CHAPTER - 11

THE EARTH

Of all the planets that have been discovered so far, the earth is the only planet that contains life. Seen from the space, the earth looks like a mass of land, sea and air.

What make our earth unique are its atmosphere and its water. Together, these make possible a rich variety of animal and plant life.

Although the earth is almost 4 to 5 billions years old, no rocks as old as this have ever been found.

The study of the earth is going on. The study of the earth is called **Geology.** All the sciences that deal with the earth are known as Earth Sciences.

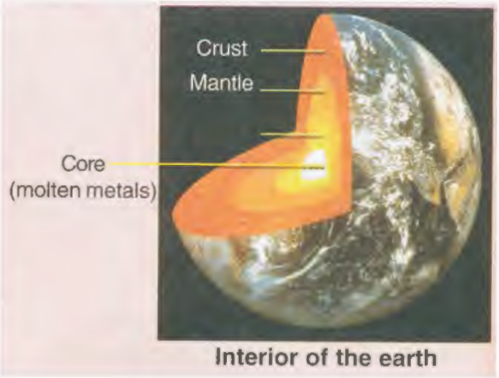
Formation of the Earth

Once it was thought that the earth developed from a rotating body of hot gases in space. These gases cooled and the other bodies were formed.

Later, in about 1900, it was suggested that the earth developed out of material from the sun.

Some scientists believe that the earth may have been very hot during the early part of its formation. At first, it was a fiery mixture of boiling rock and poisonous gases. As millions of years went by, the earth grew cooler and a thin crust formed on its surface which sealed in the heat.

Inside The Earth



Interior of the earth

The earth is organised into three main layers:

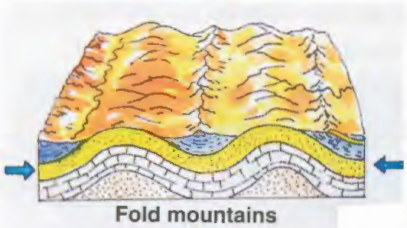
1. Crust, 2. Mantle and 3. Core.

1. Crust : The outermost layer of the earth is called the crust. The thickness of the earth varies from place to place, Under continents, its thickness ranges from 35 to 60 kilometres. Under oceans, it is thinner and is only 6 kilometres.

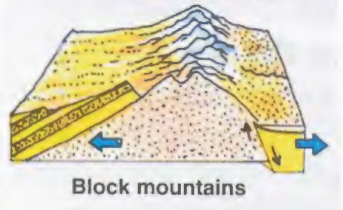
2. Mantle : The region between the crust and core of the earth is called mantle. Nearly 2,900 km thick, the mantle is made up of hot rocks. Temperature and pressure here are lower than in the core. Even so, much of the mantle rock is semi-molten.

3. Core : The innermost part of the earth is called its core. The core is made up of iron and nickel. In the outer region of the core, the metals are present in the molten state. The inner region of the core is a solid ball.

How Mountains are Formed ?

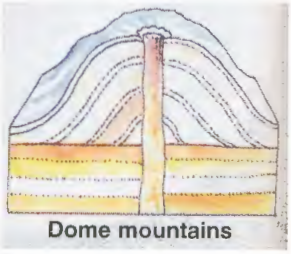

Fold mountains

Mountains are formed by the movement in the earth's curst and it takes millions of years to form. Sometimes, the earth's crust got squeezed and formed fold mountains.


Block mountains

Block mountains are formed when the earth's crust splits and one side is pushed up.

Dome mountains are formed when melted rock below the earth's crust slowly forces the land upwards.


Dome mountains

Volcano


A volcano

Volcanic action is one of the ways through which mountains are formed.

Hot, liquid rock often has been forced through cracks in rocks. If it comes to the surface, it may flow out, or be blown out. The melted rock, steam and ashes that are forced through a hole in the surface, may form a mountain called a volcano.

From time to time, some volcanoes pour out hot liquid rock called lava. Usually, the flow of lava from a volcano causes a little harm.

However, there have been times when whole cities near active volcanoes have been damaged, or destroyed. Some cities have been completely covered by lava.

Earthquake


An earthquake can damage buildings

Earthquakes occur when large masses of rock slip past each other suddenly. Great trembling and vibrations are often felt. These shocks can be so strong that they destroy buildings and do great damage. However, some earthquakes are so mild that they are not noticed.

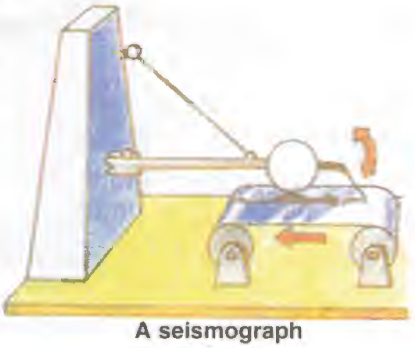
In 1923, Japan suffered an earthquake in which 1,50,000 lives were lost and some 5,70,000 buildings collapsed.

