

GEOGRAPHY

STANDARD SEVEN



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GEOGRAPHY

STANDARD SEVEN



2017

**Maharashtra State Bureau of Textbook Production and
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The Constitution of India

Preamble

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a 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 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.

NATIONAL ANTHEM

Jana-gana-mana-adhināyaka jaya hē
Bhārata-bhāgya-vidhātā,

Panjāba-Sindhu-Gujarāta-Marāthā
Drāvida-Utkala-Banga

Vindhya-Himāchala-Yamunā-Gangā
uchchala-jaladhi-taranga

Tava subha nāmē jāgē, tava subha āsisa māgē,
gāhē tava jaya-gāthā,

Jana-gana-mangala-dāyaka jaya hē
Bhārata-bhāgya-vidhātā,

Jaya hē, Jaya hē, Jaya hē,
Jaya jaya jaya, jaya hē.

PLEDGE

India is my country. All Indians
are my brothers and sisters.

I love my country, and I am proud
of its rich and varied heritage. I shall
always strive to be worthy of it.

I shall give my parents, teachers
and all elders respect, and treat
everyone with courtesy.

To my country and my people,
I pledge my devotion. In their
well-being and prosperity alone lies
my happiness.

Preface

Dear Students,

Welcome to Standard VII ! So far, you have studied Geography as part of Environmental Studies in Std III to V and from your Geography textbook in Std VI. Now we are happy to offer this Std VII Geography textbook to you.

Many events occur in your surroundings. You are a part of the environment where Nature keeps meeting you in the form of sunlight, rain, and cold. You feel happy when a light, pleasant breeze touches you. Geography is a subject that offers explanations of all these natural events. It takes you closer to Nature. In this subject, we also study the interactions of living organisms among themselves and with Nature.

You will learn many basic concepts related to the earth in this subject. You have to study many factors of human activities closely associated with your daily life. If you study them well, it will definitely prove useful to you in future. In Geography we also study the financial, social, cultural interactions between various human communities.

The skills of observation, thinking and analysis are important for learning this subject well. Keep using and refining them. Maps, charts, graphs, diagrams, information and communication are tools for learning this subject. Get well acquainted with them.

Do carry out the easy tasks and activities given in this textbook for you. Many things that you have learnt in your previous textbook will help you to learn from this book. Do keep them in mind.

Wish you all the best !

Pune

Date : 28.03.2017, (Gudhi Padwa)

Indian Solar Year :
7 Chaitra, 1939



(Dr Sunil Magar)

Director

Maharashtra State Bureau of Textbook
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Sr. No	Area	Unit	Competency Statements
1.	General Geography	1.1 How Seasons Occur	<ul style="list-style-type: none"> ● Gather and examine data/information about specific regions. ● Ask questions based on geographical information.
		1.2 Eclipses	<ul style="list-style-type: none"> ● Ask various questions after examining geographical references.
2.	Physical Geography	2.1 Soils	<ul style="list-style-type: none"> ● Understand natural events and the reasons behind them, from a geographical point of view.
		2.2 Air Pressure	<ul style="list-style-type: none"> ● Identify the physical features of a region and explain how they affect man. ● Use maps and other geographical tools to answer questions regarding a region. ● Use maps and other geographical tools to answer questions regarding the location of a region.
		2.3 Winds	<ul style="list-style-type: none"> ● Ask various questions after examining geographical references.
		2.4 Movement of Ocean Water	<ul style="list-style-type: none"> ● Identify the physical features of a region and explain how they affect man.
3.	Human Geography	3.1 Agriculture	<ul style="list-style-type: none"> ● Explain with the help of maps, models and other geographical tools, how changes occurred at a place over a period of time due to human activity.
		3.2 Introduction to Natural Regions	<ul style="list-style-type: none"> ● Learn about physical and human characteristics and understand their significance for the community. ● Think about the issues related to places, people and environment with the help of geographical factors. ● Tell how the physical environment in a region affects its economy, culture and trade. ● Use maps and other geographical tools to answer questions regarding a region. ● Frame questions about a specific region and investigate further in that direction.
		3.3 Patterns of Human Settlement	<ul style="list-style-type: none"> ● Understand the patterns of distribution of human settlement and the process of the spread of human activities. ● Examine the positive and negative effects of the interrelation between human life and physical setups in a region. ● Examine how man used geographical factors in the construction of settlements and how he adapted to and improved upon the local physical natural environment.
4.	Practical Geography	Relief Maps	<ul style="list-style-type: none"> ● Use maps to make guesses and draw inferences regarding geographical elements. ● Use maps and other geographical tools to answer questions regarding a region.

- For Teachers -

- ✓ To begin with, get familiar with the textbook yourself.
- ✓ Please plan carefully and independently for the activities in each chapter. Please do not teach without planning.
- ✓ The teaching-learning interactions, processes and participation of all students is very necessary and so is your active guidance.
- ✓ Please use the geographical teaching aids in the school as required for the appropriate understanding of the subject. It is necessary to use the globe, the maps of the World, India and the State, atlases and thermometers.
- ✓ Though the number of chapters has been reduced the number of periods required for each chapter has been given a thought. Abstract concepts are difficult to follow and therefore you are expected to use the given number of periods fully. This will help the students to assimilate the content without feeling the 'burden of learning'.
- ✓ Like other social sciences, geographical concepts too are not easy to understand. Major concepts of geography have a scientific base and they deal with abstractions. Encourage group work, learning through each other's help, etc. Facilitate peer learning as much as possible by reorganizing the class structure frequently.
- ✓ You will find that the character 'Globee' appears in different boxes and instructions given in the chapters. Please ensure that it helps to create interest in the subject.
- ✗ The present book has been prepared for constructivist and activity-based teaching. Please do not teach the lessons in the book by just reading them aloud.
- ✓ Follow the order of the chapters as given in the contents because the concepts have been introduced in a graded manner to facilitate knowledge-building.
- ✓ Do not use the boxes titled 'Do you know?' for evaluation.
- ✓ A glossary is given at the end of the book. Detailed information of important geographical terms / concepts in the chapters is given in this glossary. The words are given alphabetically. The words included in the glossary are enclosed in blue highlights in the chapters, e.g. eclipse (Chapter 2, Page 4)
- ✓ Some websites have been given for reference at the end of the chapter and the glossary. Also, a list of references used is also given. You as well as the students are expected to use these references. These references will surely help you to go beyond the textbook. Please bear in mind that extra reading is always helpful for understanding any subject in depth.
- ✓ Use thought-provoking, activity-oriented, open-ended, multiple choice questions for evaluation. Some examples are given at the end of the chapters in the 'exercises'.
- ✓ Use QR Code given in the textbook.

- For Students -



The character '**Globee**' will meet you in every chapter. Have you guessed who he is? He will help in the various tasks you are expected to do. Try to follow his instructions.



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Front Cover : Children putting up prominent features on the Globe. Back Cover :(1) Gateway of India, Mumbai (2) People of Masai and Zulu tribes, and their house (3) Hampi, Karnataka (4) A sledge - a means of transport in the Tundra region (5) A Mongol hunter (6) Transplanting rice - South Asia.

1. How Seasons Occur - Part 1



Let's recall.

- How do day and night occur on the earth?
- What term is used to describe the earth's revolution around the sun?
- How long does the earth take to do so?
- In which hemispheres is our country located?
- Why don't the sun's rays fall perpendicular at all the places on the earth?



Can you tell?

Note the timings of sunrise and sunset in your area, for the following period by direct observation, or using calendars, newspapers or the Internet. A specimen table has been given below. Record the entries for the month of June, find the answers to the following questions and discuss them.

- Among the records in the table which is the longest day?
- What difference do you notice in the duration of the nights day by day?
- Guess the reason behind it.

- How did you find out the duration of the night?
- Which two dates had days and nights of the same duration?
- With the help of the table, you saw how the duration of the day and the night changes. Do you think such a change occurs everywhere on the earth?
- Use the following format to record the duration of daytime from the 19th to 28th of every month from September to December.

Geographical explanation

You must have noticed the change in the duration of daytime and the nighttime from 19th to 28th June. It takes 24 hours for the earth to rotate around itself. It rotates from west to east. The earth's rotation has enabled us to **measure time** in terms of days. During a single day, we experience different stages like sunrise, midday, sunset as well as daytime and nighttime.

To understand the changes in the locations of sunrise and sunset on the horizon, let us carry out the activity given on the next page.

Date	Sunrise	Sunset	Duration		Source of Information
			Day	Night	
19 th June					
20 th June					
21 st June					
22 nd June					
23 rd June					
24 th June					
25 th June					
26 th June					
27 th June					
28 th June					



Try this.

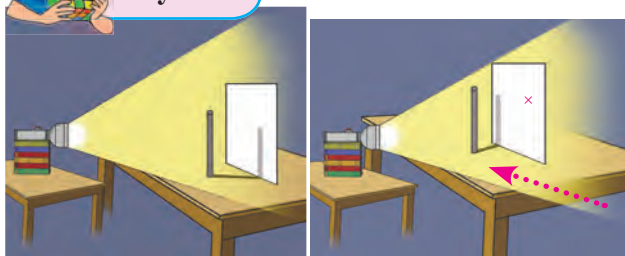


Figure 1.1 Experiment of the shadow

- ❖ Paste a large white paper on one side of the table.
- ❖ Place a torch in front of the table in such a way that it wouldn't move.
- ❖ Stand a rod or a candle between the white paper and the torch. See fig. 1.1
- ❖ Direct the light beam of the torch in such a way that the shadow of the rod/candle falls on the paper.
- ❖ Mark the position of the shadow on the paper.
- ❖ Move the table along with the rod/candle, from one side to the other slowly.
- ❖ Observe and mark the position of the shadow that falls on the paper.
- ❖ Note the change in the location of the shadow.

Geographical explanation

From this activity, you will realize that as the position of the table changes, the position of the shadow also changes. If the positions of the sunrise and the sunset on the horizon are observed for the whole year, you will realize that they keep on changing. Let us try to understand the reason behind this with the help of the next activity.



Try this.

(For teachers : This activity is to be conducted throughout the year. Start this within eight days after the school opens. Continue it till the end of December. Make observations once in a week at the time of sunrise or sunset as per your convenience).

- ❖ Take a thick stick about 1.5 to 1.7 m long.
- ❖ Keeping some distance, fix the stick near a wall that receives sunlight at the time

of sunrise or sunset throughout the year. (Remember that the stick has to be fixed at this spot for a period of about one year.)

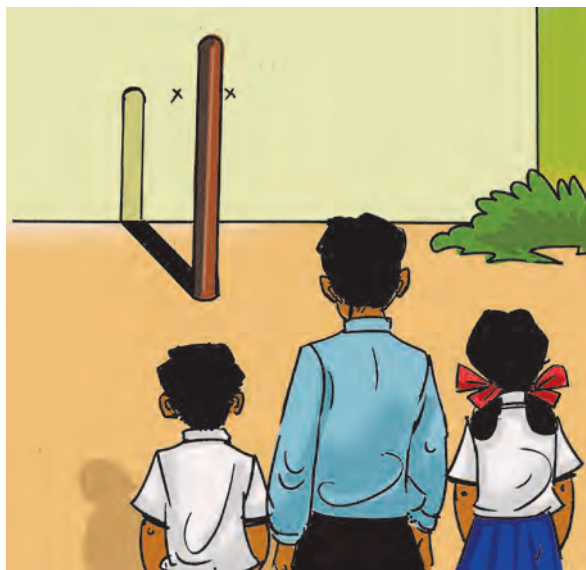


Figure 1.2 Experiment

- ❖ After the observation, mark the position of the shadow for that date.
- ❖ If the position of the shadow changes, measure and note the distance between the earlier and the changed position.
- ❖ During the period of this activity, observe the place of sunrise and the sunset on the horizon as well.

(The next part of the lesson should be dealt with in the month of September)

- ❖ Study the duration of daytime and nighttime on the basis of observations from the table for the month of September.
- ❖ What was the direction of the shadow of the stick in the month of September?
- ❖ On which day was the duration of the day and the night the same?



Think about it.

- ☞ If the position of the shadow on the wall moves towards the north, in which direction does the location of sunrise or sunset appear to shift?

Note : The second half of this lesson (Chapter 8) should be handled in the class around 22nd of December. Before that, record the observations as explained above.

2. The Sun, the Moon and the Earth

The moon's motions:

Like the earth, the moon, also has axial and orbital motions. The moon while rotating around itself, revolves around the earth and the earth revolves around the sun. As a result, though the moon does not revolve around the sun independently, indirectly, it makes revolutions around the sun. The time it takes to make one revolution around the earth and one rotation around itself is the same. That is why, we constantly see one and the same side of the moon.



Think about it.

Like sunlight and moonlight, is there anything called the earthlight? If yes, where do you think it is found?



Try this.

Carry out this activity on a playground.

- ❖ Select three students.
- ❖ Give them the roles of the sun, the moon and the earth.
- ❖ Make the sun stand in the middle. (See the title page.)
- ❖ Draw an elliptical orbit around the sun.
- ❖ The student who has been given the role of the earth should rotate around himself from west to east. Simultaneously he should revolve around the student who is the sun along the drawn orbit in the anti-clockwise direction.
- ❖ Make sure that the student who is performing the role of the moon is also revolving around the one who is acting as the earth.
- ❖ Draw a diagram of the whole activity in your notebook.

Geographical explanation

The moon's orbit of the revolution is also elliptical as that of the earth. Hence the distance of the moon from the earth is not the same

everywhere along its orbit while revolving. When it is the closest to the earth it is said to be in **perigee** and when it is at the farthest the position is called **apogee**. See fig. 2.1

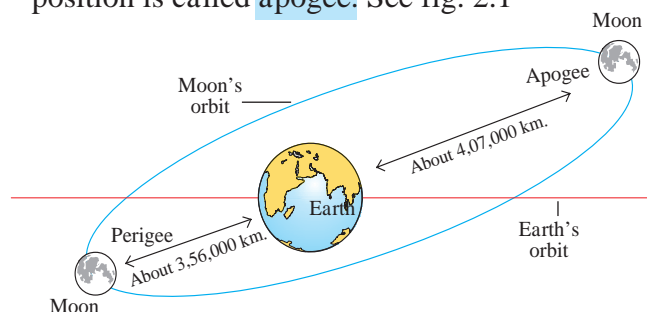


Figure 2.1 : Moon's positions

You have studied the phases of the moon. You know how it waxes from the new moon day to the full moon day and how it wanes from the full moon to the new moon day.

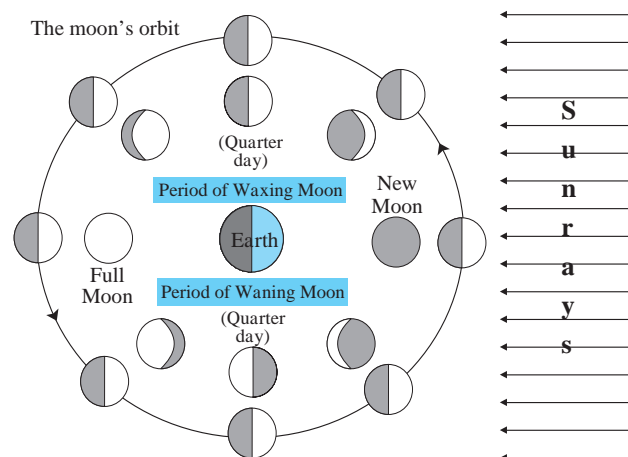


Figure 2.2 : Waxing and waning moon (Phases)

See fig 2.2 which shows the different phases of the moon. It shows the relative position of the moon on both the quarters, the full moon and the new moon days with respect to the earth and the sun.



Think about it.

Fig. 2.2 shows the positions of the moon as seen from the space and as seen from the earth. How will you identify which are which?

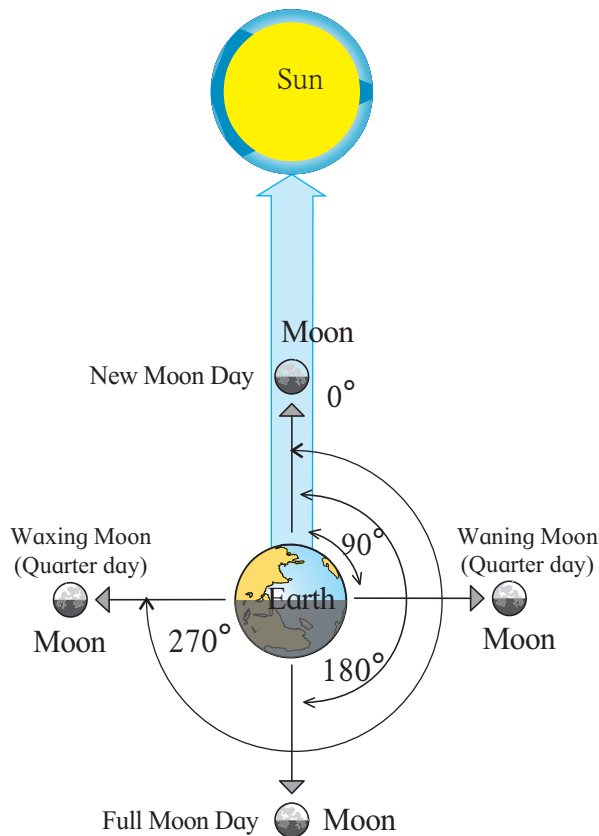


Figure 2.3 : Angles made by the earth-moon-sun

We see the phases of the moon in the sky from the earth. They are the illuminated portions of the moon. They become visible due to the sunlight reflected from the moon. While revolving around the earth, the moon is on the opposite side of the sun on a full moon day, whereas on a new moon day, it is positioned between the sun and the earth. On the first and the third quarter days, the moon, the earth and the sun make an angle of 90° . At these positions, we see half the portion of illuminated moon. Hence in the sky, it appears semicircular in shape. (See fig. 2.3.)

Eclipses:

The orbital path of the earth and that of the moon are not in the same plane. The moon's revolutionary orbit makes an angle of about 5° with that of the earth. As a result, the moon intersects the plane of the earth's orbit twice during one revolution. On each new moon day, the lines joining the earth and the sun and the moon make an angle of 0° whereas on each full moon day, this angle is of 180° . Even so, the sun, the earth and the moon may not be in one straight line in the same plane on every

new moon or full moon day. Hence, eclipses do not occur on each new moon or full moon day. (See fig. 2.4.) However, sometimes, on a new moon day or a full moon day, the three fall in one line and are in the same plane. Eclipses occur on such occasions. Eclipses may be solar or lunar.

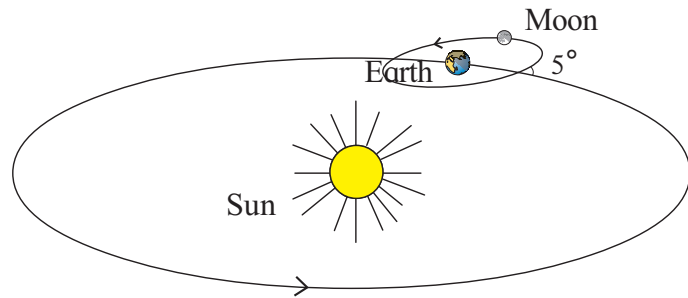


Figure 2.4 : Angle between the planes of orbits



Think about it.

Consider the relative positions of the sun, the moon and the earth on the new moon day and both the quarters. What will be the angle between the lines joining the earth and the moon as well as the earth and the sun? How many times will this angle be formed in a month?

Solar eclipse:

If the moon is between the sun and the earth, the shadow of the moon falls on the earth. At such a time these three celestial objects are on the same plane and fall in one line. Hence the place on the earth where the moon's shadow falls, experiences a solar eclipse. This shadow is of two types. The central portion of the shadow is darker and the periphery is light. In the area of dark shadow on the earth, the sun becomes completely invisible. This condition is known as total solar eclipse. However, during the same period, at the places where the shadow is lighter, the sun disc appears partially covered. This condition is described as partial solar eclipse. (See fig. 2.5) Total solar eclipse is seen in a very limited region of the earth.

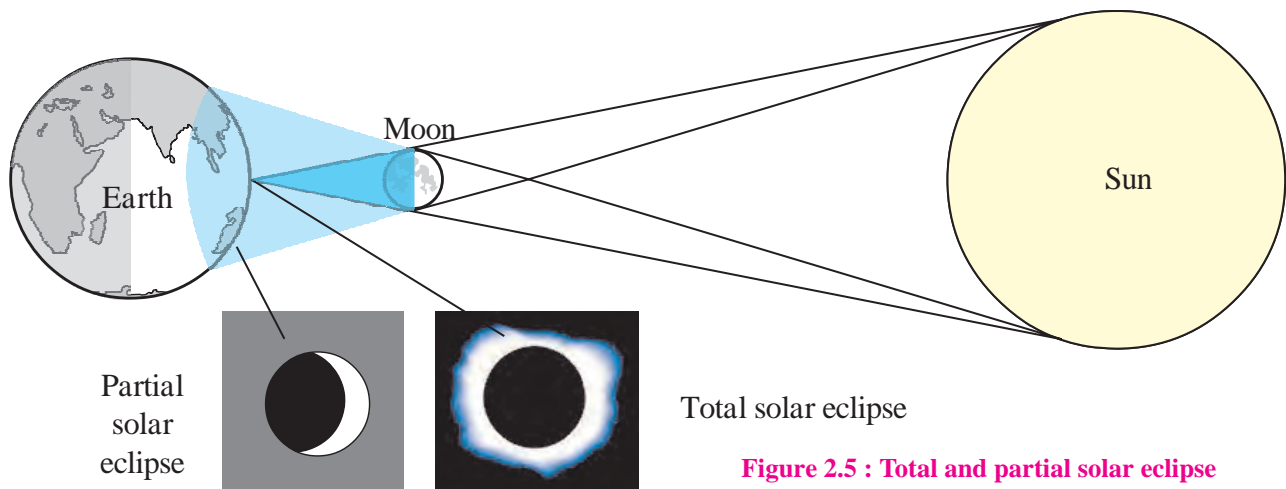


Figure 2.5 : Total and partial solar eclipse

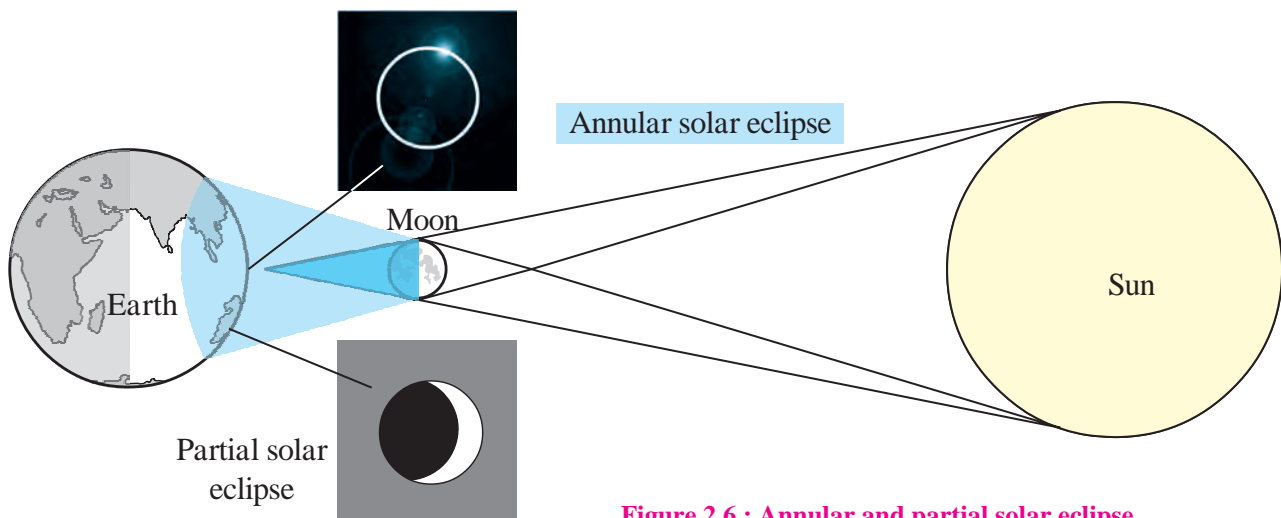


Figure 2.6 : Annular and partial solar eclipse

Sometimes the moon is in apogee position. This means it is at its farthest from the earth. As a result, the deep shadow of the moon is cast in space and does not reach the earth. From a very small region of the earth, only an illuminated edge of the sun disc is seen in the form of a ring. This is called annular eclipse. (Fig. 2.6) Annular eclipse is a rare phenomenon.

- ❖ Fix a small plastic or sponge ball on the sharp end of the pencil.
- ❖ Draw a circle along the midline of the ball. Let this ball be your moon.
- ❖ Now place a large plastic or rubber ball at a distance of 10 to 15 cm. from this moon. Let this larger ball be the earth. Draw a circle



Try this.

- ❖ Take a ball of clay or mud and keep it at the centre of a table.
- ❖ Fix a pencil vertically in the clay ball in such a way that its sharp end points upwards.

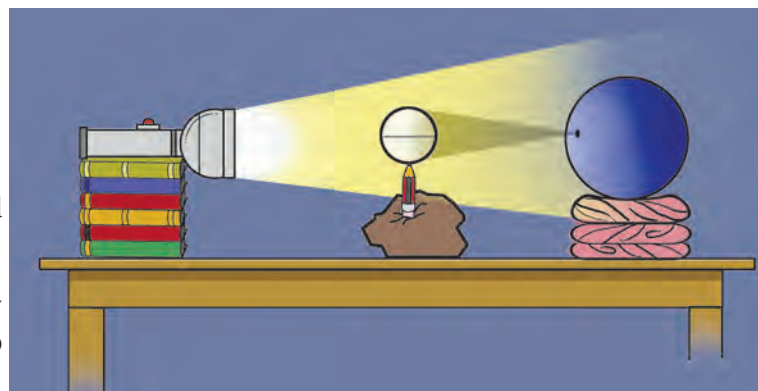


Figure 2.7 : Solar eclipse activity

along the midline of this ball too using a pencil in the centre. Let this be the equator.

- ❖ Keep the ball steady using a rubber or cloth ring.
- ❖ Arrange the balls representing the earth and the moon in such a way that the circle drawn on the moon will be in the plane of the equator of the earth.
- ❖ Take a torch (the sun). Hold it at a distance of about 30 cm from the moon.
- ❖ Direct the light beam on the moon. See fig. 2.7.
- ❖ Observe the shadow of the smaller ball on the earth to understand how solar eclipse occurs.

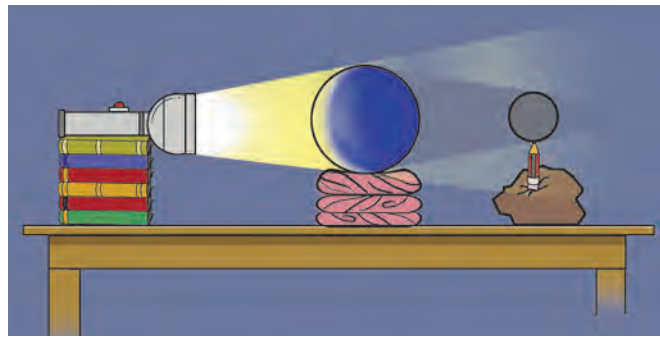


Figure 2.9 : Lunar eclipse activity

Lunar eclipse:

A lunar eclipse occurs when the moon enters the shadow of the earth, while revolving around it. At this time, it is necessary that the earth is between the sun and the moon, and all three of them are in the same plane. On a full moon day, the moon's path of revolution passes through the thick shadow of the earth. If the moon is totally hidden within the shadow, we see a total lunar eclipse and if only a part of the moon is in the shadow, we see a partial lunar eclipse. (See fig. 2.8).



Try this.

- ❖ Arrange the materials used for the solar eclipse demonstration earlier, as shown in fig. 2.9 and try to understand how a lunar eclipse occurs.



Use your brain power!

- ❏ On the day of solar eclipse, in which part of the earth will it not be seen?
- ❏ Can we see total and annular solar eclipses on the same occasion?
- ❏ Why is an annular lunar eclipse not seen?
- ❏ Which eclipses will you see from the moon?
- ❏ Why are solar eclipses caused by the other planets not seen from the earth?



Think about it.

- ❏ When solar eclipses do not occur on a new moon day, does it mean that the moon does not have any shadow at all?

