SOCIAL SCIENCE

The Earth : Our Habitat

TEXTBOOK IN GEOGRAPHY FOR CLASS VI

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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FOREWORD

The National Curriculum Framework (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986).

The success of this efforts depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge.

These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience.

The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development committee responsible for this book. We wish to thank the Chairperson of the advisory group in Social Sciences, Professor Hari Vasudevan and the Chief Advisor for this book, Vibha Parthasarathi for guiding the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation committed to systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

Director
National Council of Educational
Research and Training

New Delhi
20 December 2005

Rationalisation of Content in the Textbooks

In view of the COVID-19 pandemic, it is imperative to reduce content load on students. The National Education Policy 2020, also emphasises reducing the content load and providing opportunities for experiential learning with creative mindset. In this background, the NCERT has undertaken the exercise to rationalise the textbooks across all classes. Learning Outcomes already developed by the NCERT across classes have been taken into consideration in this exercise.

Contents of the textbooks have been rationalised in view of the following:

- Overlapping with similar content included in other subject areas in the same class
- Similar content included in the lower or higher class in the same subject
- Difficulty level
- Content, which is easily accessible to students without much interventions from teachers and can be learned by children through self-learning or peer-learning
- Content, which is irrelevant in the present context

This present edition, is a reformatted version after carrying out the changes given above.

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The Council is thankful to the Survey of India for certification of maps given in the textbook. It also gratefully acknowledges the support of individuals and organisations as listed below for providing various photographs, and other materials such as articles and paintings used in this textbook —

Science Popularisation Association of Communications and Educators (SPACE), New Delhi (Fig. 1.6); Photo Division, Ministry of Information and Broadcasting, Govt. of India (Agricultural Field – Cover page); ITDC/Ministry of Tourism, Govt. of India, (Fig. 5.5 and Plateau on Contents page); (Tiger– Cover page); (Himalayas – cover page and page 30); (Deer on Contents page); Prakash Higher Secondary School, Bodakdev, Ahmedabad (Poem and paintings related to the Tsunami on page 44 and 45); Social Science, Part-II, Class VI, NCERT, 2005 (Fig. 1.3).

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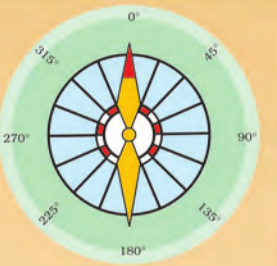
The following are applicable to all the maps of India used in this book

1. The responsibility for the correctness of internal details rests with the publisher.
2. The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
3. The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.
4. The interstate boundaries amongst Arunachal Pradesh, Assam and Meghalaya shown on this map are as interpreted from the "North-Eastern Areas (Reorganisation) Act.1971," but have yet to be verified.
5. The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.
6. The state boundaries between Uttaranchal & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by the Governments concerned.
7. The spellings of names in this map, have been taken from various sources.

Contents



THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a [1]**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

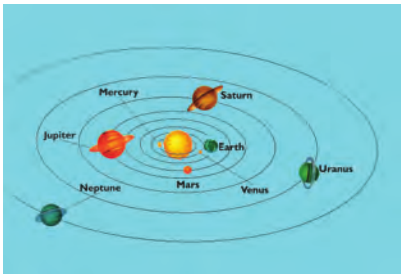
EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the [2][unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

---

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)



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1

THE EARTH IN THE SOLAR SYSTEM

How wonderful it is to watch the sky after sunset! One would first notice one or two bright dots shining in the sky. Soon you would see the number increasing. You cannot count them any more. The whole sky is filled with tiny shining objects – some are bright, others dim. It seems as if the sky is studded with diamonds. They all appear to be twinkling. But if you look at them carefully you will notice that some of them do not twinkle as others do. They simply glow without any flicker just as the moon shines.

Along with these bright objects, you may also see the moon on most of the days. It may, however, appear at different times, in different shapes and at different positions. You can see the full moon only once in about a month's time. It is **Full moon** night or *Poornima*. A fortnight later, you cannot see it at all. It is a **New moon** night or *Amavasya*. On this day, you can watch the night sky best, provided it is a clear night.

Do you wonder why can't we see the moon and all those bright tiny objects during day time? It is because the very bright light of the sun does not allow us to see all these bright objects of the night sky.

The sun, the moon and all those objects shining in the night sky are called **celestial bodies**.

Some celestial bodies are very big and hot. They are made up of gases. They have their own heat and light, which they emit in large amounts. These celestial bodies are called **stars**. The sun is a star.

Countless twinkling stars in the night sky are similar to the sun. But we do not feel their heat or light, and they look so tiny because they are very very far from us.

Let's Do

You'll need : 1 torch, 1 sheet of plain paper, pencil and a needle.

Step :

1. Place the torch in the centre of the paper with its glass front touching the paper.
2. Now draw a circle around the torch.
3. Perforate the paper with the needle within the circled area.
4. Now place the perforated circle part of the paper on the glass front and wrap the paper around the torch with a rubber band.
5. Take care that the switch of the torch is not covered.
6. In a dark room, stand at some distance facing a plain wall. Switch off all other lights. Now flash the torch light on the wall. You will see numerous dots of light on the wall, like stars shine in the night.
7. Switch on all the lights in the room. All dots of light will be almost invisible.
8. You may now compare the situation with what happens to the bright objects of the night sky after the sun rises in the morning.

Figure 1.1 : Saptarishi and the North Star

You must have noticed that all objects look smaller when seen from a distance. How small an aeroplane looks when it is flying at a great height!

While watching the night sky, you may notice various patterns formed by different groups of stars. These are called ***constellations***. Ursa Major or Big Bear is one such constellation. One of the most easily recognisable constellation is the *Saptarishi* (*Sapta*-seven, *rishi*-sages). It is a group of seven stars (Figure 1.1) that forms a part of Ursa Major Constellation. Ask someone elder in your family or neighbourhood to show you more stars, planets and constellations in the sky.

In ancient times, people used to determine directions during the night with the help of stars. The North star indicates the north direction. It is also called the **Pole Star**. It always remains in the same position in the sky. We can locate the position of the Pole Star with the help of the Saptarishi. Look at Figure 1.1. You will notice that, if an imaginary line is drawn joining the pointer stars and extended further, it will point to the Pole Star.

Some celestial bodies do not have their own heat and light. They are lit by the light of the stars. Such bodies are called **planets**. The word 'planet' comes from the Greek word "Planetai" which means 'wanderers'. The earth on which we live is a planet. It gets all its heat and light from the sun, which is our nearest star. If we look at the earth from a great distance, say the moon, it will appear to be shining just as the moon.

The moon that we see in the sky is a satellite. It is a companion of our earth and moves round it. Like our earth, there are seven other planets that get heat and light from the sun. Some of them have their moons too.

Interesting Fact

Jupiter, Saturn and Uranus have rings around them. These are belts of small debris. These rings may be seen from the earth with the help of powerful telescopes.

THE SOLAR SYSTEM

The sun, eight planets, satellites and some other celestial bodies known as asteroids and meteoroids

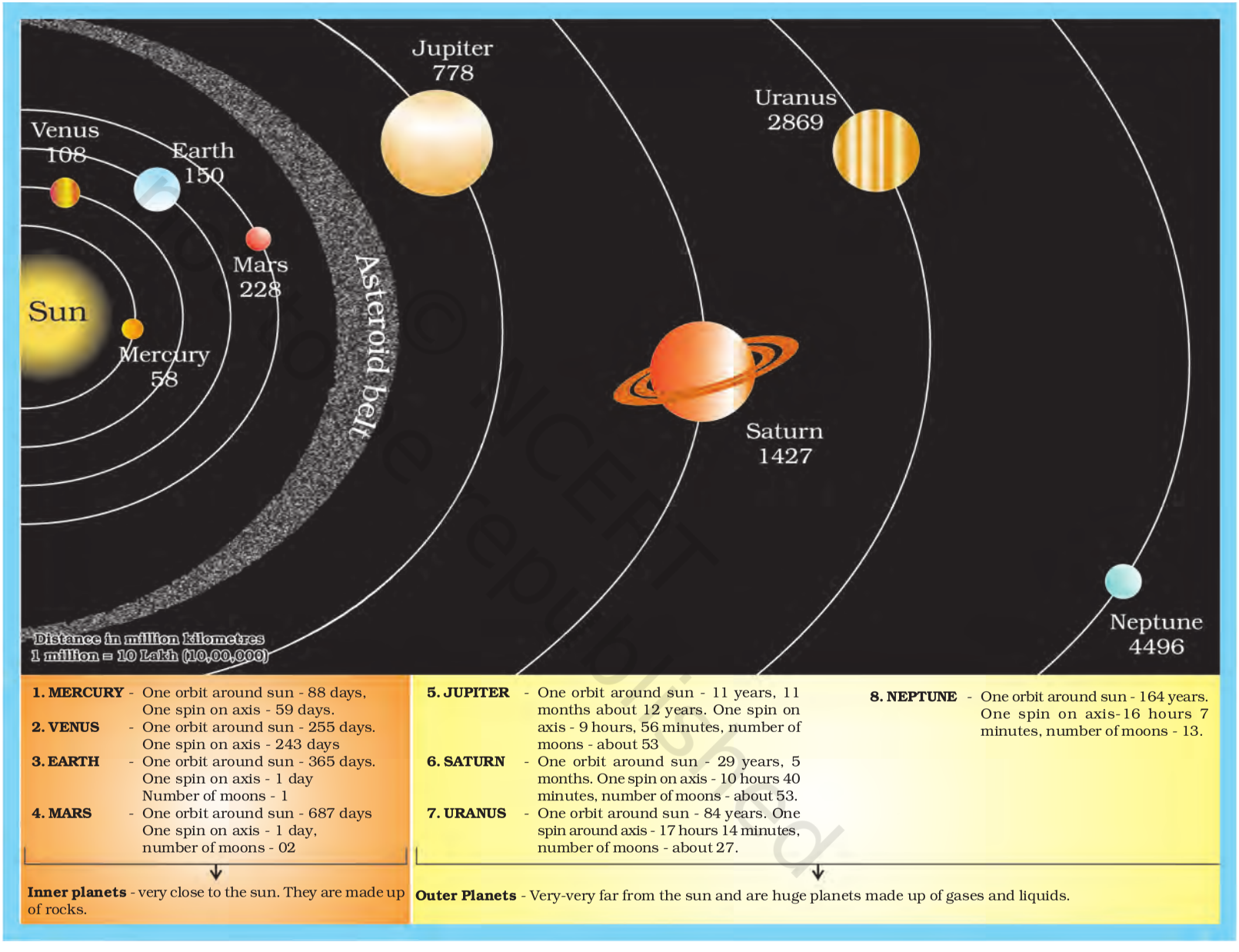


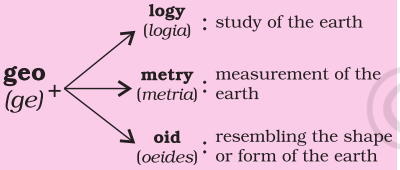
Figure 1.2 : The Solar System *Saurce: https://planetarynames.wr.usgs.gov/Page/Planets*

Do you know?

'Sol' in Roman mythology is the 'Sungod'. 'Solar' means 'related to the sun'. The family of the sun is, therefore, called the solar system. Write down as many words using the word solar on your own as you can.

Word Origin

Many words used in a language may have been taken from some other language. Geography, for example, is an English word. It has its origin in Greek, which relates to the description of the earth. It is made of two Greek words, 'ge' meaning 'earth' and 'graphia' meaning 'writing'. Find out more about the earth.



Do you know?

Humans have always been fascinated gazing at the night sky. Those who study the celestial bodies and their movements are called astronomers. Aryabhatta was a famous astronomer of ancient India. He said that the moon and the planets shine due to reflected sunlight. Today, astronomers all over the world are busy exploring the universe.

form the solar system. We often call it a solar family, with the sun as its Head.

The Sun

The sun is in the centre of the solar system. It is huge and made up of extremely hot gases. It provides the pulling force that binds the solar system. The sun is the ultimate source of heat and light for the solar system. But that tremendous heat is not felt so much by us because despite being our nearest star, it is far away from us. The sun is about 150 million km away from the earth.

Planets

There are eight planets in our solar system. In order of their distance from the sun, they are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

An easy way to memorise the name of the planets in order of their distance from the sun is:

MY **V**ERY **E**FFICIENT **M**OTHER **J**UST **S**ERVED **U**S **N**UTS.

All the eight planets of the solar system move around the sun in fixed paths. These paths are elongated. They are called **orbits**. *Mercury* is nearest to the sun. It takes only about 88 days to complete one round along its orbit. *Venus* is considered as 'Earth's-twin' because its size and shape are very much similar to that of the earth.

Till recently (August 2006), Pluto was also considered a planet. However, in a meeting of the International Astronomical Union, a decision was taken that Pluto like other celestial objects (Ceres, 2003 UB_{313}) discovered in recent past may be called 'dwarf planets."

The Earth

The earth *is* the third nearest planet to the sun. In size, it is the fifth largest planet. It is slightly flattened at the poles. That is why, its shape is described as a **Geoid**. Geoid means an earth-like shape.

Conditions favourable to support life are probably found only on the earth. The earth is neither too hot nor too cold. It has water and air, which are very essential for our survival. The air has life-supporting gases like oxygen. Because of these reasons, the earth is a unique planet in the solar system.

From the outer space, the earth appears blue because its two-thirds surface is covered by water. It is, therefore, called a *blue planet*.

Do you know?

Light travels at the speed of about 300,000 km per second. Yet, even with this speed, the light of the sun takes about eight minutes to reach the earth.

The Moon

Our earth has only one satellite, that is, the moon. Its diameter is only one-quarter that of the earth. It appears so big because it is nearer to our planet than other celestial bodies. It is about 3,84,400 km away from us. Now you can compare the distance of the earth from the sun and that from the moon.

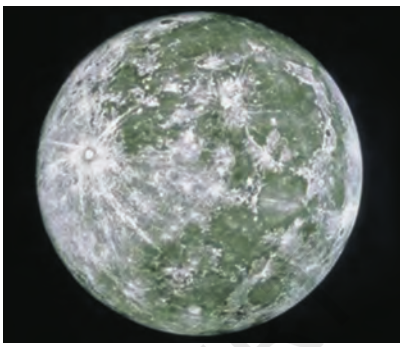
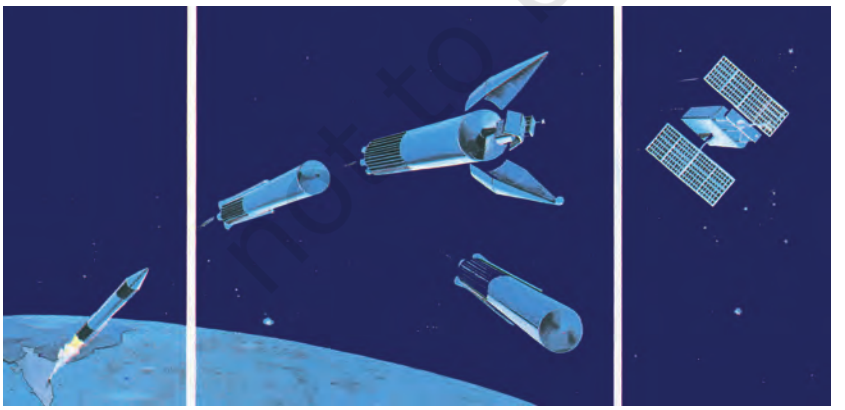


Figure 1.3 : The moon as seen from the space

The moon moves around the earth in about 27 days. It takes exactly the same time to complete one spin. As a result, only one side of the moon is visible to us on the earth. common for all the moons (tidal locking)

The moon does not have conditions favourable for life. It has mountains, plains and depressions on its



Rocket launch *Rocket falls back to the Earth* *Satellite enters orbit*

Figure 1.4 : Human-made Satellite

Interesting Fact

Neil Armstrong was the first man to step on the surface of the moon on 20 July 1969. Find out whether any Indian has landed on the moon?

A Satellite is a celestial body that moves around the planets in the same way as the planets move around the sun.

A Human-made Satellite is an artificial body. It is designed by scientists to gather information about the universe or for communication. It is carried by a rocket and placed in the orbit around the earth.

Some of the Indian satellites in space are INSAT, IRS, EDUSAT, etc.

? *What do animals and plants require in order to grow and survive?*

Figure 1.5 : Asteroid

surface. These cast shadows on the moon's surface. Look at the full moon and observe these shadows.

Asteroids

Apart from the stars, planets and satellites, there are numerous tiny bodies which also move around the sun. These bodies are called ***asteroids***. They are found between the orbits of Mars and Jupiter (Figure 1.2). Scientists are of the view that asteroids are parts of a planet which exploded many years back.

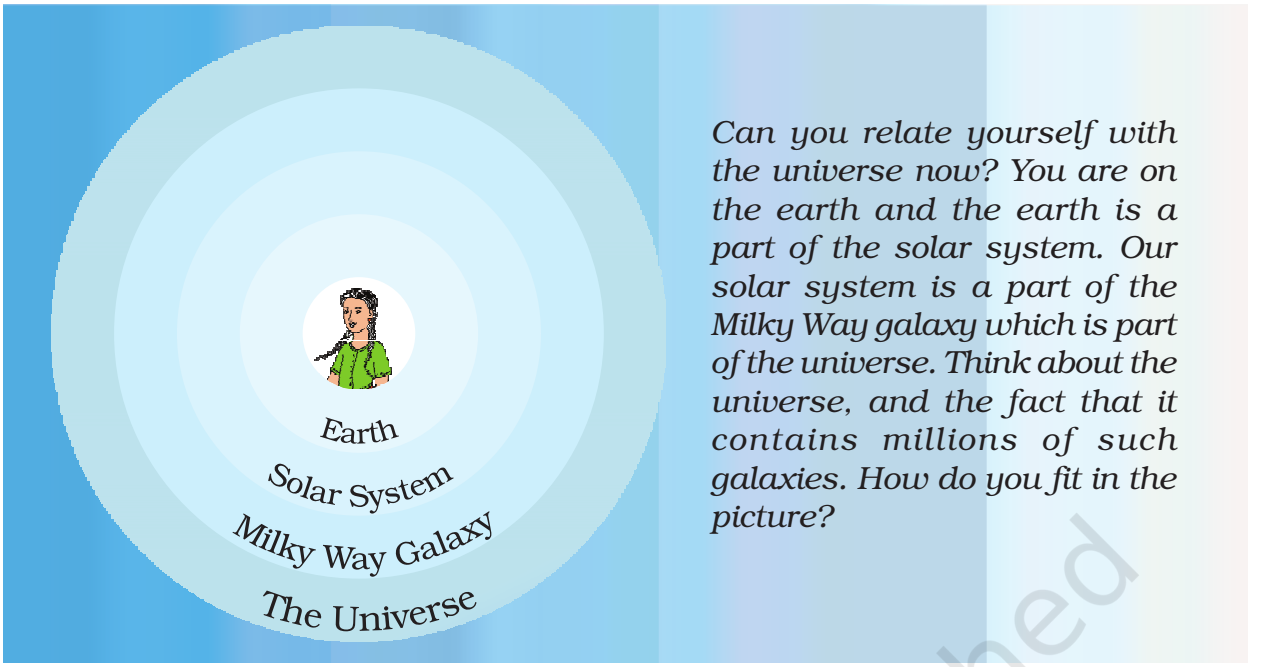
difference between asteroids and meteoroids

Meteoroids

The small pieces of rocks which move around the sun are called **meteoroids**. Sometimes these meteoroids come near the earth and tend to drop upon it. During this process due to friction with the air they get heated up and burn. It causes a flash of light. Sometimes, a meteor without being completely burnt, falls on the earth and creates a hollow.

Do you see a whitish broad band, like a white glowing path across the sky on a clear starry night? It is a cluster of millions of stars. This band is the *Milky Way* galaxy (Figure 1.6). Our solar system is a part of this galaxy. In ancient India, it was imagined to be a river of light flowing in the sky. Thus, it was named *Akash Ganga*. A **galaxy** is a huge system of billions of stars, and clouds of dust and gases. There are millions of such galaxies that make the **Universe**. It is difficult to imagine how big the universe is. Scientists are still trying to find out more and more about it. We are not certain about its size but we know that all of us – you and I belong to this universe.

Figure 1.6 : Milky Way



Can you relate yourself with the universe now? You are on the earth and the earth is a part of the solar system. Our solar system is a part of the Milky Way galaxy which is part of the universe. Think about the universe, and the fact that it contains millions of such galaxies. How do you fit in the picture?

EXERCISES

1. Answer the following questions briefly.

(a) How does a planet differ from a star?

(b) What is meant by the 'Solar System'?

(c) Name all the planets according to their distance from the sun.

(d) Why is the Earth called a unique planet?

(e) Why do we see only one side of the moon always?

(f) What is the Universe ?

2. Tick the correct answer.

(a) The planet known as the "Earth's Twin" is

(i) Jupiter (ii) Saturn (iii) Venus

(b) Which is the third nearest planet to the sun ?

(i) Venus (ii) Earth (iii) Mercury

(c) All the planets move around the sun in a

(i) Circular path (ii) Rectangular path (iii) Elongated path

(d) The Pole Star indicates the direction to the

(i) South (ii) North (iii) East

(e) Asteroids are found between the orbits of

(i) Saturn and Jupiter (ii) Mars and Jupiter (iii) The Earth and Mars

3. Fill in the blanks.

(a) A group of _____ forming various patterns is called a _____.

(b) A huge system of stars is called_____.

(c) _____is the closest celestial body to our earth.

(d) _____is the third nearest planet to the sun.

(e) Planets do not have their own_____ and _____.

THINGS TO DO

1. Prepare a chart of the solar system.
2. During a vacation visit a planetarium and describe your experience in the class.
3. Organise a quiz contest on the earth and the solar system.

FOR FUN

1. The sun is commonly known as *Soorya* or *Sooraj* in Hindi, Find out its name in different languages of our country. Take help of your friends, teachers and neighbours.
2. You might have heard that people make human chains and run for world peace etc. You can also make a human solar system and run for fun.

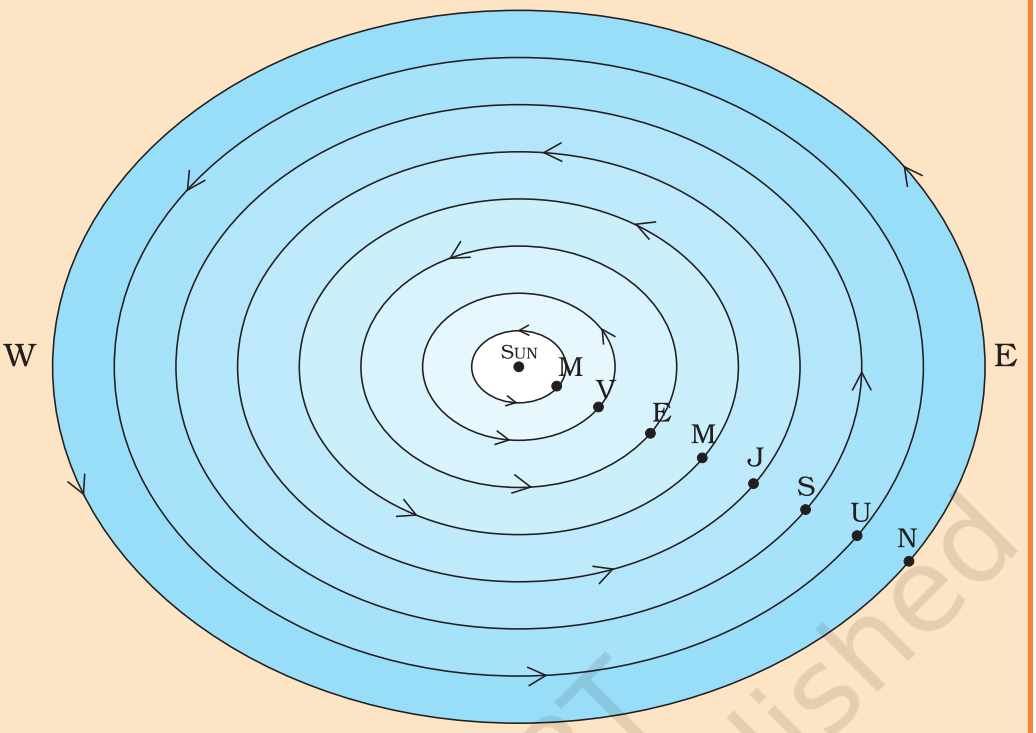
   Step 1: All children of your class can play this game. Assemble in a big hall or on a playground.

   Step 2: Now draw 8 circles on the ground as shown in the figure drawn on the opposite page.

   Use a 5-metre long rope. Mark at every half a metre with a chalk or ink. Place a small nail to mark the centre. Now hold one end of the rope at the central position. Ask your friend to hold a chalk at the ½ metre mark and move around the nail holding rope and chalk together on the ground.

   You have drawn one circle just as you do on paper using a compass and a pencil. Draw other circles in the same manner.

   Step 3: Prepare 10 placards. Name them as Sun., Moon, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.



Step 4: Select 10 children in the following order and give each one of them a placard.

Order of placard distribution

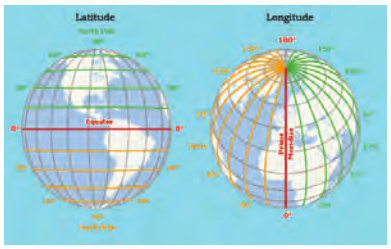
The Sun - tallest, The moon - smallest; Mercury, Mars, Venus and Earth (almost equal heights); Neptune, Uranus, Saturn and Jupiter taller than the earlier four planets but smaller than the Sun.