In 1988, Armenia, suffered an earthquake in which 25,000 people died and several towns and villages were buried.

In 2001, India suffered an earthquake

in which over 90 percent of the buildings of Bhuj city of Gujarat state were damaged. In 2005, our state J&K suffered mild earthquake and not much damage was done.

The shocks of earthquakes may be recorded on an instrument called a ***Seismograph.*** The instrument is so sensitive that it can detect vibrations too mild to be felt by man. By studying the strength of vibrations, scientists are able to locate the areas in which earthquakes occur.



A seismograph

The Movements of the Earth

Day and Night

The spinning of the earth on its axis is called rotation and it takes 24 hours to complete one rotation. The earth spins very fast on its axis. Different parts of the earth spin at different speeds. At the poles, the earth spins at 480 kilometres per hour but at the equator, it spins at 1,600 kilometres per hour. This happens because the parts near the equator make a bigger round.

Formation of days and nights

The rotation of earth on its axis causes day and night.

At any time of the day, half of the earth will receive light from the sun and will have day. The other half will be in darkness and will have night (The half that faces the sun has day, the half that is away from the sun has night).

However, as the earth spins on its axis, the side which was in darkness and had night will move into sunlight and will have day and the other side which had light will move into darkness and will have night.

The sun seems to rise in the east and set in the west. This is because the earth rotates from west to east.

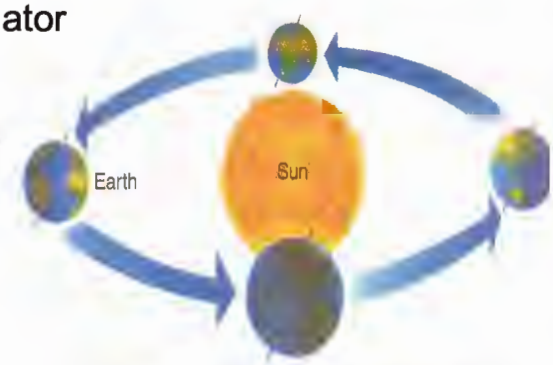
Seasons

While the earth spins on its axis, it also moves round the sun. The part in which the earth travels around the sun, is oval in shape.

The movement of the earth around the sun is called ***revolution***. The earth takes 365¼ days to complete one revolution. This is called the solar year.

Seasons are caused by te tilt of earth's axis and revolution of earth around the sun.

The sunrays fall directly on the Equator throughout the year and, therefore, the days and nights are equal at the Equator. This part receives the same amount of sunlight all the year round. It has summer throughout. Days and nights are of about 12 hours each.



Regions near the Equator have same seasons

As the earth revolves round the sun, the seasons go on changing and we get the four seasons of summer, winter, spring and autumn.

The two factors which cause seasons are: 1. The tilted axis of the earth and 2. The revolution of the earth.

Effects of Seasons on Life

In Summer, when it is very hot outside, we do not like to go out during the daytime. The sun is very hot in summer. We like to spend our time indoors. We like to wear thin cotton clothes with light colour because they help to keep the heat outside, away from our bodies. We use electric fans, desert coolers and air-conditioners to make our homes cool. We also like to drink plenty of water, sherbets and other cold drinks.

In winter, we feel more energetic and like to spend our time outdoors sitting and playing in the sun. We use dark-coloured clothes, blankets and quilts to protect ourselves from severe cold. These clothes prevent the body heat from escaping. We keep our houses warm with the help of fires, or electric heaters. We drink hot milk, tea or coffee and eat plenty of nuts to keep ourselves warm.

Like human beings, animals are also affected by seasons. Animals which have thick hair, or fur, can withstand the cold but others, like frogs and snakes, burrow themselves underground so as to keep themselves warm. They undertake 'winter sleep'. Some birds migrate from colder to warmer regions in order to avoid the extreme cold. When it becomes very hot, then also animals have to change their way of life.

Plant life also respond to the changes in seasons. Many small plants bloom and dry up before summer.

The autumn season comes just before winter. Some trees shed their leaves during autumn to protect themselves from approaching winter. Some other plants shed their leaves just before summer. Some plants (mostly herbs) flower during winter, others (mostly shrubs and trees) flower only during summer. You should carefully observe the changes in the plants and animals around your according to the change in seasons.

Thus, people, animals and plants are affected by the seasons. They adapt themselves to the surrounding climate.

Eclipses

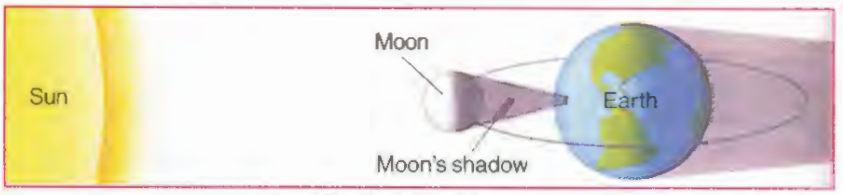
You know that earth moves around the sun, and moon revolves round the earth. So, due to this revolving their positions keep on changing. This leads to the formation of eclipses.