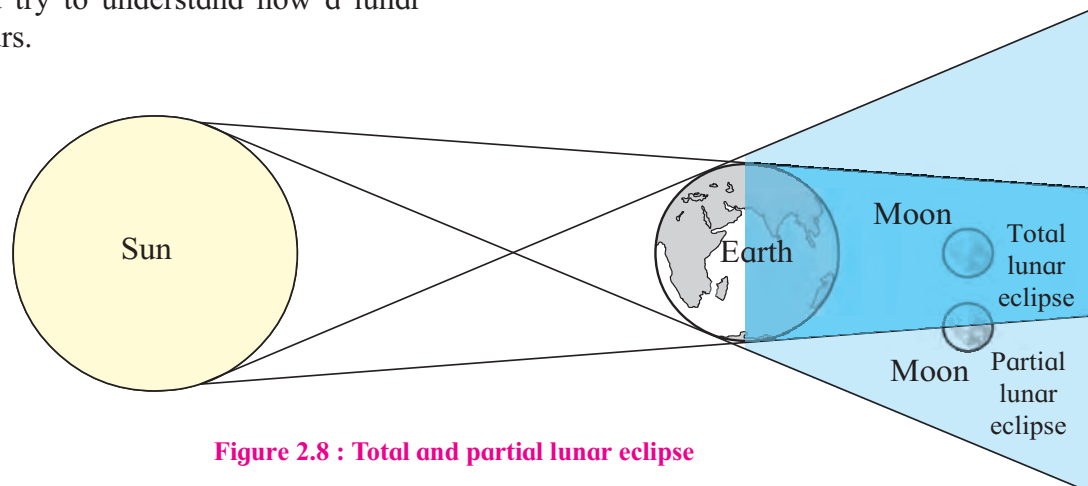


Figure 2.8 : Total and partial lunar eclipse

Characteristics of solar eclipse

- ❖ A solar eclipse occurs on a new moon day, but not on every new moon day.
- ❖ If and only if the sun, the moon and the earth are in the same plane and fall in one line, the solar eclipses occur.
- ❖ The maximum duration of a total solar eclipse is 7 minutes and 20 seconds (440 seconds).

Characteristics of lunar eclipse

- ❖ A lunar eclipse occurs on a full moon day, but not on every full moon day.
- ❖ A lunar eclipse occurs if and only if the sun, the moon and the earth are in the same plane and fall in one line.
- ❖ The maximum duration of a total lunar eclipse is 107 minutes.

Eclipse - an astronomical event:

A solar eclipse or lunar eclipse is just an astronomical event. There is nothing 'auspicious' or 'inauspicious' about these events. It is just a result of the sun, the earth and the moon being in specific positions. There is a lot of curiosity about eclipses, because an eclipse is not a regular occurrence.

For scientists working in the field of astronomy, eclipses and particularly total or annular solar eclipses present great opportunities for study. Scientists from all over the world make it a point to visit the locations where such events are going to occur. They carry out elaborate studies of eclipse conditions.



Always remember –

While observing a solar eclipse, it is necessary to view the sun disc through dark glasses or special goggles made for that purpose, otherwise the intense light of the sun can be harmful to the naked eye.

During the period of a solar eclipse, a large number of birds and animals get confused due to the untimely darkness that sets in. As this is an event that does not

suit their biological clock, their response to the event is also unusual. Try to observe the responses of the birds and animals at the time of such events and record your observations.



Do you know?

Occultation and Transit:

Like eclipses, some other specific conditions occur with reference to the sun or the moon. These are called occultation and transit respectively. Occultation occurs with reference to the moon whereas the transit is associated with the sun.

Occultation: This is a typical event occurring in space. The moon revolves around the earth. While doing so, it obscures a star or a planet and that celestial body appears to hide behind the moon. This is called occultation. The total solar eclipse is actually a kind of occultation. During this, the sun disc gets hidden completely because of the moon.

Transit: If an inner planet like Mercury or Venus comes in between the line of the earth and the sun, a transit occurs. At that time, a small dot appears to move across the sun disc. Transit is a type of solar eclipse.



Figure 2.10 : The transit of mercury



Look for me elsewhere!

☞ Class 7 General Science
Chapter 17

☞ Class 6 General Science
Chapter 16



Exercises

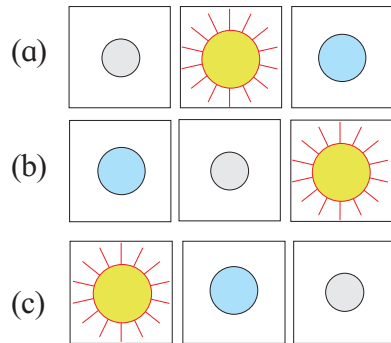


Q. 1. Correct the wrong statements. Write down the corrected ones.

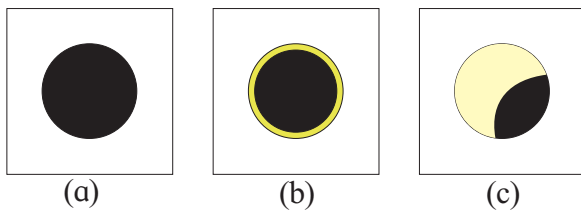
- (1) The moon revolves around the sun.
- (2) On a full moon day, the moon, the sun and the earth are positioned in this sequence.
- (3) The revolutionary orbits of the earth and the moon are in the same plane.
- (4) In one revolution of the moon, its orbit intersects the earth's orbit only once.
- (5) It is alright to observe a solar eclipse without protecting the eyes.
- (6) An annular solar eclipse occurs when the moon is in the perigee position.

Q. 2. Select the correct option.

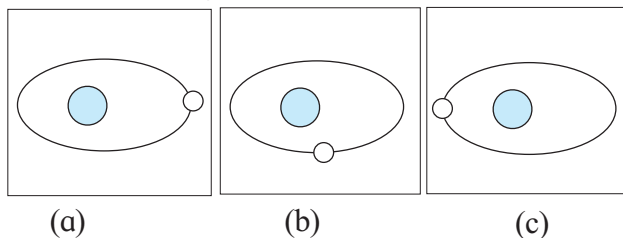
- (1) Solar eclipse



- (2) The shape of sun disc at the time of annular solar eclipse.



- (3) Apogee position of the moon.



Q. 3. Complete the following table.

Details	Lunar Eclipse	Solar Eclipse
Phase of the moon		New moon day
Sequence	Moon-Earth-Sun	
Type of eclipse		
Maximum duration of total eclipse	107 minutes	

Q. 4. Draw and label the diagrams.

- (1) Total and partial solar eclipse.
- (2) Total and partial lunar eclipse.

Q. 5. Answer the following.

- (1) Why do the sun, the moon and the earth not lie in one and the same line on every full moon and new moon day?
- (2) When total solar eclipse occurs why is partial eclipse also seen from the earth?
- (3) Suggest measures that can be taken to eradicate the superstitions related to the eclipses.
- (4) What precautions should we take while observing a solar eclipse?
- (5) What types of solar eclipses will occur in perigee condition?

Activities:

- (1) Collect paper cuttings about eclipses and paste them in a notebook.
- (2) Write a note on an eclipse that you have seen.
- (3) Using the internet, 'Panchanga' and calendar collect information about the eclipses that are likely to occur this year.

3. Tides



Can you tell?

Observe the following pictures. Answer the questions given below and discuss.



Figure 3.1 a



Figure 3.1 b

- Do the above photographs show the same place or different places?
- Observe and note the spread of water seen in both the photographs.
- What is this natural event called?

Geographical explanation

Both the photographs show the same place. If you stay near the coast for some time, you will realize that the sea water is sometimes very close to the coast (Figure 3.1a) while at other times, it is far away from the coast. (Figure 3.1b) We call these movements of the sea water 'tides'. Barring a few exceptions, all the coasts on the earth experience tides. High and low tides are natural phenomena. Let us try to understand the scientific reason behind these natural events.

Tides are movements of sea water occurring daily and regularly. The level of sea water changes after a specific period of time. After every 12 hours and 25 minutes, a cycle of high tide and low tide gets completed.

This regularly occurring event appears to be quite simple and natural, however, it is directly related to the sun, the moon and the earth and the **gravitational** and **centrifugal** forces that interact between them.



Try this.

- ❖ Keep a small stone or a chalk piece on your notebook and move the notebook from left to right with some force.



Figure 3.2 : Girl moving a notebook with force

- ❖ Take water in a small container which has a handle. See what happens if the container is whirled around with force.
- ❖ Fill the mixer jars with water and switch on the mixer. Observe. (Do this under the supervision of parents.)
- ❖ Observe a fan and a slingshot while they are moving.

- ❖ Take half a glass of water. Slowly move the glass in one direction, in circular fashion. Observe what happens to the water.



Figure 3.3 : Boy moving the glass with water

- ❖ Observe what happens if you whirl a keyring around a finger.



Figure 3.4 : Girl whirling the keyring



Can you tell?

On the basis of the questions given below, discuss the results of the activities listed above.

- In which direction did the piece of chalk fall?
- Where did the water in the glass show a bulge?
- What effect did the movement have on the things attached to the keyring?
- What happened to the water in the container and the mixer?
- Which forces could be operating in activities listed above?

- In which activities did you find that the centrifugal or gravitational force was greater?

Geographical explanation

In all the above activities, the effect of the centrifugal force is visible. The centrifugal force acts in the direction opposite to the gravitational force. Centrifugal means going away from the centre. You must have experienced it too. At the local fairs if you sit in a Ferris Wheel, your seat spins and leans outward away from the wheel. This also is an effect of centrifugal force.

Divide the students into two equal teams. Conduct a game of tug-of-war for five minutes. Discuss their experiences in the class.

Centrifugal and gravitational force:

Due to its rotation, the earth gets a type of power or force. This force works away from the centre. It is called centrifugal force. (See fig. 3.5) Due to this force any object on the earth would be thrown into the space. However, the gravitational force is working towards the centre of the earth at the same time. This force is many times greater than the centrifugal force. Hence any object on the surface of earth remains at the place where it exists.

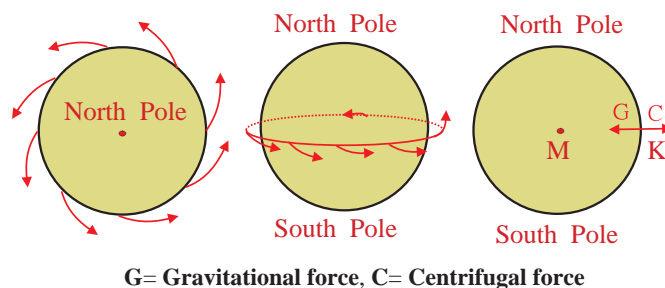


Figure 3.5 : Centrifugal force and gravitational force

Tides:

The following factors are responsible for the occurrence of tides.

- ❖ The gravitational pull of the moon and the sun as well as that of the earth.

- ❖ Revolution of the earth around the sun and the indirect revolution of the moon around the sun.
- ❖ Centrifugal force generated due to the rotation of the earth.

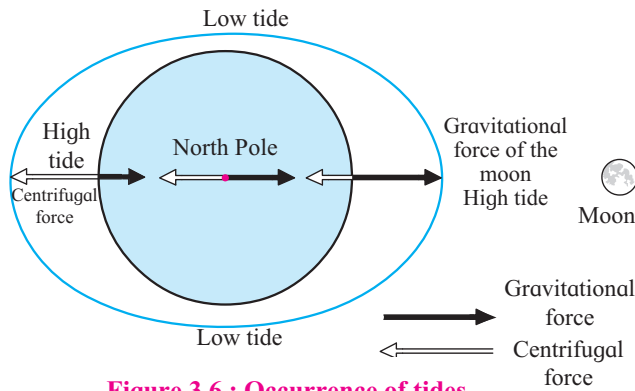


Figure 3.6 : Occurrence of tides

The moon is closer to the earth than the sun, hence its gravitational force becomes more effective than that of the sun. Tides occur due to the relative positions of the moon, the sun and the earth. A place on the earth located at the opposite point of the place experiencing high or low tide also experiences high or low tide respectively at the same time. This is a result of the centrifugal force. See fig. 3.6 and try to understand the locations of high and low tides on the earth.

- ❖ When there is high tide at 0° meridian, the 180° meridian also experiences high tide.
- ❖ The meridians that are at right angles to those having high tide will experience low tide at the same time. If it is high tide at 0° and 180° meridians, then at which meridians will low tide occur?



Think about it.

👉 Large rockets are used to go into the space away from the earth. Which force do they act against?

Types of tides:

As the timing of the tide varies every day, the range of a tide also keeps on changing.

Generally the highest high tide occurs on full moon and new moon days whereas on the days of the first and the third quarter, the high tide is at its minimum. Spring tides and neap tides are the two types of tides.

Spring tide:

On new moon and full moon days, the gravitational pull of the sun and the moon act in the same direction. Due to this, the total pull increases. Hence the tide on these days is much higher than the average high tide. This is known as spring tide. See fig. 3.7. As the bulge at the high tide is greater, the water at low tide recedes much more. The water level during spring tide is higher than the average high tides and lower than the average low.

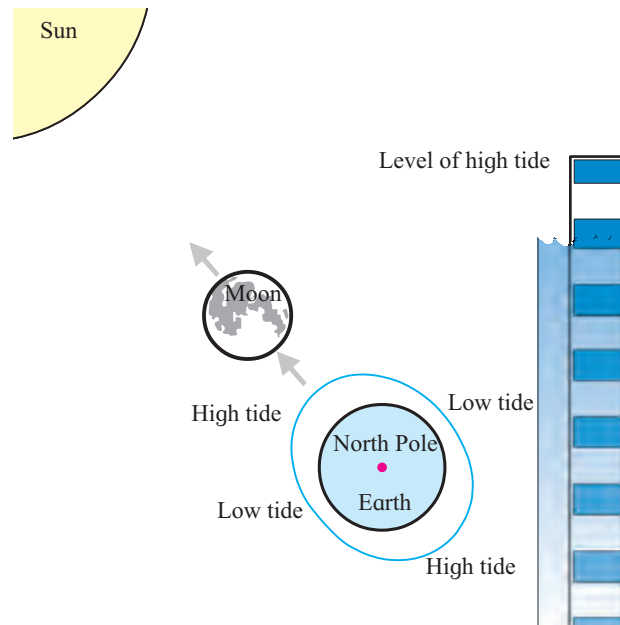


Figure 3.7 : Spring tide

Neap tide:

While revolving around the earth, the moon makes a right angle with respect to the earth and the sun, twice a month. This position occurs on the first and the third quarter of each month. On both these days, the forces of both the sun and the moon operate at right angles on the earth. See fig. 3.8. At the places where the sun causes high tide, the gravitational pull of the moon which is at right angles also acts on the sea water. Due to such conditions, the water level rise is less than usual at the time of high tide.

Similarly, fall in water level is less than usual at the time of low tide. This is because the attraction of the sun and the moon are not complementary but at right angles to each other. Such tides are called neap tides. Neap tides are a little lower than the average high tides and a little higher than the average low tides.

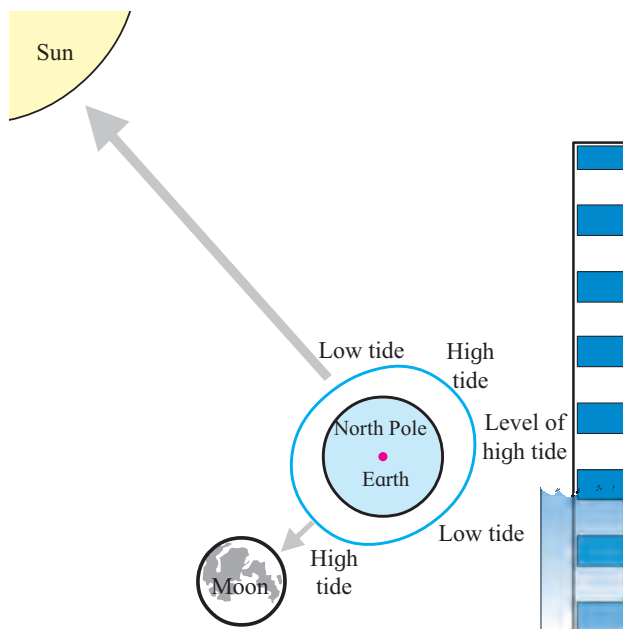


Figure 3.8 : Neap tide



Do you know?

Intertidal Range

The difference in the water level of the high tide and the low tide is called tidal range. In open seas, this range is about 30 cm. However, towards the coastal areas it goes on increasing. Along the coast of Peninsular India the range is around 100 to 150 cm for most of the part. The highest tidal range in the world is observed at Bay of Fundy along the Atlantic Coast of North America. Here the tidal range is about 1600 cm. In India, the highest tidal range is in the Gulf of Khambhat. It is about 1100 cm.

Effects of tides:

- ❖ With the high tide, fish move into the creeks and this helps fishing activity.
- ❖ The tides clear the waste and hence the coasts become clean.
- ❖ Ports do not get filled with sediments.
- ❖ Ships can move up to the ports during high tide.
- ❖ During high tide, sea water can be stored in salt pans from which salt can be obtained.
- ❖ The tidal force can be used to generate electricity.
- ❖ A lack of an understanding of the timings of high and low tides may cause accidents to swimmers entering the sea.
- ❖ The tides help in maintaining the mangroves and the coastal biodiversity.

Timings of the tides change daily:

The tides are continuously occurring phenomena. After reaching the maximum water level during high tide, the low tide sets in. Similarly, after reaching the lowest water level during low tide, the high tide sets in. Remember that in the following discussion the highest limit of the high tides is mentioned. See fig. 3.9. You will understand why the timings of the high and the low tides change daily.

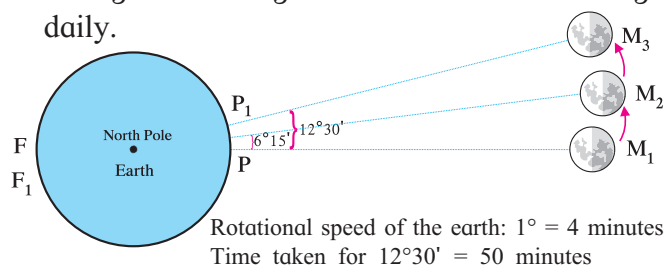


Figure 3.9 : Why do the tide timings change daily?

- ❖ There will be high tide at point 'P' as it is opposite to the moon.
- ❖ As point 'F' is opposite (at an antipodal location) to the point 'P', it will also experience high tide at the same time.
- ❖ It will take 24 hours for point 'P' to come back to its original position (360°). Point 'P' will be at point 'F' after 12 hours (180°).
- ❖ The same change will also occur with reference to the point 'F'.
- ❖ Point 'F' will not experience the same high tide, because in the meanwhile the moon also would have moved a little

ahead (approximately $6^{\circ} 15'$). Hence it will take 25 minutes more for the point 'F' to come to the position opposite to the moon.

- ❖ After 12 hours 25 minutes, 'F' will arrive opposite to the moon and it will experience high tide. Point 'P' opposite to 'F' will also experience high tide.
- ❖ Later again, after 12 hours and 25 minutes point 'P₁' will experience high tide as it comes in front of the moon. There will be high tide at F₁ too as shown in the fig. 3.9.

There is high tide and low tide twice a day (24 hours) generally. The time difference between two high tides is of 12 hours and 25 minutes.



Try this.

- ❖ Take a wide open large dish.
- ❖ Keep the dish on a table or a flat surface.
- ❖ Fill water in the dish up to the rim.

We have to generate waves in the dish.

- Is it possible to generate waves without touching or shoving the dish? Try doing so.
- In what different ways can you generate waves in the dish?

Geographical explanation

Waves:

If you blow air over hot milk or tea, while drinking, ripples are generated on the milk or the tea. In the same way, because of the force of the wind, water appears to be moving. The sea water gets pushed by the wind and ripples are generated on the water surface. These are called waves.

The sea water moves up and down or slightly forward and backward due to the waves. The waves bring the energy contained in them to the coast. They break in the shallow waters near the coast. Large or small waves are formed continuously at the surface of the sea. Generation of waves is a natural

and regularly occurring phenomenon too. See fig. 3.10.



Figure 3.10 : Waves coming to the coast

Structure of the waves:

The sea water get pushed up and down because of the wind. The raised up portion of a wave is called crest and the depressed one is called trough. If a strong wind is blowing in one direction, large waves are generated.

The vertical distance between a crest and the following trough is called the amplitude of the wave whereas the distance between two successive crests or troughs is called wave length. The wave length, its amplitude and its velocity depend on the velocity of wind. See fig. 3.11.

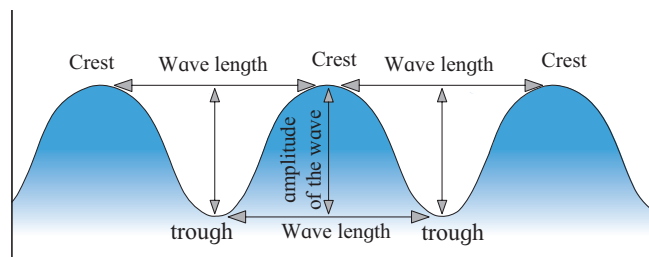


Figure 3.11 : The structure of a wave

Velocity of waves:

If we stand at the coast, we feel the waves are coming towards the coast. If a floating object is thrown at a distance in the sea, we find the object moving up and down at the same place. It does not come to the coast. It means the water forming the wave also does not come to the coast. Remember that the water in the wave does not move, what moves is the energy.

The main reason of wave generation is wind, but at times, due to earthquakes or volcanic eruptions occurring below the floor of the sea, waves get generated. Such waves assume a great height in the shallow waters near the coast. These waves are very destructive. They cause huge loss of property and life. These waves are called **tsunamis**. In 2004, tsunami waves were generated because of the earthquake that took place near Sumatra island of Indonesia. They devastated the east coast of India as well as of Sri Lanka.

The waves cause erosion along the headlands and create beaches in the protected locations in the bays.






Always remember—

If earthquake occurs in the ocean, the coastal areas face a risk of tsunamis. In such cases, it is better to go away from the coasts or towards higher altitudes. This way, loss of life can be avoided.



Look for me elsewhere!

-  Class 6, General Science Energy Resources.
-  Class 9, Geography Interior Movements.
-  Class 6, General Science, Forms of Energy



Do you know?

While moving along the sea coast or playing in the water we must take adequate care regarding the timings of the tides otherwise it can lead to serious accidents. For that we must know the timings of the tides. For this you must know the phase of the moon on the given day. Three-fourth of the phase of the moon is the time of the high tide. For example, suppose you are at the coast on the fourth phase of the moon, then three fourth of the phase is three. It means the high tide will occur at 3 am and 3 pm, and approximately 6 hours from it, that is, 9 am and 9 pm will be the low tide. There may be slight differences according to local conditions. We must collect the information from local people and learn from them about the structure of the coast, its slope, rocky areas as well as the streams near the coast before entering the sea waters for enjoyment.

Tell the timings of the tides occurring on the first and third quarter days of the month.



Figure 3.12 : Beach



Exercises



Q. 1. Prepare a chain by matching the following.

Group A	Group B	Group C
Waves	8th phase of the moon (Quarter)	Objects get thrown towards the outer side.
Centrifugal force	New moon day	Highest high tide occurs on this day.
Gravitational force	Rotation of the earth	These are also generated due to earthquakes and volcanoes.
Spring Tide	The moon, the sun and the earth	The forces of the sun and the moon operate in different directions.
Neap Tide	Wind	Operates in the direction towards the centre of the earth.

Q. 2. Give geographical reasons:

- (1) Tides are influenced more by the moon than the sun.
- (2) At some places along the coast, the low lying areas turn into lagoons or marshy lands.
- (3) Place located on the opposite meridian to the place experiencing high or low tide will also experience high or low tide respectively.

Q. 3. Answer in brief.

- (1) If there is high tide at 7 am, find the timings of the next high and low tides on the same day at a given place.
- (2) If at Mumbai (73° E meridian), there is high tide at 1.00 pm on Thursday, then on which other meridian will there be high tide too? State with reasons.
- (3) Explain the reasons for the generation of waves.

Q. 4. In what way will the following depend on the tides?

- (1) Swimming
- (2) Steering a ship
- (3) Fishing
- (4) Salt pans.
- (5) Going to coastal areas for trips

Q. 5. Observe fig. 3.8 of neap tide and answer the following questions.

- (1) Which phase of the moon does it show ?
- (2) What are the relative positions of the moon, the sun and the earth ?
- (3) What effect will it have on the tides ?

Q. 6. Differentiate between

- (1) High tide and low tide.
- (2) Spring tide and neap tide.

Q. 7. Describe the positive and negative effects of tides.

Activities:

- (1) Visit the nearest sea coast. From a higher location, observe the waves approaching the coast. See if the approaching waves change their direction. With the help of your teacher find the answer to why this change occurs.
- (2) Collect information from the internet about how electricity is generated from waves. Find places where such electricity is being generated.

4. Air Pressure



Let's recall.

Have you tried the activity that shows 'Air has weight' given on page 16 of your Science textbook?

Geographical explanation

During the activity, you saw that the balance tipped on the side of the full blown balloon. This shows that the air has weight.

Anything that has weight, exerts pressure on the thing that lies below it. Thus, the air in the atmosphere exerts pressure on the surface of the earth. Due to this **air pressure**, various phenomena like storms, precipitation, etc. occur in the atmosphere. There are variations in air pressure.

- ❖ Air pressure is not uniform on all places on the earth's surface.
- ❖ Air pressure keeps on changing from time to time.
- ❖ The altitude of a region, temperature of the air, and amount of water vapour in the air are some factors influencing air pressure.

Altitude of the region and air pressure:

The proportion of dust in the air, water vapour, heavy gases, etc. is higher in the air closer to the surface of the earth. This proportion decreases with increasing altitude. As one moves higher and higher from the surface of the earth, the air becomes thinner and thinner. As a result, the air pressure decreases with increasing altitude.

Air temperature and air pressure:



Try this.

- ❖ Take a flying lantern.
- ❖ Tie an approximately 5m long thread to the flying lantern so that you can bring the lantern down whenever required.
- ❖ After carefully reading the instructions given on the package of the lantern, open it and light the candle placed in it. Observe what happens.

- ❖ After some time, bring the lantern down with the help of the thread and put off the candle.

(Instructions for teachers/parents: This activity is to be performed under your supervision and presence with utmost care.)

The teacher should arrange a discussion after completing the activity given above. Use following questions to initiate the discussion.)



Figure 4.1 : The experiment of the flying lantern

- Did the flying lantern start ascending immediately after the candle was lit?
- What would have happened to the flying lantern had the candle got extinguished after the lantern had gone up in the air?

Geographical explanation

The air in the flying lantern gets heated once the candle is lit. The hot air expands, becomes lighter and starts moving up. Therefore, the lantern is also lifted up towards the sky. In nature too, a similar phenomenon occurs.

Temperature and air pressure are closely related. Wherever the temperature is high, the air pressure is low. As the temperature rises the air gets heated, expands, and becomes lighter. This lighter air in the vicinity of the earth's surface starts moving up towards the sky. As a result, the air pressure in such areas decreases.



Think about it.

➤ What will be the effect on air pressure if the temperature drops? Why?



Can you tell?

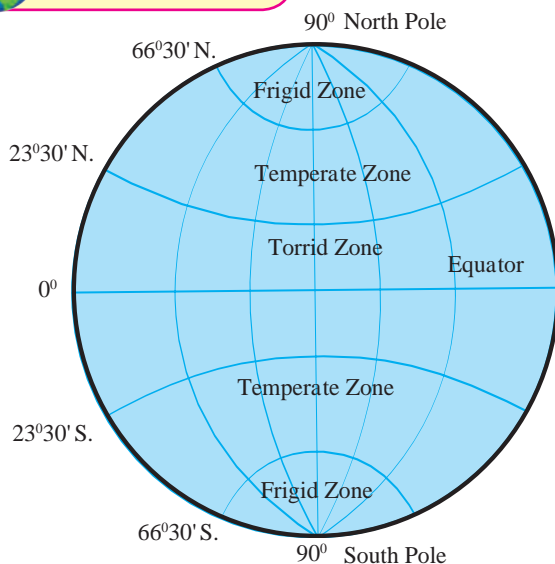


Figure 4.2 a : Temperature zones

Temperature zones and pressure belts are interrelated to each other but the latitudinal extent of the temperature zones is much larger while pressure belts are narrower. See fig. 4.2a and 4.2b. For example, the Temperate zone extends from $23^{\circ} 30'$ to $66^{\circ} 30'$. Compared to this, the air pressure belt has limited extent. It is generally up to 10° parallel.

The uneven distribution of temperature influences the distribution of air pressure too. This leads to the formation of low and high pressure belts horizontally between the equator and the poles. See fig. 4.2b.

Observe fig. 4.2 a and b and answer the following questions:

- Which pressure belt is mainly found in the Tropics?
- With which pressure belt are the polar winds associated? In which temperature zone are they observed?
- What could be the reason behind a low pressure belt in the Tropics?
- With which pressure belts are the winds in the Temperate zone associated?
- Write the latitudinal extent of the low pressure belts.