Now ask the children holding placards to take their places with the Sun in the centre in their orbits. Ask the child holding the moon placard to keep the hand of the child holding the earth placard always.

Now your Solar System is almost ready to go into action.

Now make everybody move slowly in the anti-clockwise direction. Your class has turned into a small human replica of the solar system.

While moving on your orbit you can also turn around. For everybody the spin should be anti-clock wise except for Venus and Uranus who will make the spin in the clock-wise direction.



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2

GLOBE : LATITUDES AND LONGITUDES

Figure 2.1 : Globe

In the previous chapter, you have read that our planet earth is not a sphere. It is slightly flattened at the North and the South Poles and bulge in the middle. Can you imagine how it looks? You may look at a globe carefully in your classroom to get an idea. **Globe** is a true model (miniature form) of the earth (Figure 2.1).

Globes may be of varying size and type – big ones, which cannot be carried easily, small pocket globes, and globe-like balloons, which can be inflated and are handy and carried with ease. The globe is not fixed. It can be rotated the same way as a top spin or a potter's wheel is rotated. On the globe, countries, continents and oceans are shown in their correct size.

It is difficult to describe the location of a point on a sphere like the earth. Now the question arises as to how to locate a place on it? We need certain points of reference and lines to find out the location of places.

You will notice that a needle is fixed through the globe in a tilted manner, which is called its **axis**. Two points on the globe through which the needle passes are two poles – North Pole and South Pole. The globe can be moved around this needle from west to east just as the earth moves. But, remember there is a major difference. The real earth has no such needle. It moves around its axis, which is an imaginary line.

Another imaginary line running on the globe divides it into two equal parts. This line is known as the **equator**. The northern half of the earth is known as the Northern Hemisphere and the southern half is known as the Southern Hemisphere. They are both

Let's Do

Take a big round potato or a ball. Pierce a knitting needle through it. The needle resembles the axis shown in a globe. You can now move the potato or the ball around this axis from left to right.

equal halves. Therefore, the equator is an imaginary circular line and is a very important reference point to locate places on the earth. All parallel circles from the equator up to the poles are called **parallels of latitudes**. Latitudes are measured in degrees.

The equator represents the zero degree latitude. Since the distance from the equator to either of the poles is one-fourth of a circle round the earth, it will measure ¼th of 360 degrees, i.e. 90°. Thus, 90 degrees north latitude marks the North Pole and 90 degrees south latitude marks the South Pole.

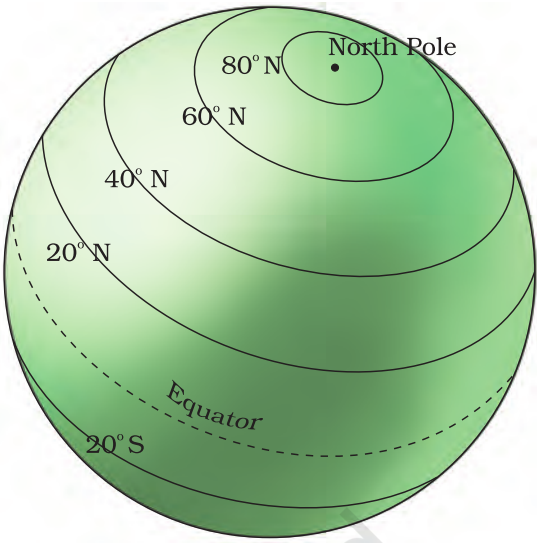


Figure 2.2 : Latitude

As such, all parallels north of the equator are called 'north latitudes.' Similarly all parallels south of the equator are called 'south latitudes.'

The value of each latitude is, therefore, followed by either the word north or south. Generally, this is indicated by the letter 'N' or 'S'. For example, both Chandrapur in Maharashtra (India) and Belo Horizonte in Brazil (South America) are located on parallels of about 20° latitude. But the former is 20° north of the equator and the latter is 20° south of it. We, therefore, say that Chandrapur is situated at 20° N latitude and Belo Horizonte is situated at 20° S latitude. We see in Figure 2.2 that as we move away from the equator, the size of the parallels of latitude decreases.

Do you know?

By measuring the angle of the Pole Star from your place, you can know the latitude of your place.

Important Parallels of Latitudes

Besides the equator (0°), the North Pole (90°N) and the South Pole (90° S), there are four important parallels of latitudes–

(i) **Tropic of Cancer** (23½° N) in the Northern Hemisphere. (ii) **Tropic of Capricorn** (23½° S) in the Southern Hemisphere. (iii) **Arctic Circle** at 66½° north of the equator. (iv) **Antarctic Circle** at 66½° south of the equator.

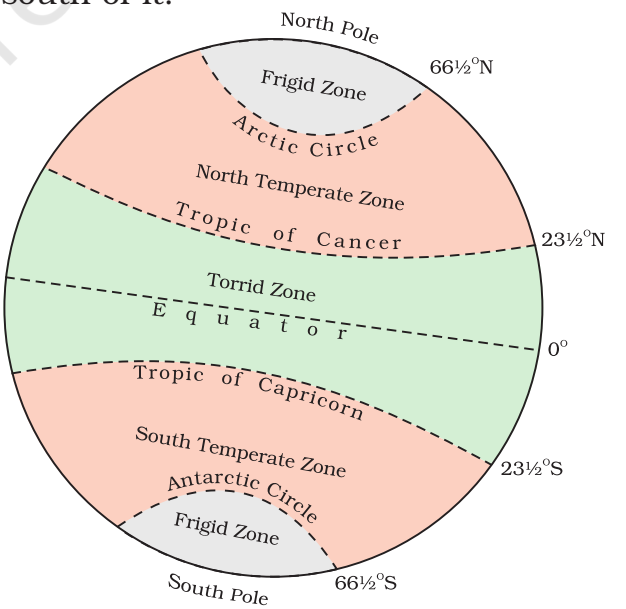


Figure 2.3 : Important Latitudes and Heat Zones

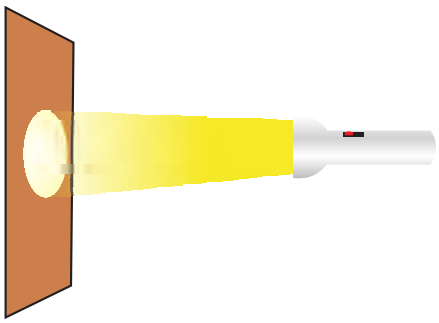


Figure 2.4 : (a)

Torch-light falling on a straight surface is bright and covers a smaller area.

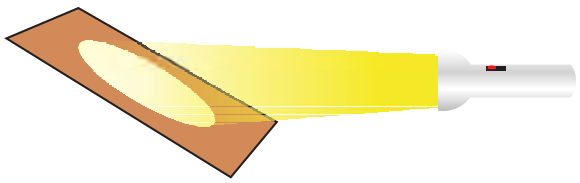


Figure 2.4 : (b)

Torch-light falling on a slanted surface is less bright but covers a bigger area.

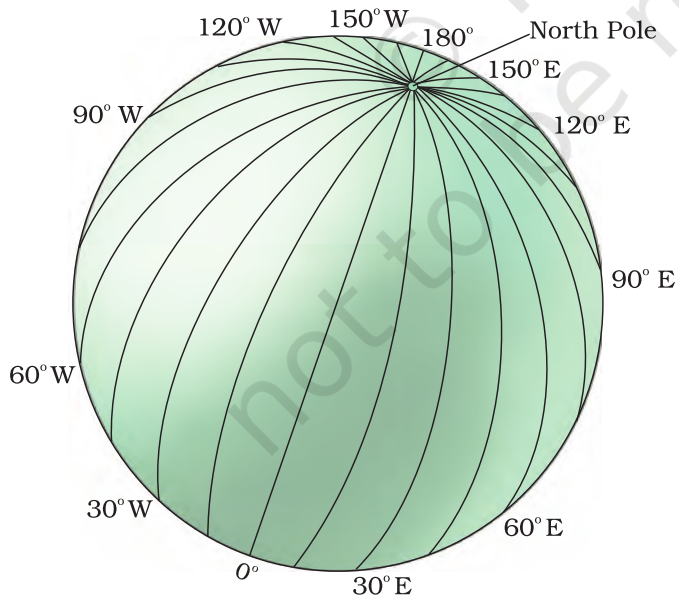


Figure 2.5 : Longitudes

Heat Zones of the Earth

The mid-day sun is exactly overhead at least once a year on all latitudes in between the Tropic of Cancer and the Tropic of Capricorn. This area, therefore, receives the maximum heat and is called the **Torrid Zone**.

The mid-day sun never shines overhead on any latitude beyond the Tropic of Cancer and the Tropic of Capricorn. The angle of the sun's rays goes on decreasing towards the poles. As such, the areas bounded by 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, have moderate temperatures. These are, therefore, called **Temperate Zones**.

Areas lying between the Arctic Circle and the North Pole in the Northern Hemisphere and the Antarctic Circle and the South Pole in the Southern Hemisphere, are very cold. It is because here the sun does not rise much above the horizon. Therefore, its rays are always slanting and provide less heat. These are, therefore, called **Frigid Zones** (very cold).

What are Longitudes?

To fix the position of a place, it is necessary to know something more than the latitude of that place. You can see, for example, that Tonga Islands (in the Pacific Ocean) and Mauritius Islands (in the Indian Ocean) are situated on the same latitude (i.e., 20° S). Now, in order to locate them precisely, we must find out how far east or west these places are from a given line of reference running from the North Pole to the South Pole. These lines of references are called the meridians of longitude,

and the distances between them are measured in 'degrees of longitude.' Each degree is further divided into minutes, and minutes into seconds. They are semi-circles and the distance between them decreases steadily polewards until it becomes zero at the poles, where all the meridians meet.

Unlike parallels of latitude, all meridians are of equal length. Thus, it was difficult to number the meridians. Hence, all countries decided that the count should begin from the meridian which passed through Greenwich, where the British Royal Observatory is located. This meridian is called the **Prime Meridian**. Its value is 0° longitude and from it we count 180° eastward as well as 180° westward. The Prime Meridian and 180° meridian divide the earth into two equal halves, the Eastern Hemisphere and the Western Hemisphere. Therefore, the longitude of a place is followed by the letter E for the east and W for the west. It is, however, interesting to note that 180° East and 180° West meridians are on the same line. international date line?

Now look at the grid of the parallels of latitude and meridians of longitude on the globe (Figure 2.6). You can locate any point on the globe very easily if you know its latitude and longitude. For example, Dhubri in Assam is situated at 26° N latitude and 90° E longitude. Find out the point where these two lines cut each other. That point will be the location of Dhubri.

Let's Do

Draw a circle. Let the Prime meridian divide it into two equal halves. Colour and label the eastern hemisphere and the western hemisphere. Similarly draw another circle and let the equator divide it into two halves. Now colour the Northern hemisphere and Southern hemisphere.

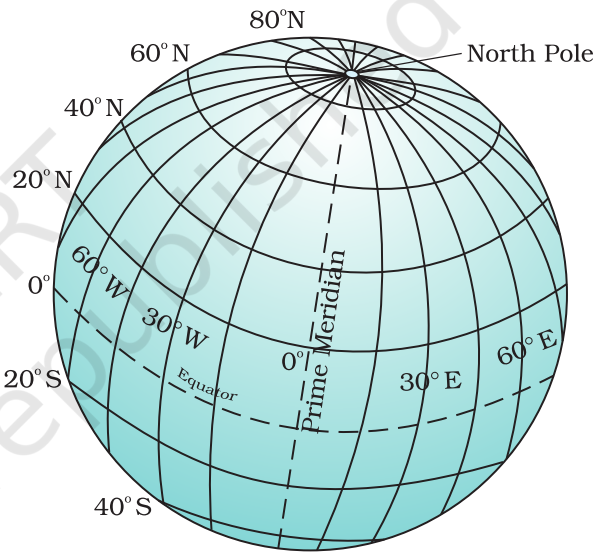


Figure 2.6 : Grid

To understand this clearly draw equidistant vertical and horizontal lines on a paper (Figure 2.7). Label the vertical rows with numbers and horizontal rows with letters, draw some small circles randomly on points where these horizontal and vertical lines intersect each other. Name these small circles as a, b, c, d and e.

Let vertical lines represent East Longitudes and horizontal lines as North Latitudes.

Now you will see that circle 'a' is located on B° N latitude and 1° E longitude.

Find out the location of other circles.

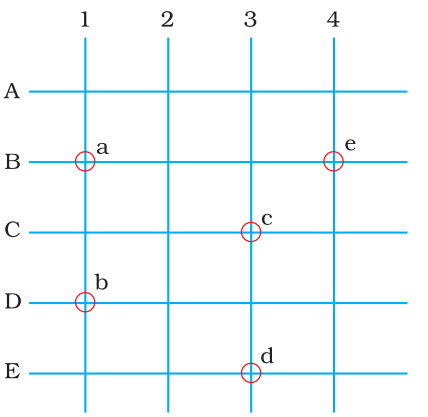


Figure 2.7

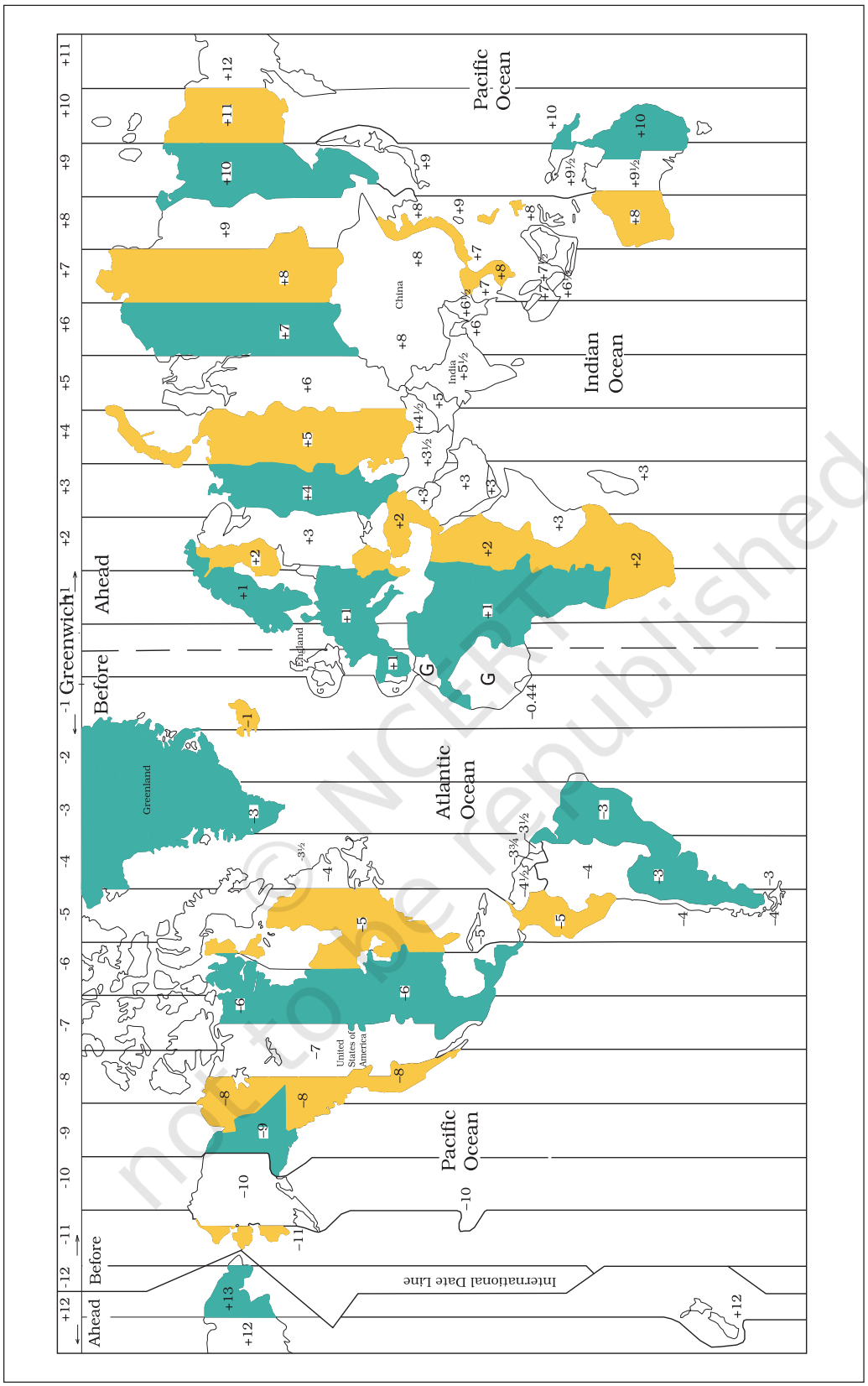


Figure 2.8 : Time zones of the World

Longitude and Time

The best means of measuring time is by the movement of the earth, the moon and the planets. The sun regularly rises and sets every day, and naturally, it is the best time-keeper throughout the world. Local time can be reckoned by the shadow cast by the sun, which is the shortest at noon and longest at sunrise and sunset.

When the Prime Meridian of Greenwich has the sun at the highest point in the sky, all the places along this meridian will have mid-day or noon.

As the earth rotates from west to east, those places east of Greenwich will be ahead of Greenwich time and those to the west will be behind it (Figure 2.8). The rate of difference can be calculated as follows. The earth rotates 360° in about 24 hours, which means 15° an hour or 1° in four minutes. Thus, when it is 12 noon at Greenwich, the time at 15° east of Greenwich will be 15 × 4 = 60 minutes, i.e., 1 hour ahead of Greenwich time, which means 1 p.m. But at 15° west of Greenwich, the time will be behind Greenwich time by one hour, i.e., it will be 11.00 a.m. Similarly, at 180°, it will be midnight when it is 12 noon at Greenwich.

At any place a watch can be adjusted to read 12 o'clock when the sun is at the highest point in the sky, i.e., when it is mid-day. The time shown by such a watch will give the local time for that place. You can see that all the places on a given meridian of longitude have the same local time.

Why Do We Have Standard Time?

The local time of places which are on different meridians are bound to differ. For example, it will be difficult to prepare a time-table for trains which cross several longitudes. In India, for instance, there will be a difference of about 1 hour and 45 minutes in the local times of Dwarka in Gujarat and Dibrugarh in Assam. It is, therefore, necessary to adopt the local time of some central meridian of a country as the standard time for the country. In India, the longitude of 82½° E (82° 30'E) is treated as the standard meridian. The local time at this meridian is taken as the standard time for the whole country. It is known as the Indian Standard Time (IST).

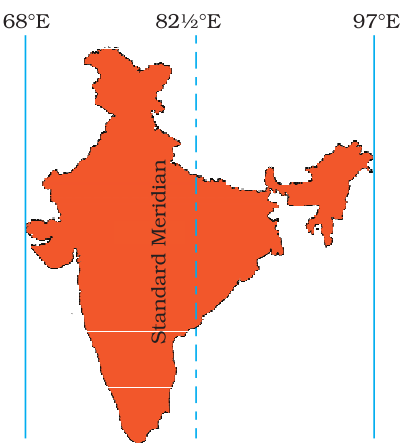


Figure 2.9 : Indian Standard Meridian

Kabeer lives in a small town near Bhopal. He tells his friend Alok that they will not be able to sleep tonight. A day and night cricket match between India and England had started at 2 p.m. in London. This means that the match would begin at 7.30 p.m. in India and finish well into the night. Do you know what is the time difference between India and England?

India located east of Greenwich at 82°30'E is 5 hours and 30 minutes ahead of GMT. So it will be 7:30 p.m. in India when it is 2:00 p.m. noon in London.

Some countries have a great longitudinal extent and so they have adopted more than one standard time. For example, in Russia, there are as many as eleven standard times. The earth has been divided into twenty-four time zones of one hour each. Each zone thus covers 15° of longitude.

EXERCISES

1. Answer the following questions briefly.

(a) What is the true shape of the earth?

(b) What is a globe?

(c) What is the latitudinal value of the Tropic of Cancer?

(d) What are the three heat zones of the Earth?

(e) What are parallels of latitude and meridians of longitude?

(f) Why does the torrid zone receive maximum amount of heat?

(g) Why is it 5.30 p.m. in India and 12.00 noon in London?

2. Tick the correct answers.

(a) The value of the prime meridian is

(i) 90° (ii) 0° (iii) 60°

(b) The frigid zone lies near

(i) the Poles (ii) the Equator (iii) the Tropic of Cancer

(c) The total number of longitudes are

(i) 360 (ii) 180 (iii) 90

(d) The Antarctic circle is located in

(i) the Northern hemisphere

(ii) the Southern hemisphere

(iii) the Eastern hemisphere

(e) Grid is a network of

(i) parallels of latitudes and merdians of longitudes

(ii) the Tropic of Cancer and the Tropic of Capricorn

(iii) the North Pole and the South Pole

3. Fill in the blanks.

(a) The Tropic of Capricorn is located at _____.

(b) The Standard Meridian of India is _____.

(c) The 0° Meridian is also known as _____.

(d) The distance between the longitudes decreases towards_____.

(e) The Arctic Circle is located in the _____ hemisphere.

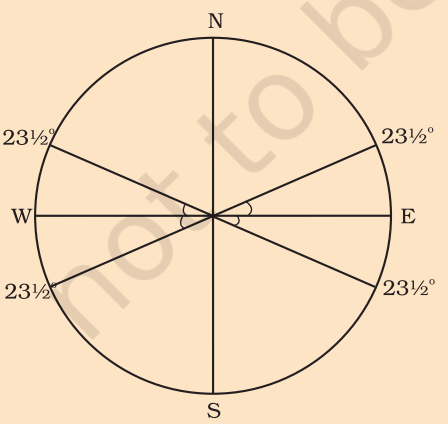
Things To Do

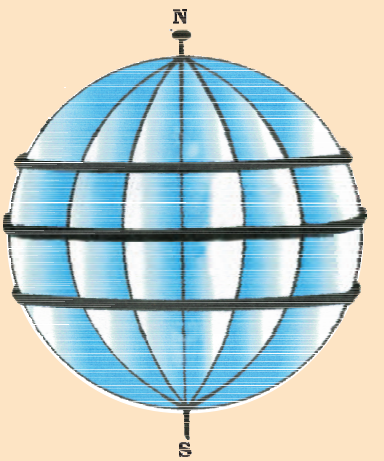
1. Draw a diagram of the globe showing the earth's axis, the Equator, Tropics of Cancer and Capricorn, Arctic Circle and Antarctic Circle.

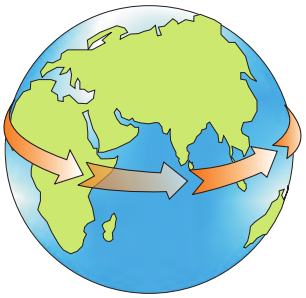
For Fun

1. Draw and cut out six circles of the same size (approx. 3 cm. radius) from cardboard. Mark diametres (NS, EW) and 23½° angles on each face of the circles as shown on the figure. Place the circle one on top of the other and stitch along the line NS. Now there are twelve semi-circles. Let one semi-circle represent 0° or Greenwich Meridian (Prime Meridian). The 6th semi-circle from it will be the 180° Meridian. Between the 0° and 180° there are 5 semi-circles on both sides which are West and East longitudes 30° apart. On two ends of the stapled line stick pins to represent the North and South Poles.

   A rubber band around the model touching the EW points will represent the Equator. Two rubber bands touching the 23½° points, South and North of the EW points will represent the tropics.







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3

MOTIONS OF THE EARTH

Let's Do

Take a ball to represent the earth and a lighted candle to represent the sun. Mark a point on the ball to represent a town X. Place the ball in such a way that the town X is in darkness. Now rotate the ball from left to right. As you move the ball slightly, the town will have its sunrise. As the ball continues to move, the point X gradually gets away from the sun. This is sunset.

As you know that the earth has two types of motions, namely rotation and revolution. **Rotation** is the movement of the earth on its axis. The movement of the earth around the sun in a fixed path or orbit is called **Revolution.**

The axis of the earth which is an imaginary line, makes an angle of 66½° with its **orbital plane**. The plane formed by the orbit is known as the orbital plane. The earth receives light from the sun. Due to the spherical shape of the earth, only half of it gets light from the sun at a time (Figure 3.2). The portion facing the sun experiences day while the other half away from the sun experiences night. The circle that divides the day from night on the globe is called the **circle of illumination**. This circle does not coincide with the axis as you see in the Figure 3.2. The earth takes about 24 hours to complete one rotation around its axis. The period of rotation is known as the *earthday*. This is the daily motion of the earth.

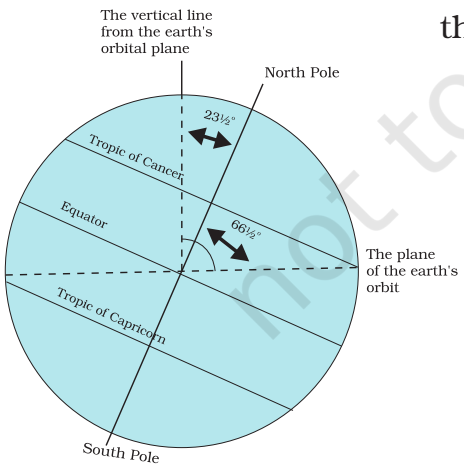


Figure 3.1 : Inclination of the Earth's axis and the orbital plane

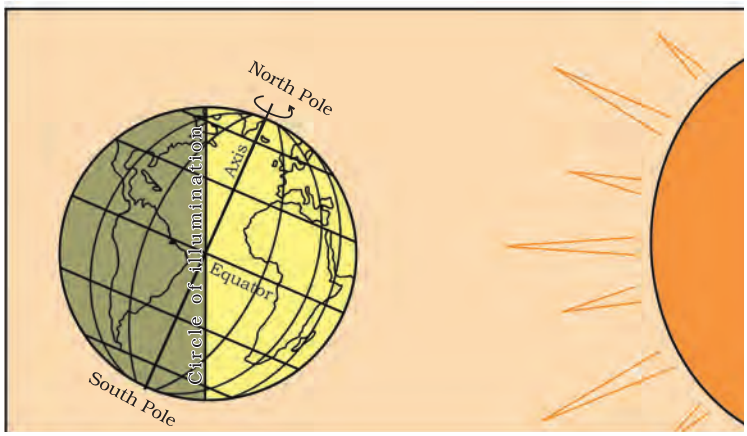


Figure 3.2 : Day and Night on the Earth due to rotation

What would happen if the earth did not rotate? The portion of the earth facing the sun would always experience day, thus bringing continuous warmth to the region. The other half would remain in darkness and be freezing cold all the time. Life would not have been possible in such extreme conditions.

