

Social Science **II**

Standard X

Part-1



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT, Kerala)

2016

THE NATIONAL ANTHEM

Jana-gana-mana-adhinayaka, jaya he
Bharata-bhagya-vidhata.
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchala-Jaladhi-taranga.
Tava shubha name jage,
Tava shubha asisa mage,
Gahe tava jaya gatha,
Jana-gana-mangala-dayaka jaya he
Bharata-bhagya-vidhata.
Jaya he, jaya he, jaya he,
Jaya jaya jaya, jaya he!

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.

State Council of Educational Research and Training (SCERT)

Poojappura, Thiruvananthapuram 695 012, Kerala

Website : www.scertkerala.gov.in, e-mail : scertkerala@gmail.com

Phone : 0471 - 2341883, Fax : 0471 - 2341869

Typesetting and Layout : SCERT

Printed at : KBPS, Kakkanad, Kochi-30

© Department of Education, Government of Kerala

Dear Students,

You have already learnt how diverse and dynamic the earth we live in.

Haven't you understood the reasons for the same?

We can make use of the diversities of nature for the progress of mankind with the help of technology. The lessons in Class X are so arranged as to help familiarize the physiography, climate, and soil of our country, and to develop a general awareness on the use of the potentials of modern technology in geography. Also there is an opportunity to get acquainted with global phenomena like the pressure belts and winds.

We are living in a world where human resource development is necessary. This textbook also discusses concepts like the society in which we regularly interact, the economic transactions in the society, banks and their functions, and national income.

I believe that the understanding of nature and wealth through these would help you to interact with our living planet responsibly and that you can transform into responsible citizens who care for nature.

Dr.P.A.Fathima
Director, SCERT

Textbook Development Team

Dr. P. Babukuttan Senior Lecturer, DIET, Kollam	Wilfred John S. HSST, MGHSS, Kaniyapuram, Thiruvananthapuram
Abdul Hameed Vilangil HSA, MUMVHSS, Vadakara, Kozikkode	Vijay Kumar C.R. HSST, Govt. HSS, Mithirmala, Thiruvananthapuram
E.C. Mohanan Tutor, GTTI, Chittur, Palakkad	Unnikrishnan U. HSST, Govt. HSS, Venjaramoodu, Thiruvananthapuram
Thomas K.J. HSA, GHSS, Kumili, Kottayam	Shanlal A.B HSST, Govt. HSS, Harippad
Ajayakumar HSST, GHSS, Bekkur	Shoojamon S. HSA, PNMGHSS, Kunthalloor, Chirayinkeezhu
Joby Manuel HSA, Nirmala HS, Thariyod, Wayanad	Venkitamoorthy HSST, Muhammadan Govt. HSS, Edathara
Nisanth Mohan M. HSST, Govt. Tamil HSS, Chalai, Thiruvananthapuram	Manoj K.V. Research Officer, SCERT

English Version

Alpha Manjooran Associate Professor of English (Rtd.), University College, Thiruvananthapuram
I P Joseph Assistant Professor (Rtd.), SCERT, Thiruvananthapuram
Meera Baby R Assistant Professor of English, Govt. College, Kanjiramkulam, Thiruvananthapuram
Dr. Martin Pattrik Associate Professor (Rtd), Department of Economics, Maharajas College, Ernakulam
Nisanth Mohan M HSST, Govt. Tamil HSS Chalai, Thiruvananthapuram
Vijay Kumar C R HSST, Govt. Boys HSS, Mithirmala, Thiruvananthapuram

Experts

Dr. Martin Pattrik Associate Professor (Rtd), Department of Economics, Maharajas College, Ernakulam
I.P. Joseph Assistant Professor (Rtd), SCERT
Muraleedharan S. Associate Professor (Rtd), Department of Economics, Maharajas College, Ernakulam
Alan Zachria Assistant Professor, St. Thomas College, Pala
Dr. Muralivalabhan Principal (Rtd), NSS College, Vazhur, Changanaserry

Academic Co-ordinator

Chithra Madhavan
Research Officer, SCERT

Content

01. Seasons and Time	07
02. In search of the source of wind	21
03. Human Resource Development in India	37
04. Terrain analysis through maps	51
05. Public Expenditure and Public Revenue	75



**Certain icons are used in this
textbook for convenience**



**For further reading (Need not be
subjected to assessment)**



Questions for assessing the progress



Learning activities



Significant learning outcomes



Let us assess



Extended activities



1

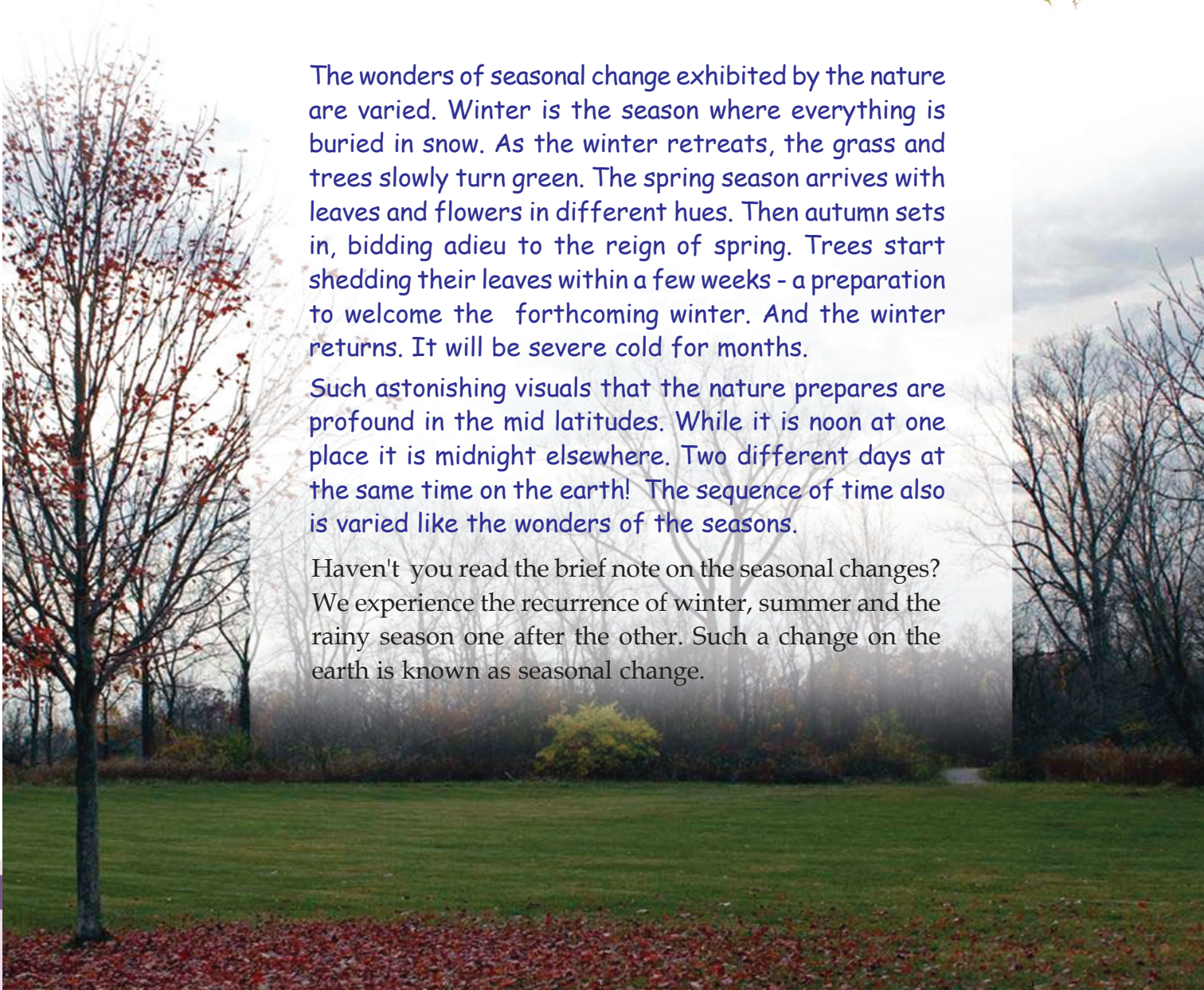
Seasons and Time



The wonders of seasonal change exhibited by the nature are varied. Winter is the season where everything is buried in snow. As the winter retreats, the grass and trees slowly turn green. The spring season arrives with leaves and flowers in different hues. Then autumn sets in, bidding adieu to the reign of spring. Trees start shedding their leaves within a few weeks - a preparation to welcome the forthcoming winter. And the winter returns. It will be severe cold for months.