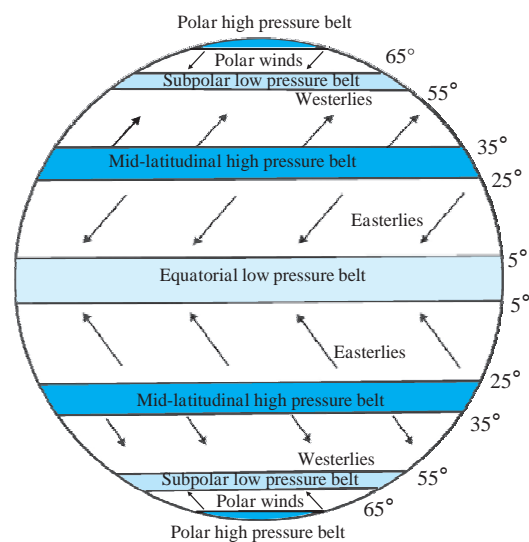


Figure 4.2 b : Pressure belts and planetary winds

Pressure belts on the earth's surface:

The heat received from the sun is uneven in different regions. Hence the distribution of the temperature is uneven from the equator to the poles. As a result, the temperature zones are created. We have studied this in the previous class.

Equatorial low pressure belt:

The sunrays can be perpendicular between the Tropic of Cancer and the Tropic of Capricorn. So the temperature is higher in this region. Hence air in this region gets heated, expands, becomes lighter and moves towards the sky. As this process operates continuously a low pressure belt gets formed in the central part of this region between the parallels 5° north and 5° south.

Mid-latitude high pressure belts:

The heated air becomes lighter, starts ascending and after reaching higher altitudes, moves towards the polar region, i.e., towards the North and the South Pole. Due to low temperatures at the higher altitudes, the air cools down and becomes heavier. This heavier air descends down in both the hemispheres in the region between 25° to 35° parallels. This leads to the formation of high pressure belts in these parallels of latitudes in both the hemispheres. This air is dry, hence the region does not get rainfall. Consequently, most of the hot deserts on the earth are found in these regions. (See fig. 4.2b.)

Sub-polar low pressure belts:

Due to earth's curvature, the area between two parallels gets reduced as we move towards the poles. This results in lesser friction of the air with the earth's surface. Air in this region is thrown out because of this reduced friction and also because of the earth's rotational motion. This leads to the development of a

low pressure belt. This condition is observed in the area between 55° and 65° parallels in both the hemispheres.

Polar high pressure belts:

In both the polar regions, the temperature is below 0°C throughout the year. Hence, here the air is cold. As a result, high pressure belts get formed. These are called polar high pressure belts. They generally occupy the area between 80° and 90° parallels in both the hemispheres.

The duration and the intensity of sunrays varies during particular periods of the year in both the hemispheres. As a result, the locations of the temperature zones and the pressure belts dependent on the sun's heat also vary. This change is of the order of 5° to 7° towards north in Uttarayan, and 5° to 7° south in Dakshinayan. This is called the oscillation of pressure belts.



Always remember –

The major difference between the temperature zones and pressure belts is that the temperature zones are continuous and are spread from the equator to the poles from Torrid to Frigid. Pressure belts are not continuous and areas of high and low pressure are found in different regions from the equator to the poles.

Effects :

Air pressure has the following effects.

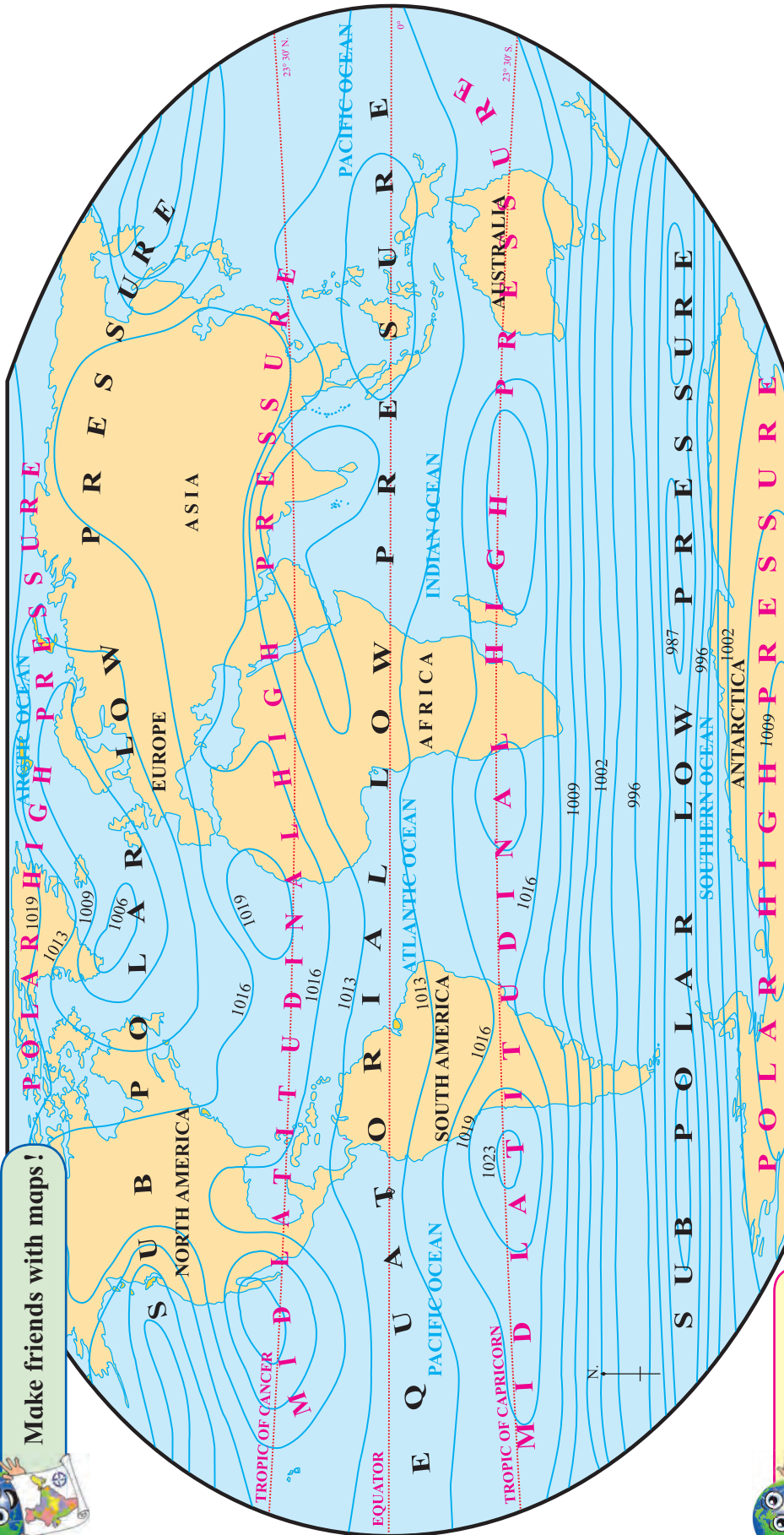
- ❖ Origin of winds.
- ❖ Generation of storms.
- ❖ Convictional type of rain.

Isobars:

The line that joins the places of equal pressure on the map is called an **isobar**.



Make friends with maps!



Can you tell?

- ▶ Observe the map given above and study the distribution of air pressure. Consider the following points:
 - ▶ The nature of the isobars.
 - ▶ High and low pressure belts and their latitudinal position.
- ▶ The direction of the isobars and the distance between successive isobars over oceans and continents.
- ▶ Comparison of the isobars in the northern and the southern hemispheres.



Do you know?

The air pressure at sea-level is 1013.2 millibars.

Figure 4.3 : Distribution of Annual Average Pressure in the World (Value of Air Pressure in Millibars)



Use your brain power!

☞ If there is low pressure at the equator, what will be the condition of air pressure in the Arctic Zone?



Do you know?

All things in and on the earth stay earthbound because of the earth's gravity. This includes air which is in the gaseous form. Due to the earth's gravity, air is pulled to the earth's surface. That is why, air pressure is maximum at **sea-level**. Note that air exerts pressure on everything and everyone including us. It is believed that the weight of the air column on any one person's head amounts to 1000 kg.



Always remember –

Air pressure is measured in units of millibars. For this an instrument called **barometer** is used. The air pressure at the earth's surface is measured with this instrument.



Figure 4.3 : Barometer



Give it a try.

Study the temperature distribution map given in your Std VI textbook and the pressure distribution map in this lesson to find the correlation between air temperature and air pressure.



Look for me elsewhere!

- ☞ Class Three- Environmental Studies.
- ☞ Class Seven- Science.



Exercises



Q. 1. Give reasons:

- (1) Air pressure decreases with increasing altitude.
- (2) Pressure belts oscillate.

Q. 2. Give short answers to the following questions.

- (1) What effect does temperature have on air pressure?
- (2) Why is the subpolar low pressure belt formed?

Q. 3. Write notes on:

- (1) Mid-latitude high pressure belts
- (2) Horizontal distribution of air pressure.

Q. 4. Fill in the gaps with the appropriate option.

- (1) At higher altitudes air becomes
(thicker, thinner, hotter, more humid)

(2) Air pressure is expressed in
(millibars, millimetres, millilitres, milligrams)

(3) On the earth, air pressure is
(uniform, uneven, high, low)

(4) The pressure belt spreads between 5° North and 5° South parallel.
(Equatorial low, Polar high, Subpolar low, Mid-latitude high)

Q. 5. How does a high pressure belt get formed near 30° parallel? Why does this region have hot deserts?

Q. 6. Draw a neat diagram showing pressure belts. Label the diagram.

5. Winds



Can you tell?

- ❖ See outside the window of your classroom. Which objects are moving? Which are still?
- ❖ Which objects are moving on their own?
- ❖ Which objects are not moving on their own? Why?

(Through these questions, make the students think of 'Winds'.)

We feel the wind but cannot see it. When certain objects in our surroundings move, we experience wind. The movement of air is called wind. Why does air move?



Try this.

(Get pairs of students to do this.)

- Fold a paper into two same-sized rolls.
- Keep both the paper rolls on one side of a table.
- You and your friend should select one roll each.
- Without touching the role of the paper or the table, what can be done to move the paper rolls to the other end of the table?



Figure 5.1 : Generation of wind

- See who moves the paper roll first to the other end of the table.
- What could be the reason of the delay in making the rolls reach to the other end of the table?
- What can we do to move the rolls to the other end of the table with a greater speed?
- Can a bottle filled with water be moved to the other end of the table in this manner? Can we use the same method that you tried for moving the paper rolls?

Geographical explanation

We have learnt that the air pressure is not uniform across the earth's surface. Air moves from high pressure areas towards low pressure

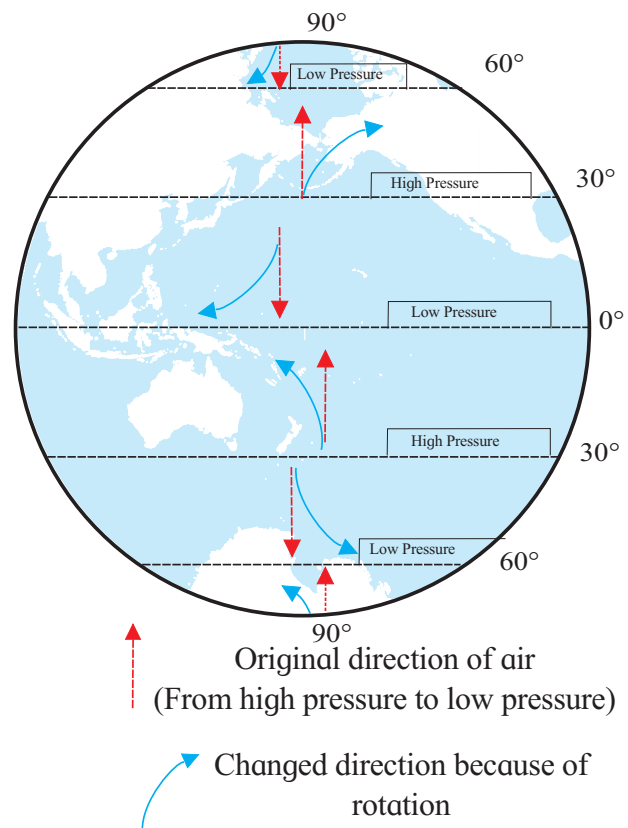


Figure 5.2 : Change in direction of winds

areas in a horizontal manner. Winds are generated due to this movement.

The extent of the difference in the air pressure affects the velocity of the wind. If there is less difference in the pressure, winds blow with less velocity. Winds blow with greater velocities if the pressure difference is greater. Wind speed also varies. Wind velocity is measured in the units of **knots** or kilometres per hour.



Give it a try.

Write the changed direction of the wind in the table below:

Pressure Belts	Northern Hemisphere	Southern Hemisphere
Mid Latitudes		
Poles		

When we consider the earth as a whole, we find the direction of the winds is influenced by the rotation of the earth. In the northern hemisphere, winds get deflected towards the right of their original direction, whereas in the southern hemisphere they get deflected toward the left of their original direction. See fig. 5.2. This direction has been shown by curved arrows in the figure. The rotation from west to east causes this change in the original direction of the winds.



Can you tell?

Observe fig. 5.3 and answer:

- Which are the winds in the northern hemisphere that blow from the mid-latitudinal high pressure belt to the equatorial low pressure belt?
- What is the direction of the Westerlies in the southern hemisphere?
- Which planetary winds blow from the mid-latitudinal high pressure belts to the subpolar low pressure belts in the northern hemisphere?
- Why is the direction of polar winds not the same in both the hemispheres?

- Name the winds that blow in the southern hemisphere?
- In which direction do the Easterlies blow in the northern and southern hemispheres?

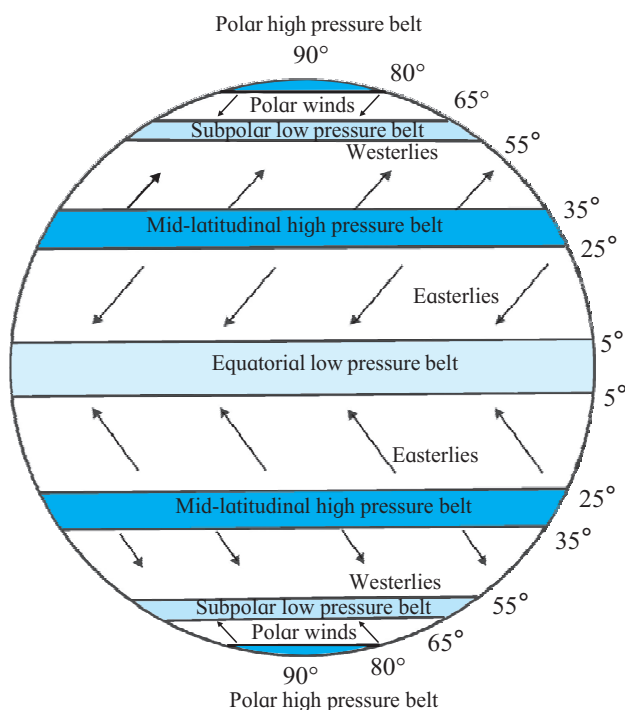


Figure 5.3 : Planetary winds and pressure belts on the earth

Winds are known by the direction from which they blow. For example, Westerlies are winds that blow from the west. The direction of blowing, the duration, the regions covered, and the condition of the air determine the following wind types:

Planetary winds:

Some winds blow regularly on the earth from high to low pressure belts throughout the year. These winds cover a large portion of the earth, hence these are called planetary winds. For example, the **Easterlies**, the **Westerlies** and the Polar winds.

In both the hemispheres, the winds blow from the high pressure area between 25° and 35° parallels, to the equatorial low pressure belt. (See fig. 5.3.) Due to the rotation of the earth, their original direction changes. In the northern hemisphere, they blow from the north-east to the south-west whereas in the southern hemisphere they blow from the south-east to the north-west. These winds

coming from both the sides converge near the equatorial calm belt. These winds are known as the Easterlies.

In both the hemispheres, winds blow from the mid-latitudinal high pressure belt to the subpolar low pressure belt situated near 60° parallel. (Fig. 5.3.) Their original direction changes due to the rotation of the earth. In the southern hemisphere, these winds blow from the north-west to the south-east and in northern hemisphere, they blow from the south-west to the north-east. These winds are called Westerlies.

In both the hemispheres, winds blowing from the polar high pressure belt to the subpolar low pressure belt (55° to 65°) are called Polar winds. Generally, they blow from east to west.



Do you know ?

Winds in the southern hemisphere blow with great velocities. The southern hemisphere is mostly occupied by oceans. In this hemisphere the obstacle caused by the relief of the land surface is almost absent. As there is no obstacle; winds blow with greater velocities in the southern hemisphere as compared to the northern hemisphere. Their characteristics are as follows:

- ☞ Beyond 40° S, winds blow with tremendous velocities. These winds are called Roaring Forties.
- ☞ Around 50° S, winds are stormy. Hence they are called Furious Fifties.
- ☞ The stormy winds around 60° S make tremendous noise and hence they are called Screeching Sixties.

Why are such winds not found in the northern hemisphere at 40° , 50° and 60° parallels?

Local winds:

The winds that blow for a short duration of time, originate in specific regions and blow

over a limited area are called local winds. Local winds affect the climate of the region where they blow. These winds are known by different local names in the different regions where they blow.



Try this.

In the activity given below, consider the elevation of land, the heating and cooling properties of land and water, the air pressure, etc.

(A) Observe the picture. (Fig. 5.4 a.) Describe the valley breeze with the help of the picture.

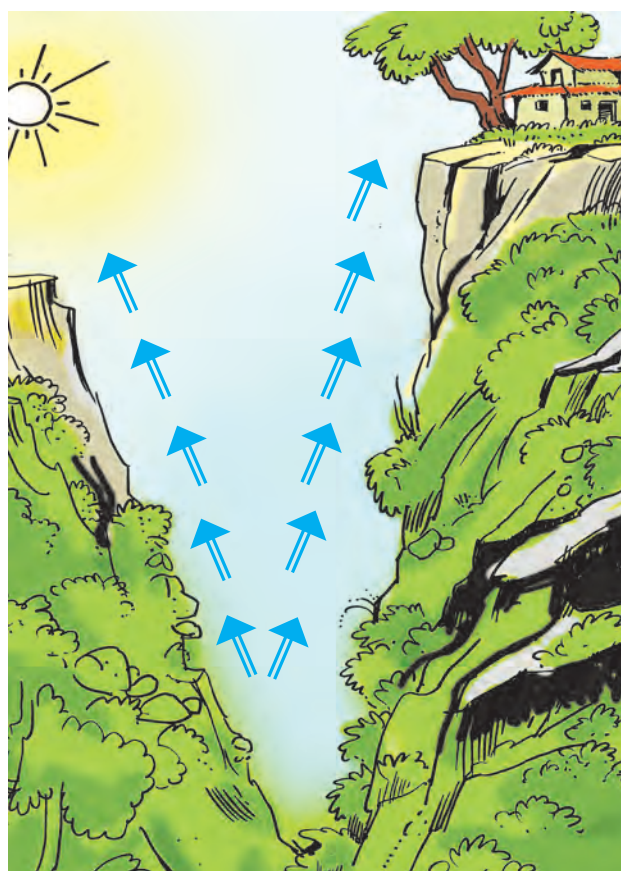


Figure 5.4 a : Valley breeze

Characteristics of Valley Breeze

- ❖
- ❖
- ❖
- ❖
- ❖
- ❖



Figure 5.4 b : Mountain breeze

(B) Read the following information carefully and draw a diagram for the mountain breeze accordingly.

Characteristics of the Mountain breeze:

- ❖ Mountains cool down quickly at night.
- ❖ The valley zone is comparatively warmer.
- ❖ Air pressure is greater on the mountains.
- ❖ Winds blow from the mountain towards the valley.
- ❖ The hot and light air from the valley is pushed upwards and the cool air rushes down into the valley.
- ❖ Mountain winds set in after sunset.



Do you know?

The region up to 5° north and 5° south of the equator remains calm for most of the year and winds do not blow in this region. It is called the equatorial calm zone or **Doldrums**.

In the area near the Tropic of Cancer and Tropic of Capricorn, that is, between 25° and 35° north and south, there exists a high pressure belt. This is also a calm belt. This belt is known as **Horse Latitudes**.



Can you tell?

Observe the diagrams given below. Answer the questions related to sea and land breezes.

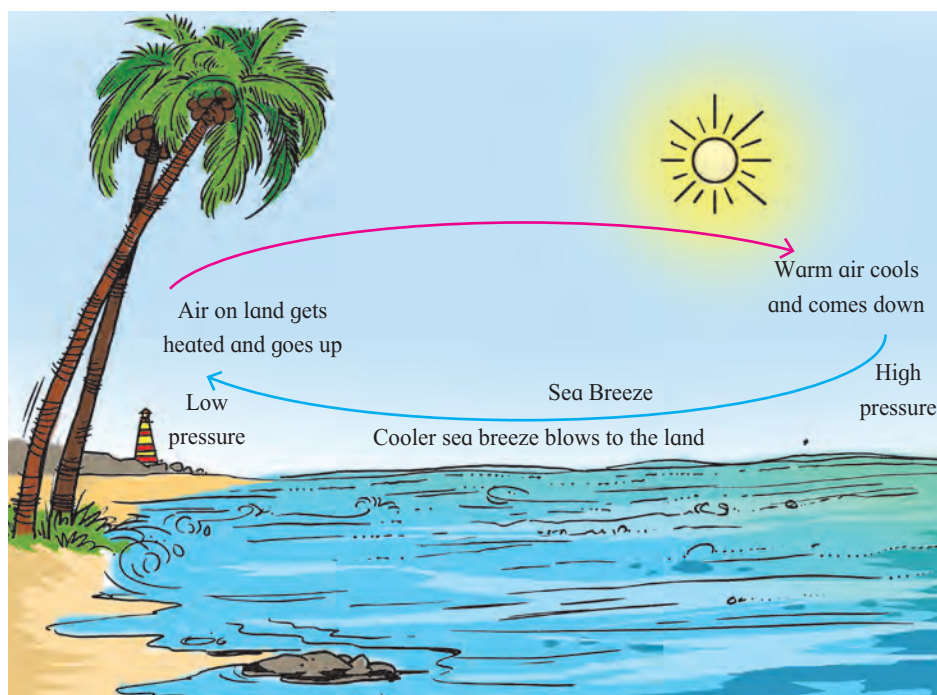


Figure 5.5 a : Sea breeze

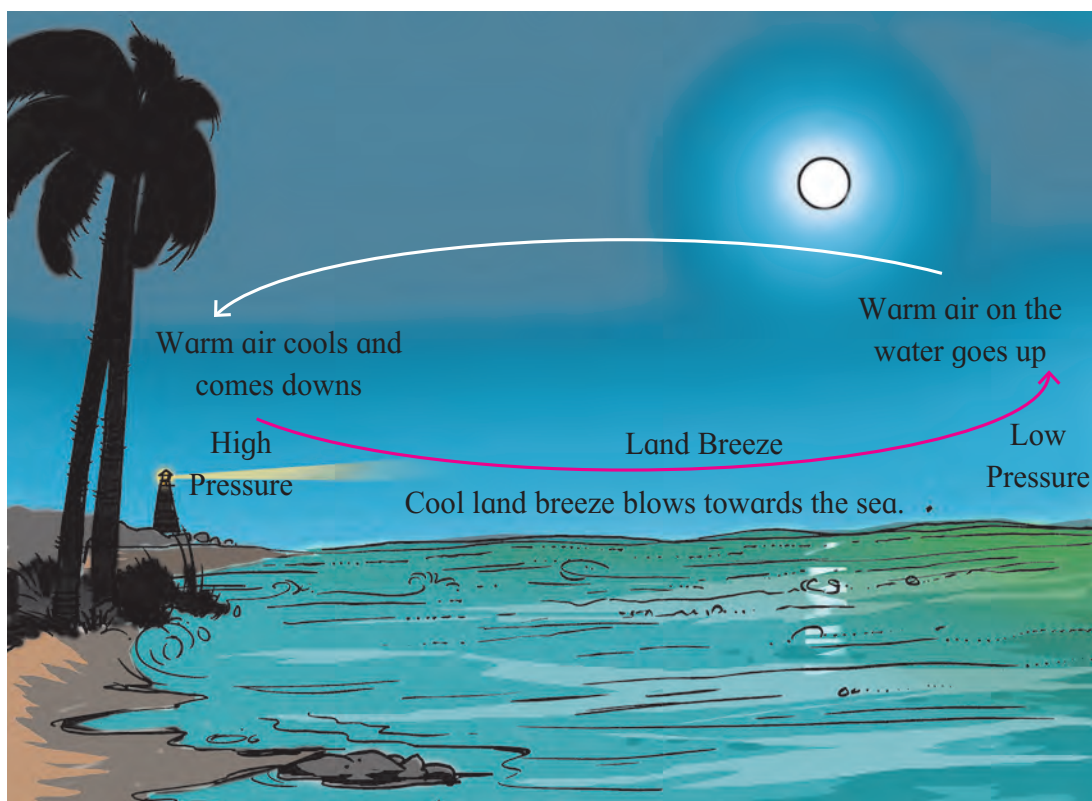


Figure 5.5 b : Land breeze

- Why do the breezes blow from the sea to the land during the day?
- When do the winds blow from the land to the sea?
- Describe the winds shown in fig. 5.5 a.
- Compare fig. 5.5a and 5.5b with reference to temperature conditions, air pressure and winds.
- Which winds are called sea breezes and which are called land breezes ? Why?
- In which part of India are the land and sea breezes experienced?
- Do you experience sea and land breezes in your area?

Geographical explanation

The land is made up of dense matter. Land is stable and opaque. As a result, heat is transferred at a greater speed and in a higher proportion. Hence, land gets heated quickly.

The density of water is comparatively less. Water is transparent and unstable. Hence, water does not get heated quickly. As a result, the air pressure in land and water areas is different.

In the coastal areas, land gets heated during daytime. Hence, the air on the land also gets heated and the air pressure on land decreases. The sea water gets heated slowly hence the air is less heated and the air pressure remains high. Winds blowing from the sea towards the land are called sea breezes. At night, land cools down faster as compared to the sea and therefore has higher air pressure. Hence, the land breeze blows from land towards the sea.

Besides these, winds blow under particular conditions in different areas. These are also called local winds. For example, Fohn, Chinook, Bora, Loo, etc. See the table on the next page.



Do you know ?

Major local winds in the world

Name of the wind	Nature of the wind	Characteristics and areas of influence
Loo	Hot and dry	Blows in the North Indian plains during the summer season generally in the afternoons. They come from the hot Thar Desert.
Simoom	Hot, dry and destructive	These blow with tremendous velocities from the Sahara and Arabian deserts. As these winds are quite strong they are destructive.
Chinook (Snow eater)	Warm and dry	These blow down the eastern slopes of Rocky Mountains of North America. They cause the snow to melt and increase the temperature in the valleys.
Mistral	Cold and dry	These blow in Spain, France and areas the around the Mediterranean Sea. They originate from the Alps. These cold winds reduce the temperature in the coastal areas.
Bora	Cold and dry	These blow from the Alps Mountains towards the coastal areas of Italy.
Pampero	Cold and dry	These blow around the Pampas grasslands in South America.
Fohn (foehn)	Hot and dry	These blow along the northern slopes of the Alps.

Seasonal winds (Monsoon):

Monsoon winds are generated due to the uneven heating of land and water in the different seasons. During summers, Monsoons blow from the sea to the land and in winter they blow from the land to the sea. Southeast Asia, East Africa, North Australia are the regions where the

pronounced effects of these winds are felt. (See fig. 5.6.) The influence of monsoon winds is seen in the summer and winter seasons in the Indian subcontinent. Due to these winds, the Indian subcontinent experiences monsoon (rainy) and retreating monsoon seasons apart from summer and winter.