The second motion of the earth around the sun in its orbit is called **revolution**. It takes 365¼ days (one year) to revolve around the sun. We consider a year as consisting of 365 days only and ignore six hours for the sake of convenience.

Do you know?

The ancient Indian astronomer Aryabhata had stated that 'the earth is round and rotates on its own axis'

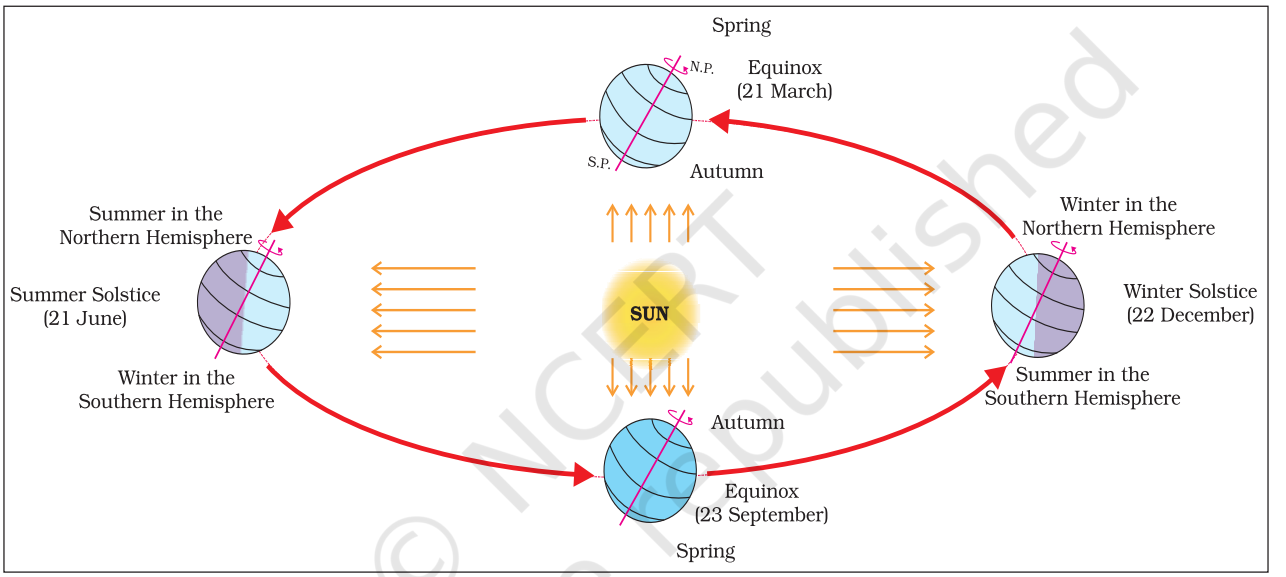


Figure 3.3 : Revolution of the Earth and Seasons

Six hours saved every year are added to make one day (24 hours) over a span of four years. This surplus day is added to the month of February. Thus every fourth year, February is of 29 days instead of 28 days. Such a year with 366 days is called a **leap year**. Find out when will the next leap year be?

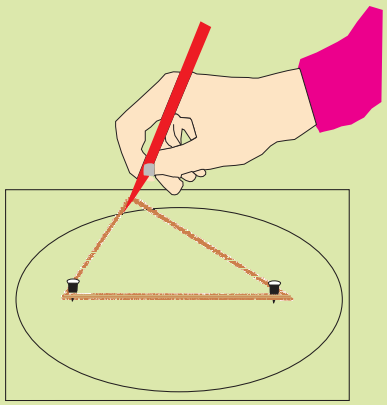
From the Figure 3.3, it is clear that the earth is going around the sun in an **elliptical orbit**.

Notice that throughout its orbit, the earth is inclined in the same direction.

A year is usually divided into summer, winter, spring and autumn seasons. Seasons change due to the change in the position of the earth around the sun.

Let's Do

Do you know how to draw an ellipse? Take a pencil, two pins and a loop of thread. Now fix these pins on a paper as shown in the figure. Put the loop on the paper enclosing these two pins inside the loop. Now hold the pencil and draw the line keeping the thread tight and moving the pencil along it. The figure represents an ellipse.



Let's Do

To understand the earth's inclination in the same direction, draw a big ellipse on the ground and take a flag with a stick. Stand anywhere on the line of the ellipse. Point your flag to a fixed point far away like on a tree-top. Now move along the ellipse keeping your flag always pointing towards that fixed point. In this way, the axis of the earth remains inclined permanently in the same position. The revolution of the earth and the inclination of the earth's axis in a fixed direction cause seasons.

Look at the Figure 3.3. You will see that on 21st June, the Northern Hemisphere is tilted towards the sun. The rays of the sun fall directly on the Tropic of Cancer. As a result, these areas receive more heat. The areas near the poles receive less heat as the rays of the sun are slanting. The North Pole is inclined towards the sun and the places beyond the Arctic Circle experience continuous daylight for about six months. Since a large portion of the Northern Hemisphere is getting light from the sun, it is summer in the regions north of the equator. The longest day and the shortest night at these places occur on 21st June. At this time in the Southern Hemisphere all these conditions are reversed. It is winter season there. The nights are longer than the days. This position of the earth is called the **Summer Solstice**.

On 22nd December, the Tropic of Capricorn receives direct rays of the sun as the South Pole tilts towards it. As the sun's rays fall vertically at the Tropic of Capricorn (23½° S), a larger portion of the Southern Hemisphere gets light. Therefore, it is summer in the Southern Hemisphere with longer days and shorter nights. The reverse happens in the Northern Hemisphere. This position of the earth is called the **Winter Solstice**. Do you know that Christmas is celebrated in Australia in the summer season?

On 21st March and September 23rd, direct rays of the sun fall on the equator. At this position, neither of the poles is tilted towards the sun; so, the whole earth experiences equal days and equal nights. This is called an **equinox**.

On 23rd September, it is autumn season in the Northern Hemisphere and spring season in the Southern Hemisphere. The opposite is the case on 21st March,

when it is spring in the Northern Hemisphere and autumn in the Southern Hemisphere.

Thus, you find that there are days and nights and changes in the seasons because of the rotation and revolution of the earth respectively.

EXERCISES

1. Answer the following questions briefly.

(a) What is the angle of inclination of the earth's axis with its orbital plane?

(b) Define rotation and revolution.

(c) What is a leap year?

(d) Differentiate between the Summer and Winter Solstice.

(e) What is an equinox?

(f) Why does the Southern Hemisphere experience Winter and Summer Solstice in different times than that of the Northern Hemisphere?

(g) Why do the poles experience about six months day and six months night?

2. Tick the correct answers.

(a) The movement of the earth around the sun is known as

(i) Rotation (ii) Revolution (iii) Inclination

(b) Direct rays of the sun fall on the equator on

(i) 21 March (ii) 21 June (iii) 22 December

(c) Christmas is celebrated in summer in

(i) Japan (ii) India (iii) Australia

(d) Cycle of the seasons is caused due to

(i) Rotation (ii) Revolution (iii) Gravitation

3. Fill in the blanks.

(a) A leap year has _____ number of days.

(b) The daily motion of the earth is _____.

(c) The earth travels around the sun in _____ orbit.

(d) The sun's rays fall vertically on the Tropic of _____ on 21st June.

(e) Days are shorter during _____ season.

Things To Do

1. Make a drawing to show the inclination of the earth.
2. Record the timings of sunrise and sunset at your place taking help from your local newspaper on the 21st of each month and answer the following :

   (a) In which month are the days the shortest?

   (b) In which months are the days and nights nearly equal?

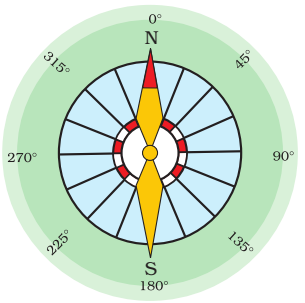
For Fun

1. Draw different shapes of ellipses by placing two pins nearer and farther using the same loop of thread. Notice when the ellipse becomes circular.
2. On any sunny day, take a straight stick that is one metre long. Find out a clean and level place on the ground. Place this stick into the ground where it casts a distinctive (sharp) shadow.

   Step (1): Mark the tip of the shadow with a stone or a twig or by any other means. The first shadow mark is always towards the west. See after 15 minutes and mark the tip of the shadow again. By then it would have moved a few centimetres away. Now join the two points and you have an approximate east-west line.

   Step (2) : Stand with the first mark to your left and the second mark to your right you are now facing north. This fact is true everywhere on the earth because the earth rotates in west to east direction.

   An alternative method is more accurate but requires more time. Set up your shadow stick and mark the first shadow in the morning. Use a piece of string to draw a clean arc through this mark around the stick. At mid-day, the shadow will shrink or disappear. In the afternoon, it will lengthen again and at the point where it touches the arc, make a second mark. Draw a line through the two marks to get an accurate east-west line.



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4

MAPS

You have learnt in the previous chapter about the advantages of a globe. However, globe has limitations as well. A globe can be useful when we want to study the earth as a whole. But, when we want to study only a part of the earth, as about our country, states, districts, towns and villages, it is of little help. In such a situation we use maps. A **map** is a representation or a drawing of the earth's surface or a part of it drawn on a flat surface according to a scale. But it is impossible to flatten a round shape completely.

We find that maps are useful to us for various purposes. One map shows a small area and a few facts. Another map may contain as many facts as a big book. When many maps are put together we get an Atlas. Atlases are of various sizes, measurements drawn on different scales. Maps provide more information than a globe. They are of different types. Some of them are described below.

Let's Do

Take an old rubber ball and draw whatever you like all over it. You may also mark north pole and south pole on it. Now cut this ball with a knife and try to flatten it. Notice how the drawings are distorted.

Physical Maps

Maps showing natural features of the earth such as mountains, plateaus, plains, rivers, oceans etc. are called **physical or relief maps**.

Political Maps

Maps showing cities, towns and villages, and different countries and states of the world with their boundaries are called **political maps**.

Thematic Maps

Some maps focus on specific information; such as road

maps, rainfall maps, maps showing distribution of forests, industries etc. are known as **thematic maps**. Suitable titles are given on the basis of information provided in these maps.

There are three ***Components of Maps*** – distance, direction and symbol.

Distance

Maps are drawings, which reduce the entire world or a part of it to fit on a sheet of paper. Or we can say maps are drawn to reduced scales. But this reduction is done very carefully so that the distance between the places is real. It can only be possible when a small distance on paper represents a large distance on the ground. Therefore, a scale is chosen for this purpose. **Scale** is the ratio between the actual distance on the ground and the distance shown on the map. For example, the distance between your school and your home is 10 km. If you show this 10 km. distance by 2 cm on a map, it means, 1 cm on the map will show 5 km. on the ground. The scale of your drawing will be 1cm = 5 km. Thus, scale is very important in any map. If you know the scale, you will be able to calculate the distance between any two places on a map.

When large areas like continents or countries are to be shown on a paper, then we use a small scale. For example 5 cm. on the map shows 500 km. of the ground. It is called a **small scale map**.

When a small area like your village or town is to be shown on paper, then we use a large scale that is 5 cm. on the map shows 500 metres only on the ground. It is called a **large scale map**.

Large scale maps give more information than small scale maps.

Direction

Most maps contain an arrow marked with the letter 'N' at the upper right hand corner. This arrow shows the north direction. It is called the north line. When you know the north, you can find out other directions, for example east, west and south. There are four major

Let's Do

Look at the Figure 4.1. There is a scale. It may be used for measuring distance between places. For example the distance between the well and the tree is 5 cm. It means that the actual distance is 50 metres. Now the distance between the PO (A) to Karim's house (E) is 12 cm. It means 120 metres on the ground but you can not fly like a bird directly from E to A. You will have to walk on the road. Let us measure the total walking distance from E to C, then C to M, M to B and B to A. Add all these distances. This will be the total walking distance from Karim's house to the post office.

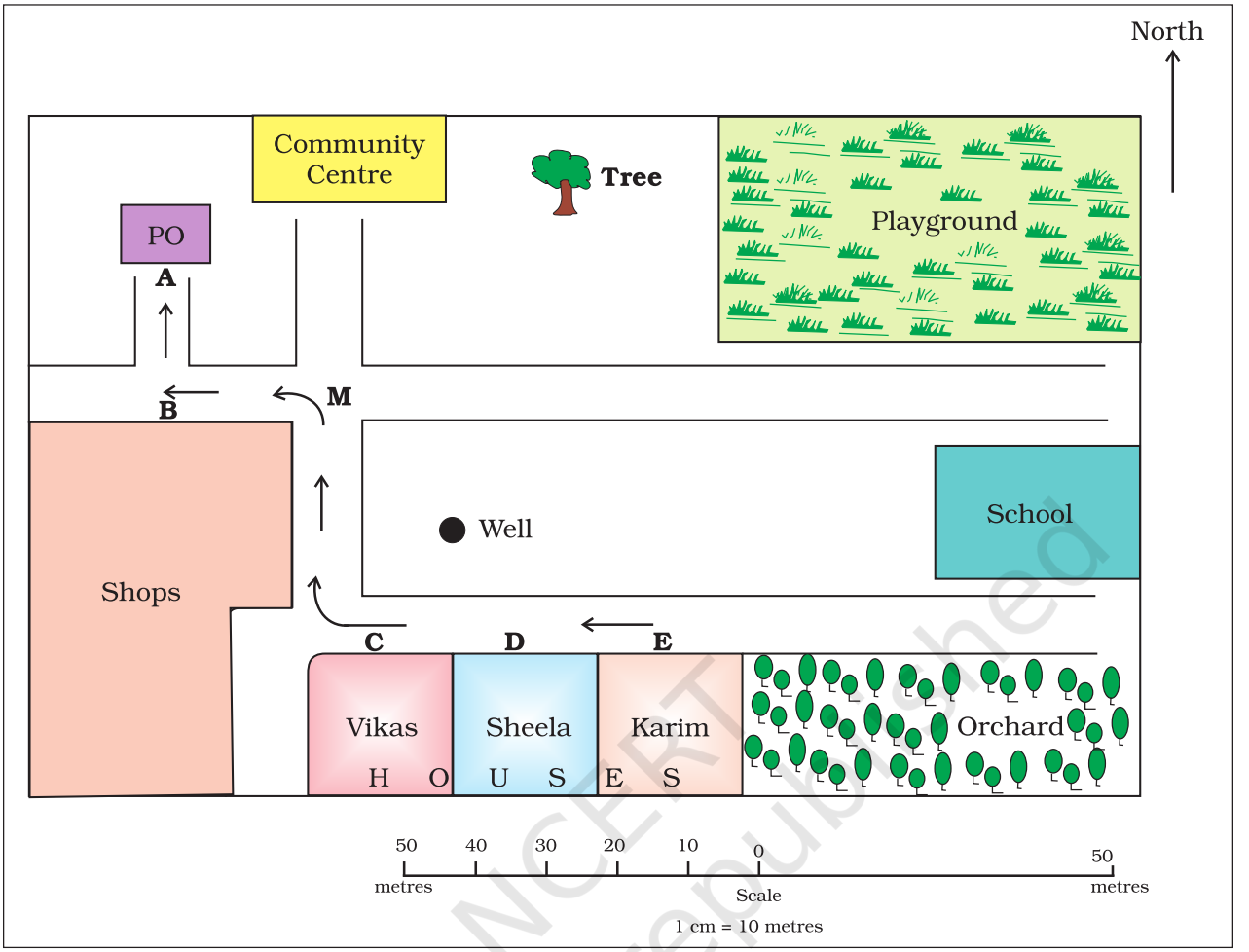

Figure 4.1 : Map of a village

directions, North, South, East and West {Figure 4.2 (a)}. They are called **cardinal points**. Other four intermediate directions are north-east (NE), south-east(SE), south-west (SW) and north-west (NW). We can locate any place more accurately with the help of these intermediate directions.

Find out the following directions from the Figure 4.1: (a) The direction of the Community Centre, the playground from Vikas's house (b) the direction of school from shops.

We can find out the direction of a place with the help of a compass. It is an instrument used to find out main directions. Its magnetic needle always points towards north-south direction {Figure 4.2 (b)}.

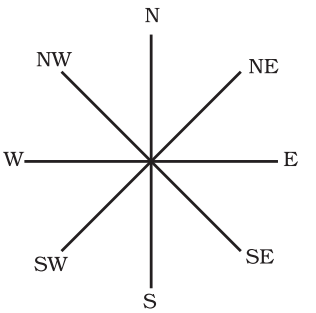

Figure 4.2 (a) : Cardinal Directions

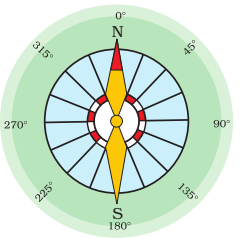

Figure 4.2 (b) : A compass

Symbols

It is the third important component of a map. It is not possible to draw on a map the actual shape and size of different features such as buildings, roads, bridges, trees, railway lines or a well. So, they are shown by using certain letters, shades, colours, pictures and lines These symbols give a lot of information in a limited space. With the use of these symbols, maps can be drawn easily and are simple to read. Even if you don't know the language of an area and therefore cannot ask someone for directions, you can collect information from maps with the help of these symbols. Maps have a universal language that can be understood by all. There is an international agreement regarding the use of these symbols. These are called **conventional symbols**. Some of the conventional symbols are shown in the Figure 4.3.

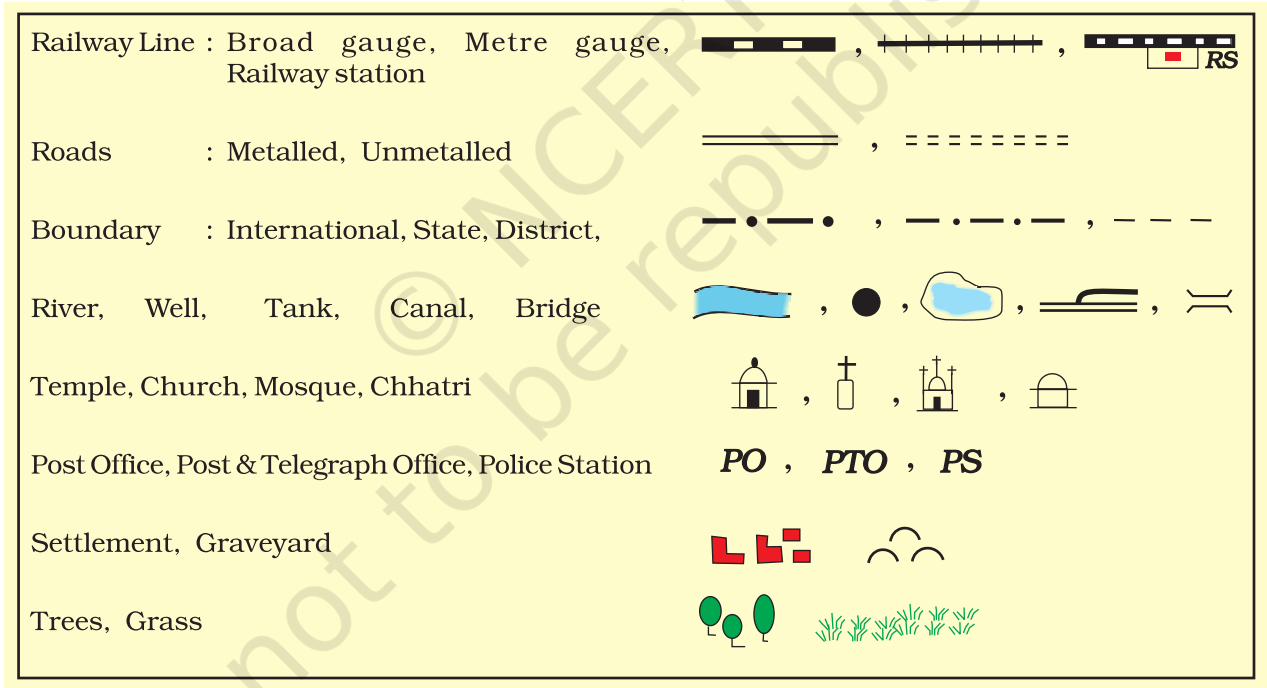

Figure 4.3 : Conventional Symbols

Various colours are used for the same purpose. For example, generally blue is used for showing water bodies, brown for mountain, yellow for plateau and green is used for plains.

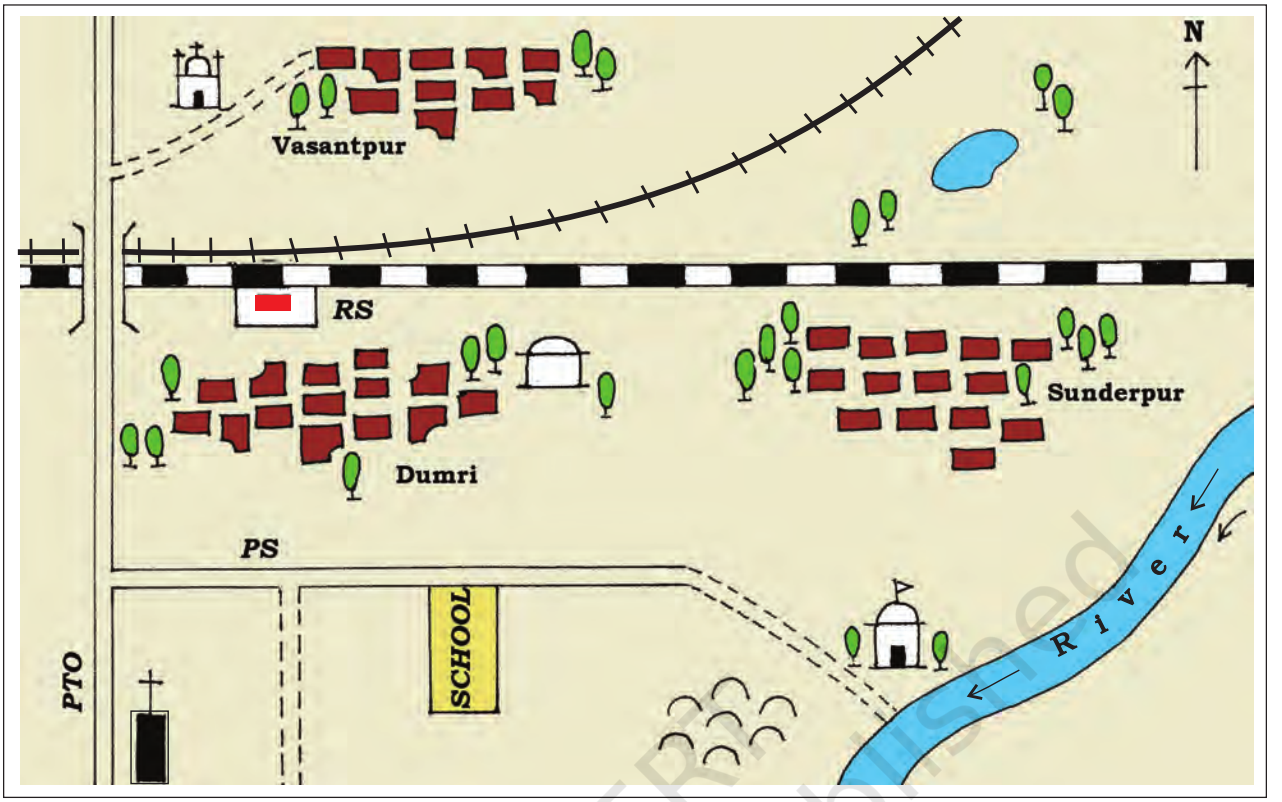

Figure 4.4 : Sunderpur village and its surrounding areas

Sketch

A **sketch** is a drawing mainly based on memory and spot observation and not to scale. Sometimes a rough drawing is required of an area to tell where a particular place is located with respect to other places. Suppose, you want to go to your friend's house, but you don't know the way. Your friend may make a rough drawing to show the way to his house. Such a rough drawing is drawn without scale, and is called a *sketch map*.

Plan

A **plan** is a drawing of a small area on a large scale. A large-scale map gives lot of information, but there are certain things which we may sometimes want to know for example the length and breadth of a room, which can't be shown in a map. At that time, we can refer drawings drawn to scale called a *plan*.

Let's Do Visit web portal School Bhuvan-NCERT and draw online neighbourhood map on satellite imageries.

Look at the Figure 4.4 and find out :

(i) In which direction is the river flowing?
(ii) What kind of road passes by the side of village Dumri?
(iii) On what type of railway line is Sunderpur situated ?
(iv) On which side of the railway bridge is the police station situated?
(v) On which side of the railway line do the following lie :
  (a) Chhatri
  (b) Church (c) Pond
  (d) Mosque (e) River
  (f) Post and Telegraph Office
  (g) Graveyard

EXERCISES

1. Answer the following questions briefly.

(a) What are the three components of a map?