Such astonishing visuals that the nature prepares are profound in the mid latitudes. While it is noon at one place it is midnight elsewhere. Two different days at the same time on the earth! The sequence of time also is varied like the wonders of the seasons.

Haven't you read the brief note on the seasonal changes? We experience the recurrence of winter, summer and the rainy season one after the other. Such a change on the earth is known as seasonal change.





You have learnt that there is periodic variation in the amount of sunshine over different places in both the hemispheres of the earth. Why?

Variations in the amount of sunshine received are the basis for the occurrence of different seasons. The earth's revolution and the tilt of the axis are the reasons for this variation.

You know that the earth revolves around the sun in an elliptical orbit. This motion is known as revolution.



- How much time does the earth take to complete one revolution?
- What is a leap year?



Sun and earth: near and far

Distance between the earth and the sun will vary continuously throughout the revolution. The days on which the sun and the earth are closest and farthest are shown in the diagram. These days are known as Perihelion and Aphelion respectively. The earth receives more solar energy when it comes closer to the sun.



You have learnt in the previous classes that the axis of the earth is tilted at an angle of $66\frac{1}{2}^\circ$ from the orbital plane. If measured from the vertical plane this would be $23\frac{1}{2}^\circ$ (Fig.1.1). The earth maintains this tilt throughout its revolution (Fig 1.2). This is known as the parallelism of the earth's axis.

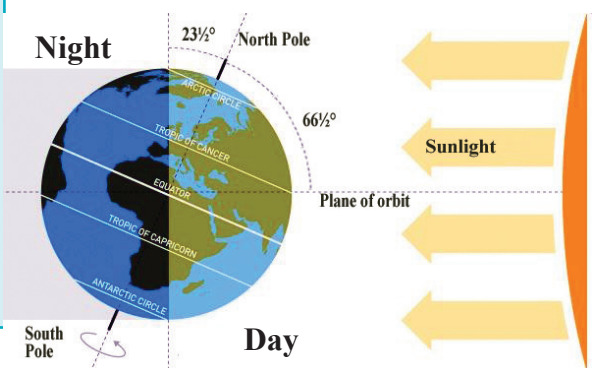


Fig 1.1

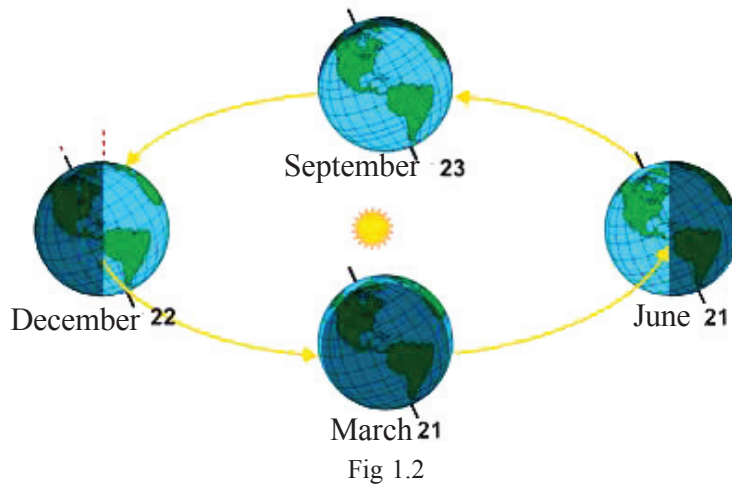


Fig 1.2

Observe the parallelism of the earth's axis from the diagram (Fig.1.2).

Since the parallelism is maintained throughout the revolution, the position of the sun in relation to the earth varies. The sun shifts apparently between Tropic of Cancer ($23\frac{1}{2}^{\circ}$ north) and Tropic of Capricorn ($23\frac{1}{2}^{\circ}$ south). This is known as the apparent movement of the sun.

The apparent movement of the sun due to the inclination of axis is the reason for the occurrence of seasons. Look at the figure 1.2. Four different positions of the earth during a single revolution (one year) around the sun is depicted in it. There will be variation in the amount of solar energy received on earth due to the apparent movement of the sun. The sun's rays fall vertically over one hemisphere during one half of the year and on the other hemisphere during the other half. Temperature will be higher over places where the vertical rays of the sun fall. The temperature will be low at places where the sun's rays are slanting.

Summer and winter

Equal amount of sunlight is received in the northern as well as the southern hemisphere when the sun is vertically over the equator. The apparent position of the sun during the earth's revolution will be

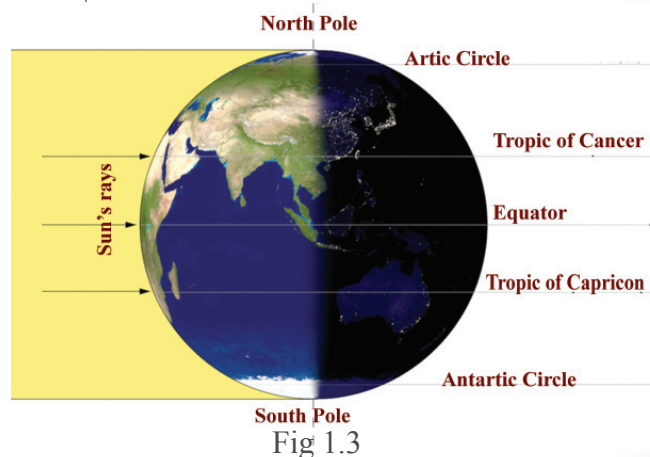
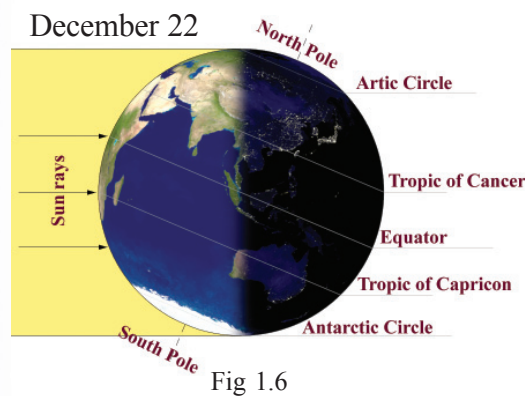
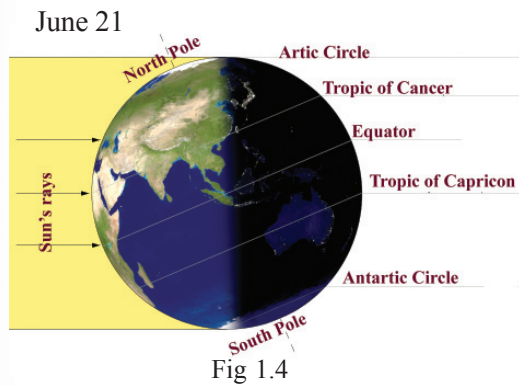



Fig 1.3




over the Equator on March 21 and September 23. Hence the length of day and night will be equal during these days on both the hemispheres (Fig.1.3). These days are called equinoxes.