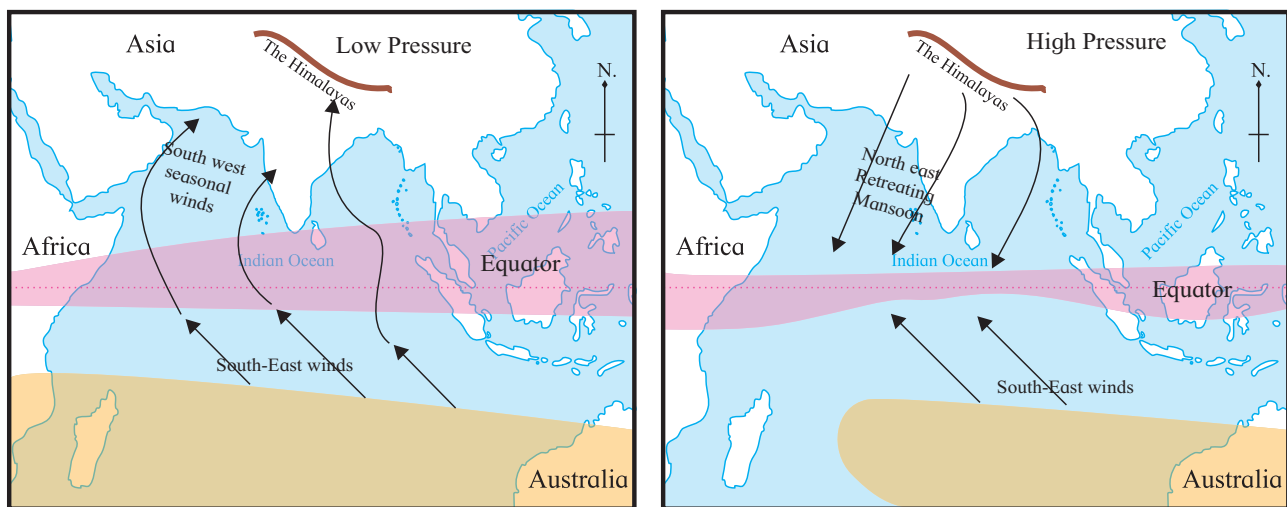


Figure 5.6 : Seasonal winds

- Equatorial low pressure belt
- Mid-latitude high pressure belt

Monsoon winds are in fact sea and land breezes blowing on large scale.

Most of the precipitation in the Indian subcontinent is the effect of monsoon winds. After crossing the equator, they blow from the south-west towards the Indian subcontinent during the period from June to September. They are called the south-west monsoons. They are full of moisture.

From September to December, because of the low pressure area developing near the equator, winds blow from the Indian subcontinent towards the equator. These are called the north-east monsoon winds. They are dry winds.

Cyclones:

Cyclonic conditions are created when a low pressure area is surrounded by high pressure areas. In these conditions, winds start blowing towards the low pressure area from the surrounding high pressure areas. (See fig. 5.7.) Due to the rotation of the earth, the cyclonic winds in the northern hemisphere move in an anticlockwise direction, whereas they move in a clockwise direction in the southern hemisphere. During a cyclone, the sky is cloudy, winds blow with a very high velocity and it rains heavily. The area affected by cyclones is limited. The duration, velocities, direction and place of origin of these winds is unpredictable. See the image of a cyclone obtained by a satellite in fig. 5.8.

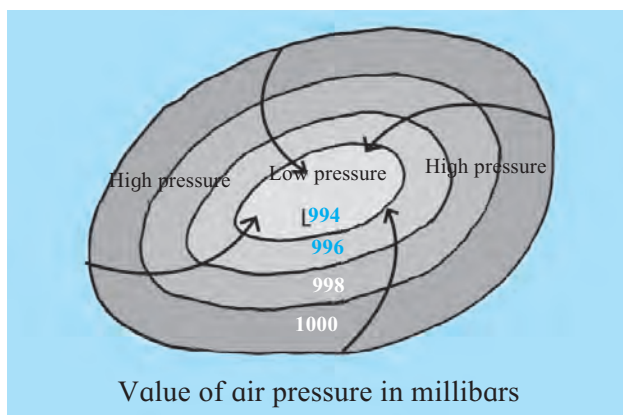


Figure 5.7 : Cyclone

On weather maps, the centre of a cyclone is represented by the letter 'L'. A cyclone system moves from one place to another.

Cyclonic storms:

Cyclones occurring in the western part of the Pacific Ocean along the coasts of Japan, China, Philippines, etc. are known as 'Typhoons'. These storms arise in the months between June and October. Due to high velocity winds and heavy rains, these prove to be destructive.

The cyclones in the Caribbean Sea are known as hurricanes. These are also destructive in nature. During these storms, the minimum velocity of the wind is 60 km per hour. Cyclones also originate in the temperate zone but they are not so powerful and hence are not destructive.

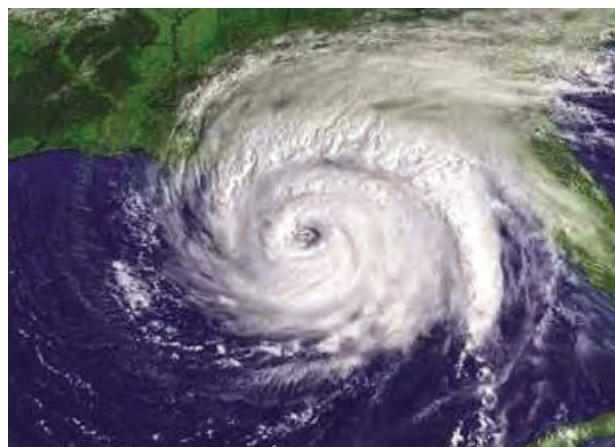


Figure 5.8 : Cyclonic storm

Anticyclones:

Under specific atmospheric conditions, the air pressure in a particular region increases and the pressure in the surrounding areas remain low. In this situation, winds blow from the centre toward the surrounding areas in a circular manner. In the northern hemisphere, these winds blow in a clockwise direction whereas in the southern hemisphere, they blow in an anticlockwise direction. During anticyclones, the skies are clear, winds blow with lesser velocities and the weather is pleasant.

Anticyclones generally last for a few days or a week. Such anticyclones originate in temperate zones.

On weather maps, the centre of an anticyclone is represented by the letter 'H'. Anticyclones are vividly experienced in high pressure belts. Winds in these regions are always moving out and hence the rainfall in such areas is quite low.

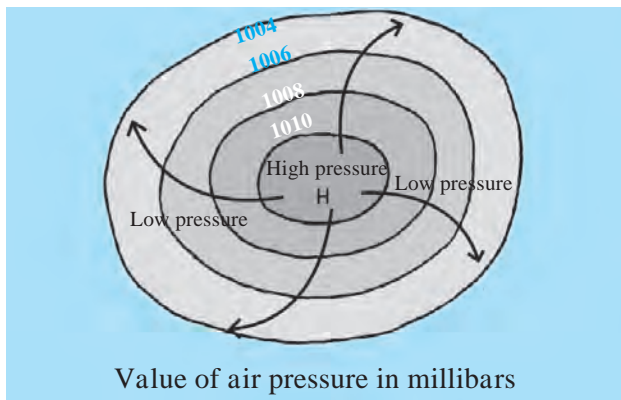


Figure 5.9 : Anticyclone



Do you know ?

Naming the cyclones:

Cyclones occurring in different parts of the world are assigned different names. A list of names is prepared for each of the oceans or its part. Names in the list are suggested by the countries in the region of that ocean. If the wind speed in the storm exceeds 33 knots (60 km/hour) the cyclone is assigned a name. Names make it easier for us to remember a particular storm.



Look for me elsewhere!

- ☞ Class Six- Lesson Five- Temperature
- ☞ Class Seven- Science.



Exercises



Q.1. Rewrite the following statements after choosing the correct option.

- (1) When the air expands, it
 - (a) becomes solid
 - (b) becomes thinner
 - (c) gets lost
 - (d) becomes humid
- (2) From high air pressure regions, winds
 - (a) blow to regions of still higher pressure.
 - (b) blow towards regions of cooler air.
 - (c) blow towards regions of low air pressure.
 - (d) remain still.
- (3) In the northern hemisphere, winds blowing towards the equator due to the rotation of the earth.
 - (a) turn to the south
 - (b) turn to the east
 - (c) turn to the west
 - (d) turn to the north

- (4) The direction of seasonal winds blowing over the Indian subcontinent during winter is from the
 - (a) south-east to north-west.
 - (b) south-west towards north-east.
 - (c) north-east to south-west.
 - (d) north-west to south-east.
- (5) The Roaring Forties in the southern hemisphere
 - (a) blow towards the equator.
 - (b) blow in the areas around 40° S parallel.
 - (c) blow from the subpolar region of low pressure.
 - (d) blow around 40° N parallel.

Q.2. Identify the type of winds from the description given below.

- (1) These winds from the south-west bring rains to the Indian subcontinent. During June to September, India gets rains. After this period these winds retreat.

- (2) These winds blowing from the north pole region towards 60° N parallel cause cold wave conditions in extensive areas covering North America, Europe and Russia.
- (3) Hilltops get heated quickly during the day. The air in this part becomes hot, light and starts ascending. Hence, a low pressure area forms in this region. At the same time the air at the foothills being cooler, and that area experiences high pressure. Air in that area blows towards low pressure.

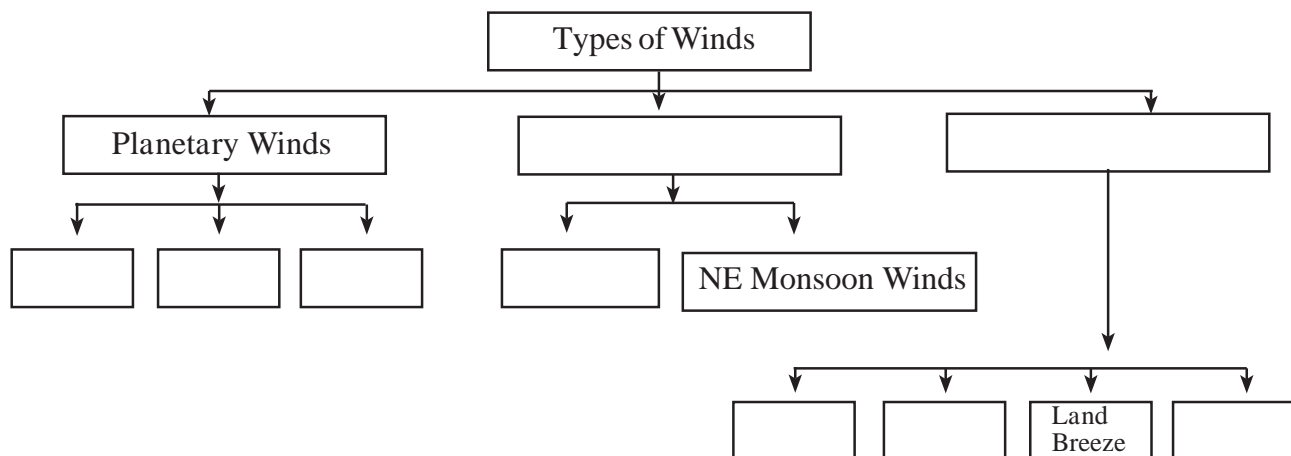
Q.3. Given below are the values of air pressure in millibars. Using the same, draw diagrams to show a cyclone and an anticyclone.

- 990, 994, 996, 1000
- 1030, 1020, 1010, 1000

Q.4. State one reason why.

- (1) A belt of calm exists near the equator.
- (2) The winds coming from the north-west in the southern hemisphere have greater velocities than the winds coming from the south-west in the northern hemisphere.
- (3) The monsoon winds in the summer come from the sea but the retreating monsoon winds in winter come from land.

Q.5. Complete the flow chart:



Q.6. Answer in short:

- (1) Why is the air pressure high in polar areas in both the hemispheres?
- (2) What effect does the rotation of the earth have on the winds?
- (3) Why do the cyclonic winds blow in a circular manner?
- (4) State the reasons that lead to the formation of cyclones and describe the effects of cyclones.

Activity :

Using the internet, obtain information, photos and maps of the recent cyclone that arrived at India's eastern coast. Write the social and economic effects of that cyclone.

ICT Question :

Use the mobile app 'Windyty' and try to know the direction of winds and pressure areas in the world.

6. Natural Regions



Can you tell?

Tick the boxes in the pictures using the index given on page 31.

Housing



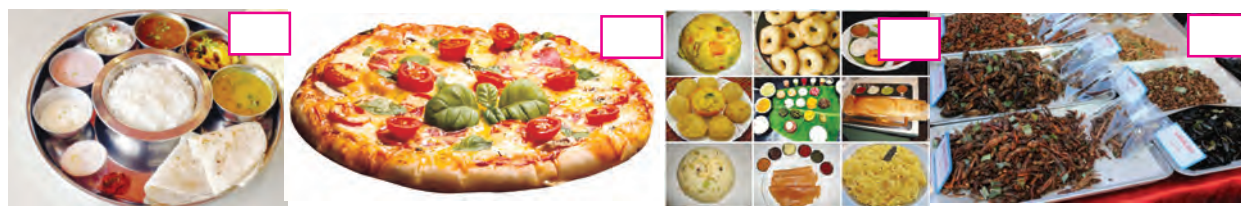
Clothing



Flora and Fauna



Food



On the basis of the selection you have done and the questions given below, arrange a discussion in the class.

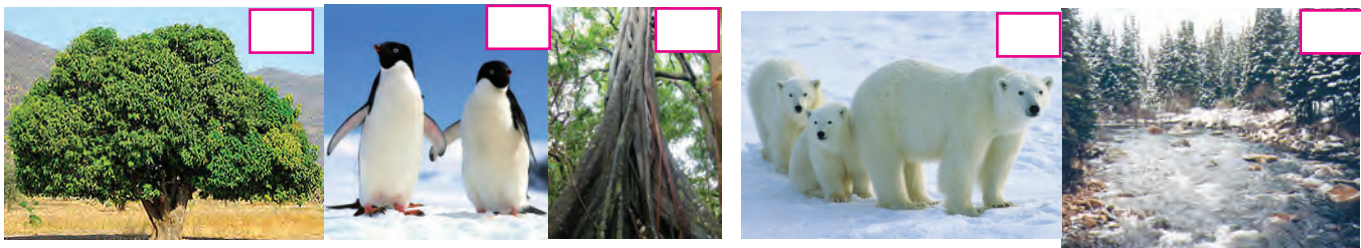
- Why are all the house types shown in the pictures not seen in our surroundings?
- Which are the regions where such types of houses are found?
- Would you like to stay in a house built of ice? Why don't we build such houses?
- What brings about differences in people's clothing?
- Where do you think **khubz**, insects and ants also form a part of the diet of the people?
- Can the animals from polar regions like

polar bears and penguins be kept in tropical zoos?

- Are all the plants shown in the pictures found in our surroundings? If not, where do you think they can be found?

There exists a large number of different things in the world than those we see in our surroundings. We see different educational and informative TV programmes about wild life. We become curious to know more about this wild life. Why is this wild life not seen in our areas? Why are they not similar to the things in our areas? What causes this difference? Let us try to find the reasons behind all this.


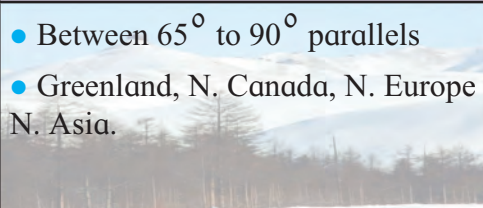

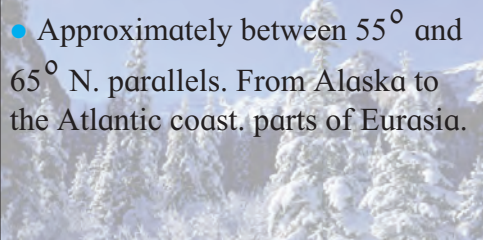

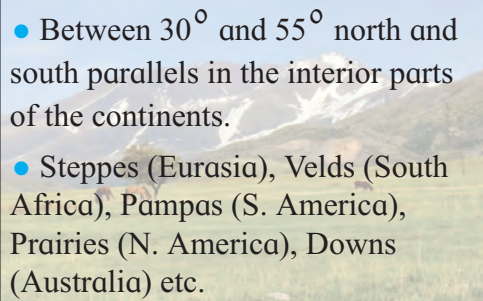

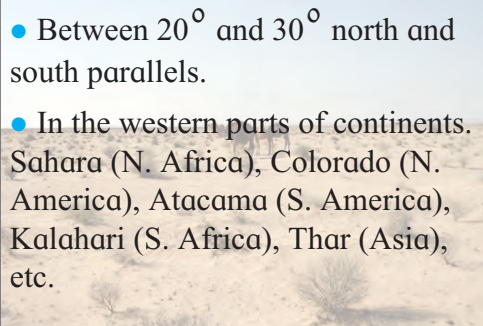

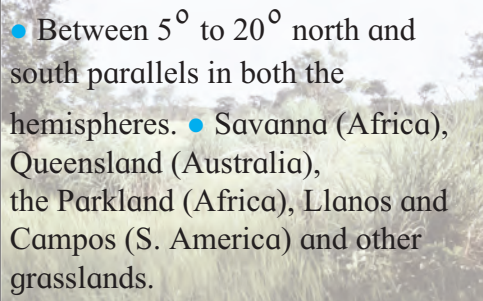
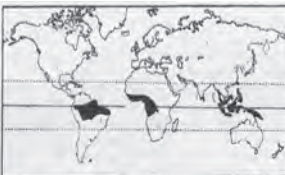
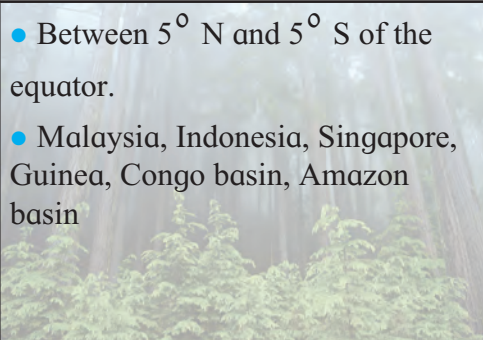
Index: (1) I use/experience! (1) I have seen! (1) I do not know about it!



Geographical explanation

There are differences in terms of landforms, climate, soils, etc in different parts of the world. This difference is mainly due to the availability of sunlight and water in that region. The availability of sunlight and water keeps on changing from the equator to the poles. You have studied this in the previous standards. Differences in landforms, climate and soil greatly influence the flora, fauna and human life and give rise to variations in the biodiversity in different parts of the world.

On the other hand, there are similarities of climate, vegetation and animal life in different continents that spread between certain latitudes. These similarities stand out as the distinctive features of these regions. As these regions stand out on the basis of natural factors, they are called natural regions. The natural environment of such regions affects the living world including human beings. The entire land area on the earth can be divided into these natural regions. Let us try to understand their distribution with the help of maps and tables given in this lesson.

Region	Location and extent	Climate
<p>Tundra Region</p> 	<ul style="list-style-type: none"> Between 65° to 90° parallels Greenland, N. Canada, N. Europe, N. Asia. 	<ul style="list-style-type: none"> Mean summer temperature 10°C Mean winter temperature approximately -20 to -30°C Mean annual rainfall 25 to 300 mm Very cold climate
<p>Taiga Region</p> 	<ul style="list-style-type: none"> Approximately between 55° and 65° N. parallels. From Alaska to the Atlantic coast, parts of Eurasia. 	<ul style="list-style-type: none"> Summer temperature 15° to 20°C Winter temperature below 0°C. Mean annual rainfall between 300 and 500 mm. Rainfall in summer, snowfall in winter
<p>Grasslands (Steppes and Prairies)</p> 	<ul style="list-style-type: none"> Between 30° and 55° north and south parallels in the interior parts of the continents. Steppes (Eurasia), Velds (South Africa), Pampas (S. America), Prairies (N. America), Downs (Australia) etc. 	<ul style="list-style-type: none"> Summer temperature around 27°C. Winter temperature below 0°C Mean annual rainfall 400 to 600 mm. Rainfall mostly during summers.
<p>Hot Desert Region</p> 	<ul style="list-style-type: none"> Between 20° and 30° north and south parallels. In the western parts of continents. Sahara (N. Africa), Colorado (N. America), Atacama (S. America), Kalahari (S. Africa), Thar (Asia), etc. 	<ul style="list-style-type: none"> Mean summer temperatures 30° to 45° C. Mean winter temperature 20° to 25° C. Tremendous heat and very low rainfall. Nights are very cold.
<p>Grasslands (SudanType)</p> 	<ul style="list-style-type: none"> Between 5° to 20° north and south parallels in both the hemispheres. Savanna (Africa), Queensland (Australia), the Parkland (Africa), Llanos and Campos (S. America) and other grasslands. 	<ul style="list-style-type: none"> Summer temperatures around 35°C. Winter temperatures around 24°C. Rainfall around 250 to 1000 mm. Hot and humid summer, warm and dry winter
<p>Equatorial Region</p> 	<ul style="list-style-type: none"> Between 5° N and 5° S of the equator. Malaysia, Indonesia, Singapore, Guinea, Congo basin, Amazon basin 	<ul style="list-style-type: none"> Summer temperatures around 30°C. Annual rainfall between 2500 and 3000 mm. High heat and rainfall throughout year. Because of hot and humid climate, vegetal litter decomposes leading to diseases.

Natural vegetation	Animal life	Human life
<ul style="list-style-type: none"> • Short lived vegetal life. • Short grass, small shrubs, flowers, lichens, moss. 	<ul style="list-style-type: none"> • Caribou, Reindeer, etc. • Polar bears, foxes, walrus and seal. • Animals with soft, thick fur. 	<ul style="list-style-type: none"> • Hunting and fisheries. • Hide tents, igloo (tupik) houses. • Use of sledges. • Eskimo people. • Tough life. Population distribution highly sparse.
<ul style="list-style-type: none"> • Coniferous forests. • Leaves are narrow, pointed; branches leaning towards the ground. Wood is light and soft. • Spruce, fir, pine, redwood, etc. 	<ul style="list-style-type: none"> • Have soft and thick fur. • Caribous, elks, ermine, beavers, silver fox, minks, bears etc. 	<ul style="list-style-type: none"> • Population is less. • Lumbering and hunting are major occupations. • Few agrarian activities.
<ul style="list-style-type: none"> • Extensive grass ranches are seen. • Short grasses growing in lumps. • Grass gets dried up in winter. • Elder, poplar trees are found 	<ul style="list-style-type: none"> • Wild life includes deer, horses, dogs, wolves, bison, rabbits, hares kangaroos, dingos etc. • Domesticated animals like sheep, goat, cattle, horse, donkeys are also found. 	<ul style="list-style-type: none"> • Rearing animals is the main occupation. • Earlier people had a nomadic life. • Lived in hide tents (Yurts). • Kirgiz people are no more nomadic, now stay in well built houses. • Grow wheat.
<ul style="list-style-type: none"> • Thorny bushes with hardly any leaves. • Leaves are narrow, oily, have thick bark. • Once moisture in soil is consumed, plants die. • Examples: cactus, sisal, palm, date palm etc. 	<ul style="list-style-type: none"> • Camels survive for days without water. • Number of animals living on the ground is less. • Daytime live inside the ground • E.g. snakes, rats, lizards, scorpions, etc. • Domesticated animals like horse, donkeys, sheep, oxen etc. 	<ul style="list-style-type: none"> • Bedouins (Sahara), Bushmen (Kalahari) Aborigines (Australia) • Most of the needs get fulfilled through animals. • Agriculture is confined to river valleys and oases.
<ul style="list-style-type: none"> • Tall and thick grass. • Height of grass around 6 m. (Elephant grass) • Trees are rare and have umbrella like canopy. • Examples: acacia, agave, sisal, pineapple, cactus etc. 	<ul style="list-style-type: none"> • Large number of herbivorous and carnivorous animals. • Nature has gifted them with speedy legs. • Skin of the animals has colorful spots or stripes/bands. • Examples: lion, cheetah, hyenas, wolf, zebra, giraffe, elephant, rhino, wild ox, buffalo, kangaroo, emu, etc. 	<ul style="list-style-type: none"> • Houses are simple, with mud walls and thatched roof, • Without windows. • Short in height and dome shaped huts called kraals. • Hunting and rearing are main occupations. • Examples: main tribes include Zulu, Hausa, Masai, etc.
<ul style="list-style-type: none"> • Dense evergreen forests • Variety of trees and bushes. • Swampy land. • Tall hard-wooded trees. • Examples: mahogany, greenheart, rosewood, ebony, etc. 	<ul style="list-style-type: none"> • A great variety in animals. • In marshy lands, crocodiles, anaconda and hippopotamus, etc. • Animals/Birds living on trees • Examples: chimpanzee, gorilla, hornbills, etc. • Poisonous insects such as the tse-tse fly 	<ul style="list-style-type: none"> • Human settlements are few. • Human life is dependent on nature. • Population is mostly tribal. • Houses are built on the trees. • Tribes like Pygmies (Africa), Boro Indians, Semang, etc.

Let's play : Prepare cards for each of the cells in the above table. Distribute the cards among students and play the game of finding other members of the family of natural regions.

The natural regions given in the table are found in specific latitudinal extents between the equator and the poles. Availability of water and temperatures found there determine the location and extent of these regions.

Besides the regions mentioned above, there are some more regions which stand out due to

local conditions. They are the Monsoon, the Mediterranean and the West European regions. While the Monsoon and West European regions stand out because of specific winds blowing there, the Mediterranean region is known for its rainfall in winters. These are described in the table below.

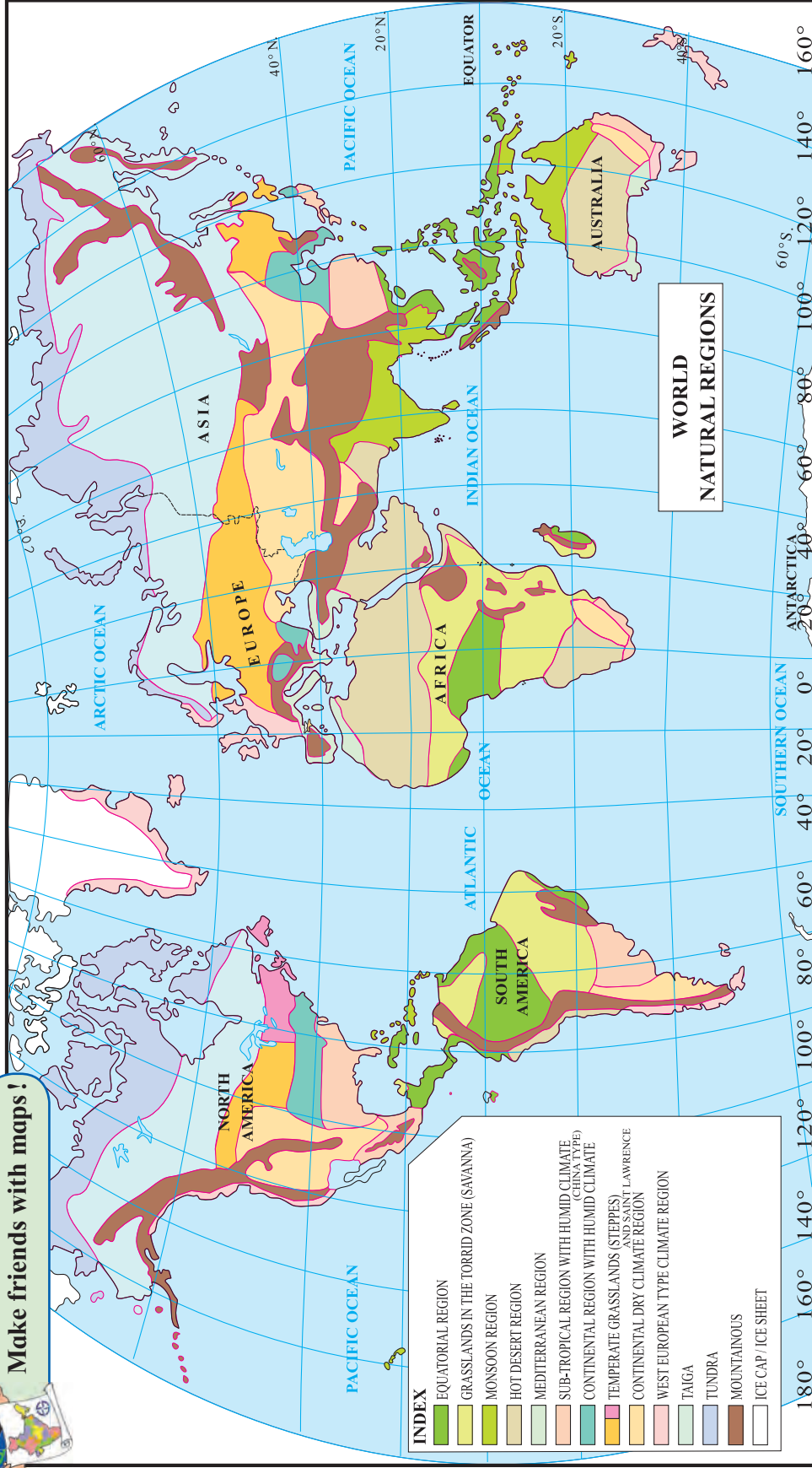
	Monsoon Region	Mediterranean Region	West European Region
Location and Areas:	<ul style="list-style-type: none"> North and south of the equator between 10° and 30° N & S parallels. Areas: Indian subcontinent, Philippines, West Indies, N. Australia, E. Africa, C. America, etc. 	<ul style="list-style-type: none"> Extends between 30° and 40° parallels in both the hemispheres on the western side of continents. Portugal, Spain, Algeria, Turkey, California, Central Chile, SW and NE Australia etc. 	<ul style="list-style-type: none"> Located in the western parts of continents between 45° and 65° N and S. parallels, Norway, Denmark, Ireland, British Columbia, South Chile, New Zealand, etc.
Climate	<ul style="list-style-type: none"> Summer temperatures between 27° and 32°C Winter temperatures 15° to 24°C. Rainfall 250 to 2500 mm. Areas get rains in specific seasons from SW Monsoon. Rainfall is highly variable and distribution is quite uneven. 	<ul style="list-style-type: none"> Dry summers and rainfall in winters Mean summer Temperature from 21° C to 27° C. Winter temperature between 10° C and 14° C. Mean annual rainfall 500 to 1000 mm. It rains in winter. 	<ul style="list-style-type: none"> Mean summer temperature around 20°C, Mean winter temperature around 5°C, Mean rainfall between 500 and 2500 mm. Rainfall mostly in the form of cyclones associated with Westerlies It rains throughout the year. Climate is mild.
Natural vegetation	<ul style="list-style-type: none"> Semi-evergreen and deciduous forests. Vegetation depends on the distribution of rainfall. Banyan, peepal, teak, sal, sheesham, sandalwood, cinchona, bamboo, acacia, shrubs, grasses etc. 	<ul style="list-style-type: none"> Thick, small and oily leaves. Thick bark Examples: olive, oak, chestnut. Grass in low rainfall regions. Coniferous forests in mountainous regions. 	<ul style="list-style-type: none"> Green grasses all the year round. Trees shed their leaves in winter. Coniferous trees and short grasses – oak, beech, maple, elm, pine, spruce, poplar, etc.
Animal life	<ul style="list-style-type: none"> Wild animals such as tigers, lions, leopards, cheetahs, elephants, wolves, boars, monkeys, snakes, peacocks, cuckoos, etc. Domesticated animals: cattle, goats, horses. 	<ul style="list-style-type: none"> Due to animal husbandry domesticated animals are found in large numbers– goat, sheep, cow, mules, horses etc. 	<ul style="list-style-type: none"> Because of animal husbandry, domesticated animals in large numbers. Wild animals include wolves, foxes, bears etc,
Human Life	<ul style="list-style-type: none"> Large number of small hamlets. Considerable difference in diet and costumes. Population is mostly involved in primary occupations Main occupation is agriculture. 	<ul style="list-style-type: none"> Seat of Greek and Roman civilisations. Main occupation is agriculture. Mostly fruit and flower cultivation. Wheat and wheat products form the staple diet. Colourful costumes. 	<ul style="list-style-type: none"> Industrious and enthusiastic people. Have been mainly sailors and explorers Use woollen clothing. Have achieved progress in secondary and tertiary sectors.