(b) What are the four cardinal directions?

(c) What do you mean by the term 'the scale of the map'?

(d) How are maps more helpful than a globe?

(e) Distinguish between a map and a plan.

(f) Which map provides detailed information?

(g) How do symbols help in reading maps?

2. Tick the correct answers.

(a) Maps showing distribution of forests are

(i) Physical map (ii) Thematic Map (iii) Political map

(b) The blue colour is used for showing

(i) Water bodies (ii) Mountains (iii) Plains

(c) A compass is used –

(i) To show symbols

(ii) To find the main direction

(iii) To measure distance

(d) A scale is necessary

(i) For a map (ii) For a sketch (iii) For symbols

THINGS TO DO

1. Draw a plan of your classroom and show the teacher's table, blackboard, desks, door and windows.
2. Draw a sketch of your school and locate the following :

(a) the principal's room (b) your classroom

(c) the playground (d) the library

(e) some big trees (f) drinking water

For Fun

1. Make the plan (in the space given below) of a fun-park where you can enjoy several activities : for example swings, slides, see-saw, merry-go-round, boating, swimming, looking into funny mirrors, etc. or anything else that you can think of.

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5

MAJOR DOMAINS OF THE EARTH

As you have read in the first chapter, the earth is the only planet which has life. Human beings can live here because the life sustaining elements of land, water and air are present on the earth.

The surface of the earth is a complex zone in which three main components of the environment meet, overlap and interact. The solid portion of the earth on which we live is called the **Lithosphere**. The gaseous layers that surround the earth, is the **Atmosphere**, where oxygen, nitrogen, carbondioxide and other gases are found. Water covers a very big area of the earth's surface and this area is called the **Hydrosphere**. The Hydrosphere comprises water in all its forms, that is, ice, water and water vapour.

The **Biosphere** is the narrow zone where we find land, water and air together, which contains all forms of life.

Word Origin

In the Greek language, *Lithos* means Stone; *Atmos* means Vapour; *Hudor* means Water; and *Bios* means Life.

Can you make words using the above?

LITHOSPHERE

The solid portion of the earth is called the *Lithosphere*. It comprises the rocks of the earth's crust and the thin layers of soil that contain nutrient elements which sustain organisms.

There are two main divisions of the earth's surface. The large landmasses are known as the **continents** and the huge water bodies are called the **ocean basins**. All the oceans of the world are connected with one another. Look at the map of the world (Figure 5.1). Are all the land masses connected with one another?

The level of seawater remains the same everywhere. Elevation of land is measured from the level of the sea, which is taken as zero.

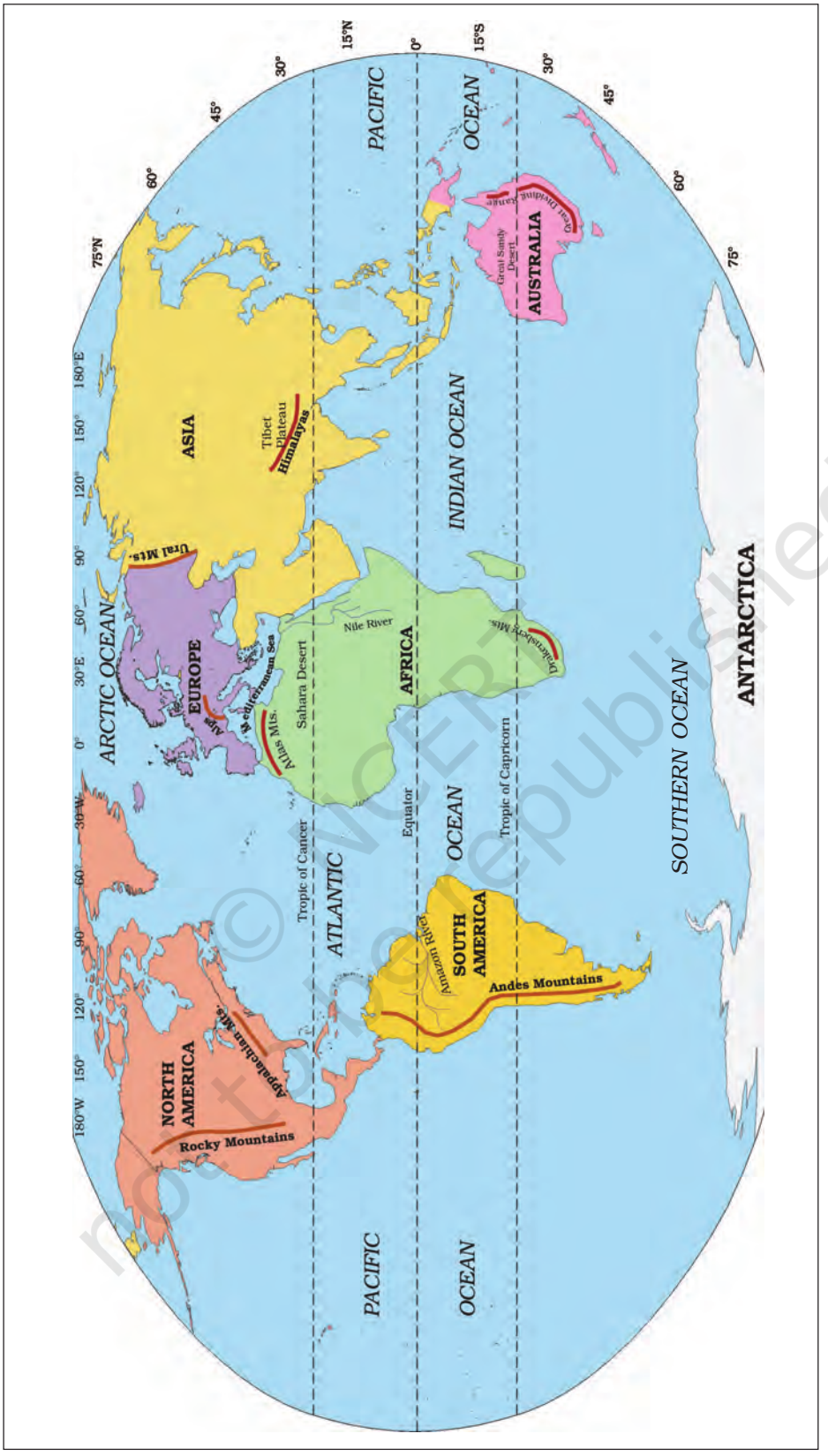


Figure 5.1 : The World : Continents and Oceans

Do you know?

Edmund Hillary (New Zealand) and Tenzing Norgay Sherpa (India) were the first men to climb the highest mountain peak Mt. Everest on the planet earth on 29th May, 1953.

Junko Tabei (Japan) was the first woman to reach the summit on 16th May, 1975. The first Indian woman to climb the highest peak on 23rd May, 1984 was Bachendri Pal.

The highest mountain peak Mt. Everest is 8,848 metres above the sea level. The greatest depth of 11,022 metres is recorded at Mariana Trench in the Pacific Ocean. Could you imagine that depth of sea is much more than the highest point?

Continents

There are seven major continents. These are separated by large water bodies. These continents are – Asia, Europe, Africa, North America, South America, Australia and Antarctica. Look at the map of the world (Figure 5.1) and notice that the greater part of the land mass lies in the Northern Hemisphere.

Asia is the largest continent. It covers about one-third of the total land area of the earth. The continent lies in the Eastern Hemisphere. The Tropic of Cancer passes through this continent. Asia is separated from Europe by the Ural mountains on the west (Figure 5.1). The combined landmass of Europe and Asia is called the *Eurasia* (Europe + Asia).

Europe is much smaller than Asia. The continent lies to the west of Asia. The Arctic Circle passes through it. It is bound by water bodies on three sides. Look at the map of the world and locate it.

Africa is the second largest continent after Asia. The Equator or 0^0 latitude runs almost through the middle of the continent. A large part of Africa lies in the Northern Hemisphere. Look at the Figure 5.1; you will find that it is the only continent through which the Tropic of Cancer, the Equator and the Tropic of Capricorn pass.

The Sahara Desert, the world's largest hot desert, is located in Africa. The continent is bound on all sides by oceans and seas. Look at the world map (Figure 5.1). You will notice that the world's longest river the **Nile**, flows through Africa. Notice where the Equator, the Tropic of Cancer and the Tropic of Capricorn pass in the map of Africa.

North America is the third largest continent of the world. It is linked to South America by a very narrow strip of land called the Isthmus of Panama. The continent lies completely in the Northern and Western Hemisphere. Three oceans surround this continent. Can you name these oceans?

what is a gulf? ex gulf of khambat

South America lies mostly in the Southern Hemisphere. Which two oceans surround it on the east and the west? The Andes, world's longest mountain range, runs through its length from north to south (Figure 5.1). South America has the world's largest river, the Amazon.

Australia is the smallest continent that lies entirely in the Southern Hemisphere. It is surrounded on all sides by the oceans and seas. It is called an *island continent*.

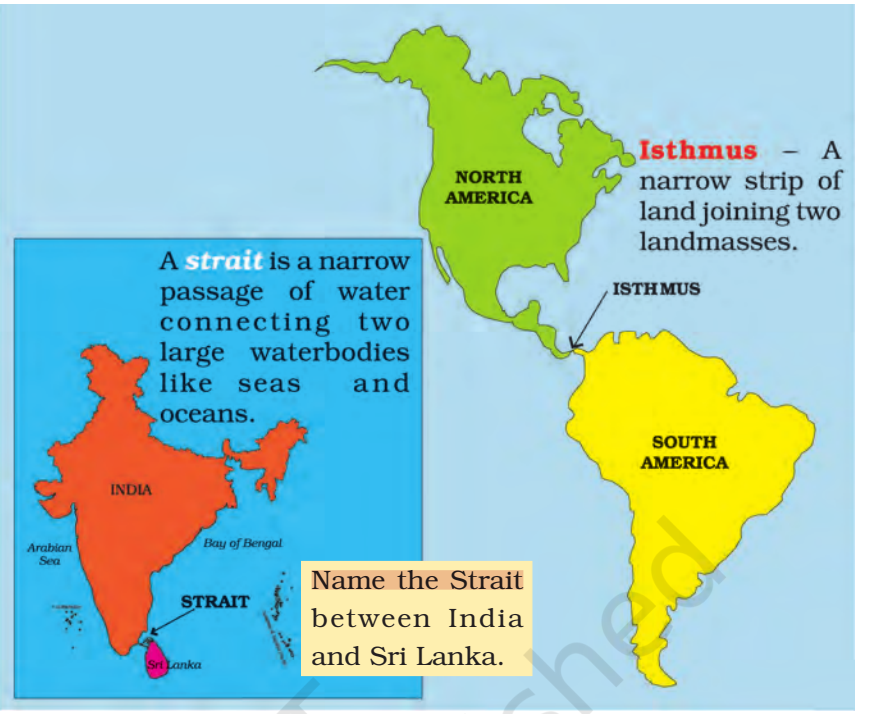


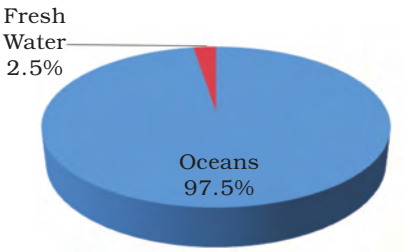
Figure 5.2 : Isthmus and Strait

Antarctica, completely in the Southern Hemisphere, is a huge continent. The South Pole lies almost at the centre of this continent. As it is located in the South Polar Region, it is permanently covered with thick ice sheets. There are no permanent human settlements. Many countries have research stations in Antarctica. India also has research stations there. These are named as **Maitri** and **Bharati**.

Hydrosphere

The earth is called the *blue planet*. More than 71 per cent of the earth is covered with water and 29 per cent is with land. Hydrosphere consists of water in all its forms. As running water in oceans and rivers and in lakes, ice in glaciers, underground water and the water vapour in atmosphere, all comprise the hydrosphere.

More than 97% of the Earth's water is found in the oceans and is too salty for human use. A large proportion of the rest of the water is in the form of icesheets and glaciers or under the ground and a very small percentage is available as fresh water for human



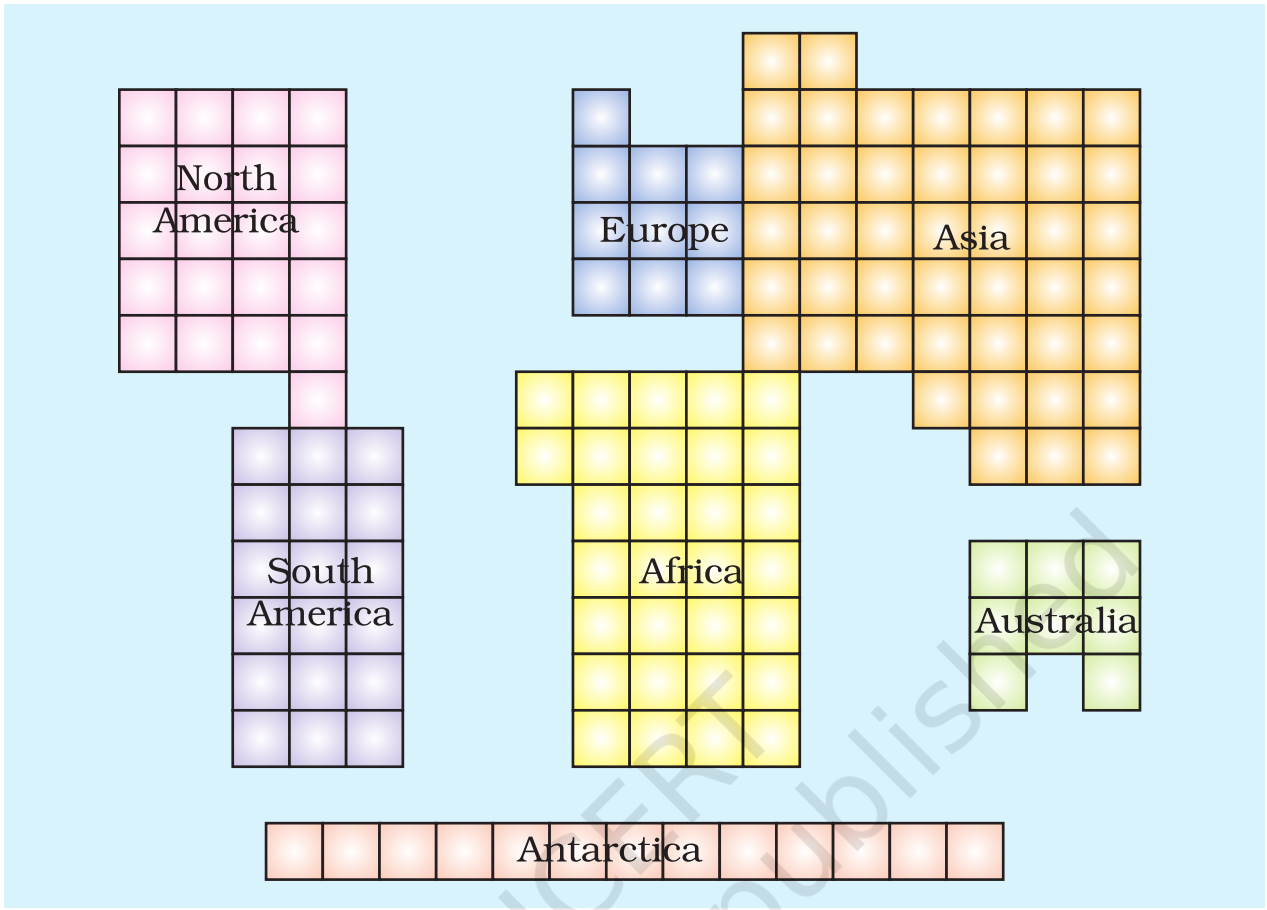


Figure 5.3 : Comparative size of the continents

Count the squares given in Figure 5.3 and answer the following :
(a) Name the largest continent; (b) Which is larger – Europe or Australia?

use. Hence, despite being a 'blue planet' we face a shortage of water!!

Oceans

Oceans are the major part of hydrosphere. They are all interconnected.

The ocean waters are always moving. The three chief movements of ocean waters are the waves, the tides and the ocean currents. The five major oceans are the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Southern Ocean and the Arctic Ocean, in order of their size (Figure 5.1).

The Pacific Ocean is the largest ocean. It is spread over one-third of the earth. Mariana Trench, the deepest part of the earth, lies in the Pacific Ocean. The Pacific Ocean is almost circular in shape. Asia, Australia,

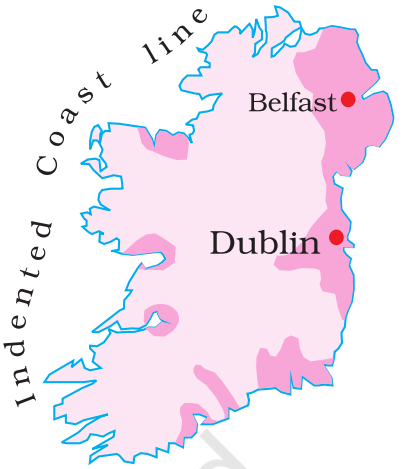
North and South Americas surround it. Look at the map and find out the location of the continents around the Pacific Ocean.

The Atlantic Ocean is the second largest Ocean in the world. It is 'S' shaped. It is flanked by the North and South Americas on the western side, and Europe and Africa on the eastern side. The coastline of Atlantic Ocean is highly *indented*. This irregular and indented coastline provides ideal location for natural harbours and ports. From the point of view of commerce, it is the busiest Ocean.

The Indian Ocean is the only ocean named after a country, that is, India. The shape of ocean is almost triangular. In the north, it is bound by Asia, in the west by Africa and in the east by Australia.

The Southern Ocean encircles the continent of Antarctica and extends northward to 60 degrees south latitude.

The Arctic Ocean is located within the Arctic Circle and surrounds the North Pole. It is connected with the Pacific Ocean by a narrow stretch of shallow water known as Berring strait. It is bound by northern coasts of North America and Eurasia.



Atmosphere

The earth is surrounded by a layer of gas called the **atmosphere**. This thin blanket of air is an integral and important aspect of the planet. It provides us with the air we breathe and protects us from the harmful effects of sun's rays.

The atmosphere extends up to a height of about 1,600 kilometres. The atmosphere is divided into five layers based on composition, temperature and other properties. These layers starting from earth's surface are called the troposphere, the stratosphere, the mesosphere, the thermosphere and the exosphere.

The atmosphere is composed mainly of nitrogen and oxygen, which make up about 99 per cent of clean, dry air. Nitrogen 78 per cent, oxygen 21 per cent and other gases like carbondioxide, argon and others comprise 1 per cent by volume. Oxygen is the breath of life while nitrogen helps in the growth of living organisms. Carbon dioxide, though present in minute amount, is important as it absorbs heat radiated by the earth, thereby keeping the planet warm. It is also essential for the growth of plants.

The density of the atmosphere varies with height. It

Figure 5.4 : Layers of the Atmosphere

Figure 5.5 : A mountaineer

is maximum at the sea level and decreases rapidly as we go up. You know, the climbers experience problems in breathing due to this decrease in the density of air. They have to carry with them oxygen cylinders to be able to breathe at high altitudes. The temperature also decreases as we go upwards. The atmosphere exerts pressure on the earth. This varies from place to place. Some areas experience high pressure and some areas low pressure. Air moves from high pressure to low pressure. Moving air is known as wind.

Biosphere – The Domain of Life

The **biosphere** is the narrow zone of contact between the land, water and air. It is in this zone that life, that is unique to this planet, exists. There are several

Figure 5.6 : The Biosphere

species of organisms that vary in size from microbes and bacteria to huge mammals. All the living organisms including humans are linked to each other and to the biosphere for survival.

The organisms in the biosphere may broadly be divided into the plant kingdom and the animal kingdom. The three domains of the earth interact with each other and affect each other in some way or the other. For example, cutting of forests for fulfilling our needs of wood, or clearing land for agriculture may lead to fast removal of soil from slopes. Similarly earth's surface may be changed due to natural calamities like earthquakes. For example, there could be submergence of land, as happened in the case of Tsunami recently. Parts of Andaman & Nicobar islands were submerged under water. Discharge of waste material into lakes and rivers makes the water unsuitable for human use. It also damages other forms of life.

Emission from industries, thermal power plants and vehicles, pollute the air. Carbon dioxide (CO_2) is an important constituent of air. But increase in the amount of CO_2 leads to increase in global temperatures. This is termed as global warming. There is thus, a need to limit the use of resources of the earth to maintain the balance of nature between the domains of the lithosphere, the atmosphere and the hydrosphere.

EXERCISES

1. Answer the following questions briefly.

(a) What are the four major domains of the earth?

(b) Name the major continents of the earth.

(c) Name the two continents that lie entirely in the Southern Hemisphere.

(d) Name the different layers of atmosphere.

(e) Why is the earth called the 'blue planet'?

(f) Why is the Northern Hemisphere called the Land Hemisphere?

(g) Why is the Biosphere important for living organisms?

2. Tick the correct answers.

(a) The mountain range that separates Europe from Asia is

(i) the Andes (ii) the Himalayas (iii) the Urals

(b) The continent of North America is linked to South America by

(i) an Isthmus (ii) a Strait (iii) a Canal

(c) The major constituent of atmosphere by per cent is

(i) Nitrogen (ii) Oxygen (iii) Carbon dioxide

(d) The domain of the earth consisting of solid rocks is

(i) the Atmosphere (ii) the Hydrosphere (iii) the Lithosphere

(e) Which is the largest continent?

(i) Africa (ii) Asia (iii) Australia

3. Fill in the blanks.

(a) The deepest point on the earth is _____ in the Pacific Ocean.

(b) The _____ Ocean is named after a country.

(c) The _____ is a narrow contact zone of land, water and air that supports life.

(d) The continents of Europe and Asia together are known as _____.

(e) The highest mountain peak on the earth is _____.

Things To Do

1. Cut the outline of the continents from an outline map of the world and arrange them according to their decreasing sizes.
2. Cut the outline of the continents from an outline map of the world and try to fit them together as a jig-saw puzzle.
3. Collect pictures of expeditions to the Himalayas. Write about the kind of equipment carried by the climbers for protection against sunshine, temperature and the lack of air.

Map Skills

1. On the outline map of the world, mark the following :

   Europe, Asia, Antarctica, South America, Australia, Indian Ocean, Pacific Ocean, Atlantic Ocean, Ural Mountains and Isthmus of Panama.

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6

OUR COUNTRY – INDIA

India is a country of vast geographical expanse. In the north, it is bound by the lofty **Himalayas**. The **Arabian Sea** in the west, the **Bay of Bengal** in the east and the **Indian Ocean** in the south, wash the shores of the Indian peninsula.

India has an area of about 3.28 million sq. km. The north-south extent from Ladakh to Kanyakumari is about 3,200 km. And the east-west extent from Arunachal Pradesh to Kuchchh is about 2,900 km. The lofty mountains, the Great Indian Desert, the Northern Plains, the uneven plateau surface and the coasts and islands present a diversity of landforms. There is a great variety in the climate, vegetation, wildlife as well as in the language and culture. In this diversity, we find unity that is reflected in traditions that bind us as one nation. India has a population of more than one hundred twenty crores since the year 2011. It is the *second most populous* country of the world after China.

The peninsula is a piece of land that is surrounded by water on three sides.

Locational Setting

India is located in the northern hemisphere. The **Tropic of Cancer (23°30'N)** passes almost halfway through the country (Figure 6.2). From south to north, main land of India extends between **8°4'N** and **37°6'N latitudes**. From west to east, India extends between **68°7'E** and **97°25'E longitudes.** If we divide the world into eastern and western hemispheres, which hemisphere would India belong to? Due to great longitudinal extent of about 29°, there could be a wide differences in local time of places located at two extreme points of India. As such, the difference between these two

Do you know?

Large countries which stretch extensively from east to west do not have a single Standard Time for the whole country. The USA and Canada have seven and six time zones respectively. Do you remember how many time zones are there in Russia?

points would be of about two hours. As you have learnt earlier, the local time changes by four minutes for every one degree of longitude. The sun rises about two hours earlier in the east (Arunachal Pradesh) than in the west (Gujarat). You have already read earlier, why the local time of longitude of 82°30'E has been taken as the *Indian Standard Time*. This meridian or longitude is also termed as the *Standard Meridian of India*.