The apparent position of the sun shifts from the Equator to the northern hemisphere from March 21 to June 21. The sun will be vertically above the Tropic of Cancer on June 21 (Fig.1.4). This day, known as the summer solstice, has the longest day in the northern hemisphere and the longest night in the southern hemisphere.

From June 21 onwards, the sun shifts from the Tropic of Cancer towards the Equator and reaches vertically over the Equator on September 23. As the sun is in the northern hemisphere from March to September, it will be summer in the northern hemisphere (Fig 1.7).

 What will be the corresponding season in the southern hemisphere?

The sun continues its apparent movement from the equator to the southern hemisphere and reaches vertically above the tropic of Capricorn on December 22. This day is known as the winter solstice.

 What might be the length of the day and night on the winter solstice day?

During the period from December 22 to March 21, the sun will apparently shift towards the Equator.

During the period from September to March, it will be winter in the northern hemisphere (Fig 1.9) and summer in the southern hemisphere.



If the earth's axis was not tilted, would there be alternate summer and winter in both the hemispheres?

Spring and autumn

Spring and autumn are the two transition seasons.

Spring is the season of transition from winter to summer. Haven't you noticed the plants sprouting mango trees blooming and the jack fruit tree bearing buds and the like (Fig.1.10)? These are the peculiarities of the spring season. Generally March and April are the summer months in the northern hemisphere.

Autumn marks the transition from the severity of summer towards winter. During this period, the atmospheric temperature decreases considerably. This is followed by a shortening of day and lengthening of night. This is the season during which the trees generally shed their leaves. The shedding of leaves is a form of adaptation to survive the forthcoming winter. Autumn is experienced in the northern hemisphere during the months of October and November. When it is spring in the northern hemisphere, it is autumn in the southern hemisphere and vice versa.

The apparent movement of the sun and the resultant seasons are a cyclic phenomenon. Observe and understand the cyclic nature of seasons from the following table (Table 1.1).



Fig 1.7



Fig 1.8



Fig 1.9

Months	The apparent movement of the sun	Seasons	
		Northern hemisphere	Southern hemisphere
From March 21 to June 21	From the Equator to the Tropic of Cancer	Spring	Autumn
From June 21 to September 23	From the Tropic of Cancer to the Equator	Summer	Winter
From September 23 to December 22	From the Equator to the Tropic of Capricorn	Autumn	Spring
From December 22 to March 21	From the Tropic of Capricorn to the Equator	Winter	Summer

Table 1.1



Traditional seasons of India

Though the Indian seasons are generally classified into four, it is estimated that there are six seasons in India based on the differences in the atmospheric conditions.

- *Vasantha- March, April*
- *Greeshma- May, June*
- *Varsha- July - August*
- *Sarat - September, October*
- *Hemanta - November, December*
- *Sisira- January, February*

The seasonal change is not pronounced in the tropics. Besides there will not be any marked difference in the length of day and night. But this difference is more clearly felt when we move towards the poles.

The conditions are reversed when the sun reaches Tropic of Capricorn. Then the days would be longer and nights shorter in the southern hemisphere. Generally, hot climate prevails in the equatorial region throughout the year. Seasonal differences are profound in the mid latitudes. Towards the poles, summers are cooler and shorter and winters, severe and longer. When the sun is above Tropic of Cancer, continuous day light is received for six months throughout in the places within the Arctic Circle ($66\frac{1}{2}^{\circ}\text{N}$). During the remaining six months, when the sun is in the southern hemisphere, it will be six months of night throughout in the places within the Arctic Circle.



How is the duration of days and nights experienced at places within the Antarctic Circle while the sun is in the southern hemisphere?



The land of midnight sun

The sun shines even at midnight! Not for a single day, but for six months throughout in the Arctic and the Antarctic Circles. But don't think that the sun will be vertically overhead during those days. The sun can be seen only on the horizon. The remaining six months are shrouded in darkness. Day light lasts only for one or two hours. The land will be covered with snow. Human life and limited agriculture here are all scheduled according to the peculiarities of this climate.



I looked at the clock - it was showing 12. The air hostess announced that we should set all our watches back by five and a half hours. As per our watches it was 5. 30 Indian Standard Time. One could say the aircraft was flying towards the West, literally swallowing our Indian Standard Time! We had to turn back the hands of our watches every now and then accordingly.

Excerpted from **S K Pottekkat's Pathirasooriyante Naattil**
 ("In the Land of the Midnight Sun")

Hope you read the extract from "Pathira sooryante Naattil", the famous travelogue by the renowned author S.K. Pottekkatt. Aren't you now convinced that time is calculated differently in different countries of the world? Let us examine the reason behind this difference in determining time.

In the ancient period, time was calculated based on the apex position of the sun and the length of the shadow cast by it. When the sun is vertically overhead, it is noon. The time estimated at each place, based on the apex position of the sun, is termed as the local time.



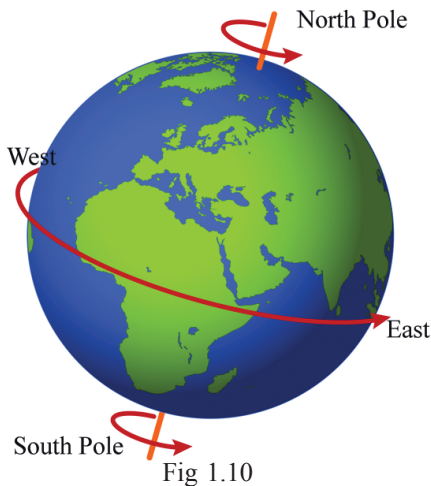
Is the local time in all the Indian states the same?



What will be the complications if there are several local times in a country?

- *Cannot prepare a railway time table applicable throughout the country.*
- *Cannot give information on radio programs.*
-

Later on, the calculation of time became more scientific and accurate. Let us go into the details of time calculation.



You know that the earth rotates on its axis while it revolves. You have also learnt that day and night occur due to rotation. Look at some of the facts associated with rotation.

- The earth rotates from west to east (Fig.1.10).
- It takes 24 hours to complete one rotation.
- As the earth rotates from west to east, the sun rises first in the eastern side.



The people of which Indian state sees the sun first?

The angular distance of the earth is 360° . We will get 360 longitudes if we draw one longitude each for each degree of angular distance. The time required to complete a 360° rotation is 24 hours.

- On converting 24 hours into minutes
 $24 \times 60 = 1440$ minutes
- That is, the time required for the completion of one rotation
 $= 1440$ minutes
- The time required for the earth to complete the rotation of 1° longitude is

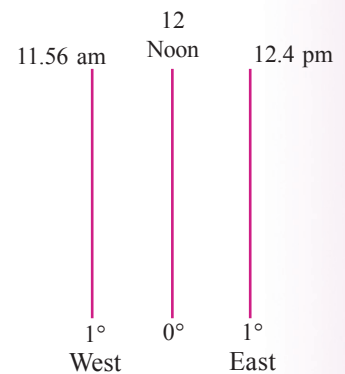
$$\frac{1440}{360} = 4 \text{ minutes.}$$

- The time required for the rotation of 15° longitudinal area is

$$15 \times 4 = 60 \text{ minutes (1 hour).}$$

That is, 15° longitudinal area of the earth passes by the sun within a period of one hour.