Besides the nine regions given in the tables, there are certain other distinctive regions which stand out because of their specific continental

locations. For example, the China type region, St. Lawrence region, etc. See the extent of these regions in fig. 6.1.



Make friends with maps!



- ▶ Which natural region occupies the largest area in the world?
- ▶ Where else do we find conditions similar to the continent of Antarctica?
- ▶ Through which natural regions does the Prime Meridian pass?

- Figure 6.1 : Natural Regions of the World**
- ▶ Which continent has the highest diversity in terms of natural regions?
 - ▶ Why are there fewer natural regions in the southern hemisphere than those in the northern hemisphere?

- Answer the following questions after studying the above map. (Fig. 6.1)
- ▶ Which natural regions are found in India?
 - ▶ Which continent comprises a major portion of the hot desert type region?

Answer the following questions:

- Which natural region consists of short-lived vegetation?
- In which natural region will you find the kraals?
- Which region has winter rains?
- In which natural regions are gorillas and chimpanzees found?
- In which natural region is the land surface in the forests devoid of vegetation?
- Which regions favour dairy farming?
- Which region is favourable for fruit production?



Think about it.

- Why are animals like lions not found in equatorial forests?

As one travels from the equator to the poles, the spectrum of biodiversity narrows down. This leads to the issue of availability of natural resources. This adversely affects human occupations. In monsoon regions, agriculture and allied activities form the main occupation of the people. In equatorial regions, occupations like gathering of gum, honey, rubber, lac, etc. are all based on forest produce. Taiga is a softwood forest. Therefore, lumbering is the main occupation there. In Tundra regions, the main occupation is hunting and fishing. Extensive farming is undertaken in grasslands nowadays.

Significant differences are found in the environment and available resources in different natural regions. The use of resources is dependent on that region's progress in science and technology. Similarly, the history and cultural organisation of that place also affects the life of the people.



Think about it.

- Why are the hot deserts mainly located along the western side of the continents?

- Why are people in the hot deserts engaged mostly in animal rearing?
- Why do people in hot deserts live a nomadic life?
- Why are carnivorous animals found in the grasslands?



Always remember—

Not only human life but the entire living world on the earth depends on the available natural resources. Hence, while utilizing these resources, we must think of all the living organisms. The concept 'the earth is one single family' will become a reality only if we do that.



Do you know ?

About 25% of the deserts on the earth are sandy deserts. Many of the deserts are occupied by rock exposures or covered by stony wastes and pebbles. Some have high hills with narrow rocky pinnacles. Deserts like Ladakh in our country or Arizona in the United States of America are of this type.

Strong winds blowing in the desert lift and deposit sand to make sandy hills or sand dunes. Some dunes can be as high as 200m. These hills do not remain stationary, but keep moving slowly under the influence of winds. At times, villages get buried under them.



Look for me elsewhere!

- Class Six- Geography- Page 48
- Class Six- Science- Diversity in living things and their classification.



Exercises



Q. 1 Read the following statements carefully. Correct the wrong ones and write them down:

- (1) Due to its mild and warm climate, people from the West European region are not energetic.
- (2) The prairie region is called the wheat basket of the world.
- (3) The trees in the Mediterranean region have oily leaves and the bark is quite thick. There is a high rate of transpiration.
- (4) The camel is an important animal of the hot desert region as it can survive without water and is useful for transport.
- (5) Carnivorous animals like tigers and lions are found in large numbers in the equatorial regions.

Q.2. Give geographical reasons:

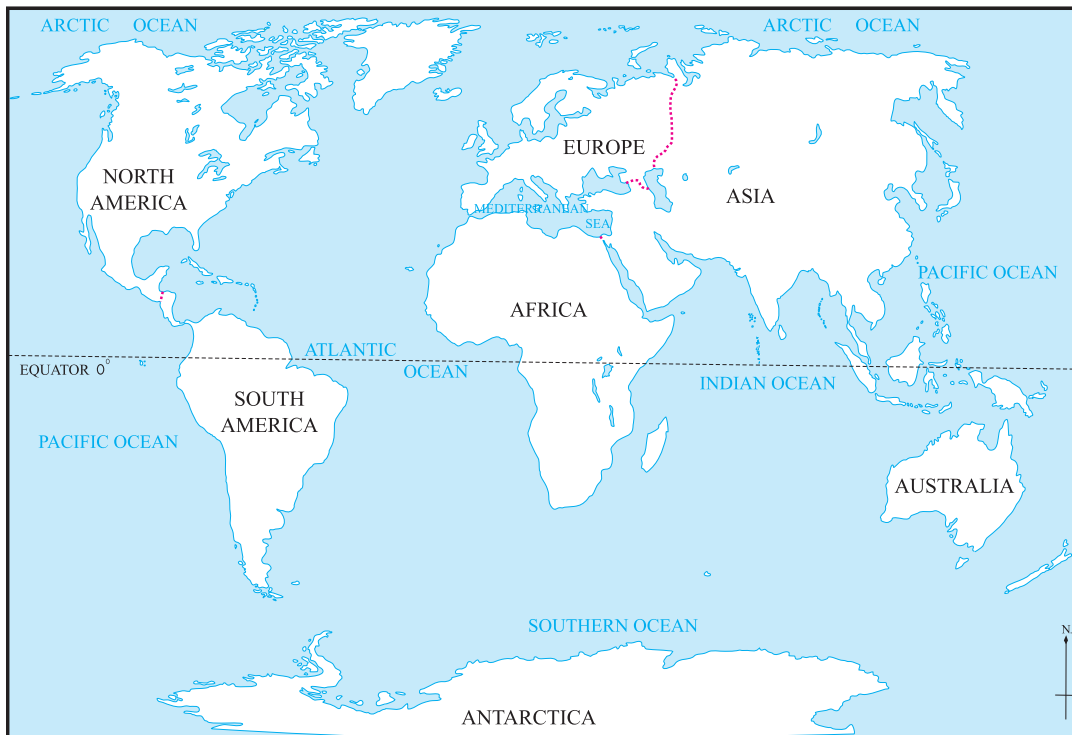
- (1) People in monsoon region are mainly engaged in agriculture.
- (2) Trees in equatorial forests grow tall.
- (3) Vegetation is short-lived in the Tundra region.

Q.3. Answer the following questions:

- (1) What is the latitudinal extent of the Taiga region?
- (2) Name any three herbivorous animals from the Sudan region. What has nature endowed them with for self-protection?
- (3) What are the characteristics of the Monsoon region?

Q. 4. Show the following items on an outline map of the world. Prepare the index.

- Colorado Desert ● British Columbia
- Downs Grassland ● Inhabited part of Greenland ● Mediterranean Sea



Activity:

Using the Internet, check the information given in this lesson. Collect pictures of the flora and fauna and the human life of the various natural regions. Make a collage by pasting these pictures on the world map.



Project :

Till now, we have studied many geographical concepts. For example, latitude, longitude, graticule, climate of a region, its physical setup, flora and fauna, etc. Now, let us do a project related to all of these.

Using the internet and other sources, choose one country each from any two natural regions. Collect some information, photographs images, etc. regarding these countries. Then make a collage using the following points.

Name of the country : _____ _____	Special features : _____ _____
Location and extent : _____ _____	_____
Climate : _____ _____	_____
Flora : _____ _____	_____
Fauna : _____ _____	_____
Human life: _____ _____	_____
Costumes : _____ _____	_____
Occupations : _____ _____	_____
	Map

Arrange an exhibition of your collage posters in the classroom and make a presentation using them.

7. Soils



Let's recall.

- What are the different constituents of soil?
- From where do the abiotic factors become available for soil formation?
- On which factors does the variety in the soil depend?

While answering the questions above, you must have gathered some information about soil and realized some of its characteristics. Let us consider the soil in more detail.

The **parent rock**, the climate of the region, the biotic material, the slope of the land and time are factors that influence soil formation.

Factors necessary for soil formation:

Parent rock: Remember that the parent rock in a region is an important factor in soil formation. Depending on the hardness of the rock and the climate of the region, the rock gets weathered. The rock turns into powdery material which further turns into earthy material. For example, the basalt rock of the Deccan Plateau in Maharashtra turns into black soil after weathering. This soil is also referred to as 'regur' soil. Rocks like granite or gneiss in South India give rise to red soil.

Regional climate: This is also an important factor influencing soil formation. Weathering of the rock is the first step in the process of soil formation. The process of weathering depends on the climate of the region. The climate decides the intensity of weathering. That is why one and the same type of rock gives rise to different types of soils when the rock is exposed to different climates. In the dry climate of Deccan Plateau, weathering of basalt leads to the formation of black soil whereas in the humid climate of the Western Sahyadris the **leaching** of the same basalt rock leads to the formation of lateritic soil.

Biotic material: The weathering of rocks turns them into powdery material but this powdery material is not soil. To turn such powdery material into soil, it is necessary that biotic material gets mixed into it. The biotic material comes from the decomposition of the remains of the plants and animals in that region. The vegetal litters, roots of plants, remains of animals, etc. get decomposed due to water. Microorganisms, and certain other organisms help decompose the dead remains of organic materials. The biotic material thus produced gets mixed into the soils and is called '**humus**'. If the proportion of humus in the soil is greater, the soils become fertile.

The process of decomposition by living organisms takes place continuously. Now-a-days production of vermicompost is undertaken on a large scale. Try to understand the process of producing vermicompost or compost. Production of compost needs sufficient period of time and elements like organic waste, water, heat etc.

Time: Soil formation is a natural and slow process. It needs a very long period of time. To form a 2.5 cm thick layer of top soil, it takes thousands of years. From this you may understand that soils are invaluable. In the region of high rainfall and higher temperatures, the process of soil formation is faster. Comparatively, in regions of low temperatures and low rainfall soil formation takes more time.

Humans use the soil gifted by nature as a resource. It is mainly used for agricultural purpose. For getting higher production, different types of chemical fertilizers, insecticides are used profusely. However, this leads to the degradation of soils.



Always remember–

Earth doesn't mean soil :

Soil contains the powdered form of weathered rock, partially or completely decomposed organic material and innumerable microorganisms. Interactions between biotic and abiotic components in the soil go on continuously. Plants get nutrients required for their growth from the soils. Soil is a complete ecosystem. Earth is also a substance. The potter uses it as raw material. A farmer uses soil as an ecosystem.



Try this.



Figure 7.1 : Soil experiment

- ❖ Take three flower pots of the same size
- ❖ Keep one pot empty. Fill the second pot with water after closing the hole at the bottom and third pot with soil.
- ❖ Put a few seeds in all of them. (You may use aserio, peas, gram, fenugreek, wheat, green gram, coriander seeds, etc.)
- ❖ Keep all the three pots in the sun and water the empty pot and the soil-filled pot for 4-5 days. Observe and answer the following.
- What happened to the seeds put in the empty pot and the pot filled with water?

- What happened to the seeds put in the pot filled with soil?
- What do you learn from this?

Geographical explanation

An important component of the living world on the earth is 'plants'. For the production and growth of plants, soil is indispensable. They provide support to plants. Vegetation is abundant in the regions that have fertile soils, e.g., the equatorial regions. However, in the areas where the soils are not fertile, vegetation is scanty, e.g., in deserts. And where there is a shortage of soil, vegetation is not seen, e.g., in the polar areas.

Though favourable climate, availability of abundant water and sunlight are necessary for the growth of a plant, these alone are not sufficient. Fertile soils favour plant growth.



Think about it.

- ☞ Why do equatorial regions have fertile soils?
- ☞ Why is the vegetation sparse in deserts?

When man realized that sowing of seeds in the soil leads to the growth of plants and yields crops, he started using soil as a resource. Gradually, he realized that the fertile soils along the river beds give higher yields. Hence he settled in the valleys and started living there in groups. This led to the rise of ancient river valley civilizations, e.g., the Indus civilization.

For the growing population, man started producing greater amount of food crops. He realized that crop production and prosperity in agriculture mainly depends on the fertility of soil and the optimum availability of water. Hence, there emerged competition among

people to discover fertile lands and settle there. Later, for getting richer harvests he made efforts to increase the fertility of soils. In the process, use of different fertilizers became a practice, which led to record agricultural productions.

Food crops, fruits and flowers are produced according to the type of soils. Food crops like jowar and bajra are produced in the regur soils of Maharashtra Plateau while soils in Konkan, Kerala, Tamilnadu and Karnataka region produce rice. In Madhya Pradesh, potato is cultivated in regions where the soils are well drained. The local agricultural produce determines the staple diet of the people.

The regions where soils are not arable need to fulfil their food requirements through import. For example, countries like Saudi Arabia, Qatar, Oman, etc. fulfil their requirements by importing food from China, India and the USA.

The regions where soils are fertile can be self-reliant as far as the food production is concerned. Hence, human settlements get concentrated in such areas. Agro-based industries flourish in these areas at a later date. For example, sugar factories develop in the sugarcane producing areas; fruit processing industries develop in the areas of fruit production, etc. These regions later show the signs of development.

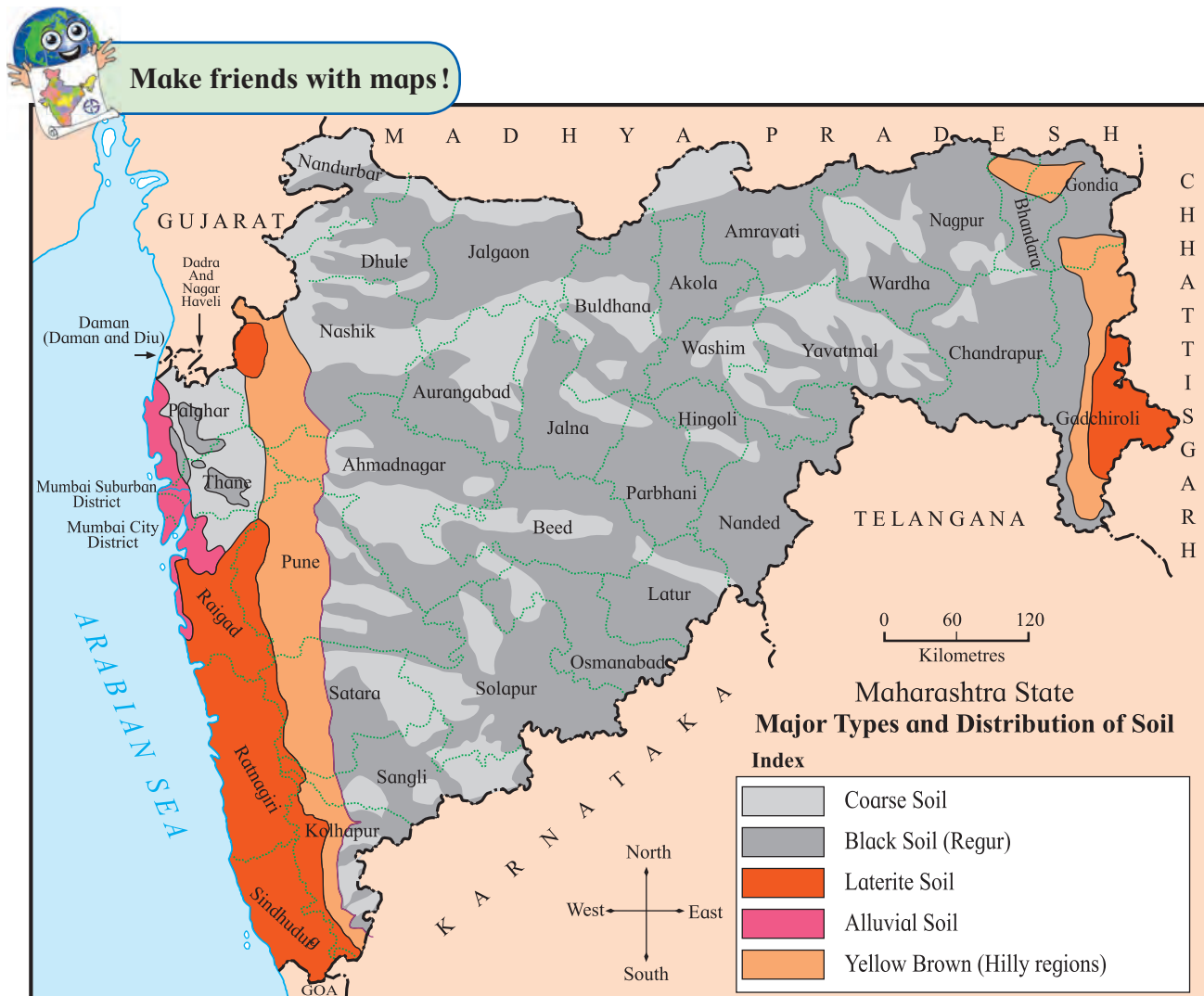


Figure 7.2 : Maharashtra –Types and Overall Distribution of Soil

Observe the map given in fig. 7.2 and answer the following questions:

- Which soil occupies most of the area in Maharashtra?
- In which areas are laterite soils found?
- Which soil is found in the river valleys of Maharashtra?
- Which soil is found in parts of the Sahyadri ranges?
- In which region is alluvial soil found?

Geographical explanation

You have studied the major soil types of Maharashtra. On the basis of the soil's colour, texture, formation process, thickness of layers, etc. we can divide the State's soils into 5 major types.

Coarse soil : This soil type is a result of weathering and low rainfall. This soil can be found in the hilltops of the western part of the plateau, e.g., Ajanta, Balaghat and Mahadeo hills. The proportion of humus is negligible in this soil.

Regur or Black soil : It is found in areas of medium rainfall in the valleys and alluvial plains of river basins. Two types of this soil are found. Dark black soil is found in the western part of Deccan Plateau while medium black soil is found in the eastern part (Vidarbha). Though it is black in colour, proportion of organic components is less in the soil.

Laterite Soil : This type of soil is found in the coastal belt of Konkan to the west of the Sahyadris and in the east of Vidarbha. In areas of very heavy rainfall, the eroded rocks get washed away in a large quantity. As a result, the parent rock lies bare open. The iron in the rock reacts with the oxygen in the air and causes chemical reactions. This gives the reddish - orange colour to the soil which is thus formed.

Alluvial soil of the coastal strip: Majority of the rivers flowing in the Konkan region are short and flow with great speed. Therefore, the alluvium brought by them gets deposited at the mouth of the rivers. This soil is found at the mouth of the rivers in the western coastal strip, e.g., the areas around Panvel -Uran coast, Dharamtar creek, etc.

Yellow brown soil : These soils are found in areas of extreme rainfall. They are not very fertile. Therefore, they are not very useful used for agriculture. They are mainly found in Chandrapur, eastern part of Bhandara and parts of Sahyadri mountains.



Try this.

- ❖ Make two small heaps of soil.
- ❖ On one of them, sow or any other fast growing seeds.
- ❖ Keep watering that heap for 4-9 days.
- ❖ After the saplings surface, water both the heaps with a watering can. Observe. See fig. 7.3.

(Note for Teachers : Start this activity 10 days before teaching this lesson so that the saplings grow a little.)



Figure 7.3 : Soil heap experiment

Soil erosion and degradation:

A layer of soil (top layer of soil) gets removed due to wind or water. This means that the soil gets eroded. Running water, climate and diversity in physiography are reasons of soil erosion. The soil quality may get lowered due to certain reasons. This is called degradation of soil. To obtain a higher agricultural yield, chemical fertilizers, insecticides, weedicides, etc. are used. The excessive spraying of chemicals and use of chemical fertilizers leads to soil degradation.

Excessive irrigation draws the salts from the soil upwards and makes the soil saline and then unproductive. Due to excessive use of chemicals their residues remain in the soils for many years. They become a threat to the existence of microorganisms in the soils. It leads to lowering of the humus content in the soil and the plants do not get micronutrients. If the pH of the soil thus gets disturbed it is a sign of soil degradation.



Figure 7.3 a : Soil degradation



Do you know ?

Geographic Indication (GI) : Certain soils are best suited for certain crops. Hence, the crop production of that crop becomes the speciality of

that area. Such crops are given the status of Geographic Indication (GI). For example, Haapus mango of Sindhudurg, custard apple from Beed district, the oranges of Nagpur, etc.



Figure 7.3 b : Soil erosion



Figure 7.3 c : Soil erosion

Soil conservation :

Considering the importance of soils, it is necessary to conserve it. It is necessary to protect the fertile soils of farmlands from getting washed out due to rains. Soil conservation includes the works like construction of embankments and, planting trees on them, construction of gully plugs against the steep slopes etc. Such works are taken up by the Department of Soil Conservation.

Planting trees can also control the velocity of the wind. This helps reducing the erosion of soil by wind. The plant roots hold the soil and this also reduces the erosion of soil. Under soil conservation, the continuous contour trenches

(CCTs) are constructed along the slopes. Construction of such trenches at different heights checks the velocity of water running along the slopes and hence reduces soil erosion. The water arrested in these trenches percolates into the ground. See fig. 7.5.

The Government of Maharashtra has implemented the watershed (catchment area) development program under which constructing embankments along slopes in rural areas, introducing CCTs along steep slopes etc. are undertaken. This led to the success of the scheme 'Arrest water, let it percolate'. This has resulted in raising the ground-water levels and reducing the erosion of soil. Recently, the Government has launched the scheme called Jalayukt Shivar. Under this scheme, works like construction of farm bunds, arresting waters of small streams, connecting the streams etc. are being carried out on a large scale.

It is advisable to reduce the excessive use of chemical fertilizers and pesticides. If organic manures, vermicompost, compost are used regularly, it helps maintain the pH

Weir



Think about it.

Rohit and Prateeksha noted that their field had yielded a bumper crop. But they also noted that a part of their field had a stunted growth of plants. What investigation will you suggest to them?

Figure 7.4 : Soil conservation

Afforestation



CCT



Contour Bunding



balance, increase the proportion of humus, and retain the fertility of soil.

Keeping the farmland fallow for some period and cultivating different crops alternatively is important to help retain the fertility of soils.



Look for me elsewhere!

- ☞ Class Seven - Science - Lesson Three
- ☞ Class Six - Geography- Lesson Seven Map 7.5
- ☞ Class Four- Environmental Studies - Food for All



Exercises



Q. 1. Complete the following table.

Factor / Process	Role in the formation of soils
Parent Rock	
Regional Climate	
Organic material	
Microorganisms	

Q. 2. Why do the following occur ?

- (1) To the west of Sahyadris, laterite soils are formed from basalt rock.
- (2) Humus content in the soil increases.
- (3) Soil formation process is faster in the equatorial climate.
- (4) The salinity of the soil increases.
- (5) Rice is the staple diet of the people from Konkan.
- (6) Soil erosion
- (7) Soil degradation.

Q. 3. Give information on:

- (1) Measures of soil conservation.
- (2) Organic manures
- (3) Place where you will get the information about the suitability of a soil for a particular crop.
- (4) Importance of soils for plant growth.

Q. 4. Complete the following table with reference to soil.

Action	Effect	Result (w.r.t. fertility)
Construction of embankments		
	Wind speed decreased	
Farm land is kept fallow for some period		
	Humus content increased.	
Trenches are dug across a slope.		
Litter is burnt in the farm.		
	Proves favourable for micro organisms	
	Salt content in the soil increases	
Chemical fertilizers used excessively		

Activity :

- (1) Visit a soil testing centre/laboratory and note the work that is carried out in the centre.
- (2) Prepare compost at home or in your housing society.
- (3) Visit a place where 'Arrest water, let it percolate' is being implemented. Collect information about it and make a note of it.

8. How Seasons Occur -Part 2



Can you tell?

Discuss the activity you have been carrying out since June. (See Chapter 1.) Make use of the observation tables for the months of June, September and December.

- In which month the duration of the day was around 12 hours?
- What could be the reason behind it?
- Bring out the differences between the duration of daytime in the months of June, September and December.
- What could be the reason for the change in the shadow of the stick?
- What did you observe about the position of the sun at the horizon at the time of sunrise and sunset?
- Which of the following factors could be related with the change in the position of the shadow of the stick and the difference in the duration of daytime?
 - Rotation of the earth
 - Distance between the earth and the sun
 - Revolution of the earth
 - The axis of the earth.

You must have noticed the longest day, the shortest day and the days with the same duration of day and night time with the help of the observations in the months of June, September and December. Generally, these dates are the same every year. With the help of the shadow experiment, you must have noted the change in the position of sunrise. Let us study the changes in the position of sunrise and the difference in duration of day and the night time.

Geographical explanation

Apparent movement of the sun:

You must have realized through your observations that the position of the sun, at sunrise appears to change on the horizon every day. Its position appears to move towards the north or south in the course of a year. However, in reality, the sun does not move anywhere. That is why,

this movement of the sun towards the north or south in a year is called the apparent movement of the sun. The position of the rising sun keeps on moving towards the south in the period from 21st June to 22nd December. This period is called **Dakshinayan**. From 22nd December to 21st June, the sun keeps on moving towards the north. This period is called **Uttarayan**. The revolution of the earth around the sun and the tilted axis of the earth are the two factors responsible for the apparent movement of the sun.

Seasons occur only with reference to the northern and the southern hemispheres.



Think about it.

- In which direction will the location of sunrise and sunset appear to move after 22nd of December?



Always remember –

This year you will study the ‘apparent motion of the sun’ in your science textbook as well. In that book, the sun’s east-west motion from sunrise to sunset, that is, its diurnal apparent motion is also considered. In geography, we consider the apparent (north-south) movement of the sun. In both the motions, the sun only appears to move and does not actually move. The diurnal apparent movement of the sun is related to the rotation of the earth whereas its annual apparent movement is related to the revolution of the earth and the tilt of the earth’s axis.