India's Neighbours

There are seven countries that share land boundaries with India. Find out names

Figure 6.1 : India and its neighbouring countries

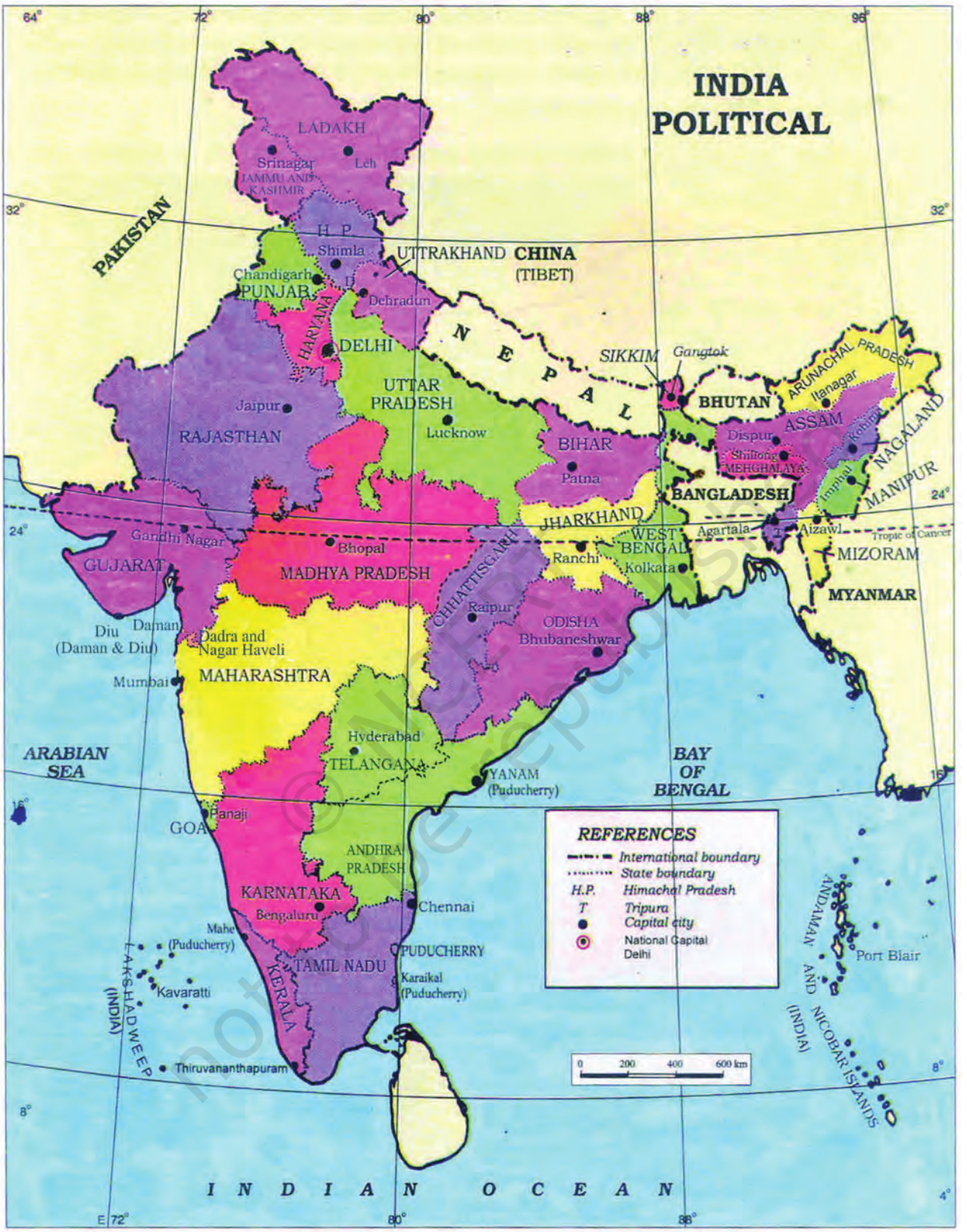


Figure 6.2 : Political map of India

of these countries from the Figure 6.1. How many of these countries do not have access to any ocean or sea? Across the sea to the south, lie our island neighbours—Sri Lanka and Maldives. Sri Lanka is separated from India by the *Palk Strait*.

Political and Administrative Divisions

India is a vast country. For administrative purposes, the country is divided into 28

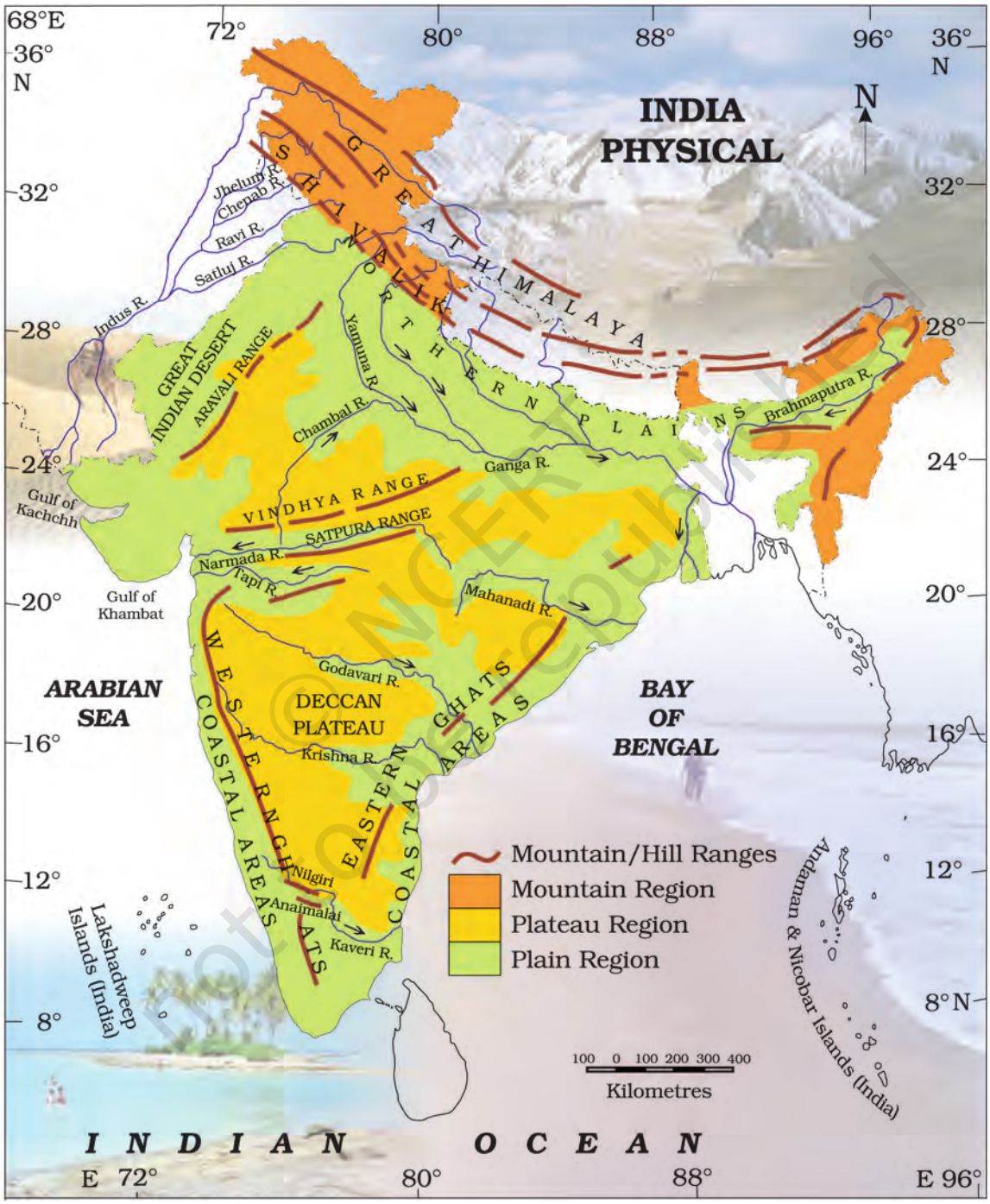


Figure 6.3 : India : Physical Divisions

States and 8 Union Territories (Appendix-I). Delhi is the national capital. The states have been formed mainly on the basis of languages.

Physical Divisions

India is marked by a diversity of physical features such as mountains, plateaus, plains, coasts and islands. Standing as sentinels in the north are the lofty snow-capped Himalayas. *Him+alaya* mean 'the abode of snow'. The Himalayan mountains are divided into three main parallel ranges. The northernmost is the **Great Himalaya** or **Himadri**. The world's highest peaks are located in this range. **Middle Himalaya** or **Himachal** lies to the south of Himadri. Many popular hill stations are situated here. Find out the names of five hill stations. The **Shiwalik** is the southernmost range.

The **Northern Indian plains** lie to the south of the Himalayas. They are generally level and flat. These are formed by the alluvial deposits laid down by the rivers– the Indus, the Ganga, the Brahmaputra and their *tributaries*. These river plains provide fertile land for cultivation. That is the reason for high concentration of population in these plains.

In the *western* part of India lies the **Great Indian desert**. It is a dry, hot and sandy stretch of land. It has very little vegetation.

To the south of northern plains lies the **Peninsular plateau**. It is triangular in shape. The relief is highly uneven. This is a region with numerous hill ranges and valleys. Aravali hills, one of the oldest ranges of the world, border it on the north-west side. The **Vindhyas** and the **Satpuras** are the important ranges. The rivers **Narmada** and **Tapi** flow through these ranges. These are west-flowing rivers that drain into the Arabian Sea. The **Western Ghats** or **Sahyadris** border the plateau in the west and the **Eastern Ghats** provide the eastern boundary. While the Western Ghats are almost continuous, the Eastern Ghats are broken and uneven (Figure 6.3). The plateau is rich in minerals like coal and iron-ore.

To the West of the Western Ghats and the East of Eastern Ghats lie the **Coastal plains**. The western

Alluvial deposits : These are very fine soils, brought by rivers and deposited in the river basins.

Tributary : A river or stream which contributes its water to a main river by discharging it into main river from either side.

Do you know?

The *Ganga and the Brahmaputra* form the *world's largest delta*, *the Sundarbans delta*. The delta is triangular in shape. It is an area of land formed at the *mouth of the river* (Where rivers enter the sea, that point is called the mouth of the river.

Let's Do

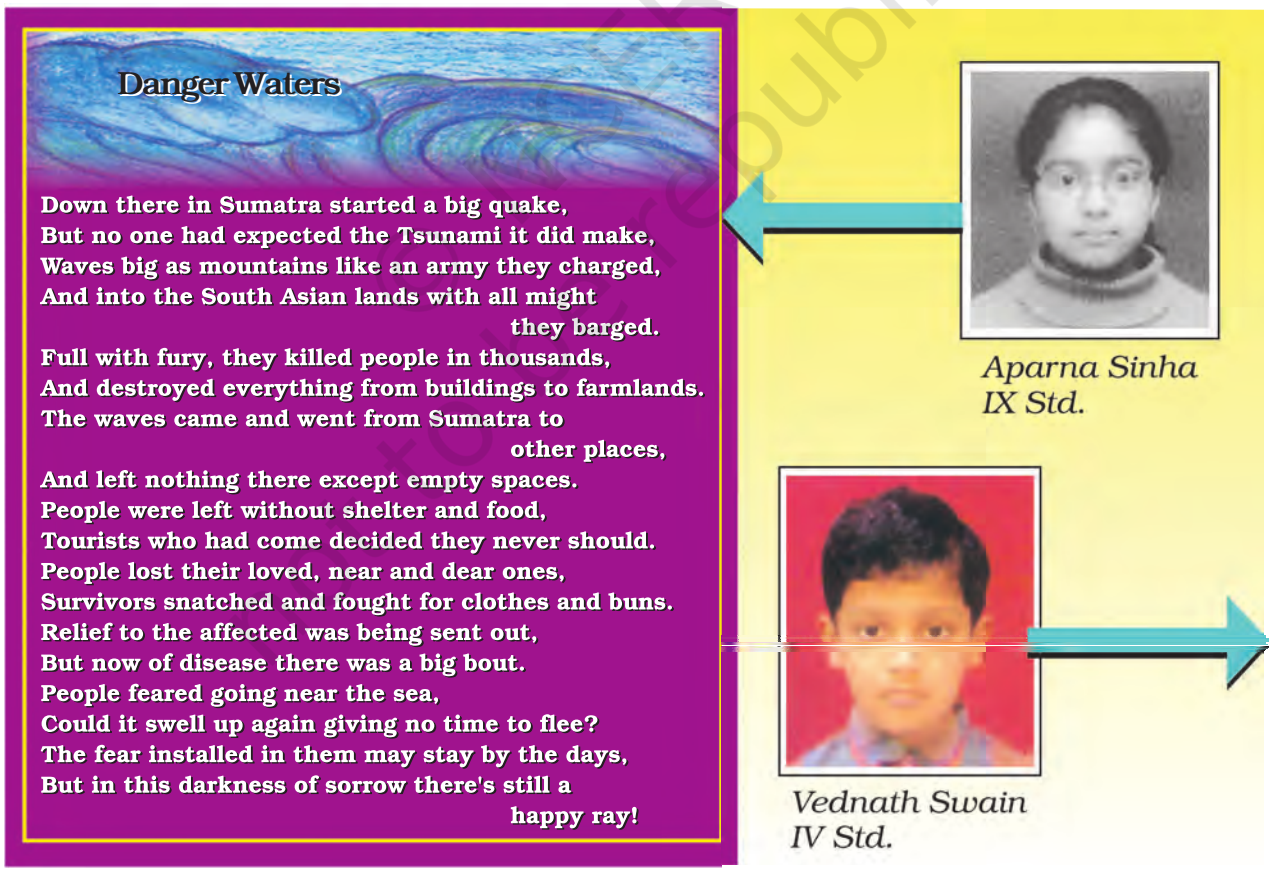
Many girls are named after rivers eg. Yamuna, Mandakini, and Kaveri. Do you know anyone in your locality who is named after a river? Ask your parents and others and make a list of such names. Could you also find other names related to water e.g. Shabnam?

Figure 6.4 : Coral Islands

Do you know?

Corals are skeletons of tiny marine animals called **Polyps**. When the living polyps die, their skeletons are left. Other poplyps grow on top of the hard skeleton which grows higher and higher, thus forming the coral islands. Figure 6.4 shows Coral islands.

coastal plains are very narrow. The eastern Coastal plains are much broader. There are a number of east flowing rivers. The rivers **Mahanadi, Godavari, Krishna** and **Kaveri** drain into the Bay of Bengal. These rivers have formed fertile deltas at their mouth. The Sunderban delta is formed where the Ganga and Brahmaputra flow into the Bay of Bengal.



Danger Waters

Down there in Sumatra started a big quake,
But no one had expected the Tsunami it did make,
Waves big as mountains like an army they charged,
And into the South Asian lands with all might
they barged.
Full with fury, they killed people in thousands,
And destroyed everything from buildings to farmlands.
The waves came and went from Sumatra to
other places,
And left nothing there except empty spaces.
People were left without shelter and food,
Tourists who had come decided they never should.
People lost their loved, near and dear ones,
Survivors snatched and fought for clothes and buns.
Relief to the affected was being sent out,
But now of disease there was a big bout.
People feared going near the sea,
Could it swell up again giving no time to flee?
The fear installed in them may stay by the days,
But in this darkness of sorrow there's still a
happy ray!

Aparna Sinha
IX Std.

Vednath Swain
IV Std.

Two groups of islands also form part of India. **Lakshadweep Islands** are located in the Arabian Sea. These are *coral islands* located off the coast of Kerala. The **Andaman** and the **Nicobar Islands** lie to the southeast of the Indian mainland in the Bay of Bengal. Do you know which group of islands were affected by the Tsunami in 2004? Find out through newspaper reports and by speaking to people how in different ways people faced this challenge when Tsunami struck the Indian coast. Tsunami is a huge sea wave generated due to an earthquake on the sea floor.

EXERCISES

1. Answer the following questions briefly.

(a) Name the major physical divisions of India.

(b) India shares its land boundaries with seven countries. Name them.

(c) Which two major rivers fall into the Arabian Sea?

(d) Name the delta formed by the Ganga and the Brahmaputra.

(e) How many States and Union Territories are there in India? Which states have a common capital?

(f) Why do a large number of people live in the Northern plains?

(g) Why is Lakshadweep known as a coral island?

2. Tick the correct answers.

(a) The southernmost Himalayas are known as

(i) Shiwaliks (ii) Himadri (iii) Himachal

(b) Sahyadris is also known as

(i) Aravali (ii) Western Ghats (iii) Himadri

(c) The Palk Strait lies between the countries

(i) Sri Lanka and Maldives

(ii) India and Sri Lanka

(iii) India and Maldives

(d) The Indian islands in the Arabian Sea are known as

(i) Andaman and Nicobar Islands

(ii) Lakshadweep Islands

(iii) Maldives

(e) The oldest mountain range in India is the

(i) Aravali hills (ii) Western ghats (iii) Himalayas

3. Fill in the blanks.

(a) India has an area of about _____.

(b) The Greater Himalayas are also known as_____.

(c) The river Narmada falls into the _____ sea.

(d) The latitude that runs almost halfway through India is _____.

Map skills

1. On an outline map of India, mark the following.

(a) Tropic of Cancer

(b) Standard Meridian of India

(c) State in which you live

(d) Andaman Islands and Lakshadweep Islands

(e) Western Ghats and Eastern Ghats

State and Union Territories of India

State	Capital	Union Territory	Capital
Andhra Pradesh	Hyderabad	Andaman and Nicobar Islands	Port Blair
Arunachal Pradesh	Itanagar	Chandigarh	Chandigarh
Assam	Dispur	Dadra & Nagar Haveli and Daman & Diu	Daman
Bihar	Patna		
Chhattisgarh	Raipur	Lakshadweep	Kavaratti
Goa	Panaji	Puducherry	Puducherry
Gujarat	Gandhi Nagar		
Haryana	Chandigarh	National Capital Territory of Delhi	Delhi
Himachal Pradesh	Shimla	Jammu & Kashmir	Srinagar
Jharkhand	Ranchi	Ladakh	Leh
Karnataka	Bengaluru		
Kerala	Thiruvananthapuram		
Madhya Pradesh	Bhopal		
Maharashtra	Mumbai		
Manipur	Imphal		
Meghalaya	Shillong		
Mizoram	Aizawl		
Nagaland	Kohima		
Odisha	Bhubaneshwar		
Punjab	Chandigarh		
Rajasthan	Jaipur		
Sikkim	Gangtok		
Tamil Nadu	Chennai		
Telangana	Hyderabad		
Uttarakhand	Dehradun		
Uttar Pradesh	Lucknow		
Tripura	Agartala		
West Bengal	Kolkata		

Some Internet Sources for more information

http://volcanoes.usgs.gov/

www.nationalgeographic.com/earthpulse

http://www.cpcb.nic.in

Notes

Social Science

Our Environment

Textbook in Geography for Class VII

0762

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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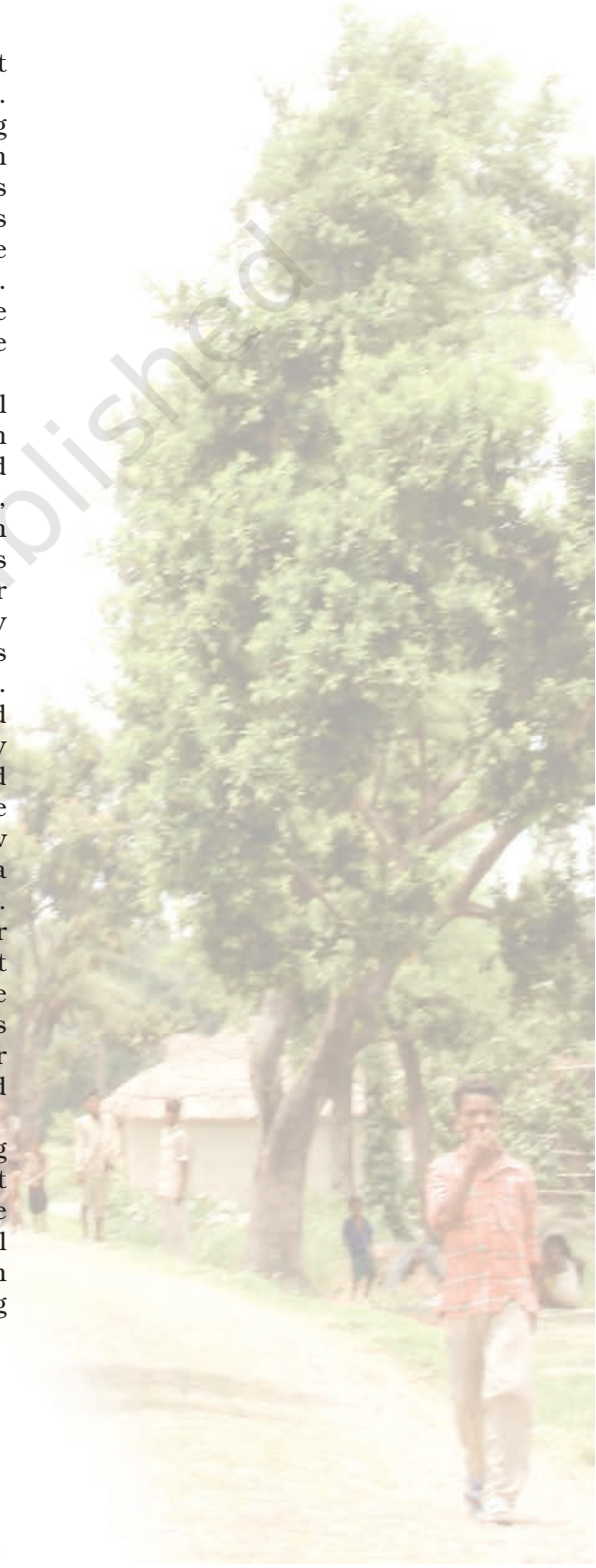
Foreword

The National Curriculum Framework (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986).

The success of this effort depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge.

These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience.

The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development committee responsible for this book. We wish to thank the Chairperson of the advisory committee for textbooks in Social Sciences, at the higher secondary level, Professor Hari Vasudevan and the Chief Advisor for this book, Vibha Parthasarathi for guiding



the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation committed to systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

Director

New Delhi
20 November 2006

National Council of Educational
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Rationalisation of Content in the Textbooks

In view of the COVID-19 pandemic, it is imperative to reduce content load on students. The National Education Policy 2020, also emphasises reducing the content load and providing opportunities for experiential learning with creative mindset. In this background, the NCERT has undertaken the exercise to rationalise the textbooks across all classes. Learning Outcomes already developed by the NCERT across classes have been taken into consideration in this exercise.

Contents of the textbooks have been rationalised in view of the following:

- Overlapping with similar content included in other subject areas in the same class
- Similar content included in the lower or higher class in the same subject
- Difficulty level
- Content, which is easily accessible to students without much interventions from teachers and can be learned by children through self-learning or peer-learning
- Content, which is irrelevant in the present context

This present edition, is a reformatted version after carrying out the changes given above.

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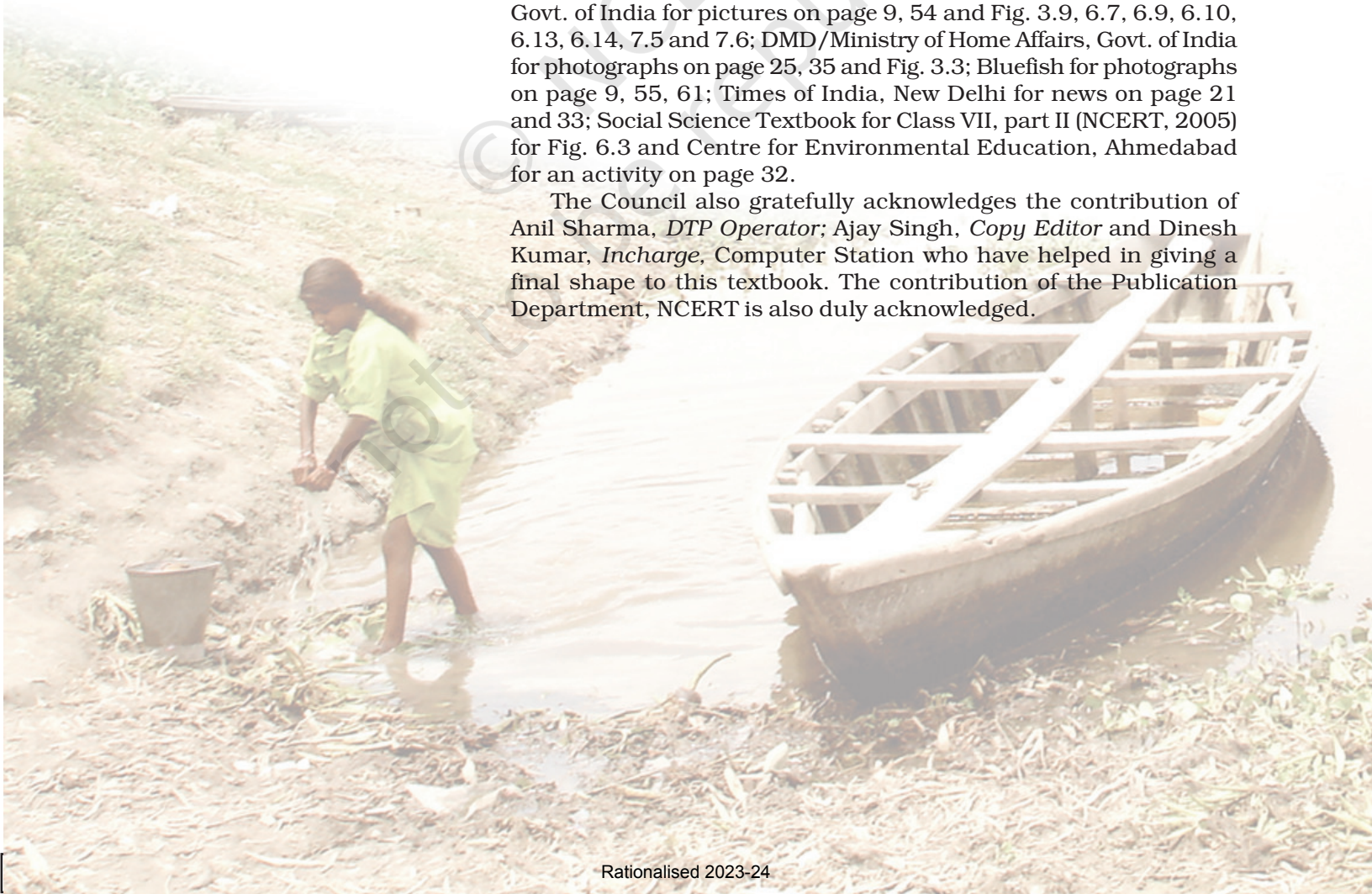
Acknowledgements are also due to Savita Sinha, *Professor* and *Head* , Department of Education in Social Sciences and Humanities, NCERT for her valuable support at every stage of preparation of this textbook.