An eclipse is nothing but it is the partial or complete hiding of one heavenly body by another by its shadow.

There are two types of eclipses : solar eclipse and lunar eclipse.

Solar Eclipse

The moon usually does not come between the earth and the sun. When it does, the moon blocks some sunlight from the earth, and a solar eclipse takes place. The moon makes a small shadow on the earth. From this shadow, the sun appears to get covered slowly.



A solar eclipse

Lunar Eclipse

As the moon revolves around the earth, the earth usually does not come between the sun and the moon. Notice in the picture what happens when the earth does come between the sun and the moon. The moon passes through the earth's shadow, which causes a lunar eclipse.

A lunar eclipse

What do you think the moon looks like from earth during a lunar eclipse ?

New Words

Atmosphere	:	The layer of gases that surrounds a planet.
Axis	:	Imaginary line through the centre of a rotating object.
Billion	:	One million million.
Core	:	The innermost part of the earth.
Crust	:	The outermost layer of the earth.
Earthquake	:	Sudden violent movement of the earth's surface.
Equator	:	Imaginary line around the earth at an equal distance from the North and the South Pole.
Fiery	:	Like or consisting of fire.

Flod	:	A band of rock layers
Geology	:	Scientific study of the earth's crust.
Lava	:	Hot liquid rock that comes out of a volcano.
Mantle	:	The region between the crust and the core of the earth.
Orbit	:	Path followed by a planet, star, moon, etc., round another body.
Revolution	:	Movement of the earth around the sun.
Rotation	:	Spinning of the earth on its axis.
Seismograph	:	Instrument for detecting earthquakes and recording how strong they are and how long they last.
Space	:	Universe beyond the earth's atmosphere in which all other planets and stars exists.
Volcano	:	Mountain or hill with an opening or openings through which lava, etc., come up from below the earth's surface.

RECAP

- Seen from the space, the earth looks like a mass of land, sea and air.
- The study of the earth is called Geology.
- The earth is organised into three main layers - crust, mantle and core.
- Mountains are formed by the movements in the earth's crust.
- One of the way in which mountains are formed is through a process of volcanic action.
- Earthquakes occur when large masses of rock slip past each other suddenly.
- Seismograph is an instrument for detecting earthquakes.
- The axis of the earth is tilted.
- The rotation of the earth on its axis causes day and night.
- Seasons are caused by tilt of the earth's axis and the revolution of the earth round the sun.

- The days and nights are equal at the Equator.
- Seasons affect the lives of plants, animals and mankind.
- Eclipses of the moon and the sun occur due to the shadows cast by the earth and the moon respectively.

Think and Answer

I. Fill in the blanks. Choose the right word/words from the box :

Core geology	volcano	mantle	crust mountains
Rotation	equal summer	earthquake	tilted equator

1. The study of the earth is called _____.
2. The earth is organised into three main layers :_____, _____ and _____.
3. _____ are formed by the movement in the earth's crust.
4. The spinning of the earth on the axis is called _____.
5. A mountain with an opening through which lava comes up from below the earth's surface is called a _____.
6. Sudden violent movement of the earth's surfaces is called an _____.
7. The axis of the earth is _____.
8. Days and night are _____ at the Equator.
9. Days are longer in _____.
10. The imaginary line that divides the earth into two equal halves, is called the _____.

II. State whether True or False for each statement:

1. The study of the earth is called Geology.
2. The outermost layer of the earth is called Mantle.

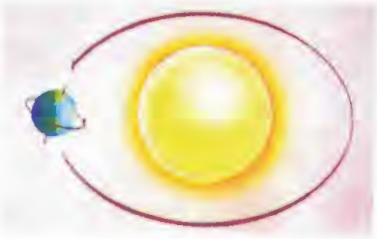
3. Block mountains form when the earth's crust slowly forces land upwards.
4. From time to time, some volcanoes pour out hot liquid rock called Lava.
5. The shocks of earthquakes may be recorded on an instrument called a Seismograph.
6. When moon comes in between the sun and the earth, lunar eclipse occurs.

III. Answer the following questions:

1. How did the earth form ?
2. What are the three main layers of the earth ?
3. How mountains are formed ?
4. Write short notes on :

(i) Volcano (ii) Earthquake (iii) Solar eclipse (iv) Lunar eclipse.

5. What is meant by the 'rotation' of the earth ?
6. What do you understand by the 'revolution' of the earth ?
7. Name the four imaginary lines on a globe.
8. What is the Equator ? Why is it hot near the Equator ?
9. What causes day and night ?
10. What causes change in the seasons ?
11. What is an eclipse ?



Do and Learn

Draw the figures of the earth and the sun showing the formation of day and night.