Observe fig. 8.1 carefully and answer:

- How is the northern hemisphere in which you live positioned relative to the sun on the dates given in the figure?
- Which season will you experience in the

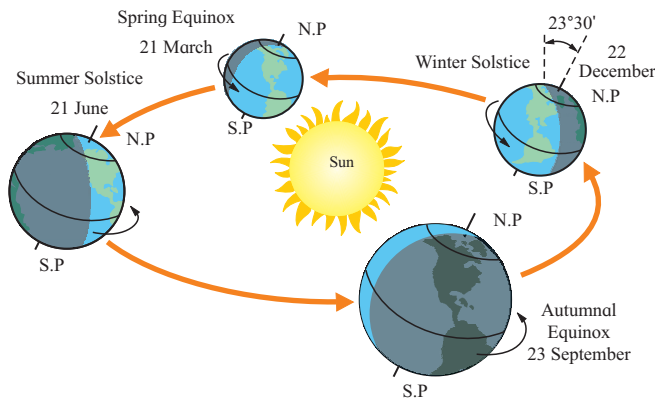


Figure 8.1 : Cycle of seasons, equinoxes, solstices

- northern hemisphere around 22nd December?
- What would be the season in the northern hemisphere around 21st June?
 - If it is winter in the northern hemisphere, which season will it be in the opposite hemisphere?
 - At any given point of time, why are the seasons in the northern and southern hemispheres different?

Perihelion and aphelion positions of the earth:

The path of the revolution of the earth around the sun is elliptical. The sun is at one of the two centres of the ellipse. The sun does not change its position. As the earth moves in an ellipse, its distance from the sun does not remain the same. It is at its minimum distance in the first week of January. This is called the **perihelion** position of the earth. In this position, the southern end of the axis is towards the sun. As against this in the first week of July, the earth is at the farthest point from the sun. This is called the **aphelion** position. In this position, the northern end of the axis is towards the sun. With the help of fig. 8.1

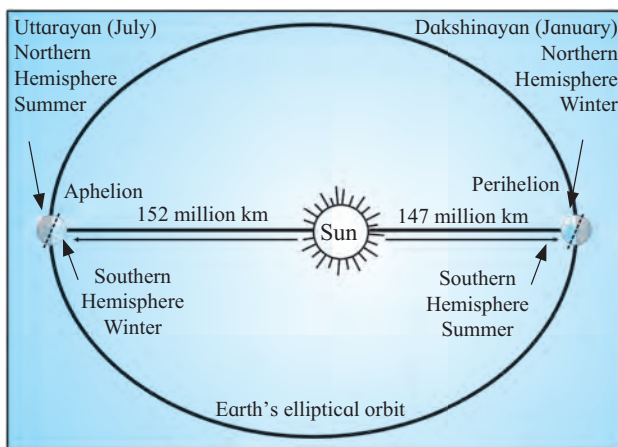


Figure 8.2 : Aphelion and perihelion position

which shows the position of the earth in relation to the sun, you can guess which season prevails in which hemisphere. Seasons occur due to the revolution of the earth, as well as due to the tilt of its axis of rotation.



Do you know ?

Due to the gravitational forces of the sun and the earth, the speed of the earth gets reduced, during the aphelion position and increases during the perihelion position. As the difference in the distance of the earth in both these positions is not very great, it does not have any effect on the seasons.

Geographical explanation

As the earth revolves around the sun, the equator receives perpendicular rays on two days in a year. This condition occurs on 21st March and 23rd September. On these days, both the poles are at the same distance from the sun. This is called **equinox**. (See fig 8.3)

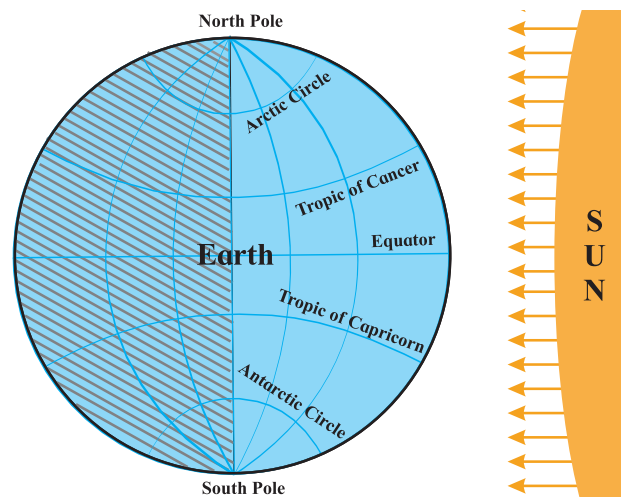


Figure 8.3 : Equinox days

The illuminated and dark portions of all the parallels including the equator are shown in figure 8.3. In the figure, the **circle of illumination** divides all the parallels from the north pole to the south pole equally. Everywhere on earth nighttime and daytime are of equal duration. This condition is called equinox. On equinox,

the sun's rays are perpendicular on the equator. In this condition, the circle of illumination coincides with the great circle defined by two opposite meridians. In the northern hemisphere spring prevails from 21st March to 21st June while autumn prevails from 23rd September to 22nd December. The southern hemisphere has the opposite seasons during these periods.

In the northern hemisphere, 21st March is called **spring or vernal equinox** whereas 23rd September is called **autumnal equinox**.

The equinox or solstice dates can vary by a day or so.



Use your brain power!

On equinox days, the two Poles experience either sunrise or sunset. On which pole will it be sunrise on 21st March?

Figure 8.4 shows the position of the earth with its tilted axis on 21st June and 22nd December. It also shows its illuminated and dark portions. Observe the figure and answer the following.

- In fig 'A' which pole is receiving sunlight?
- In fig 'B' which pole is not receiving sunlight?
- Which hemisphere has the longest daytime on 21st June?



Can you tell?

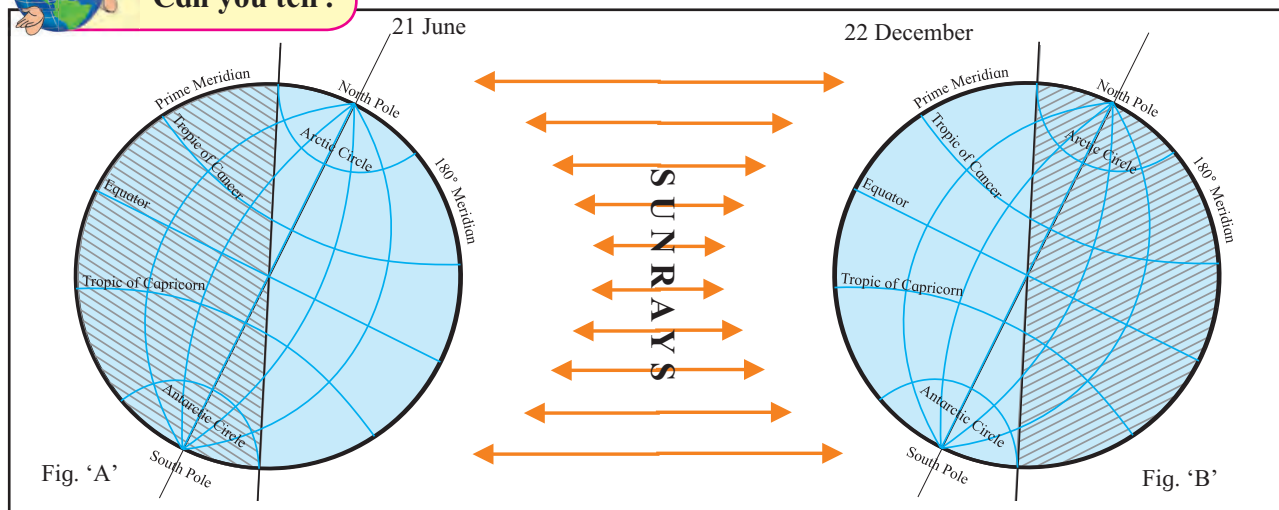


Figure 8.4 : The position of the earth with its tilted axis on 21st June and 22nd December

- Which hemisphere will have the longest night on 22nd December?
- On which date will the Tropic of Cancer receive perpendicular sunrays?
- Considering the position of the north pole, which season will prevail in the northern hemisphere from 22nd March to 23rd September?
- The cricket matches in Australia are generally in summer. When does Australia have summers?
- In which period is the 'midnight sun' observable in Norway? Which season will there be at that time?
- At what time will the midnight sun be visible at the 'Bharati' research station of India at Antarctica? What will be the season there at that time?

Geographical explanation

When any one of the poles inclines the most towards the sun, 23°30' parallel of that hemisphere receives perpendicular sunrays. See figure 8.4. The sunrays are perpendicular at the equator on 22nd March and 23rd September which are the days of equinox. After 22nd March, other parallels between the equator and the Tropic of Cancer in the northern hemisphere start receiving perpendicular rays sequentially. Only on 21st June and 22nd December the sunrays become perpendicular on the Tropic of Cancer and Tropic of Capricorn respectively. These two days are called **Solstice days**.

Sunrays are never perpendicular on any of the parallels between Tropic of Cancer and the North Pole or between Tropic of Capricorn and the South Pole. 21st June is the longest day and it marks the shortest night in the northern hemisphere. Similarly, 22nd December marks the longest day and the shortest night in the southern hemisphere. 22nd December is the shortest day in the northern hemisphere.

In the region from the Arctic Circle to the north pole, the sun remains visible for 24 hours or longer. At the north pole, the sun is visible in the sky from 22nd March to 23rd September, i.e., for six months. Similar situation prevails in the region between the Antarctic Circle and the South Pole in the period from 23rd September to 21st March. Note that on the equator, the duration of day and night is same throughout the year. (i.e., 12 hours each).

Seasons have been decided on the basis of the duration of sunlight, equinoxes and solstices. The equatorial region does not experience any change of season. Hence the climate in that region does not change at all in the year. In places beyond the equatorial region in either hemispheres, summers or winters are experienced one after the other, within a year. The occurrence of seasons one after the other in a year leads to the 'cycle of seasons'. Generally, there are two seasons, summer and winter, on the earth. However, in some places, seasons are taken to be four in all.

The changes in the atmosphere, vapour in the air, the wind and the precipitation also influence the seasons. Continuous occurrence of rain in a specific period gives rise to an additional season besides summer and winter. Due to the local conditions, seasons other than summer and winter are seen to occur in different parts. For example, rains occur in India in a specific period. Therefore we consider four seasons : such as summer, the rainy season the period of retreating monsoon and winter. There are four seasons in Europe and North America too. They are summer, autumn, winter and spring.

The cycle of season and the living world:

If the earth's axis were not tilted, the same climatic conditions would have prevailed throughout year. The seasons would not have occurred. One and the same type of climatic conditions would have prevailed on each of the different parallels. It is the tilt of the axis that leads to occurrence of seasons, change and diversity on the earth. The living world on the earth is affected by the cycle of seasons. For example, in the region between 66°30' and 90° in both the hemispheres, even the mild sunlight available for a part of the year gives rise to certain flora and fauna. In the Antarctic region, at the southernmost part of the earth, birds like penguins, fish like seal and animals like walrus are found. In the polar region of the northern hemisphere animals like reindeer, polar bears, Arctic foxes etc. are found. People living in this region too have adapted to the natural conditions prevailing in that region. Our adaptation to climatic conditions is possible only up to a certain limit. That is why organisms prefer a certain habitat. During extreme cold climatic conditions when the food supply becomes scarce, a number of birds and animals migrate temporarily. Trees bear fruit in a particular season. Therefore, agricultural seasons also depend on to the local climatic conditions.



Use your brain power !

- ☞ While India and England are located in the same hemisphere, why are the cricket matches in these two countries arranged in different months?
- ☞ On 21st March and 23rd September, daytime and nighttime are same all over the earth. But why do some parts experience summer and some parts winter on these days?
- ☞ Mention any two countries in the world where one needs woollen clothing in the month of May. Also mention their latitudinal positions.



Do you know?

Arctic tern



Once the winter at the North Pole becomes severe, this bird travels southwards. When it is summer in the northern hemisphere, it flies back towards the North Pole. It has to travel in search of food. In the course of one

year, it travels around 70,000 km. It might be the only species in the world that experiences summer twice in a year.

Siberian Crane



Due to severe winter and lack of food, cranes from the cold northern regions visit India travelling around 8 to 10 thousand kilometres. Once summer starts in India, they migrate back to the north.



Think about it.

☞ What effects do the seasons have on the biodiversity in India? Write briefly about it.



Use your brain power!

☞ The summer capital of Jammu and Kashmir is Srinagar and the winter capital is Jammu. What could be the reason?



Give it a try.

Regarding daytime and the cycle of seasons, what conditions would have prevailed at the following place, if the earth's axis were not tilted? Use the Globe to answer the question.

(Canada, Tasmania, Nigeria, West Indies, Peru, Borneo.)



Look for me elsewhere!

- ☞ Class Seven– Science– Adaptation, Apparent motion
- ☞ Class Seven– Geography– Natural Regions.
- ☞ Class Six– Geography– Chapter 5
- ☞ Class Five– Environmental Studies- Part One– Chapter 2
- ☞ Class Three– Environmental Studies- Part One– Chapter 24



Exercises



Q. 1. Complete the statements using correct options:

- (1) The apparent movement of the sun means
 - (a) The sun revolves around the earth in a year
 - (b) It appears that the sun moves to the north or south in a year.
 - (c) The earth keeps on changing its position.
- (2) If the axis of the earth were not tilted
 - (a) The earth would not have rotated around itself.
 - (b) The earth would have revolved around the sun with greater velocity.
 - (c) Different parallels on the earth would have experienced the same climate throughout the year.
- (3) 21st June and 22nd December are solstice days, that is,
 - (a) The sun starts its southward journey from Tropic of Cancer on 21st June and northward journey from Tropic of Capricorn on 22nd December.
 - (b) The Dakshinayan of the sun takes place between 21st June and 22nd December.
 - (c) The Uttarayan of the earth takes place between 21st June and 22nd December.
- (4) The revolution of the earth around the Sun and the tilt of the axis of the earth together are responsible for the following seasons.
 - (a) Summer, rainy season, Retreat of Monsoon and winter,
 - (b) Summer, winter and spring
 - (c) Summer and winter.

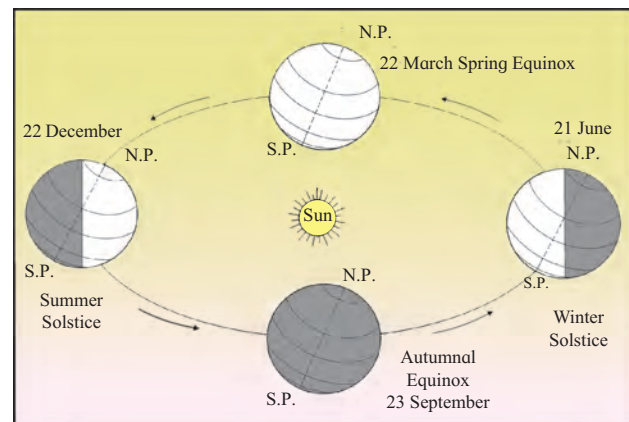
Q. 2. Answer the following questions.

- (1) What leads to the occurrence of seasons?
- (2) What is the duration of the day on equinox?
- (3) Why is the effect of the seasons not experienced in the equatorial region?
- (4) Why is the sun visible for more than 24 hours during Dakshinayan in the region between the Antarctic Circle and the South Pole?
- (5) Why are penguins not found at the North Pole?

Q. 3. Rewrite the following statements after correcting them.

- (1) The earth's velocity varies according to the period of revolution.
- (2) If we observe from the northern hemisphere, we see the apparent movement of the sun.
- (3) The dates of equinox change every year.
- (4) North Canada experiences summer from September to March.
- (5) When it is summer in South Africa, Australia has winter.
- (6) Duration of daytime is less on the vernal and autumnal equinoxes.

Q. 4. Spot the error in the diagram given below.



Q. 5. Draw a diagram showing the cycle of seasons in the southern hemisphere.

ICT Question :

- (1) Using the internet sites or a calendar, find and note the duration of the day for specific dates between 22nd March and 23rd September. Calculate the duration of the nights too. Using this information draw a compound bar graph.
- (2) Draw a diagram of aphelion and perihelion positions of the earth on the computer.

Activity :

Using the internet, collect pictorial information of any four migratory birds/animals.

9. Agriculture



Can you tell?

Figure 9.1 : A house in a village

See fig. 9.1, and discuss the following questions:

- What all do you see in the picture?
- Why has the family kept goats and hens?
- Which implements are seen in the picture?
- How are these implements used?
- In which major occupation type will the activities shown here be included?
- What could be the main occupation of these people?
- Who could be the owner of the house?
- Which products shown in the above picture do you use daily?

Geographical explanation

In the picture shown above we see a standing crop, a ploughshare, etc. From this, it becomes obvious that this is a farmer's house. A farmer keeps hens, sheep, goats

and cattle. They are also seen in the picture. He gets milk, eggs, etc from them. He sells hens, goats to earn money. He does all this for his subsistence. All these occupations depend on natural factors. All these fall under agriculture. These occupations are supplementary to the cultivation of crops.

Agriculture has a wide scope. For our basic needs of food and clothing we make use of plants and animals. Besides the cultivation of different crops, rearing cattle, sheep and goats, maintaining poultry farms, keeping bees, sericulture, horticulture, orchardry, pisciculture, pig farming, emu farming, etc. are included in agriculture.

In agricultural occupation, resources like manpower, animals, implements, etc. are used. Advanced technology is employed. In agriculture, cultivation of crops is considered to be the main and the most important occupation.



Give it a try.



Figure 9.2 : Traditional and modern agricultural activities

- Observe the pictures given above. What differences do you observe through these pictures?
- What changes have taken place in traditional agricultural practices?

Geographical explanation

In the above pictures, we see the changes in agricultural practices. In the past, primitive man had to wander in the forest to sustain himself on the collected forest produce. Later he learnt the art of cultivation and started getting greater production from the land. Through this, he could provide for the whole year's need for foodgrains. He also started obtaining a number of products through floriculture, horticulture, rearing animals, pisciculture, etc. Abandoning nomadic life, he undertook different occupations related to agriculture at the same place.

Now let us get introduced to the different occupations that come under the scope of

agriculture. We use the products of these occupations in our everyday life. These traditional occupations are allied activities in agriculture.

Animal husbandry:

Rearing different animals and obtaining various products from them for subsistence is the core of animal husbandry.

Dairy farming :

Cows, oxen, buffaloes, etc. are reared for agriculture related work. Rearing milch animals and animals which can be employed in farming is also an occupation. It is considered to be an inseparable part of **mixed farming**. It has become quite commercial in recent times. In India, it has started changing recently. Commercial dairy farming is mainly undertaken for meat and milk.

Sheep and goat rearing:

This is also a traditional occupation. That is generally carried out in hilly tracts and semi-arid regions with dry climate. Sheep and goats survive on short grasses, shrubs and acacia

which grow in remote hilly rural areas away from urban settlements. In India, it is mainly undertaken for meat. Sheep rearing is carried out to obtain wool.

Poultry:

Keeping hens and other fowl is a common practice in all parts of the world. It is a traditional occupation. Today, it is carried out as a household occupation and also on a commercial basis. Running a poultry on a commercial basis requires a lot of care. For this, scientific methods are employed. In India, this occupation is generally located in the areas close to big cities as they provide a ready market for this occupation.

In some areas, rabbit, pig and emu rearing is also undertaken.

Beekeeping:

This occupation is undertaken to obtain honey and wax. Bees, in order to collect honey, hover around the plants that bear flowers. This promotes the process of pollination. As a result, the trees bear large number of fruits and the crop yields increase. Bee keeping is an important occupation with respect to agriculture.

Pisciculture (Fish farming):

Farm ponds are dug out for this purpose. Water is stored in such ponds. Fish seeds are released in the ponds. For this, seeds of freshwater species are used. In order to achieve the best growth of fish, scientific methods are employed.

Fishing in open seas has a number of risk factors. Different types of fish and other aquatic organisms get caught in the fishing nets. Separating them becomes a major task. All organisms do not fetch the same price. All these factors led to the rearing of specific type of fish species separately. Pisciculture developed out of these efforts. Wam, Roha, Rawas (Indian Salmon), Kolambi (Prawns), etc. are reared in fish farms.

Sericulture:

Silk thread is obtained from the cocoon of the silk moth. These threads are very fine and strong and from these one can weave soft silk cloth. Getting silk thread from cocoons and manufacturing silk cloth are independent occupations. They are not included in agriculture. Different organizations supply silk moth eggs to the farmers. Leaves of mulberry trees are the main food for these silk worms. Once planted, the Mulberry trees survive for a minimum period of 15 years. Hence, the expenditure of planting the trees every year is saved.

Nursery:

In the last few years, the area under floriculture, cultivation of medicinal and aromatic plants and horticulture has increased. These plantations require a high standard of seedlings, cuttings, bulbs and seeds. This has led to the development of nurseries. Nurseries give good returns.



Figure 9.3 : Nursery



Do you know ?

Greenhouse farming: Greenhouse farming facilitates getting maximum product from the land. It can have a total control on natural factors like climate, heat, atmospheric moisture as well as soil moisture. It assists in getting maximum economic benefits. Greenhouse farming is highly specialized type of farming of the modern era. For erecting a green house

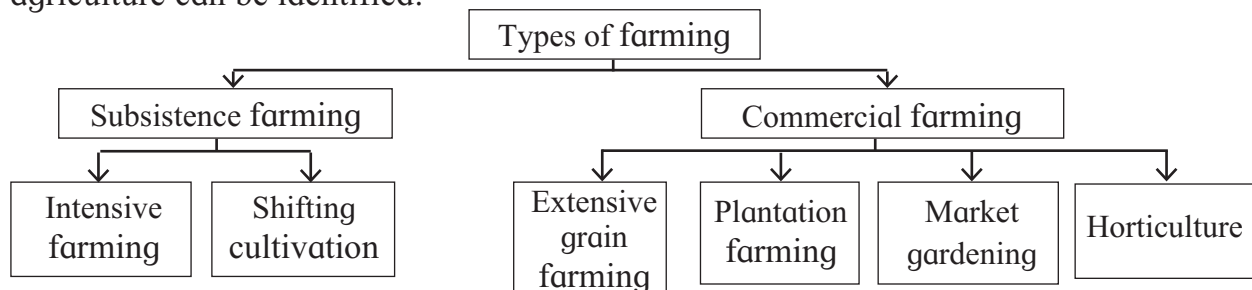
galvanized iron pipes and plastic sheets are used. Its main aim is to control the pest attack by controlling water, light and temperature. Green houses are used on larger scales for growing flowers like lily and gerbera to give maximum economic returns.



Figure 9.4 : Greenhouse farming

Types of farming :

Different types of agriculture have evolved due to geographical and cultural diversity, and technological differences in different regions. The type of farming depends upon the purpose and aims of methods of farming, the crops being cultivated, the techniques used, land use etc. Broadly, the following types of agriculture can be identified:



Subsistence farming:

Intensive farming and shifting cultivation are the two types in traditional farming. Intensive farming is carried out in one and the same farm for years together. In shifting cultivation, every year a new area is chosen for cultivation. After a specific period of time, old areas are again used for cultivation.

Intensive farming:

Getting maximum production from a minimum area is the characteristic of intensive farming.

- ❖ Due to large population or limited availability of land, per head holding is small.
- ❖ This type of farming is mostly seen in developing regions.
- ❖ Farm production is sufficient only for the requirement of the family.
- ❖ In this type of farming, the cultivator and his family are totally dependent on farming. As farm production is low, the economic condition of the cultivator is also poor.



Figure 9.5 : Terrace farming

areas or hilly tracts. The farmer initially selects a piece of land in the forest. In order to make it cultivable, he clears the land by cutting down the trees, plants, removing the shrubs and grass. Once the cut trees dry out, he burns them. The left over ash gets mixed in the soil and acts as manure. Sowing and harvesting is done before the rainy season (See fig 9.6). The production obtained from this is not sufficient to fulfil the food requirement. Hence people undertake hunting, fishing and gathering of bulbs and roots from forests. In this type of farming, the fallow period is longer than the crop period. After the productivity of the land depletes in two to three years, a different piece of land is selected for cultivation.

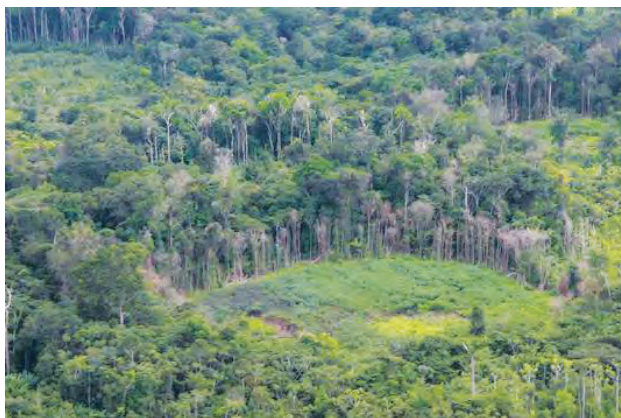


Figure 9.6 : Shifting cultivation

Commercial farming:

Extensive grain farming and plantation agriculture are the two major types covered under commercial farming.

Extensive grain farming:

- ❖ Farm size is greater than 200 hectares.
- ❖ Due to large farm size and sparse population in the region, this type of farming is carried out with the help of machines like tractors and crushers. Pesticides are sprayed with the help of helicopters or planes.
- ❖ Monocrop (a single crop) cultivation is the striking characteristic of this type of farming. The crops are wheat or corn. Besides these, barley, oats, soyabean are also cultivated to some extent.



Figure 9.7 : Mechanisation in extensive farming

- ❖ Heavy capital investment is necessary for this type of farming. Since huge expenditures are needed for the purchase of machinery, fertilizers, pesticides, godowns, transport cost etc.
- ❖ The problems in extensive grain farming are droughts, attack by pests, locusts, etc. and market fluctuations.
- ❖ This type of farming is carried out in the temperate grassland regions.

Plantation farming:

- ❖ Farm size in plantation agriculture is 40 hectares or above.
- ❖ As plantation agriculture is practised in hilly tracts, use of machines is not possible, and hence local manpower becomes important.
- ❖ The crop for which the geographical conditions are favourable is planted. This is a single crop-cultivation practice too.
- ❖ This type of agriculture does not produce food grains. Only commercial crops like tea, rubber, coffee, coconut, cocoa, spices, etc. are planted.
- ❖ This type of farming began and spread mostly during the colonial period. It is practised in the tropics.
- ❖ This type of farming requires large scale capital investment due to the long duration of crops, use of scientific methods, exportable production, processing etc.
- ❖ Climate, manpower, deterioration of environment, economic and managerial problems are the major issues faced by this type of agriculture.
- ❖ This type of agriculture is practised in India and other South Asian countries, Africa, South and Central America, etc.



Use your brain power!

- ☞ Why does extensive commercial farming need more capital?
- ☞ Why does plantation farming need skilled and experienced labour?

Market gardening:

Market gardening is a type of cultivation developed in modern times. This has developed mainly as a result of urbanization and the ready markets available in urban centres. Farmers cultivate vegetables and other items in the vicinity of urban centres to cater to the demands of city dwellers. This type of cultivation works on a principle of economics – demand and supply. The landholding is small. Use of irrigation, organic and chemical fertilizers, low investment, use of manpower, demand of



Figure 9.8 : Market gardening

markets, use of science and technology etc. are the characteristics of market gardening. It is dependent on good transport network. The quality and price of the product is determined by rapid transport. Hence, this type of farming is also known as ‘truck farming’.

Horticulture/Floriculture:

Cultivation of flowers and fruits is a subtype of market gardening. Fruits and

flowers are the major products of this type of farming. In this type of farming modern as well as traditional methods are used. The size of farms is small and every plant is cared for properly.



Figure 9.9 : Floriculture

In recent times, use of irrigation, chemical fertilizers, green houses etc. is being made for getting more profit (See fig. 9.9). Major products of horticulture are flowers like lily, gerbera, tulip, dahlia, chrysanthemum, marigold, etc. These fetch a good price in the market.

Different native and exotic fruits like mangoes, custard apples, grapes, bananas, pomegranates, dragon fruits, cherries, oranges, raspberries, strawberries, mulberries etc. are cultivated in fruit farming (See fig. 9.10) at places like Mahabaleshwar, Panchgani, Pune, Nagpur, Jalgaon, Nashik etc. Countries having Mediterranean climate, France and Italy are famous for horticulture.



Figure 9.10 : Orchardry



Do you know ?

Organic farming:

The nutrient requirements of the crops is fulfilled by soil and therefore, replenishment of used up nutrients is necessary. Nutrients are also used abundantly to increase the yield. Organic fertilizers are prepared for this purpose.

- ❖ The litter should be decomposed in the ground.
- ❖ Grasses like sesbania or jute are also buried in the soil for making manures
- ❖ Cowdung and compost manures are used.
- ❖ Vermicompost is obtained from organic waste.

When farming is done using all vestal matter mixed in the soil it is called organic farming (See fig. 9.11).

For controlling pests, organic pesticide like neem can be used. The crop obtained from organic farming is high in quality. Chemical fertilizers and pesticides are not used in such a type of farming.



Figure 9.11 : Preparing organic fertilizers



Can you tell ?

Observe the pictures in fig. 9.12 and briefly describe the type of agriculture shown in the picture. Use the space below the picture.