The Council is also grateful to the individuals and organisations as listed below for providing various photographs, illustrations and activity used in this textbook:

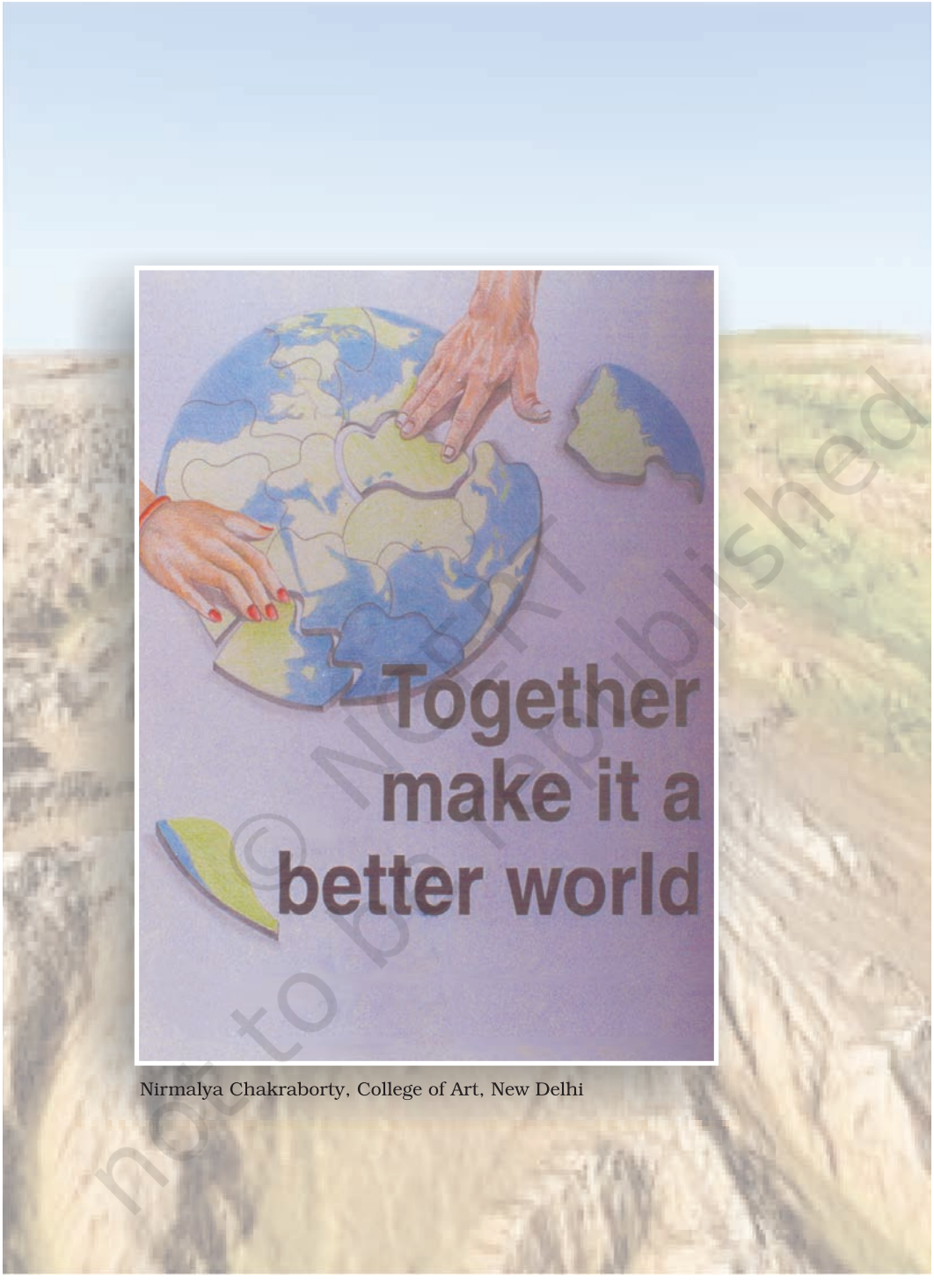
Anshu, *Reader,* Kirorimal College, Delhi for photographs on page 14,18 and Fig. 3.8, 6.4, 6.5, 6.6, 6.11, 6.12 and 7.3; Gitanjali Tahlan and Parikshit Tahlan from Rohtak for photographs on page 15, 45 and Fig. 5.3; R. Pelisson, Sahara Met for Fig. 7.1; Shveta Uppal, *NCERT* for photographs on page 1, 5, 18; ITDC/Ministry of Tourism, Govt. of India for pictures on page 9, 54 and Fig. 3.9, 6.7, 6.9, 6.10, 6.13, 6.14, 7.5 and 7.6; DMD/Ministry of Home Affairs, Govt. of India for photographs on page 25, 35 and Fig. 3.3; Bluefish for photographs on page 9, 55, 61; Times of India, New Delhi for news on page 21 and 33; Social Science Textbook for Class VII, part II (NCERT, 2005) for Fig. 6.3 and Centre for Environmental Education, Ahmedabad for an activity on page 32.

The Council also gratefully acknowledges the contribution of Anil Sharma, *DTP Operator;* Ajay Singh, *Copy Editor* and Dinesh Kumar, *Incharge,* Computer Station who have helped in giving a final shape to this textbook. The contribution of the Publication Department, NCERT is also duly acknowledged.



The following are applicable to all the maps of India used in this textbook

1. © Government of India, Copyright 2006
2. The responsibility for the correctness of internal details rests with the publisher.
3. The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
4. The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.
5. The interstate boundaries amongst Arunachal Pradesh, Assam and Meghalaya shown on this map are as interpreted from the "North-Eastern Areas (Reorganisation) Act.1971," but have yet to be verified.
6. The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.
7. The state boundaries between Uttaranchal & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by the Governments concerned.
8. The spellings of names in this map, have been taken from various sources.



Nirmalya Chakraborty, College of Art, New Delhi

Contents

1 Environment

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After the long vacation, when Ravi started going to school again, he noticed that the only playground next to his school was dug up. People said that a huge building with many flats will be constructed there. Ravi was almost in tears, when he realised that the big playground with its soft grass, marigolds and butterflies is gone for ever. He shared his feelings with his classmates. In the assembly, the Principal too sadly observed, "See how our environment is changing."

In the class Ravi asked his teacher, "What is environment?" "Whatever you see in your surroundings," said the teacher.

Ravi thought aloud, "That means, the school building, tables, chairs in the classroom, even that open field, the road, the garbage, my friends – all are parts of our environment"!

"Yes" said the teacher, "but wait..... Some objects are created by nature – for example, mountains, rivers, trees, animals. Others are made by people – for example roads, cars, clothes, books".

Now work in pairs. Make a list with your classmate sitting next to you, of the creations of nature and by human beings.

Ravi, Paramjeet, Jessy, Mustafa, Asha were all excited about making the list. "Why is our environment changing?" asked Iqbal. "It's all because of our needs. They are

Environment is our basic life support system. It provides the air we breath, the water we drink, the food we eat and the land where we live.

How do human beings modify this natural environment? The car fumes pollute the air, water is collected in a pot, food is served in vessels and land is used to build factories.

Human beings make cars, mills, factories and manufacture containers. This is how human beings modify natural environment.

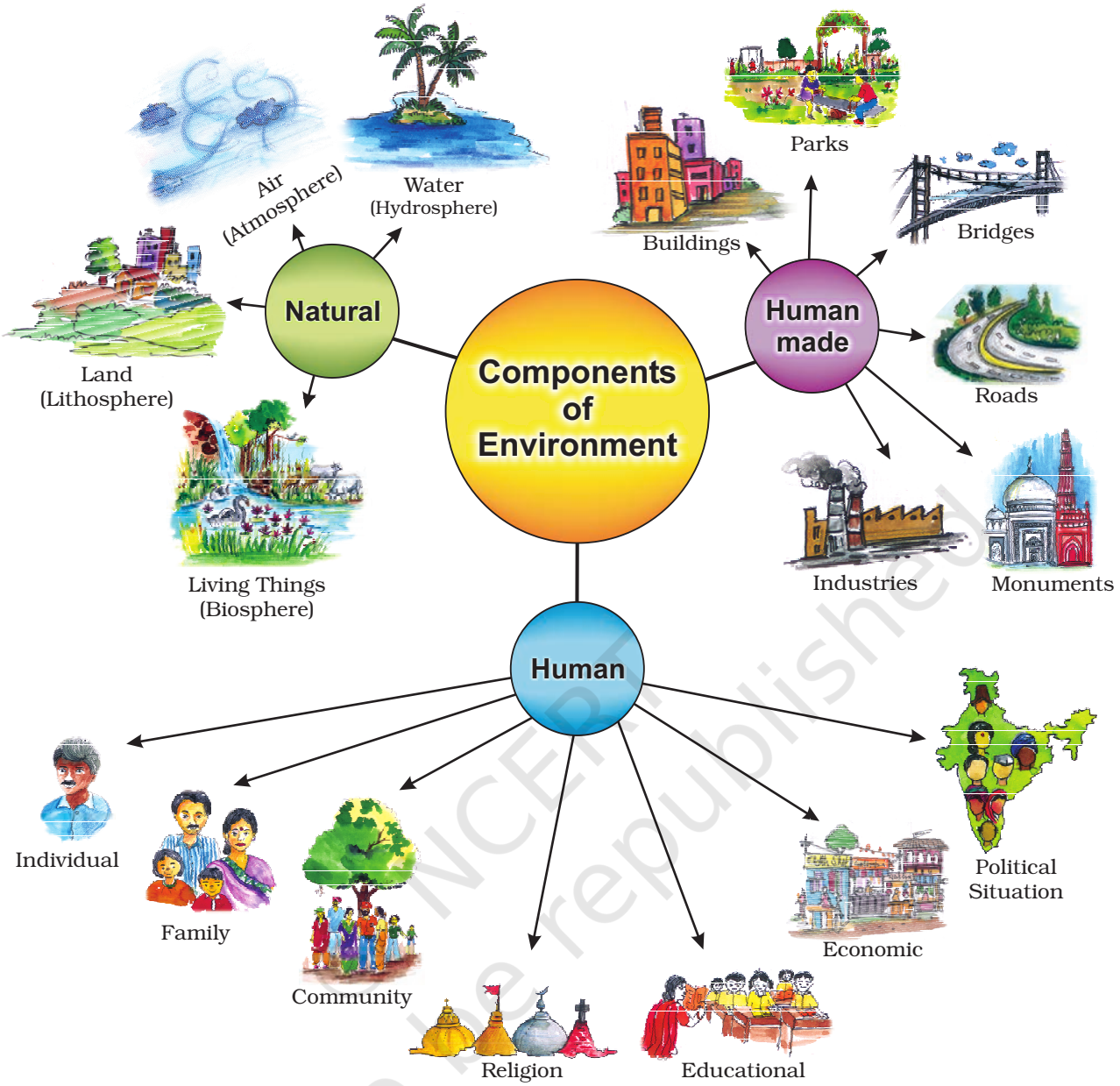


Fig. 1.1: Components of Environment

increasing day by day; we are therefore modifying and at times even destroying our natural surroundings", the teacher replied.

Biotic
The world of living organisms. e.g. plants and animals.

Abiotic
The world of non-living elements. e.g. land.

From the above conversation you understand that the place, people, things and nature that surround any living organism is called **environment**. It is a combination of natural and human made phenomena. While the natural environment refers to both **biotic** and **abiotic** conditions existing on the earth,

human environment reveals the activities, creations and interactions among human beings.

Natural Environment

Land, water, air, plants and animals comprise the natural environment. You are familiar with the meaning of lithosphere, hydrosphere, atmosphere and biosphere from your previous class. Let us learn some more facts about these domains.

Lithosphere is the solid crust or the hard top layer of the earth. It is made up of rocks and minerals and covered by a thin layer of soil. It is an irregular surface with various landforms such as mountains, plateaus, plains, valleys, etc. Landforms are found over the continents and also on the ocean floors.

Lithosphere is the domain that provides us forests, grasslands for grazing, land for agriculture and human settlements. It is also a source of mineral wealth.

Fig. 1.2: Domains of the Environment

The domain of water is referred to as **hydrosphere**. It comprises various sources of water and different types of water bodies like rivers, lakes, seas, oceans, etc. It is essential for all living organisms.

The **atmosphere** is the thin layer of air that surrounds the earth. The gravitational force of the earth holds the atmosphere around it. It protects us

Word Origin

Environment: French word *Environer/ Environner* meaning "neighbourhood".

Let's do

Look at your surroundings. Make a list of uses that the land in your neighbourhood is being put to.

Let's do

Where does the water you use in your home and school come from? Make a list of different uses of water in our daily life. Have you seen anyone wasting water? How?

Let's do

Observe the sky while coming to school. Make a note whether the day is cloudy, rainy, sunny, foggy etc.

Glossary

Ecosystem: It is a system formed by the interaction of all living organisms with each other and with the physical and chemical factors of the environment in which they live, all linked by transfer of energy and material.

Let's do

Sketch or bring photographs of your place like the students in the story.

from the harmful rays and scorching heat of the sun. It consists of a number of gases, dust and water vapour. The changes in the atmosphere produce changes in the weather and climate.

Plant and animal kingdom together make **biosphere** or the living world. It is a narrow zone of the earth where land, water and air interact with each other to support life.

What is ecosystem?

At an NCC camp that Ravi's class was attending, Jessy exclaimed, "What a heavy downpour. It reminds me of my home in Kerala. You should come and see how it pours and pours and pours over the lush green fields and coconut plantations."

Heera from Jaisalmer exclaimed, "We get no rains. We see only 'kikar' and sand, as far as the eyes can see." "But you also find camels", said Ravi.

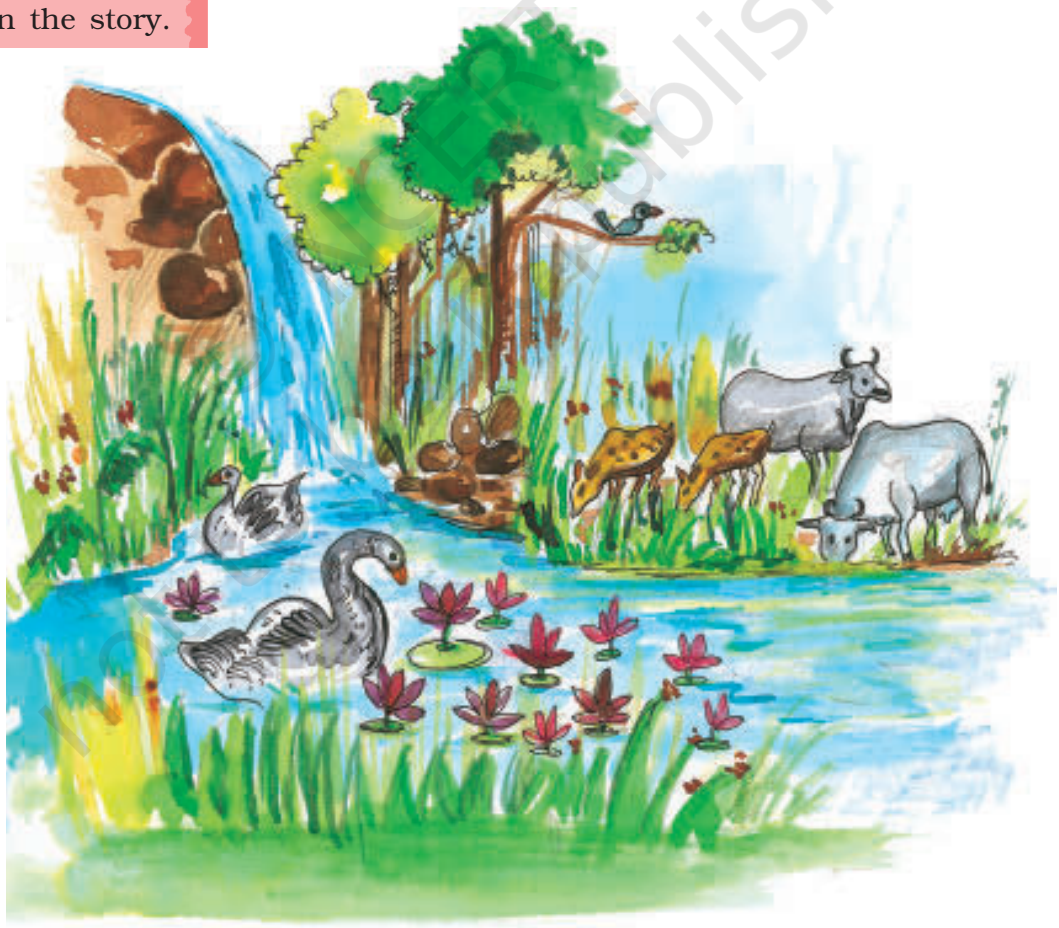


Fig. 1.3: *A Pond Ecosystem*

Heera says, "Not just camels. If you visit our desert, you will see snakes, lizards and many insects too."

Ravi wondered, "Why do the animals, the vegetation and the way people live vary from place to place? Are they all related to each other?"

"Oh yes, very much so", the teacher replied.

All plants, animals and human beings depend on their immediate surroundings. Often they are also interdependent on each other. This relation between the living organisms, as well as the relation between the organisms and their surroundings form an ecosystem. There could be an ecosystem of large rain forest, grassland, desert, mountains, lake, river, ocean and even a small pond.

Do you think the park in which Ravi and his friends played formed an ecosystem?

Human Environment

Human beings interact with the environment and modify it according to their need. Early humans adapted themselves to the natural surroundings. They led a simple life and fulfilled their requirements from the nature around them. With time needs grew and became more varied. Humans learn new ways to use and change environment. They learn to grow crops, domesticate animals and lead a settled life. The wheel was invented, surplus food was produced, barter system emerged, trade started and commerce developed. Industrial revolution enabled large scale production. Transportation became faster. Information revolution made communication easier and speedy across the world.

Have you ever thought why you love eating a juicy watermelon in summer and hot roasted peanuts in winter? A perfect balance is necessary between the natural and human environment. Humans must learn to live and use their environment in a harmonious way.

Nurie, a girl from Mizoram from Ravi's class often talks about the lush green surroundings of her place. Seeing Ravi upset at having lost his playground, Nurie invited him to visit her home state during the coming vacation. Ravi's teacher asked the students to draw the landscape, houses and activities of the people and places they visit during the holidays.

Do you know?

On 5 June every year the World Environment Day is celebrated.

Glossary

Barter System:
It is a trade in which goods are exchanged without the use of money.

Let's do

Talk to some elderly person in your neighbourhood and collect information about–

- The trees in his/ her neighbourhood when he/ she was your age.
- The indoor games he/she played.
- His/her favourite fruit at your age.
- How did they make themselves comfortable during hot summers and cold winters?

Display your answers on a wall/bulletin board.

1. Answer the following questions.

(i) What is an ecosystem?

(ii) What do you mean by natural environment?

(iii) Which are the major components of the environment?

(iv) Give four examples of human made environment.

(v) What is lithosphere?

(vi) Which are the two major components of biotic environment?

(vii) What is biosphere?

2. Tick the correct answer.

(i) Which is not a natural ecosystem?
(a) Desert (b) Aquarium (c) Forest

(ii) Which is not a component of human environment?
(a) Land (b) Religion (c) Community

(iii) Which is a human made environment?
(a) Mountain (b) Sea (c) Road

(iv) Which is a threat to environment?
(a) Growing plant
(b) Growing population
(c) Growing crops

3. Match the following.

(i) Biosphere	(a) blanket of air which surrounds the earth
(ii) Atmosphere	(b) domain of water
(iii) Hydrosphere	(c) gravitational force of the earth
(iv) Environment	(d) our surroundings
	(e) narrow zone where land water and air interact
	(f) relation between the organisms and their surroundings

4. Give reasons.

(i) Man modifies his environment

(ii) Plants and animals depend on each other

5. Activity.

Imagine an ideal environment where you would love to live. Draw the picture of your ideal environment.

2 Inside Our Earth

0762CH02

The earth, our homeland is a dynamic planet. It is constantly undergoing changes inside and outside. Have you ever wondered what lies in the interior of the earth? What is the earth made up of?

Interior of the Earth

Just like an onion, the earth is made up of several concentric layers with one inside another (Fig. 2.1). The uppermost layer over the earth's surface is called the **crust**. It is the thinnest of all the layers. It is about 35 km. on the continental masses and only 5 km. on the ocean floors.

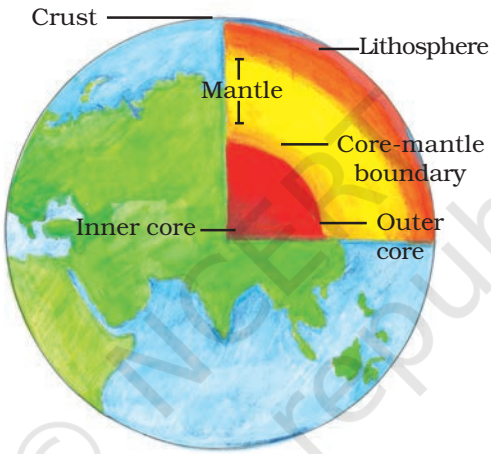


Fig. 2.1: Interior of the Earth

The main mineral constituents of the continental mass are **silica** and **alumina**. It is thus called **sial** (*si*-silica and *al*-alumina). The oceanic crust mainly consists of silica and magnesium; it is therefore called **sima** (*si*-silica and *ma*-magnesium) (Fig. 2.2).

Just beneath the crust is the mantle which extends up to a depth of 2900 km. below the crust.

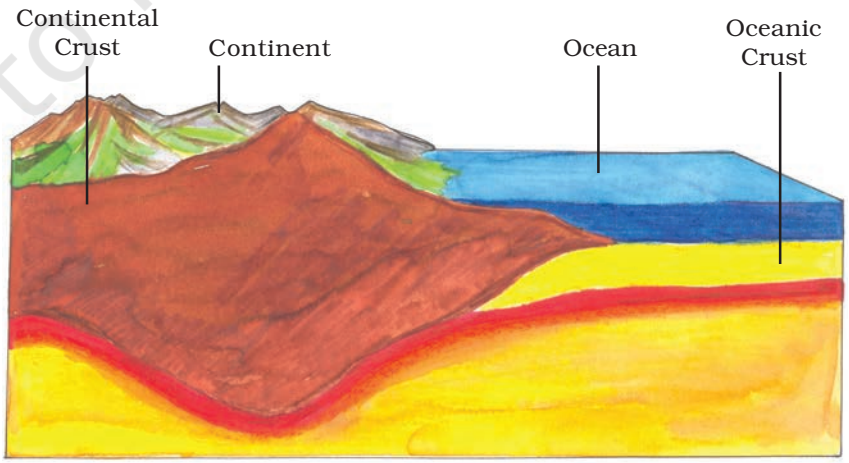


Fig. 2.2: Continental Crust and Oceanic Crust

Do you know?

- The deepest mine in the world, is in South Africa. It is about 4 km. deep. In search for oil engineers have dug a hole about 6 km. deep.
- To reach to the centre of the earth (which is not possible!) you will have to dig a hole 6000 km. deep on the ocean floor.

Do you know?

- The crust forms only 1 per cent of the volume of the earth, 84 per cent consists of the mantle and 15 per cent makes the core.
- The radius of the earth is 6371 km.

Word Origin

Igneous: Latin word *Ignis* meaning fire.

Sedimentary: Latin word *sedimentum* meaning settle down.

Metamorphic: Greek word *metamorphose* meaning change of form.

Glossary

Fossils: The remains of the dead plants and animals trapped in the layers of rocks are called fossils.

The innermost layer is the core with a radius of about 3500 km. It is mainly made up of nickel and iron and is called **nife** (*ni* – nickel and *fe* – ferrous i.e. iron). The central core has very high temperature and pressure.

Rocks and Minerals

The earth's crust is made up of various types of rocks. Any natural mass of mineral matter that makes up the earth's crust is called a **rock**. Rocks can be of different colour, size and texture.

There are three major types of rocks: **igneous rocks**, **sedimentary rocks** and **metamorphic rocks**.

When the molten magma cools, it becomes solid. Rocks thus formed are called igneous rocks. They are also called **primary rocks**. There are two types of igneous rocks: **intrusive rocks** and **extrusive rocks**.

Can you imagine lava coming out from the volcanoes? Lava is actually fiery red molten magma coming out from the interior of the earth on its surface. When this molten lava comes on the earth's surface, it rapidly cools down and becomes solid. Rocks formed in such a way on the **crust** are called **extrusive igneous rocks**. They have a very fine grained structure. For example, basalt. The Deccan plateau is made up of basalt rocks. Sometimes the molten magma cools down deep inside the earth's crust. Solid rocks so formed are called **intrusive igneous rocks**. Since they cool down slowly they form large grains. Granite is an example of such a rock. Grinding stones used to prepare paste/powder of spices and grains are made of granite.

Rocks roll down, crack, and hit each other and are broken down into small fragments. These smaller particles are called **sediments**. These sediments are transported and deposited by wind, water, etc. These loose sediments are compressed and hardened to form layers of rocks. These types of rocks are called **sedimentary rocks**. For example, sandstone is made from grains of sand. These rocks may also contain fossils of plants, animals and other micro-organisms that once lived on them.

Igneous and sedimentary rocks can change into metamorphic rocks under great heat and pressure (Fig. 2.3). For example, clay changes into slate and limestone into marble.