As the earth rotates from west to east, time advances towards the east and recedes towards the west. Look at the illustration. From a definite longitude, the time is estimated to increase by 4 minutes towards the east and decrease by 4 minutes towards the west for every degree of longitude.



Greenwich time (GMT) and time zones

The zero degree longitude is known as the Greenwich meridian. It acquires its name from Greenwich, the place where the Royal British observatory is situated (Fig.1.14) and through which this line passes. Time is calculated worldwide is based on the Greenwich line. Hence this line is also known as the prime meridian. The local time at the prime meridian is known as the Greenwich Mean Time. Based on the Greenwich line, the world is divided into 24 zones, each with a time difference of one hour. These are known as time zones.



What would be the longitudinal extent of each time zone?

Standard time

The local time would be different at each longitude. If we start calculating the local time at different places based on the longitude there, it would create lot of confusion. To solve this, the local time at the longitude that passes through the middle of a country is selected as the common time for the whole country. Each country in the world considers the longitude that passes almost through its middle as the standard meridian. The local time at the standard meridian is the standard time of that country.



The countries with wide longitudinal extent need to calculate time on the basis of more than one standard meridian.

Why?



Fig1.14

Indian Standard Time (IST)

The longitudinal extent of India is from 68°E to 97°E. This amounts roughly to 30°. The 82½° E longitude is considered as standard meridian of India.



Why is the 82½° E longitude considered as the standard meridian of India?

The local time along this longitude is generally considered as the common time of India. This is known as the Indian Standard Time.



Find the difference between the Indian Standard Time and the Greenwich Mean Time.

International Date Line

Calculate the time at each 15° longitude east and west of the Greenwich line up to 180° longitude and complete the table.

Time at Greenwich - Monday 10 A.M.					
To the west of Greenwich			To the east of Greenwich		
Longitude	Day	Time	Longitude	Day	Time
15°	Monday	9 am	15°	Monday	11 am
30°	Monday	8 am	30°	Monday	12 noon
45°			45°		
60°			60°		
75°			75°		
90°			90°		
105°			105°		
120°			120°		
135°			135°		
150°			150°		
165°			165°		
180°			180°		

Table 1.2

You might have noticed that there is a difference of 24 hours, at 180° longitude to the east and west of Greenwich. The place **A** marked in the given figure is located at 180° longitude. Which day shown in Table 1.2 may the people living here consider?

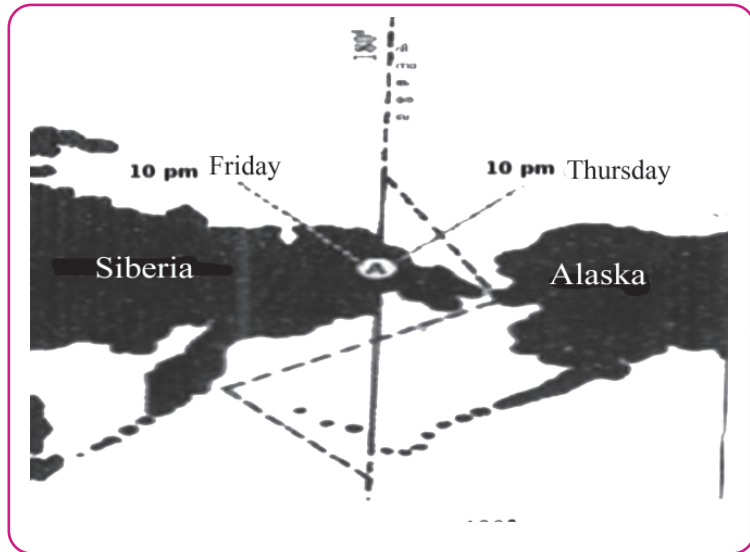


Fig 1.15

Think of the difficulties if the same place records two different times with 24 hours difference. To solve this problem, adjustments have been made avoiding the land areas along the 180° longitude. Note the longitude marked with broken lines. The line is so arranged as to avoid some of the islands to the south of the Bering Strait in the Pacific Ocean. The travellers who cross this line from the east calculate time by advancing one day and those who cross the line from the west deduct one day. This imaginary line is known as the International Date Line.

Note the International Date Line marked on the globe. Identify the continents situated to the east and the west of this line. The travellers to which of these continents will gain one day on crossing the International Date Line?



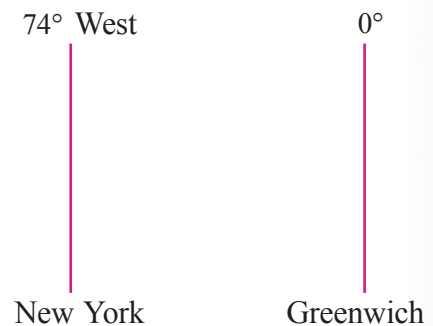
Let us calculate time

Example 1

What will be the time in New York (74°W) when it is 12 noon at Greenwich?

Let us see how the time of New York can be calculated:

- The longitudinal difference between New York and Greenwich = 74° .

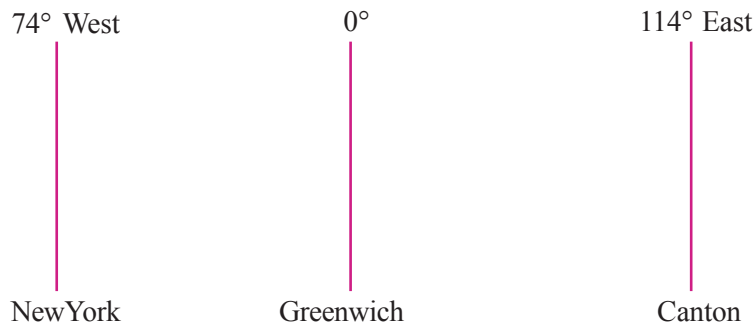


- The time difference for 1° longitude = 4 minutes
- The time difference for 74° longitude = 4×74
= 296 minutes
= 4 hours 56 minutes
- As New York is located to the west of Greenwich, the time in New York will be 4 hours and 56 minutes behind Greenwich Mean Time.

$$\begin{aligned} \text{Therefore the time at New York} &= \text{Time at Greenwich} - \\ &\quad \text{Time difference} \\ &= 12 \text{ Noon} - 4 \text{ hours} \\ &\quad 56 \text{ minutes} \\ &= 7.04 \text{ AM} \end{aligned}$$

Example 2.

What will be the time at Canton (114° East) when it is 11 pm on Monday in New York?



- The longitudinal difference between New York and Greenwich is 74° .
- The longitudinal difference between Canton and Greenwich is 114° .
- The longitudinal difference between New York and Canton is 188° .
- Time difference for 1° longitude is 4 minutes.
- Time difference for 188° longitude = 188×4
= 752 minutes
= 12 hours 32 minutes

- As Canton is to the east of New York the time at Canton would be 12 hours and 32 minutes ahead of the time in New York.
- When it is 11 pm on Monday in New York, the time at Canton will be 11.32 am on Tuesday.



Significant learning outcomes

The learner

- analyses the factors behind the occurrence of seasons and prepares notes.
- explains the various seasons as well as the environmental and atmospheric changes in each season.
- explains the equinoxes, solstices and the differences in the length of day and night on these days.
- explains the rotation and its effects.
- analyses the importance of Greenwich line and the International Date Line in time calculation and prepare notes.
- calculates the corresponding time in India and other countries based on Greenwich line.



Let us assess

- Identify the factor responsible for the occurrence of seasons from among the following:
 - a. Rotation of the earth
 - b. Tilt of the earth's axis
 - c. Parallelism of the earth's axis
 - d. All the above
- The sun's rays fall vertically between Tropic of Cancer and Tropic of Capricorn. Why?