Figure 9.12 :

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Agrotourism:

Agrotourism is a new field in tourism. In the tropics, various types of agricultural products are cultivated. Hence there is greater scope for agrotourism. In agrarian countries the rural life, local customs and culture are utilized for agrotourism (See fig. 9.13).

City dwellers are curious about the farmer's life and environment. Many of them visit rural areas just to see this. Agrotourism is financially beneficial for the farmer and his village.



Figure 9.13 : Agrotourism

Use your brain power !

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 <input type="checkbox"/>	 <input type="checkbox"/>	 <input type="checkbox"/>
 <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	 <input type="checkbox"/>
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Figure 9.14 : Choose one in each pair.

Observe the pictures of some fruits and vegetables given in figure 9.14. Tick the ones you like. Later, discuss your choices.

(For teachers: Brief the students about artificially ripened items and naturally ripened items.)

Geographical explanation

After the discussion, you may have realized that those fruits and vegetable that look fresh and attractive may not have been ripened using proper methods. At times, in

order to get the produce earlier, artificial chemicals, pesticides are employed profusely. These facilitate quicker production and the produce appears fresh and attractive. However, such products are harmful to health. Also they do not last long after purchase.



Give it a try.

Write a paragraph on the basis of the following questions:

- Which improper practices arising out of man's greed are observed in agriculture?
- What means of irrigation are available in your area?
- Have you observed the wastage of water in agriculture? If yes, describe it.
- Which steps can easily be taken to avoid improper practices in agriculture?

Geographical explanation

Marketing systems:

Marketing systems are necessary for making the goods produced by the farmers available to the consumer at a fair price and in time. The importance of marketing system in countries like India will become clear from the following points.

- ❖ Agriculture in India is scattered over vast areas.
- ❖ All farmers are not organized.
- ❖ Most of the farmers are economically weak and cannot market their production on their own. That is why, the system of Agricultural Produce Market Committees is established at the taluka level. At these places, farmers bring their produce and sell to the traders.
- ❖ As farm produce is perishable, there has

to be a proper arrangement for its sale. Institutes like farmer's organizations, consumer societies, etc. help in this task and try to protect farmers from the exploitation by agents, mediators and others.

Some of the farm produce is directly used by industries as raw material. International markets are now becoming easily available for farm produce due to globalization. Many progressive farmers are using the modern technology in their farms. Also, they sell the produce with proper packaging. Hotels and malls also require agricultural produce on a large scale. By advertising on the internet, their products get sold in local as well as international markets.



Do you know ?



Figure 9.15 : Farming in Israel

Israel is a major exporter of fresh farm produce. It is the most advanced country as far as agricultural technology is concerned. It has adverse climate, severe scarcity of water and more than half its land is occupied by hot deserts. But, overcoming all these unfavorable conditions and persistently following the path of modernization of agriculture it has taken a giant leap in the field of agriculture.



Use your brain power !

- In what different ways is ground water obtained for agriculture ?



Look for me elsewhere!

☞ Class 4 Environmental Studies (Part One)
'The Value of Food' chapter.

☞ Class 5 Environmental Studies (Part One)
'Food for All' chapter.



Exercises



Q. 1. Select the proper option for the following statements.

- (1) In which of the following type of farming are the crops rotated?
 - (a) Intensive. (c) Commercial.
 - (b) Plantation. (d) All of these.
- (2) Agriculture requires the following:
 - (a) Only ploughing
 - (b) Use of animals, implements, machines and manpower.
 - (c) Use of only manpower.
 - (d) Just cultivate the crop.
- (3) In India, agriculture has developed because....
 - (a) There are two seasons of agriculture in India.
 - (b) Majority of the people depend on agriculture.
 - (c) Traditional agriculture is practised in India.
 - (d) In India factors like climate, soils, water, etc. are conducive.
- (4) It is necessary that modern methods and technology be used in agriculture in India because....
 - (a) There are factories producing improved seeds.
 - (b) There are industries producing fertilizers
 - (c) Population is growing and there are agro-based industries.
 - (d) Modern means and machines are available.

Q. 2. Give short answers for the following questions.

- (1) Describe the importance of irrigation for agriculture.
- (2) Give a comparative account of any two methods of irrigation.
- (3) Mention the major types of farming and give information about intensive farming and extensive grain farming.
- (4) Describe the characteristics of plantation farming.
- (5) Which are the crops cultivated in your area? What are the geographical reasons for that?
- (6) Why is the agriculture in India seasonal in nature? What are the difficulties for perennial agriculture?

Activity:

Visit a farm where modern technology is used for agriculture. Collect information about it.

Use of ICT

- (1) Collect the pictures of improved seeds and means of irrigation from the internet.
- (2) Collect information regarding agricultural in Israel from the internet. and present it.

10. Human Settlements



Try this.

Look at the following picture. Find suitable locations for human settlements and show them in the picture.

(For teachers – Discuss the students' assumptions and conclusions as also the questions on the pictures given below.)

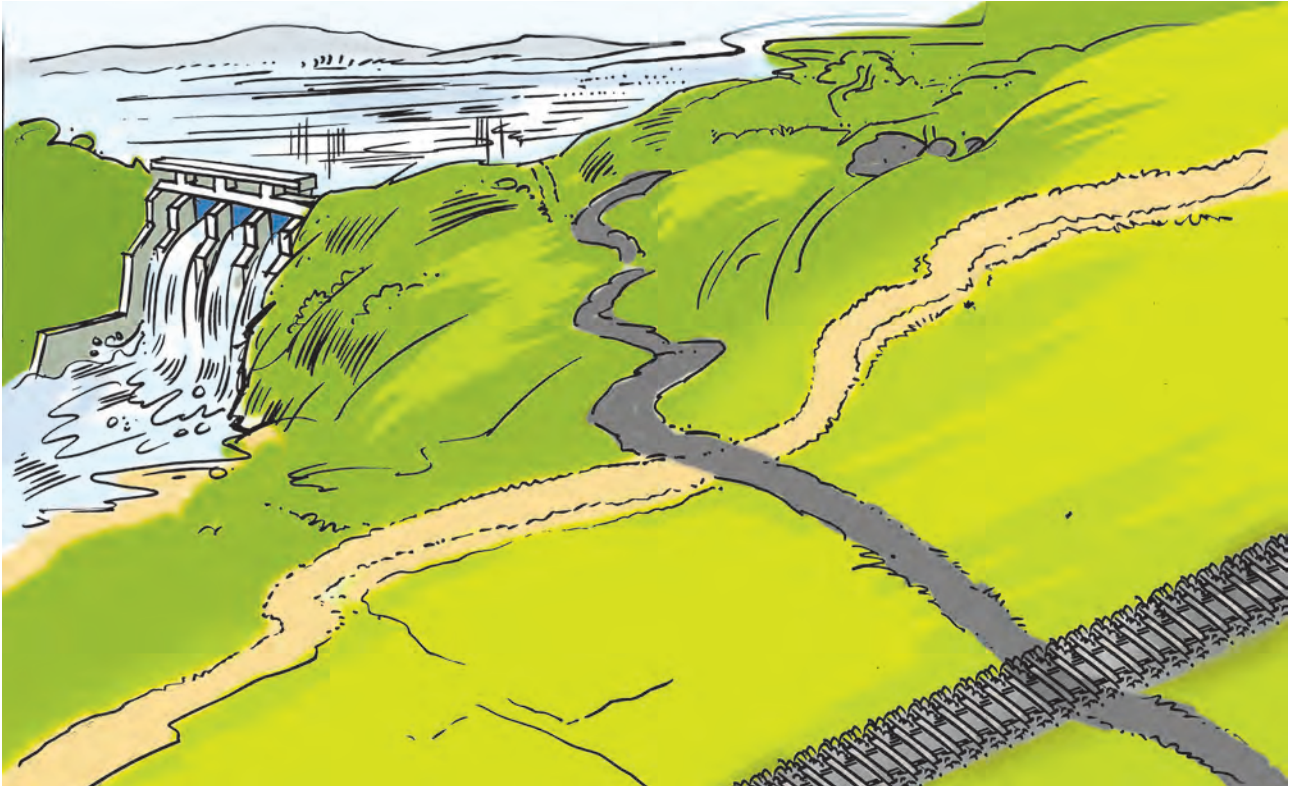


Figure 10.1 : Show settlements at suitable locations.

Why were the settlements shown at the specific places? Why should they be located there? Why can't they be located in other places?



Can you tell?

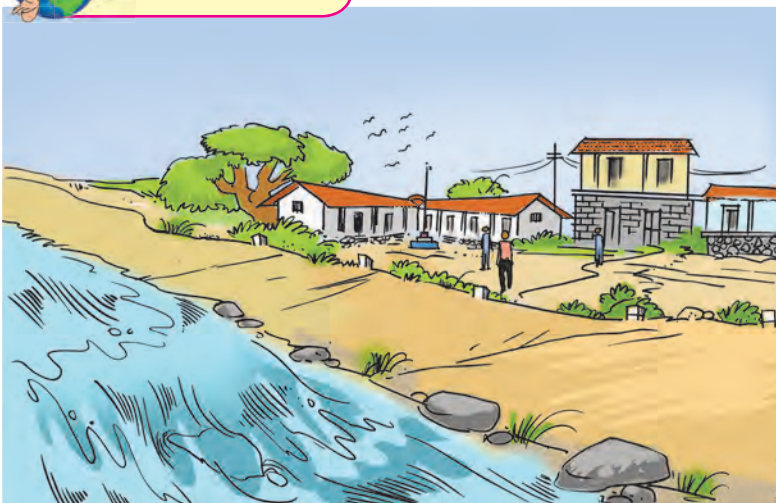


Figure 10.2 a :



Figure 10.2 b :



Figure 10.2 c :



Figure 10.2 d :

Observe the pictures given in figures 10.2 (a, b, c, d). Think and answer the following questions :

- What all can you see in the pictures?
- What are the familiar features?
- Which picture shows sparse settlements?
- Which picture shows agriculture?
- Which picture shows dense settlements?
- Which picture shows high rise buildings?
- From the following, assign a suitable names to each of the pictures : Rural settlement, Tribal hamlet, Town, City
- Arrange the pictures according to the level of development in the settlements.

Geographical explanation

Human settlements flourished at places with favourable geographic conditions – such as availability of water, a conducive climate, fertile land etc.

In the early settlements, the occupations of the people were dependent on the locally available natural resources. This gave rise to separate settlements of people engaged in a particular occupation. For example, people along the sea coast are engaged in fishing. Their settlements became fishing hamlets (Koliwada). Forest dwellers or tribal people use forest produce for their livelihood. They

live in forest areas in ‘tribal hamlets’ (Adivasi padas). Agriculture is practised in fertile areas. Farmer families build their houses in or near their fields. These settlements gradually grow bigger. The settlements where the original occupations of the majority of the people are based on natural resources are called rural settlements. Agriculture, fishery, etc are some of these occupations.

With the passage of time, other associated occupations also develop gradually in these rural settlement. As a result, people from surrounding areas migrate and settle there leading to an increase in the rural population. Houses are built and different facilities are developed for the growing population. Importance of secondary and tertiary occupations increases, the proportion of people engaged in primary occupations declines. This process leads to the transformation of rural settlement into urban settlements. Due to religious, historical, commercial, educational, and administrative reasons and also due to tourism, the original settlement may transform into an urban one. If the population and the necessary amenities increase on a large scale, the urban areas grow into metropolitan cities.



Can you tell?

Observe fig. 10.3 and discuss the following questions:

- What is the difference between the human settlement at A and B?
- What is the difference between the settlements at B and C?
- Where do you find less than 2 houses?
- In what type of settlement do you live?

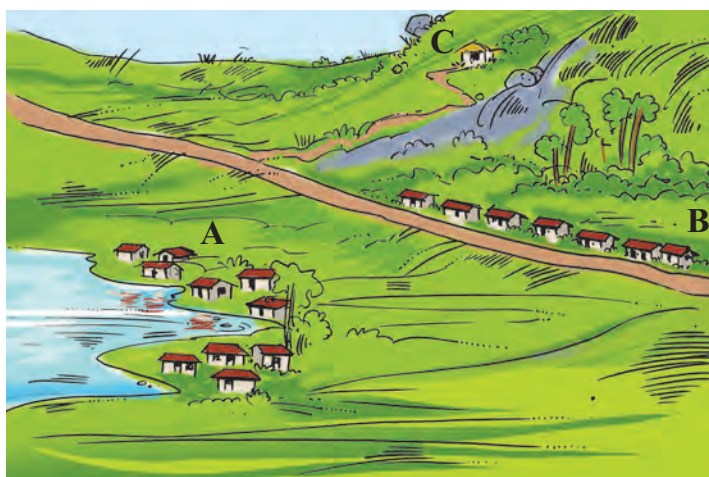
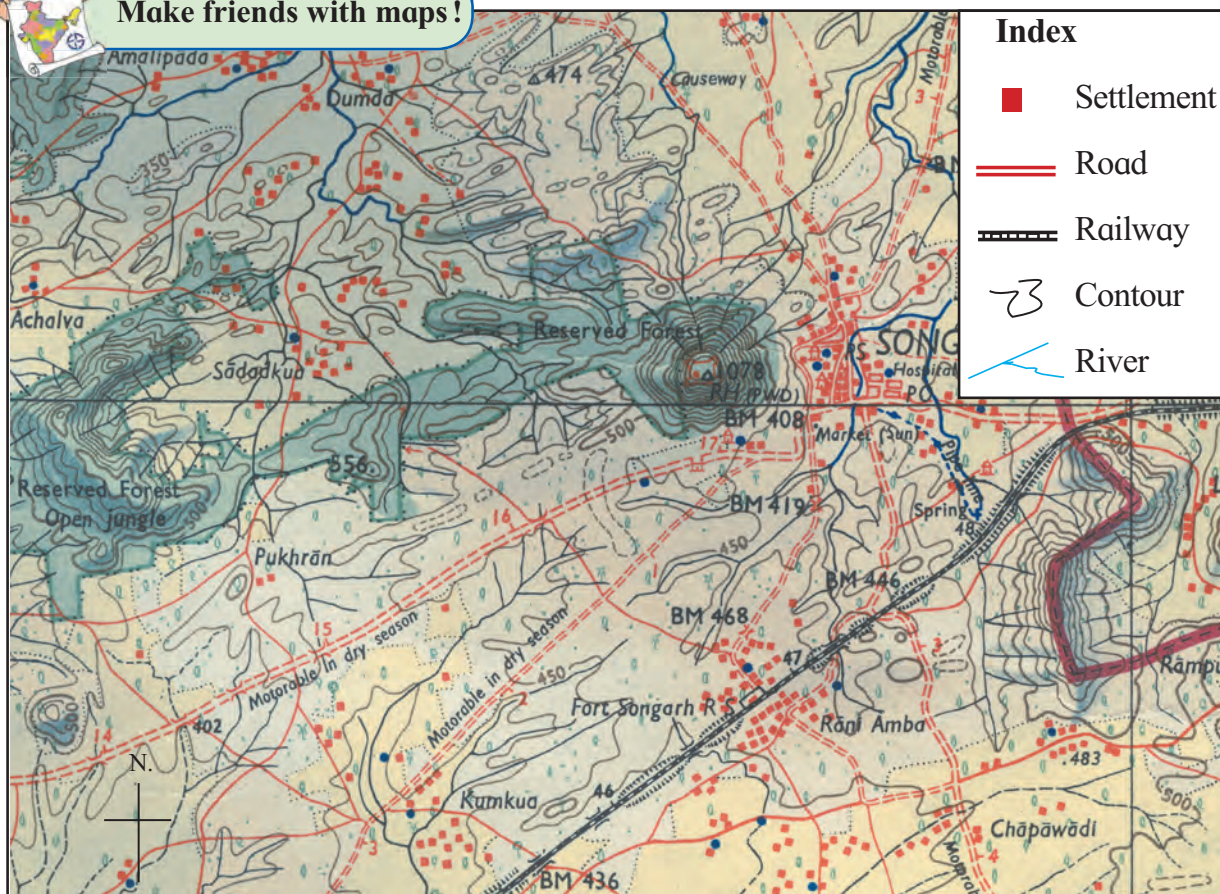


Figure 10.3 : A type of settlement



Make friends with maps!



Observe fig. 10.4 and answer the following questions.

- Name some of the settlements shown in the map.
- Which of the settlements in the map are in a scattered form?
- How are the houses in the settlements along the roads arranged?

- In which settlements are the houses close together? What could be the reason behind this density?
- Can you now classify the settlements on the basis of these patterns?

After considering various settlements, we realize that people settle down in different geographical conditions and adopt

themselves to the conditions in the region. **Patterns** of human settlements evolve in accordance with the natural conditions. In this lesson, we are going to study the major patterns of human settlements and the reasons behind them.

Geographical explanation

Using the resources from the surroundings, man constructed houses and started living in them. In the modern era of science and technology, people have made a remarkable progress in the construction of shelter. They have even built sky-scrapers. Man is thinking of constructing colonies on other planets and their satellites, too, in future.

Settlements have provided man with stability. Rural settlement is the first step towards a stable life in human history. Urban settlements have evolved through the expansion and growth of rural settlements. A certain way of life is preserved in rural settlements. Increase in the population of rural settlements is the beginning of urbanization. Life in urban settlements is more dynamic. There are large scale economic correlations between rural and urban settlements. The day-to-day food requirement of the urban population is fulfilled by rural settlements. Modernization, science and technology lead to transformation in both types of settlements.



Think about it.

Think about the possible processes that take place during the growth and development of settlements. Make a list of such processes.

The types of settlements and the characteristics of their distribution can be described as follows:

Scattered settlements :

In scattered settlements, houses are few and far from each other. Generally, such settlements are found in the areas of high relief, dense forests, grasslands, hot deserts, and extensive agricultural lands (See fig. 10.5).



Figure 10.5 : Scattered settlement

Characteristics:

- ❖ Distance between scattered settlements can be clearly seen.
- ❖ These settlements have limited populations as in small hamlets. (*pada, wadi*, etc.).
- ❖ Facilities and services in these settlements are not adequate.
- ❖ As these settlements are closer to nature, they are free from pollution.
- ❖ They depend on the centrally located villages for their day-to-day requirements.

Nucleated settlements :

These settlements are generally close to water sources like brooks, rivulets, rivers, lakes, reservoirs etc. In the deserts of Rajasthan we find nucleated settlements near assured sources of water. Fertile plains, transport hubs and mining centres, commercial centres often lead to the development of this type of settlement. Besides these reasons, defense, health, education, and other social and religious factors can also give rise to nucleated settlements. (See fig. 10.6.)

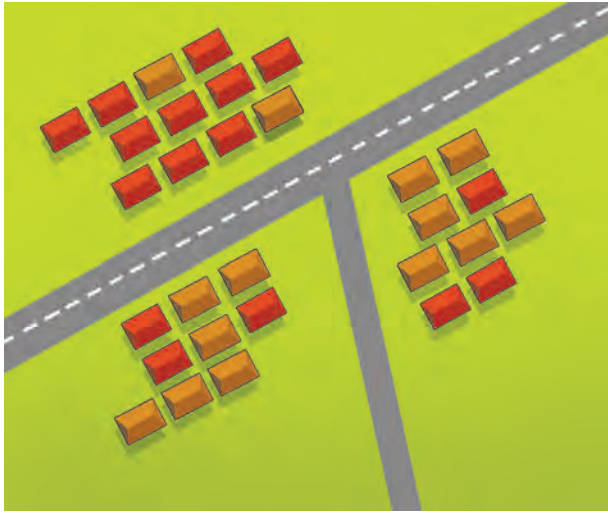


Figure 10.6 : Nucleated settlement

Characteristics:

- ❖ In these settlements, houses are close together.
- ❖ Social services are available in these settlements.
- ❖ As these settlements develop in certain places over certain periods of time they attain particular shapes.
- ❖ Roads are narrow in the old parts of these settlements .
- ❖ People from different castes, religions, races and ideologies live together in these settlements and hence they have a better social life.

Linear settlements:

Linear settlements are seen along roads, railways, rivers, sea coasts and in foothill regions etc. These types of settlements are

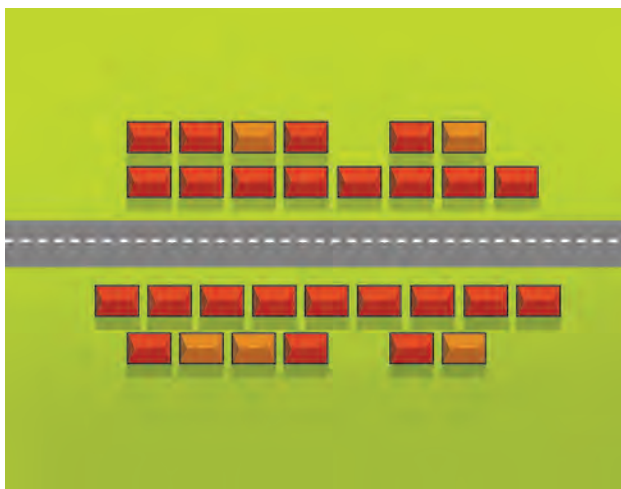


Figure 10.7 : Linear settlement

narrow in shape and they spread along a straight line (See fig. 10.7).

Characteristics:

- ❖ Houses in these settlements are along a single line. As the settlement grows in the course of time, multiple lines emerge.
- ❖ Roads are parallel to each other.
- ❖ Besides houses, some shops can be seen too.
- ❖ These settlements grow along with the roads. For example, such settlements are found along the coastal tracts, major rivers and National or State highways in our country.



Always remember –

Factors influencing the location of human settlements:

Physical	Cultural	Economic
<ul style="list-style-type: none"> ● Physiography ● Land / soils ● Climate ● Water supply ● River banks 	<ul style="list-style-type: none"> ● Defense ● Health ● Education ● Tourism ● Historical significance 	<ul style="list-style-type: none"> ● Irrigation ● Occupations ● Transport and communication ● Industries ● Trade ● Government offices



Give it a try.

- Name the metropolitan cities of India.
- Identify the type of the settlement where you live.



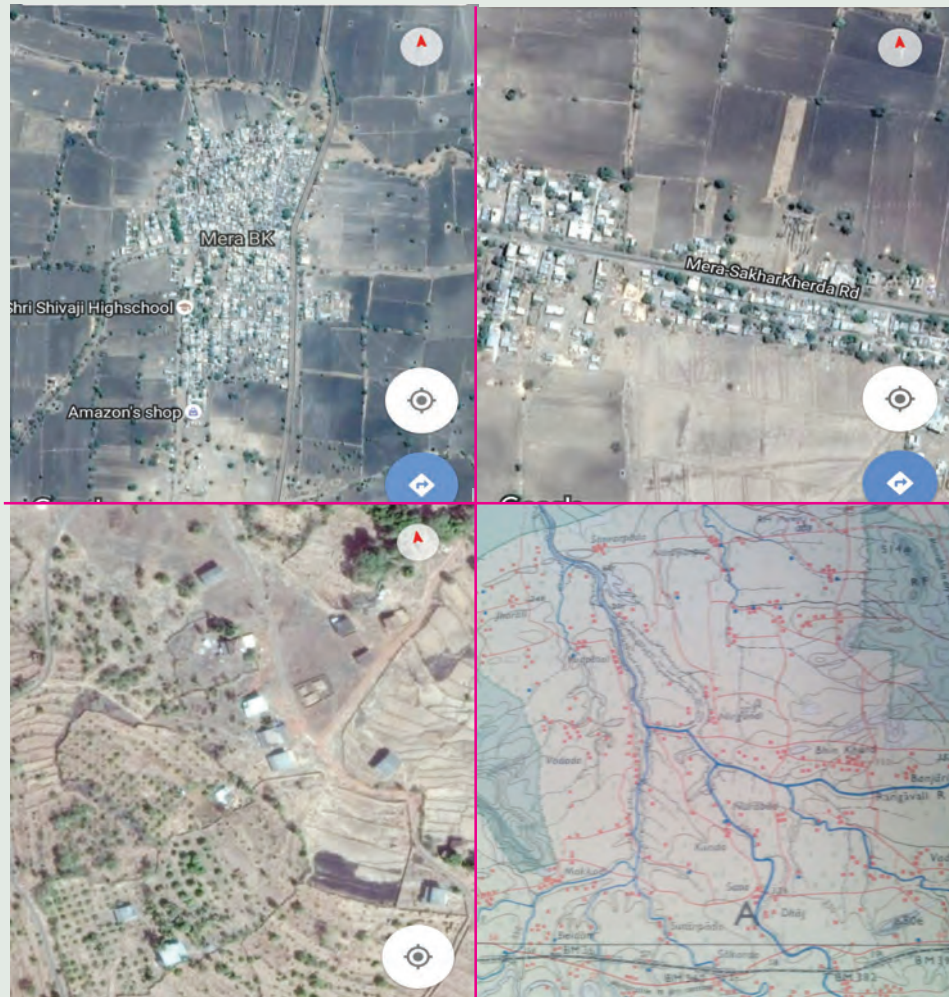
Look for me elsewhere!

- 👉 Std III– Environmental Studies– Lesson – Our village, our city.
- 👉 Std V– Environmental Studies – Part One– Page 42



Give it a try.

Observe the photographs given below. Identify the type of settlements shown here and write about them.



Exercises



Q.1. Answer in short.

- (1) Explain the various types of human settlements.
- (2) Differentiate between nucleated and scattered settlements.
- (3) Explain the natural factors affecting the location of human settlements.
- (4) Explain how human settlements have evolved.
- (5) Differentiate between a hamlet and a village.

Q. 2. Identify the types of human settlements from the following statements.

- (1) Their money and time is saved by living on the farm.
- (2) There is a lot of social life in this settlement.
- (3) Shops are located on both the sides of the road.
- (4) This settlement is found at the foothills of mountains or along the coast.
- (5) Each house is located away from the other.

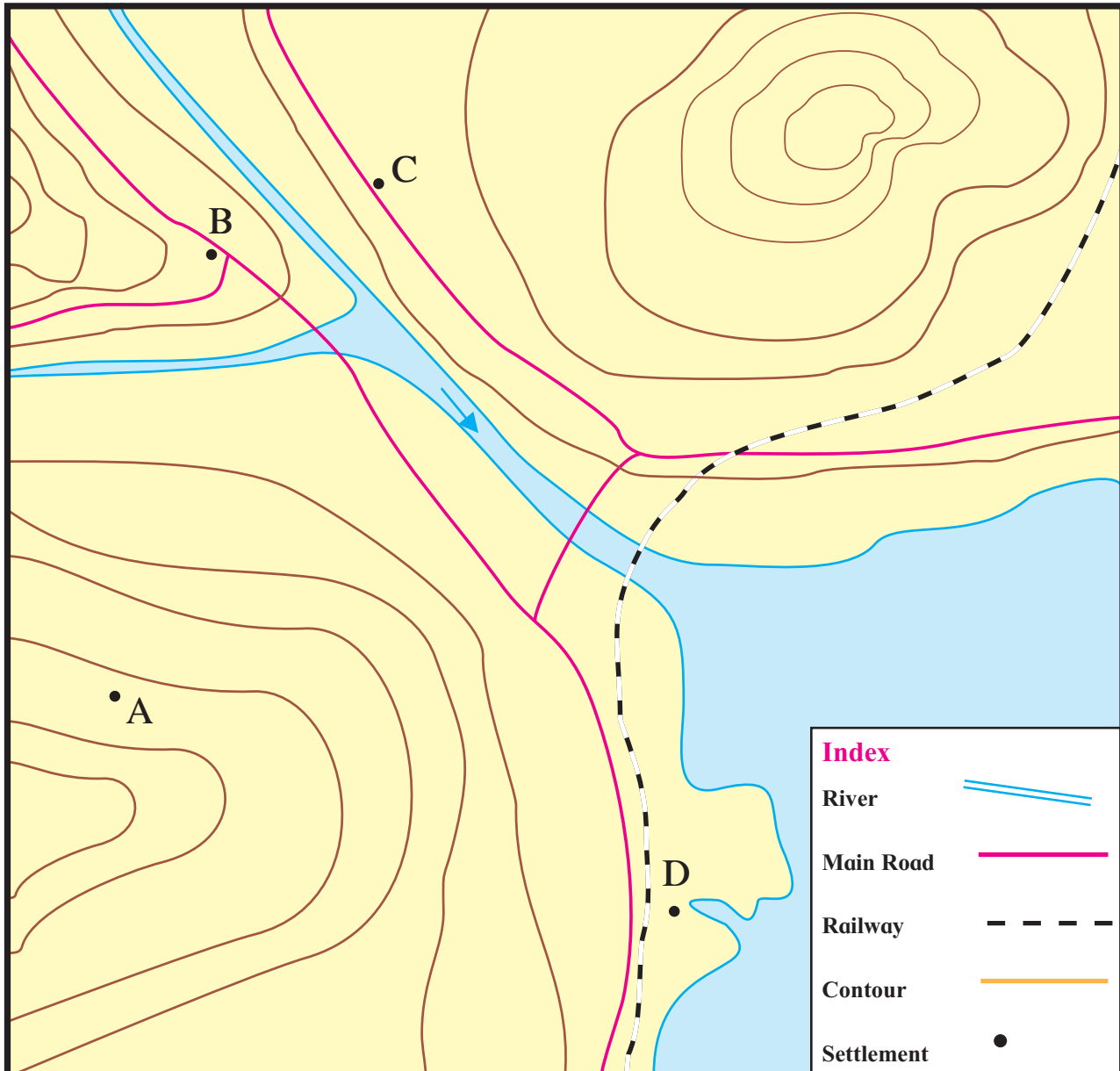
- (6) This settlement is good from a security point of view.
- (7) Having houses away from each other is good for health.
- (8) The houses are too close to each other.