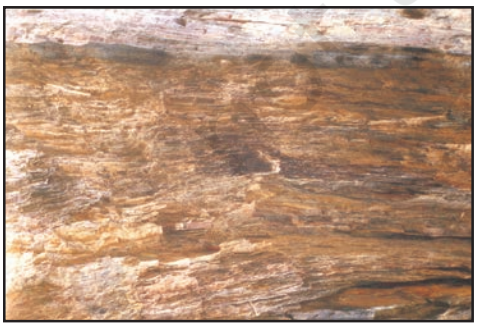


Fig. 2.3: Sedimentary rock turned into a Metamorphic rock

Rocks are very useful to us. The hard rocks are used for making roads, houses and buildings. You use stones in many games. For example, seven stones (*pitthoo*), hop-scotch (*stapu/kit kit*), five stones (*gitti*). Find out some more such games by asking your grand parents, parents, neighbours, etc.

Let's do

Collect pictures of some monuments and find out which are the rocks used to build them. Two pictures have been collected for you.

The Red Fort is made of red sandstone

The Taj Mahal is made of white marble

You will be surprised to know that one type of rock changes to another type under certain conditions in a cyclic manner. This process of transformation of the rock from one to another is known as the **rock cycle**. You have already learnt when the molten magma cools; it solidifies to become igneous rock. These igneous rocks are broken down into small particles that are transported and deposited to form sedimentary rocks. When the igneous and sedimentary rocks are subjected to heat and pressure they change into metamorphic rocks. The metamorphic rocks which are still under great heat and pressure melt down to form molten magma. This molten magma again can cool down and solidify into igneous rocks (Fig. 2.4).

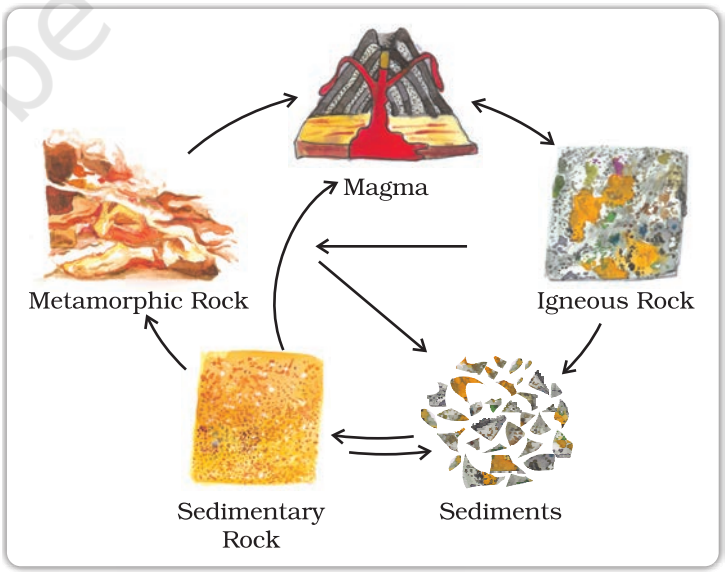


Fig. 2.4: *Rock Cycle*

What are the minerals found in your state?

Collect some samples to show in your class.

Rocks are made up of different minerals. Minerals are naturally occurring substances which have certain physical properties and definite chemical composition. Minerals are very important to humankind. Some are used as fuels. For example, coal, natural gas and petroleum. They are also used in industries – iron, aluminium, gold, uranium, etc, in medicine, in fertilisers, etc.

1. Answer the following questions.

(i) What are the three layers of the earth?

(ii) What is a rock?

(iii) Name three types of rocks.

(iv) How are extrusive and intrusive rocks formed?

(v) What do you mean by a rock cycle?

(vi) What are the uses of rocks?

(vii) What are metamorphic rocks?

2. Tick the correct answer.

(i) The rock which is made up of molten magma is

(a) Igneous (b) Sedimentary (c) Metamorphic

(ii) The innermost layer of the earth is

(a) Crust (b) Core (c) Mantle

(iii) Gold, petroleum and coal are examples of

(a) Rocks (b) Minerals (c) Fossils

(iv) Rocks which contain fossils are

(a) Sedimentary rocks

(b) Metamorphic rocks

(c) Igneous rocks

(v) The thinnest layer of the earth is

(a) Crust (b) Mantle (c) Core

3. Match the following.

(i) Core	(a) Earth's surface
(ii) Minerals	(b) Used for roads and buildings
(iii) Rocks	(c) Made of silicon and alumina
(iv) Clay	(d) Has definite chemical composition
(v) Sial	(e) Innermost layer
	(f) Changes into slate
	(g) Process of transformation of the rock

4. Give reasons.

(i) We cannot go to the centre of the earth.

(ii) Sedimentary rocks are formed from sediments.

(iii) Limestone is changed into marble.

5. For fun.

(i) What are the minerals most commonly used in the following objects?

(ii) Identify some more objects made up of different minerals.

mantle is mostly solid and sometimes have liquid magma chamber

3 Our Changing Earth

0762CH03

Activity

Take a small coloured paper pellet and put it in a beaker half filled with water. Place the beaker on a tripod stand and heat it. As the water warms up, you will observe that the paper pellet is moving upward along with the warm layers of water and then sinks back along with the cooler layers of water. The molten magma inside the earth moves in a similar manner.

Glossary

Lithospheric plates: The earth's crust consists of several large and some small, rigid, irregularly-shaped plates (slabs) which carry continents and the ocean floor.

The lithosphere is broken into a number of plates known as the **Lithospheric plates.** You will be surprised to know that these plates move around very slowly – just a few millimetres each year. This is because of the movement of the molten magma inside the earth. The molten magma inside the earth moves in a circular manner as shown in the activity.

The movement of these plates causes changes on the surface of the earth. The earth movements are divided on the basis of the forces which cause them. The forces which act in the interior of the earth are called as **Endogenic forces** and the forces that work on the surface of the earth are called as **Exogenic forces** (Fig. 3.1).

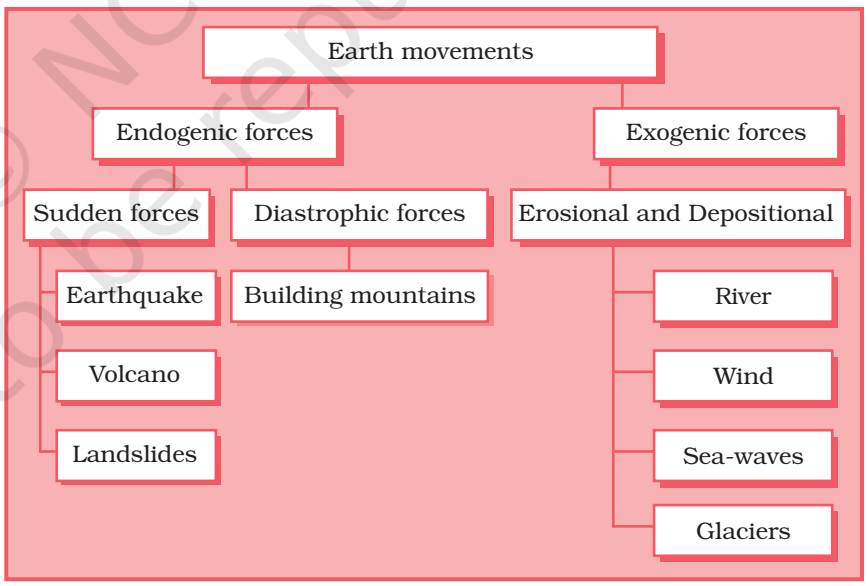


Fig. 3.1: Evolution of Landforms

Endogenic forces sometimes produce sudden movements and at the other times produce slow movements. Sudden movements like **earthquakes** and **volcanoes** cause mass destruction over the surface of the earth.

A **volcano** is a vent (opening) in the earth's crust through which molten material erupts suddenly (Fig. 3.2).

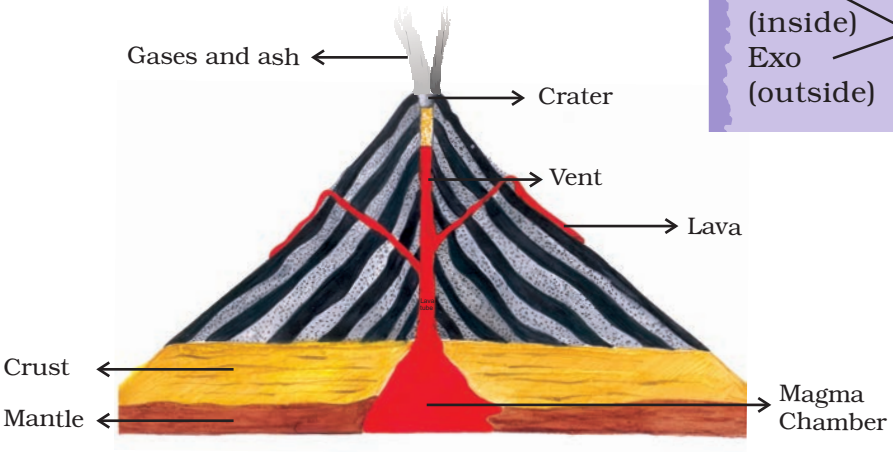


Fig. 3.2: A Volcano

Similarly, when the Lithospheric plates move, the surface of the earth vibrates. The vibrations can travel all round the earth. These vibrations are called **earthquakes** (Fig. 3.3). The place in the crust where the movement starts is called the **focus**. The place on the surface above the focus is called the **epicentre**. Vibrations travel outwards from the epicentre as waves. Greatest damage is usually closest to the epicentre and the strength of the earthquake decreases away from the centre.

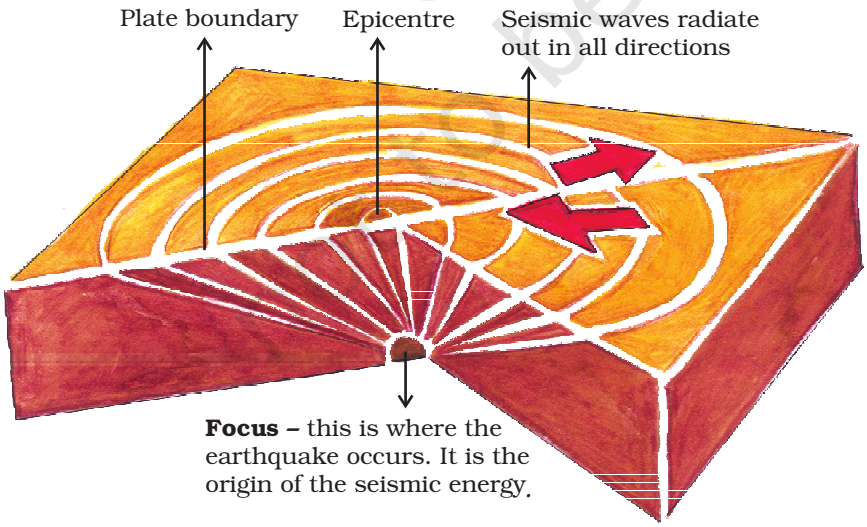


Fig. 3.3: Origin of an Earthquake

Word Origin

Endo (inside) + Exo (outside) + genic (origin) → Endogenic, Exogenic

Activity

Take a container, fill it with water and close it with a lid. Put the water to boil. Now put some peas, spoon and beads on top on the lid. What do you notice? As the water boils the lid begins to shake. The things which you have put on the lid also vibrate. The beads roll down and the spoon vibrates to make a sound. In the same manner, the earth vibrates when an earthquake occurs.

Do you know?

There are three types of earthquake waves:

1. P waves or longitudinal waves
2. S waves or transverse waves
3. L waves or surface waves

Try to find out the properties of these waves from an encyclopedia.

Fig. 3.3a: Destruction caused by an Earthquake in Gujarat

Although earthquakes cannot be predicted, the impact can certainly be minimised if we are prepared before-hand.

Some common earthquake prediction methods adopted locally by people include studying animal behaviour; fish in the ponds get agitated, snakes come to the surface.

Earthquake – A Case Study

1 EARTHQUAKE HITS BHUJ

A massive earthquake measuring 6.9 on Richter scale hit Bhuj Town on 26th January 2001.

2 *School worst affected*

Atleast 971 students and 31 teachers are feared to have lost their lives following the collapse of school buildings.

3 BHUJ RELIEF EFFORT BLIGHTED..

Three days after the quake, concern rose about food, blankets and medical supplies not reaching everyone.

4 Destruction of Bhuj

Phone lines, water pipelines and power stations transmission lines were knocked out.

5 Fire in the city

Hundreds of fires started as charcoal, cookers overturned.

6 Emergency declared in quake zone

The President declares a state of emergency.

7 CM'S APPEAL TO THE CENTRE

Gujarat appeals for financial help. The Chief Minister of Gujarat has launched an appeal for the Centre to deal with the disaster.

Do you know?

An earthquake is measured with a machine called a seismograph. The magnitude of the earthquake is measured on the Richter scale. An earthquake of 2.0 or less can be felt only a little. An earthquake over 5.0 can cause damage from things falling. A 6.0 or higher magnitude is considered very strong and 7.0 is classified as a major earthquake.

A Seismograph

Activity

1. Read the 'Earthquake – A case study' given in the form of headlines that appeared in the newspapers after the quake. Arrange the events in the right sequence of their happening.
2. Imagine if a quake suddenly shook in the middle of the school day, where would you go for safety?

Earthquake Preparedness

Where to take shelter during an earthquake —

Safe Spot – Under a kitchen counter, table or desk, against an inside corner or wall.

Stay Away from – Fire places, areas around chimneys, windows that shatter including mirrors and picture frames.

Be Prepared – Spread awareness amongst your friends and family members and face any disaster confidently.

Major Land Forms

The landscape is being continuously worn away by two processes – weathering and erosion. **Weathering** is the breaking up of the rocks on the earth's surface. **Erosion** is the wearing away of the landscape by different agents like water, wind and ice. The eroded material is carried away or transported by water, wind, etc. and eventually deposited. This process of erosion and deposition create different landforms on the surface of the earth.

Work of a River

The running water in the river erodes the landscape. When the river tumbles at steep angle over very hard rocks or down a steep valley side it forms a **waterfall** (Fig. 3.4).

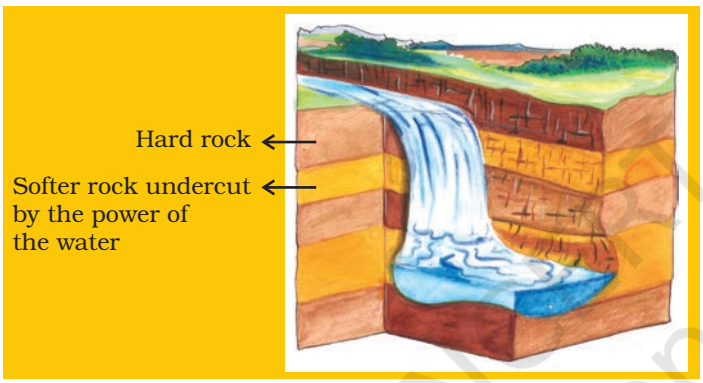


Fig. 3.4: Waterfall

- There are thousands of small waterfalls in the world. The highest waterfall is Angel Falls of Venezuela in South America. The other waterfalls are Niagara falls located on the border between Canada and USA in North America and Victoria Falls on the borders of Zambia and Zimbabwe in Africa.

The Niagra falls

As the river enters the plain it twists and turns forming large bends known as **meanders**. Due to continuous erosion and deposition along the sides of the meander, the ends of the meander loop come closer and closer. In due course of time the meander loop cuts off from the river and forms a cut-off lake, also called an **ox-bow lake**. At times the river overflows its banks. This leads to the flooding of the neighbouring areas. As it floods, it deposits layers of fine soil and other material called sediments along its banks. This leads to the formation of a flat fertile **floodplain**. The raised banks are called **levees**. As the river approaches the sea, the speed of the flowing water decreases and the

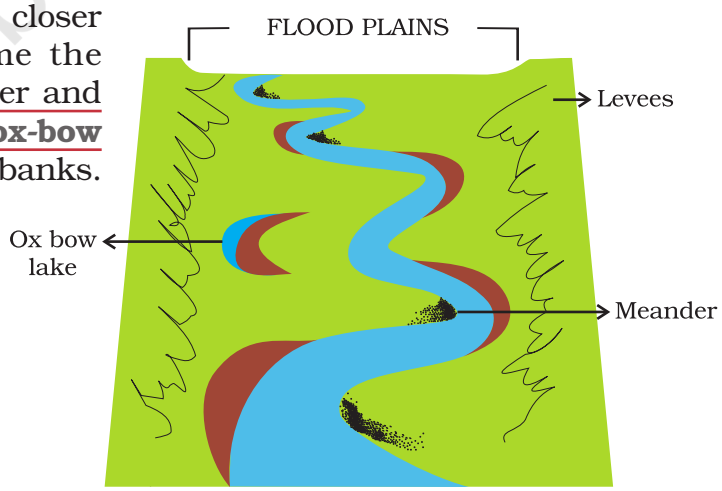


Fig. 3.5: Features made by a river in a flood plain

Let's do

Find out the names of a few rivers of the world that form a delta.

river begins to break up into a number of streams called distributaries. The river becomes so slow that it begins to deposit its load. Each distributary forms its own mouth. The collection of sediments from all the mouths forms a **delta**.

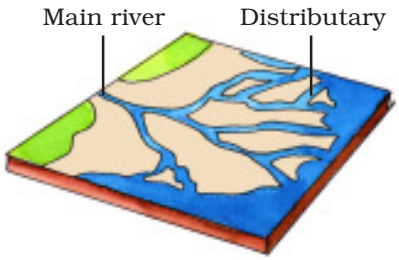


Fig. 3.6: A Delta

Work of Sea Waves

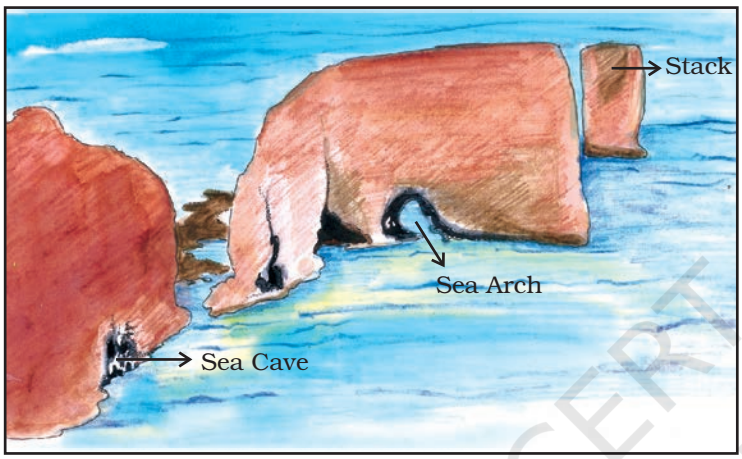


Fig. 3.7: Features made by sea waves

The erosion and deposition of the sea waves gives rise to coastal landforms. Seawaves continuously strike at the rocks. Cracks develop. Over time they become larger and wider. Thus, hollow like caves are formed on the rocks. They are called **sea caves**. As these cavities become bigger and bigger only the roof of the caves remain, thus forming **sea arches**. Further, erosion breaks the roof and only walls are left. These wall like features are called **stacks**. The steep rocky coast rising almost vertically above sea water is called **sea cliff**. The sea waves deposit sediments along the shores forming beaches.

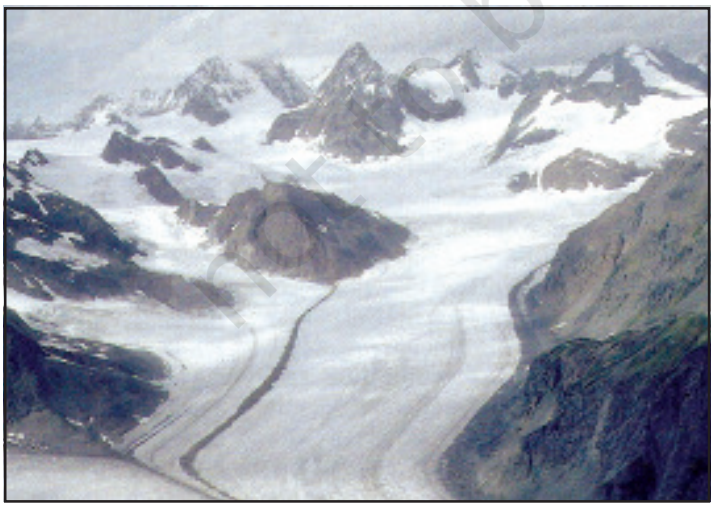


Fig. 3.8: A Glacier

Work of Ice

Glaciers are "rivers of ice" which too erode the landscape by bulldozing soil and stones to expose the solid rock below. Glaciers carve out deep hollows there. As the ice melts they get filled up with water and become beautiful lakes in the mountains. The material carried by the glacier such as rocks big and small, sand and silt gets deposited. These deposits form **glacial moraines**.

Fig. 3.9: Sand Dunes

Work of wind

Have you ever visited a desert? Try to collect some pictures of sand dunes.

An active agent of erosion and deposition in the deserts is wind. In deserts you can see rocks in the shape of a mushroom, commonly called **mushroom rocks**. Winds erode the lower section of the rock more than the upper part. Therefore, such rocks have narrower base and wider top. When the wind blows, it lifts and transports sand from one place to another. When it stops blowing the sand falls and gets deposited in low hill – like structures. These are called **sand dunes** (Fig. 3.9). When the grains of sand are very fine and light, the wind can carry it over very long distances. When such sand is deposited in large areas, it is called **loess**. Large deposits of loess is found in China.

1. Answer the following questions.

(i) Why do the plates move?

(ii) What are exogenic and endogenic forces?

(iii) What is erosion?

(iv) How are flood plains formed?

(v) What are sand dunes?

(vi) How are beaches formed?

(vii) What are ox bow lakes?

2. Tick the correct answer.

(i) Which is not an erosional feature of sea waves?
(a) Cliff (b) Beach (c) Sea cave

(ii) The depositional feature of a glacier is:
(a) Flood plain (b) Beach (c) Moraine

(iii) Which is caused by the sudden movements of the earth?
(a) Volcano (b) Folding (c) Flood plain

(iv) Mushroom rocks are found in:
(a) Deserts (b) River valleys (c) Glaciers

(v) Ox bow lakes are found in:
(a) Glaciers (b) River valleys (c) Deserts

3. Match the following.

(i) Glacier	(a) Sea shore
(ii) Meanders	(b) Mushroom rock
(iii) Beach	(c) River of ice
(iv) Sand dunes	(d) Rivers
(v) Waterfall	(e) Vibrations of earth
(vi) Earthquake	(f) Sea cliff
	(g) Hard bed rock
	(h) Deserts

4.Give reasons.

(i) Some rocks have a shape of a mushroom.

(ii) Flood plains are very fertile.

(iii) Sea caves are turned into stacks.

(iv) Buildings collapse due to earthquakes.

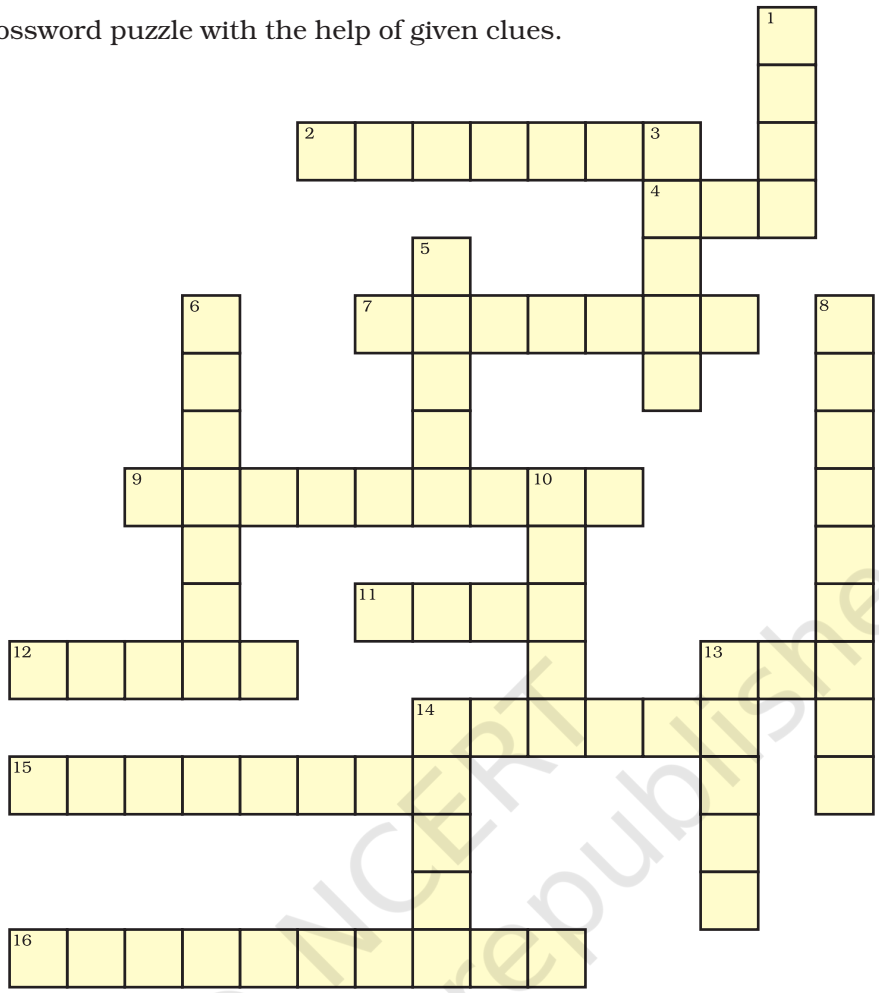
5. Activity.

Observe the photographs given below. These are various features made by a river. Identify them and also tell whether they are erosional or depositional or landforms formed by both.

Photograph	Name of the Feature	Type (Erosional or Depositional or Both)
		
		
		

6. For fun.

Solve the crossword puzzle with the help of given clues.