- Highlight the importance of March 21, June 21, September 23, and December 22.
- Why is the International Date Line not straight unlike the other longitudes?
- Why is there an eastward increase and westward decrease in time?



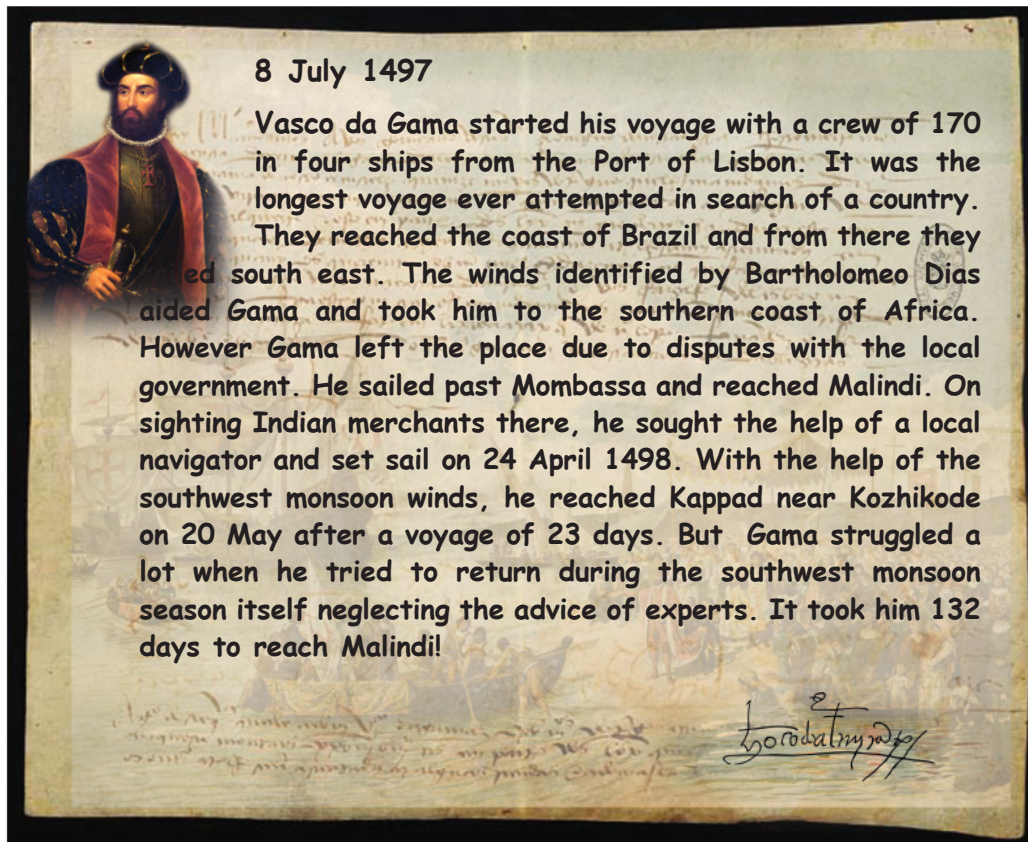
Extended activities

- Exhibit pictures along with short notes in the class showing the seasonal changes in nature.
- Record your observations on the changes in nature in different seasons and prepare a weather observation diary.
- With the help of an atlas, find out the standard meridians of different countries and calculate their local time.



2

In Search of the Source of Wind



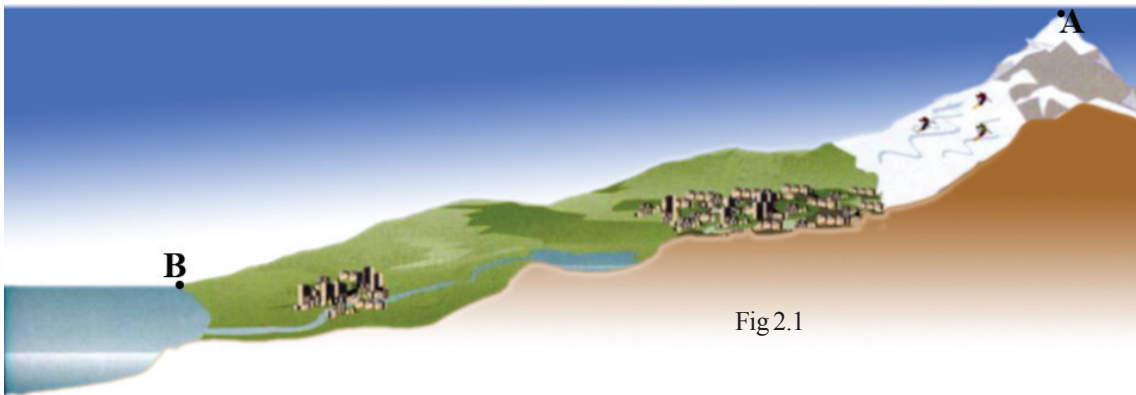
It was the winds and an unyielding will that helped the mariner named Vasco da Gama to sail thousands of kilometers from Europe to find a sea route to India. The role of winds in that voyage which changed the course of our land's history is worthy of mention. How do winds influence us? Let us look into a few aspects like the different types of wind, their formation, and effects.

You have learnt that atmospheric pressure is the weight of atmospheric air and the variations in the atmospheric pressure are the basic cause for wind. Let us look into the reasons behind this and the effects thereof.

Variations in atmospheric pressure

The air exerts an average weight of 1034 mg per cm² on the earth's surface. The atmospheric pressure is measured using an instrument called Mercury Barometer. It is recorded in units like millibar (mb) and hectopascal (hPa). The level of mercury at normal atmospheric pressure will be 76 cm. The atmospheric pressure at that point will be 1013.2 mb or hPa.

Look at the following diagram.



Did you see the places marked A and B in the diagram? Which of these places will have a higher atmospheric pressure? Why?



Atmospheric pressure and altitude

The atmospheric pressure decreases with altitude. The pressure decreases at the rate of 1 millibar (mb) per an altitude of 10 meters.

The rarification of air with altitude is the reason for this decrease in atmospheric pressure.



Why do mountaineers carry oxygen cylinders?

You might have felt your ears clog as you go to high altitude places like Ponmudi, Ooty, Paithalmala and Brahmagiri. This is due to the low pressure in these places.

The atmospheric pressure and the altitude are inversely proportional. Haven't you understood that altitude is an important factor influencing the atmospheric pressure?

Apart from altitude, temperature and humidity also influence the atmospheric pressure. Let us see how.

Temperature and atmospheric pressure

Like any other matter, air also expands when it gets heated. The expanded air is less dense and hence it ascends. This leads to the lowering of atmospheric pressure. The ascending air spreads to the sides and cools. On cooling, it becomes dense and descends. As a result the atmospheric pressure increases.

The atmospheric pressure decreases as the temperature increases and vice versa. Haven't you understood that the temperature and the atmospheric pressure are inversely proportional? Given below are the day and night scenes of a place (Fig.2.2).