- (B) 'B' has a high school, a big market and a small theatre.
- (C) 'C' has houses, farms, many shops and small industries.
- (D) 'D' is a natural harbour. Many industries have been established there.

Q.3. Study the diagram and identify the types of settlements.

(A) Settlement 'A' has 5-6 houses and the place does not have other facilities.

- * 'C' is a settlement that has developed along the roadside. Give two reasons of its location here.



ICT Activity :

With the help of the internet, find the image of your village/city. On that basis, write about

the type and characteristics of your settlement.

11. Contour Maps and Landforms

In Standard V, you have gathered some information about how height and relief are shown on a map. Now carry out the following activity on the same topic under the guidance of your teacher.



Try this.

(For the teacher: Carry a few large potatoes to the class. Make groups of the students and distribute the potatoes among the groups.)



- ❖ Take a large oblate shaped potato and other required items as shown above.



- ❖ Observe how a potato appears when seen from the front and when seen from above? Draw an outline of the potato in your note book.



- ❖ Cut the potato into two parts so that each part has a flat base.



- ❖ Rest the cut half on its flat base and measure its height in millimetres.



- ❖ This is our 'potato hill'. The tapering side of the potato is the hill top.



- ❖ Draw two circles, each going round the hill, one near the top, and the other close to the base. Keep sufficient distance between the circles. The circle near the top will be smaller.



- ❖ Now the teacher will slice the potato on these circles.



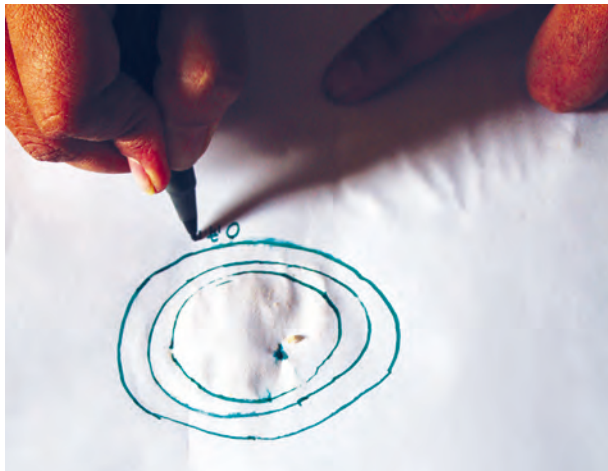
- ❖ Do not separate the slices. Insert a toothpick or a piece of pointed stick through the slices vertically.



- ❖ Without removing the toothpick, place the sliced potato on a piece of paper. Moving a pencil along the edge of the lowest slice draw, its outline. It will be nearly circular in shape.



- ❖ After drawing the outline, pull the toothpick upwards. Remove the lowest slice delicately and keep it aside. Repeat the same procedure for the other two slices.

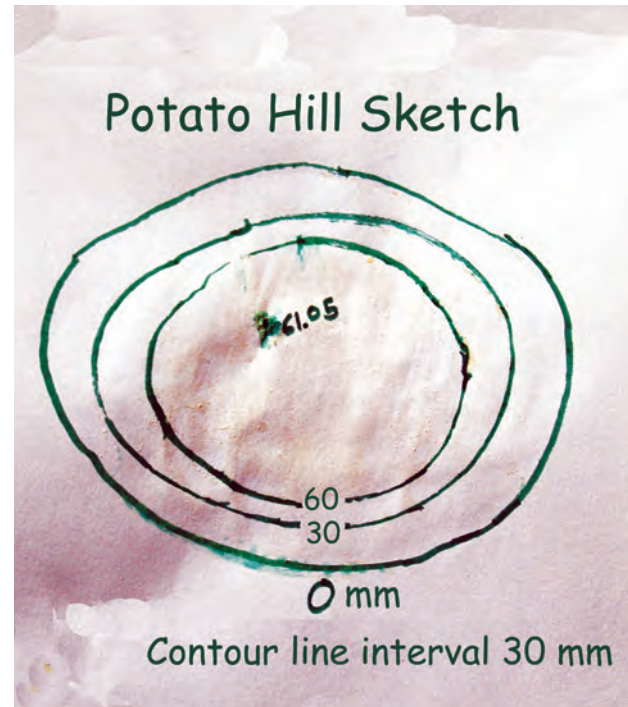


- ❖ Observe the figure that is formed after the exercise is complete. You will note that you have drawn three concentric circles.

Write the height of the potato that you had measured earlier in the centre of the innermost circle. Measure the thickness of all the slices you have kept side. Give value '0' (zero) to the outermost circle. How will you give the values to the other lines? Think about it. Do you think that the thickness of

each slice that you have measured can help you?

After assigning values to each circle, our sketch of the potato hill will be complete.



Think about it.

- 👉 What did we achieve in this activity? We have transferred a three dimensional object – the potato – into a two dimensional picture.

In reality it is not possible to make the slices of a mountain or any other landform and place them on paper or on the ground to draw a two dimensional picture of that landform. For this, mathematical and survey methods are applied. You will learn about these methods if you study Geography as a special subject at a later stage.

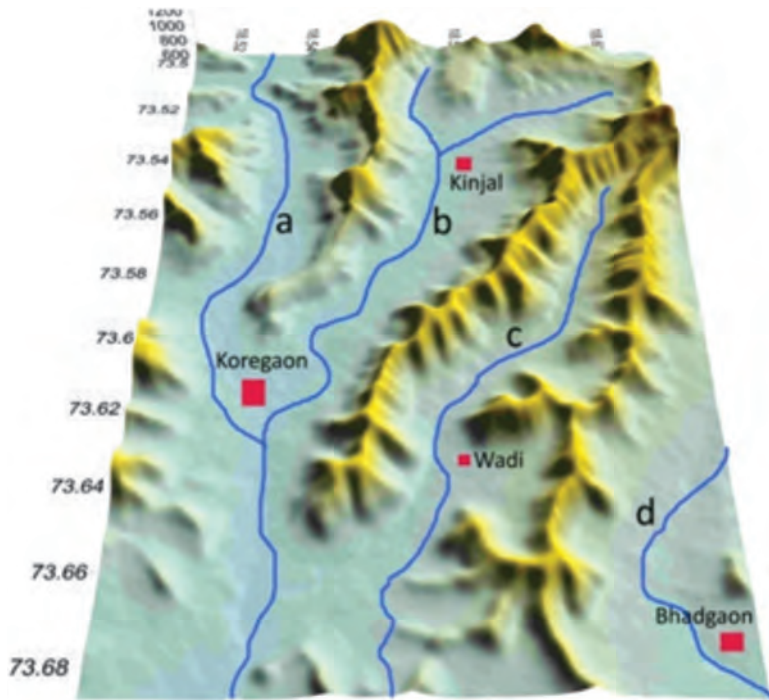


Figure 11.1 a : A model of the earth's surface



Figure 11.1 b : Contour line map

A model of the relief in an area is shown in fig 11.1 (a) given above. Observe it carefully and answer the following questions.

➤ Which landforms do you observe in the model?

➤ Which colours have been used on them?

Observe the map given in fig. 11.1 (b) and answer the following questions.

➤ What all do you see in the map?

➤ What is the general direction of the ranges shown in the map?

➤ Towards which direction is the flat land located in the map?

➤ What are the maximum and minimum values of the lines in the map?

➤ What do these values indicate?

➤ Do you find any similarities in the map and the model in fig. 11.1(a)?

What are those?

➤ Which figure gives us more information and what is that information?

➤ Is there any similarity between this map and the sketch map of the potato hill?

Geographical explanation

While studying different landforms on the surface of the earth, one has to take into consideration various facets of landforms like altitude, relief, slope, direction of slope and the drainage. For this, maps prepared using particular methods are used. These are known as contour maps. These maps help us to understand the above characteristics of the landforms. These maps are of immense use to mountaineers, trekkers, soldiers, defense officers, etc. These maps prove to be of great use in the planning for a region too.



Use your brain power!

When one sees a landform on a contour map, what is the observer's position with respect to the landform? (For example, a hill is shown with the help of contours on a map. From where do you think you are looking at it?)



Figure 11.3 a : A model of the Karha river basin, Saswad



Figure 11.3 b : A map of the Karha river basin, Saswad

A 3D model is given in fig. 11.3 (a). The northern part of the model shows the basin of the rivers Mula-Mutha. To its south is the Katraj-Diveghat range extending from the west to the east. Beyond that some portion of Karha basin is seen.

(Observe this model and the map (fig. 11.3 (b)) given below it and answer the following questions.)

- In which direction does fort Purandar lie?
- What is the direction of flow of the river Karha?
- In which parts are the hill ranges not observed?
- Which part of the map is not seen in the model? Why?
- In which direction does the altitude of Katraj-Diveghat range decrease?
- In which direction are higher hill ranges located?

While finding answers to these questions, you will become familiar with the contour lines and you will be able to identify major landforms shown by the contour lines.

- Find the altitude of your place above mean sea-level (in metres).

You have to draw contour lines from mean sea-level to your place. The interval of the contour should not be more than 50 m. Determine how many lines you will draw for this.

- Friends, consider you have gone for mountaineering. You have to conquer a peak on the hill 'A'. A map of this hill is given (figure 11.4). Studying the contour lines in the map, find the side from which you will reach the peak safely and easily. Mark your path on the map with a pencil.

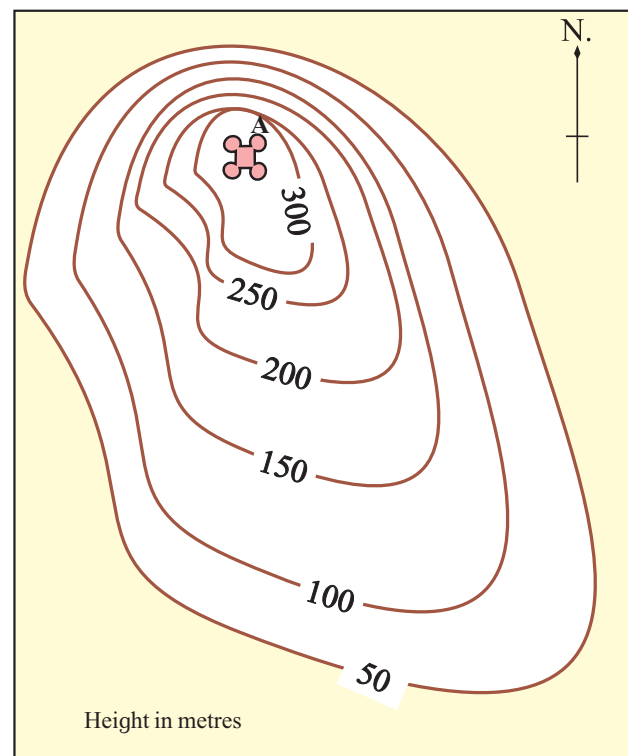


Figure 11.4 : Contours (Hill)



Always remember–

Contour lines join places with the same altitude on a map. Therefore, generally they do not cross each other.



Look for me elsewhere!

👉 Class Five Environmental Studies – Part One– page 39-41



Exercises



Q.1. Answer the following questions.

- (1) How can the distribution of the height and landforms in a region be shown?
- (2) To whom are the contour maps useful?
- (3) What do you understand by observing contour lines?
- (4) How will a contour map be useful for a farmer?

Q.2. Fill the blanks with appropriate words.

- (1) If the contour lines are closer to each other, the slope is
- (2) The contour lines on the map represent
- (3) The slope can be understood from the distance between the
- (4) If the distance between two contour lines is more, the is gentle.

GLOSSARY

- **Agent:** A person acting as a link between a producer and a consumer. The consumers of any product are not located in one region. They are scattered over a vast area. In such situation it is difficult for the producer to reach the consumers. Therefore, it becomes necessary to have a link between the producers and consumers. The agents are this link.
- **Agriculture:** Agriculture is a comprehensive term. It includes farming and many allied occupations. Animal husbandry, dairy farming, pisciculture, sericulture, nursery, etc. come under the scope of the term agriculture.
- **Agro-tourism:** In this form of tourism, the most important aspect is to obtain the information about agricultural activities by actually visiting a farm or a meadow. People are curious about knowing how the food they consume is produced. It is out of this curiosity that agro-tourism has developed. It is the first experience for most visitors especially for youngsters. For a few decades, agro-tourism has become popular in India. Agro-tourism Development Corporation works for the spread of this form of tourism. By 2014, around 214 centers for agro-tourism in rural settlements have been started in Maharashtra.
- **Air pressure:** Air has weight and any object or material having weight exerts pressure on the thing / material that lies below it. Air exerts pressure on the lower layers of atmosphere and the earth's surface. Air pressure is measured in millibars. The air pressure at the sea level is 1013.2 mb.
- **Annular eclipse:** The sun disc does not get totally covered by the moon if the moon is in its apogee position (at the farthest distance from the earth). Moon's shadow does not reach up to the earth. As a result in such a situation only the rim of the sun disc remains visible from a very narrow portion of the earth. This illuminated rim appears like a ring. Hence this type of solar eclipse is called annular solar eclipse.
- **Anti-cyclone:** At times, the air pressure in a region increases more than the surrounding areas. Under such conditions, winds blow from the central high pressure areas towards the low pressure in the surrounding areas in a circular manner. Such winds moving outwards from the central regions in a circular manner are called anticyclones.
- **Antipodal point:** A point that is located diametrically opposite to a given point. Such a point is fixed with reference to an imaginary line in the form of the diameter of the earth. For any or every point on the surface of the earth, there exists an antipodal point on the earth's surface.
- **Aphelion:** A position of the earth on its elliptical orbit when it is at the maximum distance from the sun. This position occurs in the month of July.
- **Apogee:** A specific position of the moon on its orbital path with respect to the earth. In this position the moon is at its farthest distance from the earth.
- **Autumnal equinox :** One of the positions of the earth on the orbital path, relative to the sun. This position occurs on 23rd September. In this position both the poles of the earth are equidistant from the sun and the sunrays are perpendicular at the equator. The duration of nighttime and daytime are equal all over the earth.
- **Barometer:** An instrument used to measure air pressure. Air pressure is measured in millibars. There are different types of barometers in use. In some barometers, vacuum boxes called aneroids are used. Air pressure suppresses the aneroids and this pressure is expressed on a plate with markings by an indicator.
- **Bedouin People:** A nomadic tribe from the Arabian Desert.
- **Catchment area:** Area of a river basin. The area from where the water gets collected into a river is called the catchment area of the

river. This term is also used with reference to a dam or a bund indicating the area from which water gets collected in the reservoirs.

- **Centrifugal force:** A force that leads to the movement away from the center. The particles in rotating objects develop a tendency to move away from the centre. Such a force which leads to outward motion in an object is called centrifugal force.
- **Circle of illumination:** Sunlight divides the Globe into an illuminated and a dark part. The line separating the two parts is the circle of illumination. This is not an imaginary line, it exists on the surface of the earth all the time. The circle of illumination is a great circle. Due to the rotation of the earth, its position seems to change all the time.
- **Contour line:** These are isolines of height. These are drawn by joining the places of equal altitude. These help in identification of landforms, determine the amount of slope and help us understand the type and direction of slope. They also help in the analysis of intervisibility between any two points on the map.
- **Contour trench:** In order to reduce the erosion of soil, trenches are dug out in the direction perpendicular to the slope of the land and trees are planted along such trenches. While digging out such trenches care needs to be taken to maintain the level.
- **Cyclone:** A condition of lowering of air pressure in a region. Under such a condition, the air from the surrounding regions rushes to the central low pressure area in a circular manner. This leads to the formation of a system of whirling winds that moves from one place to other under the influence of prevailing regional winds.
- **Dakshinayan :** March of the sun towards the south. This starts from 21st June and every day the sun appears to be moving southwards slowly. The southward march of the sun comes to an end on 22nd December when it starts moving towards the north. In reality, the sun does not move but due to the revolution of the earth and the inclination of its axis, the

sun appears to be moving towards north or south.

- **Doldrums:** The belt extending from 5° N to 5° S parallels. As the temperatures in this belt are high, the heated air starts ascent. This gives rise to a low pressure belt. Winds in this zone are not very effective and hence this region becomes a region of calm and it is called doldrums.
- **Easterlies:** Winds arriving from the east. These are the planetary winds blowing towards the equatorial low pressure belt from the mid-latitudinal high pressure belts in both the hemispheres.
- **Eclipse:** A condition of the sun disc getting covered by the moon OR the moon disc getting shadowed by the earth. Solar eclipse occurs when the moon is positioned between the earth and the sun and covers the sun disc. Lunar eclipse occurs when the moon passes through the shadow of the earth. This situation becomes possible if the sun, the moon and the earth come in one straight line. Such a situation occurs only on the full moon or new moon days. However as the planes of the orbits of the moon and the earth intersect each other at an angle of 5°, the eclipses do not occur on every full moon or every new moon day.
- **Economics:** the science of financial management. It is needed at all levels – from individual to national.
- **Equinox:** Specific situation of the earth's location on its orbital path with respect to the sun. In this situation, both the ends of the earth's axis face the sun and are equidistant from the sun. This situation is observed on two days in a year. On these two days, the circle of illumination coincides with the meridional great circles. This situation is observed on 22nd March and 23rd September. On these days, sun rays are perpendicular at the equator. The duration of daytime and nighttime is the same and it is of 12 hours.
- **Fortnight:** A period of 15 days from new moon day to full moon day (and from full moon day to new moon day).

- **Gravitational force:** In any two objects, there exists an attraction towards each other. This is called gravitational force. The gravitational force depends on the mass of the two objects and the distance that separates them. The planets revolving around the sun along their specific orbits is the combined effect of the gravitational force of the sun and the centrifugal force associated with the planets. The value of gravitational force is computed as $M_1 M_2 / D^2$, where M_1 and M_2 represent the mass of object 1 and 2 and D represents the distance between them.
- **Greenhouse:** This is a house constructed using sophisticated technology for the growing of vegetables and flowers. The walls and roof of this house are made up of transparent materials—mostly glass. Conditions conducive for the growth of plants are controlled under such structures. The temperature inside the greenhouse is considerably higher than the temperature outside during the day. With the help of various instruments the temperature, relative humidity, air pressure etc. are controlled in greenhouses.
- **Height above sea-level (ASL):** Height above mean sea-level. This is known as altitude. Considering the mean sea-level to have zero height, the heights of all other locations is measured as above or below sea-level.
- **High tide and low tide:** The rise or fall in the level of sea waters caused by the combined effect of centrifugal force associated with sea water and the gravitational pull of the moon and the sun. The rise in the level is called high tide and the fall is called low tide.
- **Horizon:** A line where it appears that the sky and the land are meeting. In reality, it is the plane of a tangent line assumed to be drawn at a given place. 'N' number of such tangents to the earth surface can be assumed. When the celestial objects like the sun become visible above this line, we say it is a sunrise. When it moves below this tangent line it is said to be Sunset.
- **Horizontal distribution:** The values of different elements of climate are not the same at various places on the earth. As a result, the values of temperature, air pressure, rainfall etc. differ from place to place near the earth's surface. This distribution of climate elements in a horizontal direction is called horizontal distribution.
- **Horse latitudes:** A region in both the hemispheres between 25° and 35° parallels. This is the region of high pressure belt from which the air moves outwards. The region is generally quiet. Due to historical reasons it is called horse latitudes.
- **Humus:** Organic substances in the soil. Residues of plants, litter, roots etc. get decomposed and mixed in the soil. Such decayed organic material increases the fertility of soils.
- **Irrigation:** Making water available for the crops, besides the rains, is called irrigation. Water is essential for the crops. At times, it becomes difficult to depend on rains for the crops. Under such situations, the water from canals, lakes, wells, reservoirs is supplied to the crops. This is called irrigation.
- **Isobars:** Lines joining the places of equal air pressure on the map. Isobars show the distribution of air pressure in the atmosphere.
- **Khubz:** It is a staple dietary item of Arabian people. It is in the form of thick flat bread like roti.
- **Knots:** A unit used to express the wind velocity. When the wind is blowing at a velocity of 1 nautical mile (1.853 km) per hour, it is said to have velocity of one knot. (1 statute mile = 1.609 km). The word knot also indicates 1 minute arc distance along equatorial circumference.
- **Land use:** Land as a natural resource is used for different purposes. The analysis of the purposes for which the land from a region is used is the subject matter of land use studies. Forest, agriculture and settlements etc. are the purposes for which the land is used. Land use in a region gives rise to particular patterns.
- **Leaching:** It is a type of chemical weathering. This process is dominant in the areas of high

rainfall and humid climate. The salts and other soluble minerals are washed out of the rock water in a dissolved form by the percolating.

- **Linear settlement:** If the growth of settlement has taken place with respect to a linear element, the houses in such a settlement also appear to have been arranged in a linear manner. Settlements with such patterns are called linear settlements. Such settlements are found along roads, canals, rivers or sea coast.
- **Local winds:** Winds which blow in some restricted areas in different parts of the earth. These are known by different names.
- **Marketing management:** The finished products produced by the producers have to reach markets in order to be available to the consumers, clients, partners and the entire society. All the processes involved in taking the finished products from the production areas to the markets are covered under the term marketing management. Marketing is useful for generating clients, maintaining and satisfying them.
- **Measurement of time:** A day, a month and a year are the basic units of the measurement of time. A day and a year are the results of the axial and the orbital motions of the earth respectively. The month is a result of the revolution of the moon around the earth.
- **Mixed farming:** A type of farming. This type of agriculture has a wide scope. It includes the farming and allied occupations like dairy, poultry etc. This term is also used for inter-cropping. Allocation of land for different crops in a season is also considered to be a form of mixed farming.
- **Neap tide:** The range of tides is lowest on the first and third quarter days. On these days the sun and the moon are positioned at right angle to each other with respect to the earth and hence the forces of their attraction do not complement each other.
- **Nucleated settlement:** The pattern of settlements mostly depends on geographical factors. If the buildings / houses are concentrated around a specific point in a settlement such a settlement is called nucleated settlement. There can be different reasons for such a concentration. The most important is the source of water. Defense / protection is also one of the reasons for the settlement to get nucleated.
- **Parent rock:** The major rock type in a region. Soil forming processes start with the weathering of rock in the region. As a result of weathering, the rock is reduced to a powdery substance. The parent rock is the largest constituent of any soil by weight.
- **Partial eclipse:** A type of solar or lunar eclipse when a part of the sun disc is covered by the moon or part of the moon disc is shadowed by the earth.
- **Pattern:** An arrangement of objects. The assembly of various factors that emerges in a space or over a time period forms a pattern. While such an arrangement is emerging, the factors individually or collectively are influenced by geographical conditions. Drainage pattern is an example of spatial pattern whereas crop pattern is an example of temporal pattern.
- **Perigee:** A specific position of the moon on its orbital path with respect to the earth. In this position, the moon is at its nearest distance from the earth.
- **Perihelion:** A position of the earth on its elliptical orbital path at the minimum distance from the sun. This position occurs in the month of January.
- **Period of waning moon:** The fortnight from the full moon day to the new moon day. In this period, the illuminated portion of the moon appears to be getting progressively reduced as observed from the earth.
- **Period of waxing moon:** The fortnight from the new moon day to the full moon day. In this period the illuminated part of the moon keeps on increasing every day as observed from the earth.
- **pH:** The acidity or alkalinity of a substance is determined with the help of pH value. This scale ranges from '-1' to 14. The pH value of

'7' indicates neutrality whereas the values lower than '7' indicate acidity and if the value is more than '7' the substance is considered to be alkaline. For example, the lemon juice that contains citric acid has pH of 2. The seawater that tastes salty has an average pH value equal to 8. The water of Great Salt Lake has pH value of 10.

- **Phases of the moon:** The illuminated portion of the moon disc observed from the earth that keeps on changing every day within a lunar month.
- **Resources:** The materials and energies available in nature and the assets created by man and used for making human life easier and more comfortable are called resources. All the constituents in nature that are used by man are resources.
- **Sea-level:** The level of sea waters keeps on oscillating due to the tides, waves, etc. The mean of high and low tide determines the mean sea-level at a place in coastal area. All height values in the region are measured with reference to the mean sea-level. As the tidal range of different places can vary the mean sea-level of a selected station is taken as the standard mean sea-level for the region. For India mean sea-level at Chennai is considered as the standard mean sea-level.
- **Seasonal winds:** Winds which blow during specific periods and in limited areas. For example, the monsoon winds.
- **Soil degradation:** Lowering of the soil quality. This occurs due to the reduction of humus content of the soils. The mixing of unnecessary chemical substances in the soil particularly as a result of excessive use of chemical fertilizers leads to degradation of soils. Use of chemical fertilizers, insecticides, pesticides, weedicide etc. causes the degradation of soils.
- **Soil erosion:** Removal of the top layers of the soils due to the work of the running water and the wind is called soil erosion. Top layers of soil contain high proportion of humus. The removal of top layer also causes loss of humus that leads to lowering of fertility of soils.
- **Solar eclipse:** If the moon gets positioned between the earth and the sun and if these three are in a straight line, the shadow of the moon falls on the earth. As a result the sun becomes totally or partially invisible in the shadow zone. This condition is called solar eclipse.
- **Solstices:** Specific positions of the earth on its elliptical orbital path. These positions occur on two days– 21st June and 22nd December. These are the solstice days. On 21st June, the north pole of the earth records maximum inclination i.e., 23° 30', towards the sun. On this day, the sunrays are perpendicular at the Tropic of Cancer. On 22nd December, the south pole of the earth records maximum inclination, i.e., 23° 30', towards the sun. On this day, the sunrays are perpendicular at the Tropic of Capricorn. 21st June and 22nd December are summer and winter solstices respectively. 21st June is the longest day in the northern hemisphere whereas 22nd December is the longest day in the southern hemisphere.
- **Spring or vernal equinox:** One of the positions of the earth on the orbital path relative to the sun. This position occurs on 23rd March. In this position both the poles of the earth are equidistant from the sun and the sunrays are perpendicular at the equator. The duration of night time and day time are equal all over the earth.
- **Spring tide:** The high or low tide occurring on the full moon and the new moon days. As the sun and the moon are on the same side of the earth on this (new moon) day, maximum tidal range is observed. The tidal range on full moon day is also high but it is somewhat less than that on new moon day.
- **Subcontinent:** A part of a continent that is geographically and culturally different from the rest of the continent. The region in South Asia that lies south of the Himalayan ranges is called the Indian Subcontinent. This includes countries like India, Pakistan, Bangladesh, Nepal, Bhutan and Sri Lanka.
- **Total eclipse:** A type of solar or lunar eclipse when the sun disc is completely covered by

the moon or the moon is completely shadowed by the earth.

- **Tsunami:** Huge sea waves generated as a result of earthquakes occurring below the sea bottom. Tsunami waves cause tremendous loss of life and property in the coastal region where they strike.
- **Tourism :** A service occupation. Various services needed by the tourists in a region are provided as a part of this. These include lodging facilities, hospitality, transport, communication, etc. as also maintenance of tourist places.
- **Uttarayan:** March of the sun towards the north. This starts from 23rd December and every day the sun appears to be moving northwards slowly. The northward march of the sun comes to an end on 21st June when it starts moving towards the south. In reality, the sun does not move but due to the revolution of the earth and the inclination of its axis, the sun appears to be moving towards north or south.
- **Vertical distribution:** Distribution in vertical direction. Temperature and air pressure vary in horizontal as well as vertical direction. The variation caused due to height is called vertical distribution.
- **Westerlies:** Winds arriving from the west. These are the planetary winds blowing from the mid-latitudinal high pressure belts towards the sub-polar low pressure belts in both the hemispheres.
- **Winter:** A period of low temperature in a year. Due to decreasing duration of sun light and also due to the slant nature of the sun rays, the heat received is less during this period and hence the temperatures are low. The northern hemisphere experiences winter from 23rd September to 22nd March while the southern hemisphere experiences winter from 22nd March to 23rd September.

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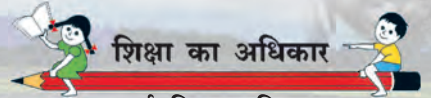
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