Across

2. Loop like the bend of a river
4. Solid form of water
7. Moving mass of ice
9. Sudden descent of water in the bed of a river
11. Natural cavity on weak rocks formed by action of waves
12. Embankment on a river that keeps it in its channel
13. Large body of sea water
14. Dry area where sand dunes are found
15. Small hill of sand caused by the action of the wind
16. Flat plain formed by river deposits during time of flood

Down

1. Rise and fall of water caused by friction of wind on water surface
3. Flow of water in a channel
5. Steep perpendicular face of a rock along a sea coast
6. Debris of boulder and coarse material carried by glacier
8. Crescent shaped lake formed by a meandering river
10. Fine sand deposited by the action of the wind
13. Isolated mass of rising steep rock near a coastline
14. Alluvial tracts of land formed by the river deposits at the mouth of a river

4 Air

0762CH04

Do you know?

Carbon dioxide released in the atmosphere creates a green house effect by trapping the heat radiated from the earth. It is therefore called a **greenhouse** gas and without it the earth would have been too cold to live in. However, when its level in the atmosphere increases due to factory smoke or car fumes, the heat retained increases the temperature of the earth. This is called **global warming**. This rise in temperature causes the snow in coldest parts of the world to melt. As a result the sea level rises, causing floods in the coastal areas. There may be drastic changes in the climate of a place leading to extinction of some plants and animals in the long run.

Our earth is surrounded by a huge blanket of air called atmosphere. All living beings on this earth depend on the atmosphere for their survival. It provides us the air we breathe and protects us from the harmful effects of the sun's rays. Without this blanket of protection, we would be baked alive by the heat of the sun during day and get frozen during night. So it is this mass of air that has made the temperature on the earth liveable.

Composition of the Atmosphere

Do you know that the air we take in while breathing is actually a mixture of many gases? Nitrogen and oxygen are two gases which make up the bulk of the atmosphere. Carbon dioxide, helium, ozone, argon and hydrogen are found in lesser quantities. Apart from these gases, tiny dust particles are also present in the air. The pie chart gives you the percentage of different constituents of air (Fig. 4.1).

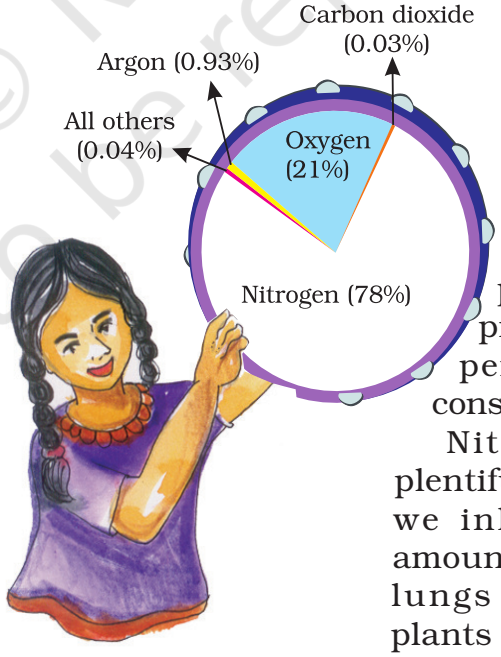


Fig. 4.1: Constituents of Air

Nitrogen is the most plentiful gas in the air. When we inhale, we take some amount of nitrogen into our lungs and exhale it. But plants need nitrogen for their survival. They can not take

nitrogen directly from the air. Bacteria, that live in the soil and roots of some plants, take nitrogen from the air and change its form so that plants can use it.

Oxygen is the second most plentiful gas in the air. Humans and animals take oxygen from the air as they breathe. Green plants produce oxygen during photosynthesis. In this way oxygen content in the air remains constant. If we cut trees then this balance gets disturbed.

Carbon dioxide is another important gas. Green plants use carbon dioxide to make their food and release oxygen. Humans or animals release carbon dioxide. The amount of carbon dioxide released by humans or animals seems to be equal to the amount used by the plants which make a perfect balance. However, the balance is upset by burning of fuels, such as coal and oil. They add billions of tons of carbon dioxide into the atmosphere each year. As a result, the increased volume of carbon dioxide is affecting the earth's weather and climate.

Do you know?

When air is heated, it expands, becomes lighter and goes up. Cold air is denser and heavy. That is why it tends to sink down. When hot air rises, cold air from surrounding area rushes there to fill in the gap. That is how air circulation takes place.

Read and Ponder: Is global warming a serious issue in today's world?

Structure of the Atmosphere

Our atmosphere is divided into five layers starting from the earth's surface. These are **Troposphere**, **Stratosphere**, **Mesosphere**, **Thermosphere and Exosphere** (Fig. 4.2).

Troposphere: This layer is the most important layer of the atmosphere. Its average height is 13 km. The air we breathe exists here. Almost all the weather phenomena like rainfall, fog and hailstorm occur in this layer.

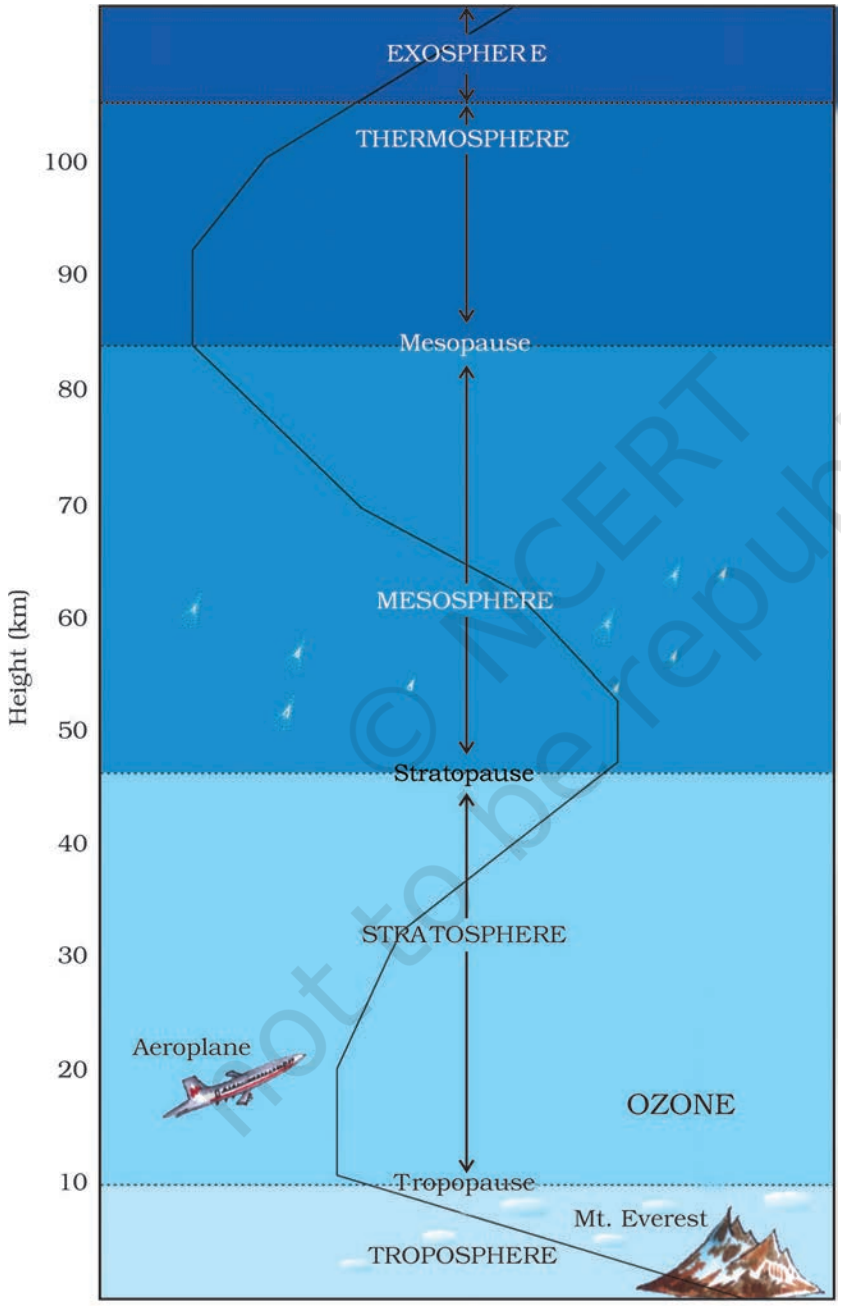


Fig. 4.2: Layers of the Atmosphere

Stratosphere: Above the troposphere lies the stratosphere. It extends up to a height of 50 km. This layer is almost free from clouds and associated weather phenomenon, making conditions most ideal for flying aeroplanes. One important feature of stratosphere is that it contains a layer of ozone gas. We have just learnt how it protects us from the harmful effect of the sun rays.

Mesosphere: This is the third layer of the atmosphere. It lies above the stratosphere. It extends up to the height of 80 km. Meteorites burn up in this layer on entering from the space.

Thermosphere: In thermosphere temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. It extends between

80-400 km. This layer helps in radio transmission. In fact, radio waves transmitted from the earth are reflected back to the earth by this layer.

Exosphere: The upper most layer of the atmosphere is known as exosphere. This layer has very thin air. Light gases like helium and hydrogen float into the space from here.

Weather and Climate

"Is it going to rain today?" "Will it be bright and sunny today?" How many times have we heard this from anxious cricket fans speculating the fate of a One Day match? If we imagine our body to be a radio and the mind its speaker, weather is something that fiddles with its control knobs. Weather is this hour-to-hour, day to day condition of the atmosphere. A hot or humid weather may make one irritable. A pleasant, breezy weather may make one cheerful and even plan for an outing. Weather can change dramatically from day to day. However, the average weather condition of a place for a longer period of time represents the **climate** of a place. Now do you understand why we have daily weather forecasts.

Let's do

For ten days note down weather report from a local newspaper and observe the changes occurring in the weather.

Do you know?

You will be surprised to know that the earth receives only 1 in 2,000,000,000 parts of the sun's energy.

Temperature

The temperature you feel everyday is the temperataure of the atmosphere. The degree of hotness and coldness of the air is known as temperature.

The temperature of the atmosphere changes not only between day and night but also from season to season. Summers are hotter than winters.

An important factor that influences the distribution of temperature is ***insolation***. ***Insolation*** is the incoming solar energy intercepted by the earth.

The amount of insolation decreases from the equator towards the poles. Therefore, the

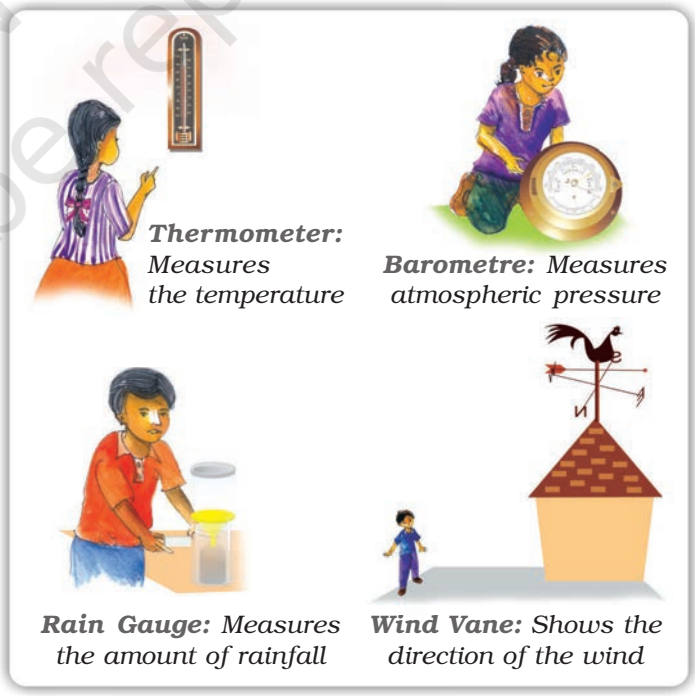


Fig. 4.3: *Weather Instruments*

The standard unit of measuring temperature is degree Celsius. It was invented by Anders Celsius. On the Celsius scale the water freezes at 0°C and boils at 100°C.

temperature decreases in the same manner. Now do you understand why poles are covered with snow? If the earth's temperature rises too high, it would become too warm for some crops to grow. Temperature in cities is much higher than that of villages. The concrete and metals in buildings and the asaphalt of roads get heated up during the day. This heat is released during the night.

Also, the crowded high rise buildings of the cities trap the warm air and thus raise the temperature of the cities.

Air Pressure

On the moon there is no air and hence no air pressure.

Astronauts have to wear special protective space suits filled with air when they go to the moon. If they did not wear these space suits, the counter pressure exerted by the body of the astronauts would make the blood vessels burst. The astronauts would bleed.

You will be surprised to know that air above us presses us with a great force on our bodies. However, we don't even feel it. This is because the air presses us from all directions and our body exerts a counter pressure.

Air pressure is defined as the pressure exerted by the weight of air on the earth's surface. As we go up the layers of atmosphere, the pressure falls rapidly. The air pressure is highest at sea level and decreases with height. Horizontally the distribution of air pressure is influenced by temperature of air at a given place. In areas where temperature is high the air gets heated and rises. This creates a low-pressure area. Low pressure is associated with cloudy skies and wet weather.

In areas having lower temperature, the air is cold. It is therefore heavy. Heavy air sinks and creates a high pressure area. High pressure is associated with clear and sunny skies.

The air always moves from high pressure areas to low pressure areas.

Wind

A wind is named after the direction ***from*** which it blows, e.g. the wind blowing ***from*** the west is called westerly.

The movement of air from high pressure area to low pressure areas is called wind. You can see wind at work as it blows dry leaves down the pavement or uproots trees during a storm. Sometimes when the wind blows gently you can even see it blowing away smoke or fine dust. At times wind can be so strong that it is difficult to walk against it. You must have experienced it is not easy to hold an umbrella on a windy day. Think of some other examples when strong winds have created

problems for you. Winds can be broadly divided into three types.

1. *Permanent winds* – The trade winds, westerlies and easterlies are the permanent winds. These blow constantly throughout the year in a particular direction.
2. *Seasonal winds* – These winds change their direction in different seasons. For example monsoons in India.
3. *Local winds* – These blow only during a particular period of the day or year in a small area. For example, land and sea breeze. Do you recall the hot and dry local wind of northern planes of India? It is called *loo*.

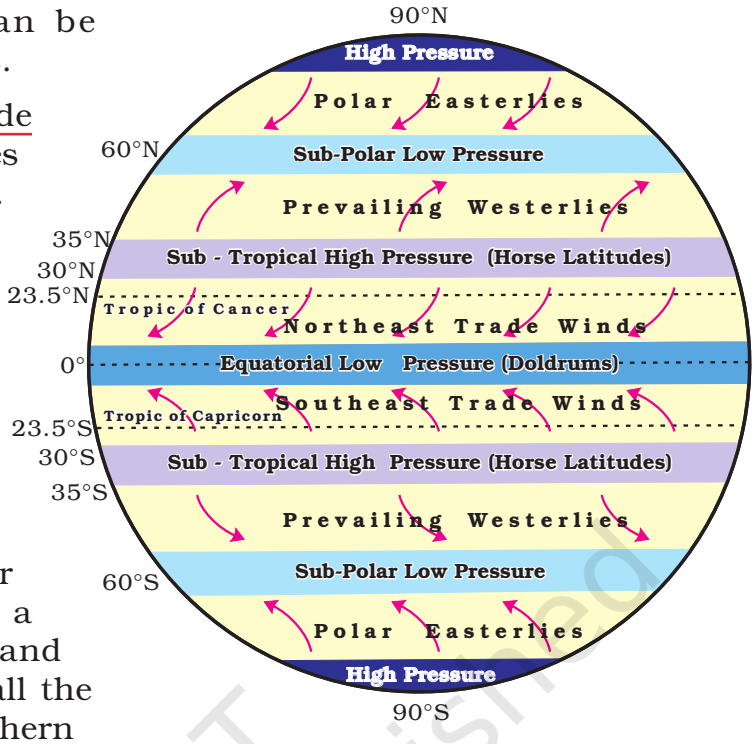


Fig. 4.4: Major Pressure Belts and Wind System

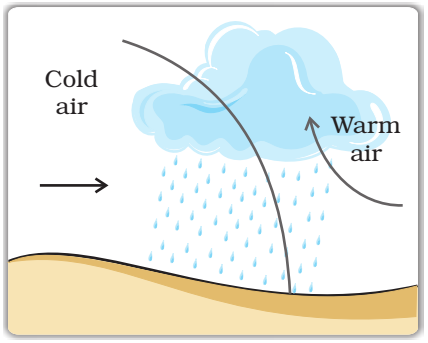
CYCLONE – NATURE'S FURY

Destruction caused by a cyclone

Odisha, located on the eastern seacoast of India is prone to cyclones that originate in the Bay of Bengal. On 17-18 October 1999, cyclone hit five districts of the state. Another supercyclone occurred on the 29 October 1999, that devastated large portions of the state. The damages caused were mainly due to three factors: wind velocity, rain and tidal surge. The winds of upto 260 km. per hour lasted for over 36 hours. These high velocity winds uprooted trees and damaged the *kutcha* houses. Roof tops of several industrial sheds and other houses were also blown away. Power supply and telecom lines snapped completely. Heavy rain occurred under the influence of the cyclone for three days continuously. These rains led to flooding in the major rivers of Odisha. The cyclonic winds caused tidal waves that swept 20 km. inland and brought massive destruction to the coastal areas. The 7 to 10 m high tidal wave intruded suddenly and caused massive damage to the standing paddy crops.

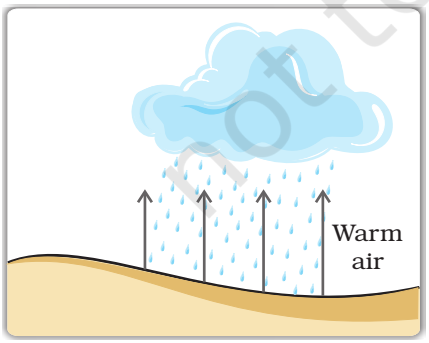
The cyclone originated as a "depression" in the Gulf of Thailand, near east of Port Blair, on 25 October 1999 and gradually moved in a northwestward direction. It intensified into a supercyclone and hit the area between Erasama and Balikuda in Odisha on 29 October at 10.30 a.m.

The supercyclone swept the entire coast of Odisha including the cities of Bhubaneshwar and Cuttack and 28 coastal towns. About 13 million people were affected. A large number of livestock were killed. Standing crops of paddy, vegetables and fruits were heavily damaged. Due to salinisation caused by tidal surge, large tracts of agricultural land have turned infertile. Large tracts of sal, teak and bamboo plantations have disappeared. The mangrove forests between Paradeep and Konark vanished.



Cyclonic Rainfall

Relief (Orographic) Rainfall



Convectional Rainfall

Fig. 4.5: *Types of Rainfall*

Moisture

When water evaporates from land and different water bodies, it becomes water vapour. Moisture in the air at any time, is known as humidity. When the air is full of water vapour we call it a humid day. As the air gets warmer, its capacity to hold the water vapour increases and so it becomes more and more humid. On a humid day, clothes take longer to dry and sweat from our body does not evaporate easily, making us feel very uncomfortable.

When the water vapour rises, it starts cooling. The water vapour condenses causing formation of droplets of water. Clouds are just masses of such water droplets. When these droplets of water become too heavy to float in air, then they come down as precipitation.

Jet planes flying in the sky leave a white trail behind them. The moisture from their engines condenses. We see trails of this condensed moisture for some time when there is no air movement to disturb it.

Precipitation that comes down to the earth in liquid form is called rain. Most of the ground water comes from rainwater. Plants help preserve water. When trees on hill sides are cut, rainwater flows down the bare mountains and can cause flooding of low lying areas. On the basis of mechanism, there are three types of rainfall: the convectional rainfall, the orographic rainfall and the cyclonic rainfall (Fig. 4.5).

Rainfall is very important for the survival of plants and animals. It brings fresh water to the earth's surface. If rainfall is less – water scacity and drought occur. On the other hand if it is more, floods take place.

Other forms of precipitation are snow, sleet, hail.

1. Answer the following questions.

(i) What is atmosphere?

(ii) Which two gases make the bulk of the atmosphere?

(iii) Which gas creates green house effect in the atmosphere?

(iv) What is weather?

(v) Name three types of rainfall?

(vi) What is air pressure?

2. Tick the correct answer.

(i) Which of the following gases protects us from harmful sun vays?
(a) Carbon dioxide (b) Nitrogen (c) Ozone

(ii) The most important layer of the atmosphere is
(a) Troposphere (b) Thermosphere (c) Mesosphere

(iii) Which of the following layers of the atmosphere is free from clouds?
(a) Troposphere (b) Stratosphere (c) Mesosphere

(iv) As we go up the layers of the atmosphere, the pressure
(a) Increases (b) Decreases (c) Remains the same

(v) When precipitation comes down to the earth in the liquid form, it is called
(a) Cloud (b) Rain (c) Snow

3. Match the following.

(i) Trade Winds	(a) Incoming solar energy
(ii) Loo	(b) Seasonal wind
(iii) Monsoon	(c) Horizontal movement of Air
(iv) Wind	(d) Layer of ozone gas
	(e) Permanent wind
	(f) Local wind

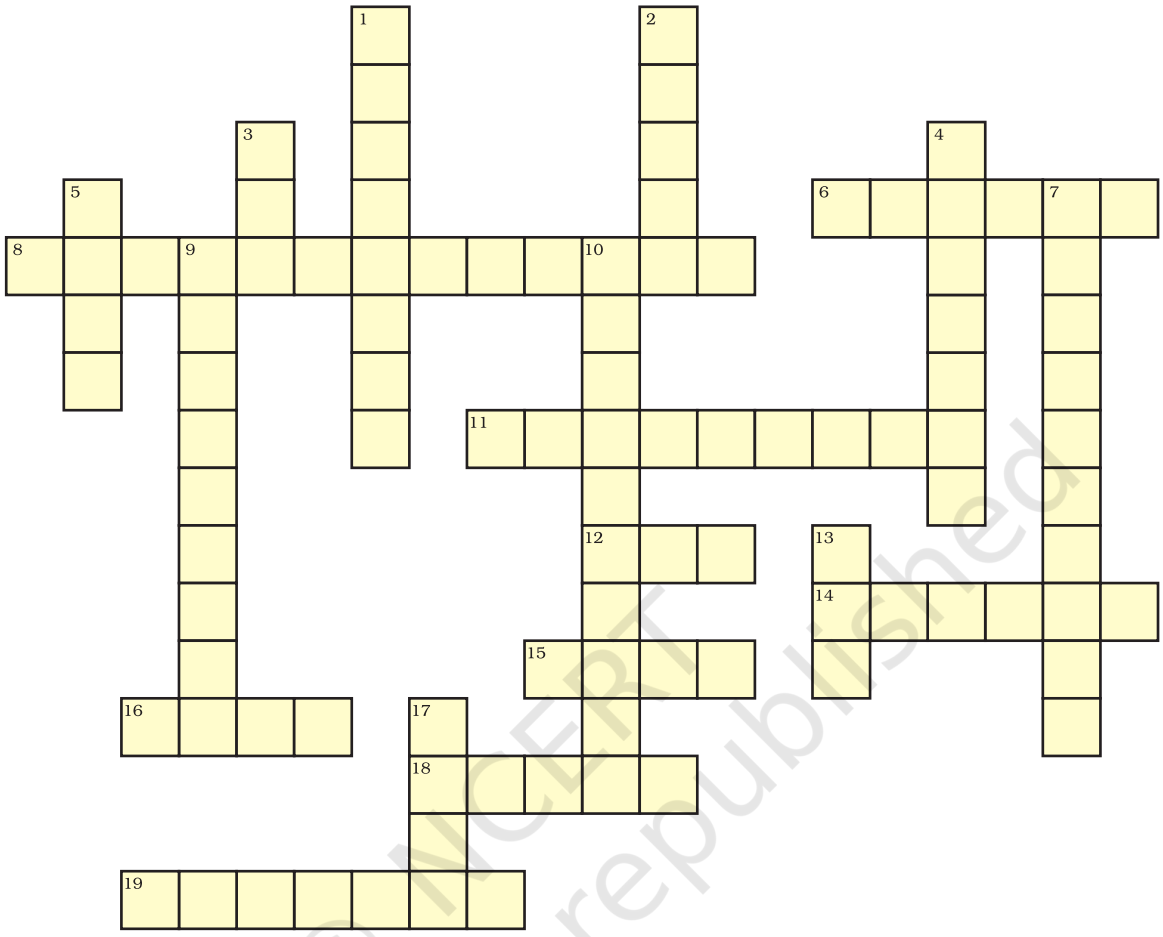
4. Give reasons.

(i) Wet clothes take longer time to dry on a humid day?

(ii) Amount of insolation decreases from equator towards poles?

5. For fun.

(i) Solve this Crossword puzzle with the help of given clues:



Across

6. An Indian tree having extraordinary quality of providing oxygen round the clock
8. Gas present in atmosphere occupying only 0.03% by volume
11. Outermost layer of atmosphere
12. Mixture of many gases
14. Life giving gas
15. Air in motion
16. An indian tree valued highly for medicinal properties
18. Gas protecting us from harmful sunrays
19. Low pressure area

Down

1. Amount of water vapour in air
2. Condensation of water vapours around dust particles in atmosphere
3. Example of local wind blowing in summer in northern india
4. Short term changes in atmosphere
5. Precipitation in liquid form
7. Blanket of air around the earth
9. Instrument to measure pressure
10. Incoming solar radiation
13. Reduces visibility in winters
17. It is ..... time when sun is overhead