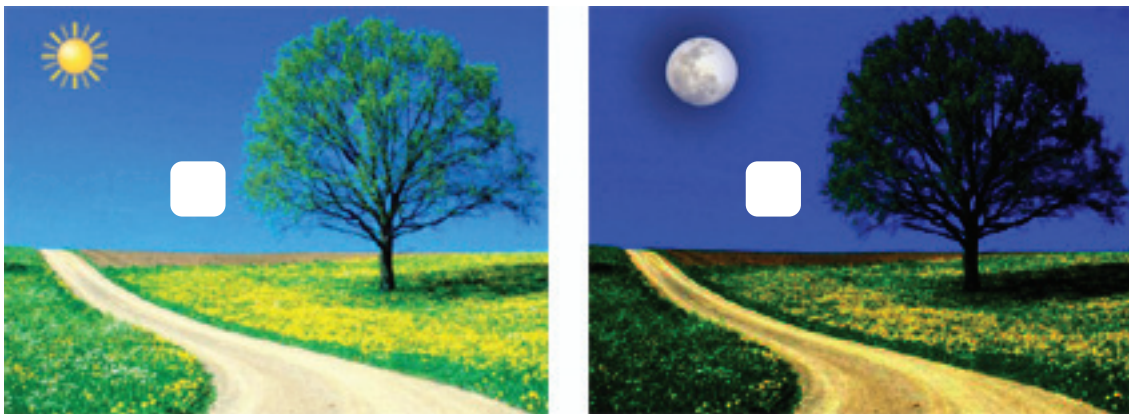


Fig 2.2

Compare the two pictures. Identify the situations of low and high atmospheric pressure and suitably mark 'H' and 'L' in the pictures.



Compared to the colder regions, the tropical regions experience low atmospheric pressure. Why?

Humidity and atmospheric pressure

Humidity refers to the quantity of water present in the atmosphere. Water vapour is lighter than air and hence it ascends. If the quantity of water vapour is more in a unit volume

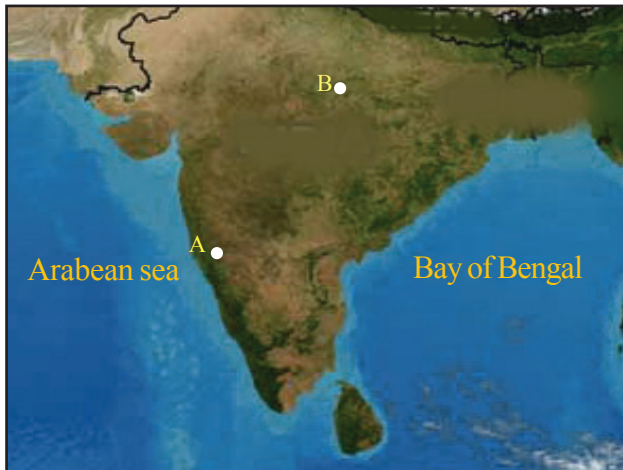


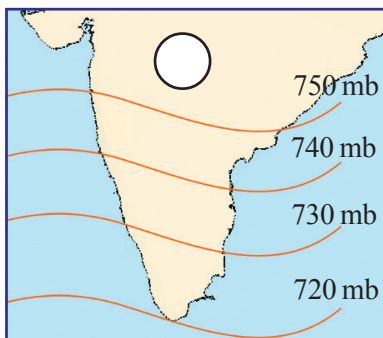
Fig 2.3

of air, then naturally the atmospheric pressure will be less.

Humidity and atmospheric pressure are inversely proportional. Two places at the same elevation are marked as A and B in the figure (fig.2.3). Which of these has a low atmospheric pressure? Why?

Hope you have understood that altitude, temperature and humidity experienced in a region

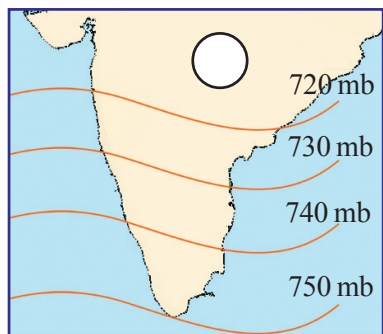
influence the atmospheric pressure. Variations in atmospheric pressure occur in accordance with the variations in the above factors.



A

If the atmospheric pressure of an area is higher than that of the surrounding regions it can be designated as 'high pressure' (High - H). In that case, what would low pressure be?

You have learnt about the isotherms in the previous classes. Similarly isobars are imaginary lines joining places having the same atmospheric pressure. We can easily understand the distribution of the atmospheric pressure of any region by observing the isobars.



B

Fig 2.4

Observe Fig 2.4. It shows the distribution of atmospheric pressure of a region in two different seasons.



Observe the distribution of isobars in the given figure and mark H and L at places experiencing high pressure and low pressure respectively.

Haven't you realized that there can be seasonal variation in the atmospheric pressure of the same region?

Global pressure belts

Studies have revealed that the atmospheric pressure is uniform between certain latitudes. Based on that, the earth's surface is divided into different pressure belts. Look at Fig 2.5. Haven't you seen the various pressure belts on the Earth? These are known as the global pressure belts. Let's learn about each of these pressure belts in detail.

Equatorial low pressure belt

This is the zone where the sun's rays fall vertically throughout the year. Hence the temperature will be high in this zone all through the year. The air expands due to sun's heat and rises up on a massive scale. This is the reason for the low pressure experienced throughout this zone.

The equatorial low pressure belt is situated between 5° North and South latitudes. As the air in this zone ascends on a large scale, winds are very feeble here. This pressure belt is also known as 'doldrum', meaning 'the zone with no winds'. The region was a nightmare for the ancient mariners.

Sub tropical high pressure belt

The hot air ascending from the equatorial low pressure belt cools gradually and subsides at the sub tropical zone due to the rotation of the earth. Hope you have understood the reason for the occurrence of high pressure all along this zone.

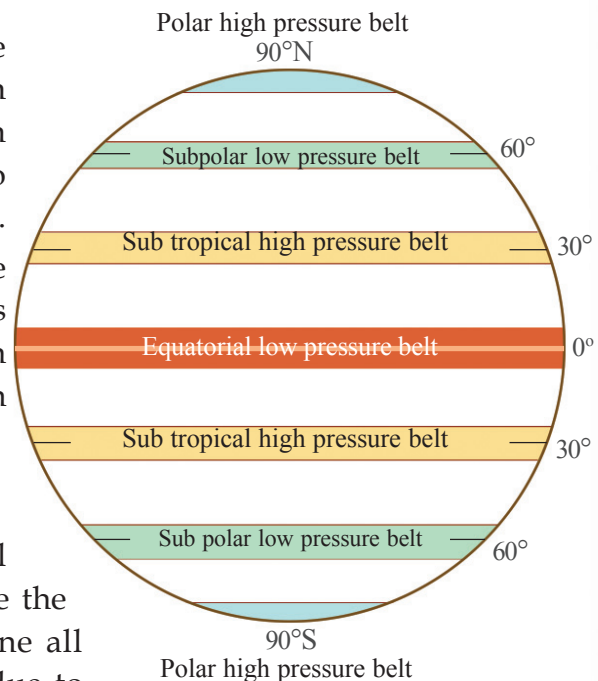


Fig 2.5
Global pressure belts



Horse latitude

Superior breeds of Arabian horses were once a major export from Asia to Europe and Cargo ships were used to carry them across. As the winds are feeble in the subtropical regions, it was difficult for these ships to sail smoothly. In order to make the ship lighter for ensuring easy voyage, they used to throw many of these horses into the sea. Thus the zone acquired the name 'horse latitude'.



Find out the position of the sub tropical high pressure belt from the given figure (Fig2.5).

Sub polar low pressure belt

Look at Fig 2.5. As this zone is close to the Pole, the air is colder here. Though the cold air remains close to a the earth, the air is thrown up due to the rotation of the earth. As a result, low pressure is experienced all along the sub polar region.



Find out the location of the sub polar low pressure belt from the Fig 2.5.



If the Earth did not rotate, would there have been low pressure in the sub polar region?

Polar high pressure belt

This zone experiences severe cold throughout the year. As a result, the air remains chilled under the extreme cold that prevails over the Poles, and this contributes to the steady high pressure experienced here.



