in the rocks under the surface. Juddering shock waves are sent out in all directions. They can also cause massive ocean waves called tsunamis.



**I**N SPRING plants and trees begin to flower. It is mating season for many animals. The weather is very changeable, with sunshine, wind and showers.



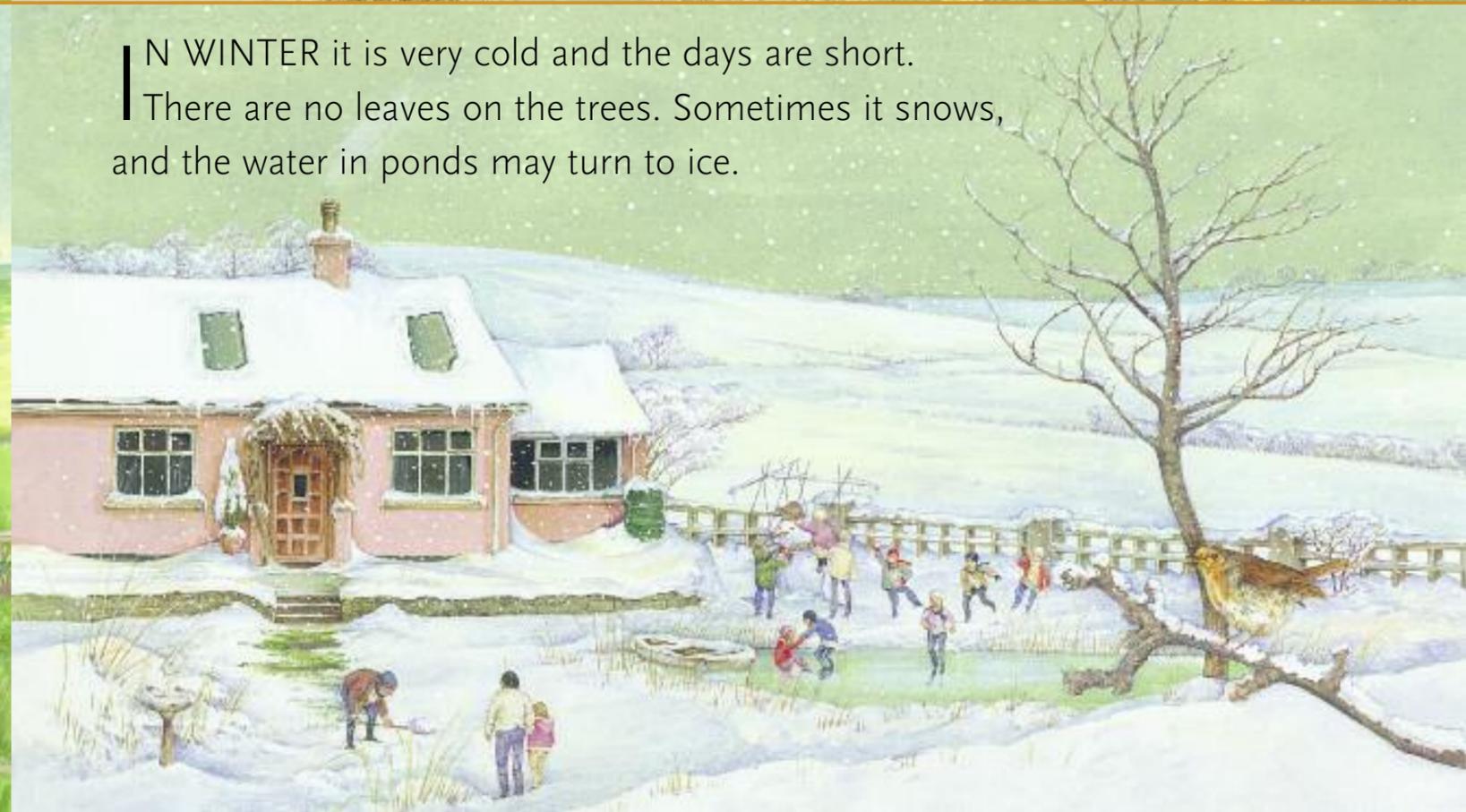
**A**UTUMN comes after summer is over. Days are shorter and colder, and the leaves begin to fall from the trees. Sometimes it can be frosty or foggy.



**T**HE SUMMER is the warmest time of year. The days are long and you can play outside until late. Sometimes there are sudden thunderstorms.



**I**N WINTER it is very cold and the days are short. There are no leaves on the trees. Sometimes it snows, and the water in ponds may turn to ice.





## Wind

Wind is moving air. On a warm day, winds can be cooling, but on a cold day, a strong wind can make it feel much worse!

Some regions are warmer than others. Warm air rises, so cooler air flows in to replace it. This produces winds.



## Sun

When the sun shines, it becomes bright and warm. In the summer the sun is higher in the sky and it can be very hot. The sun shines all day, but sometimes we do not see it as clouds are in the sky covering it. It rises in the morning and sets at night.



## Thunderstorm

When dark clouds build up in the sky, especially on a hot day, a thunderstorm might be on the way. It starts to rain heavily. There is lightning—sudden, jagged streaks of light in the sky. These are flashes of electricity, caused by water droplets and ice crystals bumping together. The heat of the flash causes the air to expand very quickly. This produces a loud boom known as thunder. You hear this a few seconds later.

## Rain

Clouds in the sky are made up of millions of water droplets and ice crystals. As they increase in number and grow heavier the cloud cannot hold the droplets any more. They then fall to earth as rain.



## Clouds

When it is warm, water evaporates (becomes an invisible gas) and rises. Higher up, the air cools and the water vapour condenses (turns back to liquid) around dust particles. Millions of water droplets mass together to form clouds.



## Fog

Fog is really a cloud that hugs the ground. Mist is a thin fog. It is often becomes foggy when air cools at night, causing water droplets to form in the air. The fog disappears when the sun warms up the air.

## Frost

On some cold mornings there may be frost, a thin layer of sparkling ice crystals over the grass and leaves. At night, the air near the ground cools quickly and water vapour condenses. Everything, including spiders' webs, is soaked. This is called dew. If the temperature falls below freezing, the condensed vapour turns to frost.



## Ice

When it is cold, water freezes to ice. It becomes solid. The surface of a pond may freeze over. If it is very thick it may be strong enough to skate on. Icicles, frozen drips of water, can form on buildings.



## Rainbow

If it is raining and sunny at the same time, you may see a rainbow. A rainbow forms when the light from the sun shines through raindrops. Each tiny raindrop splits the light into seven colours: red, orange, yellow, green, blue, indigo and violet.



## Snow

In the winter water droplets in the clouds freeze and snow falls. If you look at snowflakes close up, you will see that they all have six sides or points, but no two flakes are exactly alike. If it is cold enough, the snow stays on the ground and you can build snowmen and have a snowball fight!

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