- *Find out the latitudinal location of the polar high pressure belts.*
- *Complete the following table by incorporating the names of different pressure belts and their latitudinal extent.*

Pressure belt	Latitudinal extent
•	•
•	•

You are now aware of the distribution of the pressure belts on the earth. Variations in the amount of solar energy received and the rotation of the earth contributes to the formation of different pressure belts. The pressure belts shift according to the apparent movement of the sun. The pressure belts shift northward during the period of sun's northward progression

and towards the south during the period of its southward progression.

Atmospheric pressure and winds

Global variations in the atmospheric pressure lead to the formation of winds. The horizontal movement of air from a high pressure zone to a low pressure zone is called wind. There are different types of winds on the earth's surface, ranging from light breeze that makes the leaves flutter to cyclones that cause widespread damage. Winds are named on the basis of the direction from which they blow. For example the south wind is the wind blowing from the south. The peculiarities of the source regions influence the nature of the wind.

Winds blowing from the sea will be saturated with moisture whereas, the moisture content will be less in winds blowing from drier regions.

The speed and direction of wind

The speed and the direction of wind are based on

- Pressure gradient force
- Coriolis force
- Friction

Let's examine them one by one.

Pressure gradient force

The pressure gradient is said to be steeper when the pressure difference is more. Fig 2.6 depicts the pattern of isobars in two different situations.

Analyse the figures and answer the following questions:

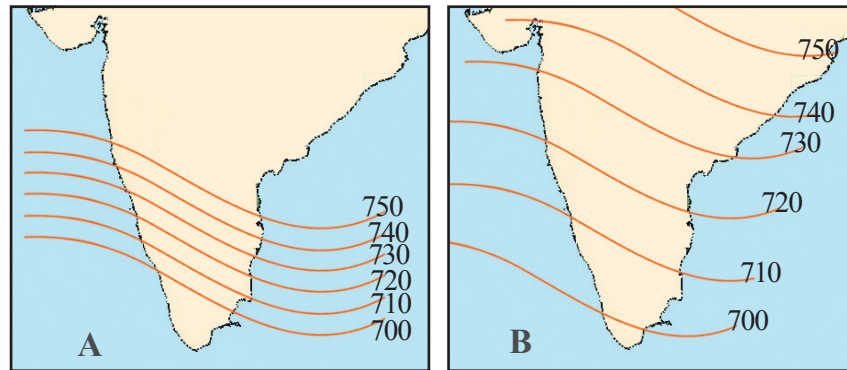


Fig 2.6



- *Mark the direction of winds using arrow marks in both the diagrams.*
- *In which of these situations will the speed of the wind be higher? Why?*

Coriolis Force

Freely moving bodies get deflected to the right in the northern hemisphere and to the left in the southern hemisphere due to a force generated as a result of earth's rotation. This is known as the Coriolis force. This force increases as it moves towards the Poles from the Equator. Admiral Ferrel found out that the winds in the northern hemisphere deflect towards their right and those in the southern hemisphere deflect towards their left due to the Coriolis effect. The law put forward by him on the basis of this is known as Ferrel's law.

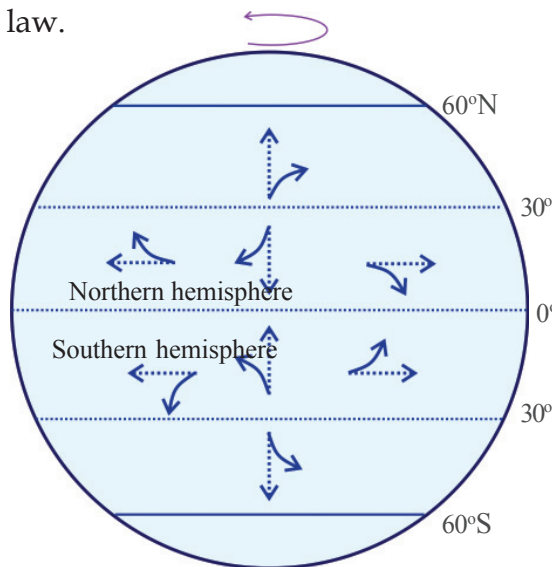


Fig 2.7

Friction

Look at the given pictures (Fig2.8).

In which of these situations do winds blow smoothly? The speed of wind will be high over ocean surfaces and level lands as the friction is less. On the other hand, the friction being more along difficult terrains and places with dense forest cover, the speed of wind will be less in those places.



Fig2.8

Pressure belts and wind

You have learnt that there exist differences in pressure over different latitudinal zones at the global level. These pressure differences lead to the formation of winds. Winds blow from high pressure regions to low pressure regions. The winds developed between the global pressure belts can be generally called as planetary winds. The different planetary winds are listed below.

- Trade winds
- Westerlies
- Polar easterlies

Find out the latitudinal locations of the different pressure belts from Fig 2.5 and mark these in the Fig 2.9.

Haven't you noticed the different planetary winds?

Let's study them in detail.

To prevent desertification



Trees are often planted along the borders of deserts. It is a measure to reduce the speed of the wind thereby preventing the expansion of deserts.

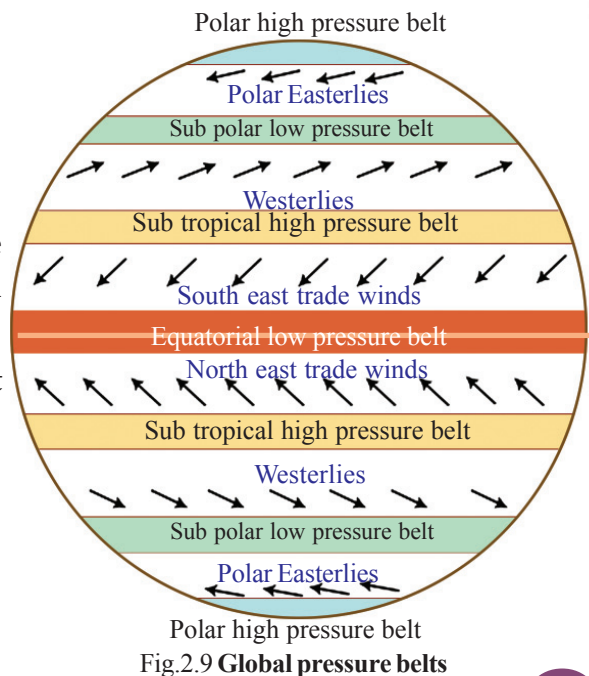


Fig.2.9 Global pressure belts



On the hands of wind...

In the past, the westerlies that blow in a constant direction throughout the year were a blessing to those transporting goods in ships and other vessels. The name 'trade wind' might have evolved since it helped ocean trade quite a lot. The term 'traden' in German means winds that maintain constant direction.



Trade winds

Haven't you seen the sub tropical high pressure belts in both the hemispheres from Fig 2.9?

From here, the winds blow continuously towards the equatorial low pressure belt. These are known as trade winds. As these winds blow from the northeast in the northern hemisphere, they are known as northeast trade winds. The zone where the trade winds from both the

hemispheres converge is known as the Inter Tropical Convergence Zone (ITCZ).



Find out the direction and the name of the trade winds in the southern hemisphere from Fig 2.9.



What could be the reason for the trade winds blowing from the southeast and northeast directions?

Westerlies

Haven't you seen the sub polar low pressure belts situated close to the sub tropical high pressure belts in both the hemispheres? Winds blow continuously from high pressure zones to these low pressure zones. As the direction of these winds are mostly from the west, these are known as the westerlies.



Find and note the direction of the westerlies in both the hemispheres from Fig 2.9.

The westerlies are stronger in the southern hemisphere than in the northern hemisphere. This is due to the vast expanse of oceans in the southern hemisphere. You read about the route of Vasco da Gama in the beginning of this chapter. It was the

westerlies that helped Gama to reach the South Africa through the south Atlantic Ocean.

The ancient mariners had given different names to the rough westerlies in the southern hemisphere, such as 'Roaring Forties' (along 40° latitudes), 'Furious Fifties' (along 50° latitudes) and 'Shrieking Sixties' (60° latitudes).

Polar Easterlies

You have learnt that the cold polar regions are centres of high pressure. The polar winds are the cold winds that blow from these high pressure areas towards the sub polar low pressure belts. These winds blow from the east in both the hemispheres due to the Coriolis force. Hence these are known as polar easterlies. These winds play a significant role in determining the climate of North America, the eastern European countries, and Russia.

Prepare a chart describing the planetary winds, the areas where they blow, and their features and exhibit in the class.



Periodic winds

You are now familiar with different planetary winds. These winds blow in a constant direction throughout the year. But some winds are confined to a small locality. Hence these are known as local winds. These are of two types - local periodic winds and other local winds. Monsoon winds are example of periodic winds.

What is monsoon?

The term 'monsoon' is derived from the Arab word 'mousam'. It means 'winds that change direction in accordance with season'. Monsoon is the seasonal reversal of wind in a year.



The Arab scholar Hippalus was the first to observe the shift in the direction of monsoon winds.



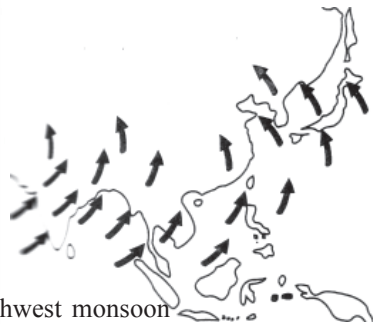
Mekhasandesam, the epic poem by Kalidasa is a creative visualization of monsoon winds that change direction according to the season as a messenger.

There are many factors responsible for the formation of the monsoon winds. Some of these are:

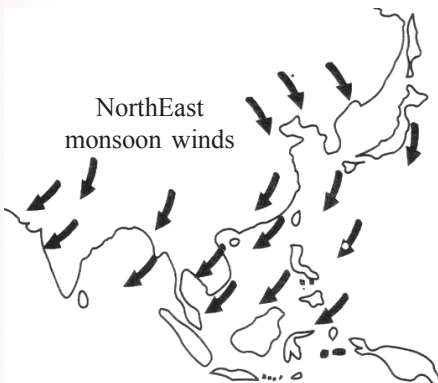
- The apparent movement of the sun
- Coriolis force
- Differences in heating

Sun's rays fall vertically to the north of the Equator during certain months due to the tilt of the earth's axis. This leads to an increase in temperature along the region through which Tropic of Cancer passes. The pressure belts also shift slightly northwards in accordance with this. The southeast trade winds also cross the equator and moves towards the north as the Inter Tropical Convergence Zone (ITCZ) moves northwards during the summer in the northern hemisphere. As the trade winds cross the Equator they get deflected and transform into southwest monsoon winds under the influence of the Coriolis effect. The low pressure formed over the land due to the intense day temperature attracts these sea winds and further contributes to the formation of the southwest monsoon winds.

As a result of the formation of high pressure zones over the Asian landmass during winter and low pressure zones over the Indian Ocean, the northeast trade winds get strengthened. These are the northeast monsoon winds.



Southwest monsoon winds



NorthEast monsoon winds

Now haven't you understood monsoon, the phenomenon of seasonal reversal of wind in a year?



Monsoon doesn't occur in the northern European region.

Why?

Now try to identify the winds that helped Gama to reach Kerala coast from Malindi.



Why did these winds cause trouble to Gama on his return to Malindi?

Land and sea breeze

Don't you remember that the atmospheric pressure is different during day and night at the same place? Similarly the reaction of land and sea to Sun's heat is not uniform. The land heats up and cools down quickly, whereas the sea gets heated up slowly and can retain the heat for a longer period of time. Look at Fig 2.10.

The air in contact with the land also gets heated up and ascends as the land heats up quickly during the day time. This leads to the formation of low pressure over the land which causes the comparatively cooler air to blow from the sea. This is known as sea breeze.

As the land cools faster than the sea during the night, it would be high pressure over the land and low pressure over the sea. This results in the movement of air from the land to sea. This is the land breeze. The land breeze which starts blowing at night becomes active in the early morning and ceases by sunrise.

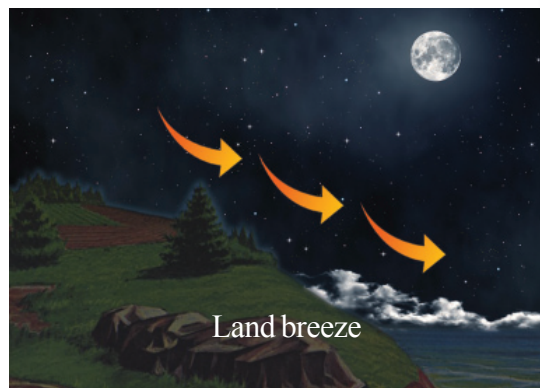
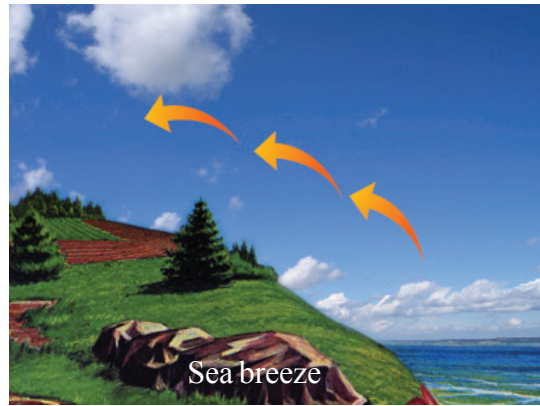


Fig 2.10

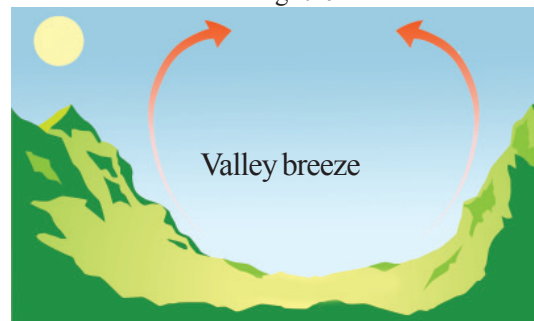


Fig 2.11

Mountain and valley breeze

Look at the figure (Fig 2.11). These are winds experienced in mountainous regions that are well above the sea level.

During the day time the air in the valley gets heated up more than the air on the mountain tops. As a result, the wind blows upslope from the valley. This is known as valley breeze.

But during night the air in the mountainous regions cools due to the intense cold conditions in that region. As cool air is denser, it blows towards the valley. This is known as mountain breeze.

Local winds

Local winds are winds whose effects are limited to a comparatively smaller locality. Formed as a result of local pressure differences, these winds are weak. Such winds exist in different parts of the world. Loo, Mangoshowers, and Kalbaisakhi are the local winds experienced in India. Chinook, Harmattan and Foehn are some of the local winds in other parts of the world.

Chinook is a local wind that blows down the eastern slope of the Rockie mountains in North America. As a result of these winds, the snow along the eastern slopes of the Rockies melts away. The term Chinook means 'snow eater' a term that suits to its peculiarity. Since this wind reduces the severity of the cold, it is helpful for the wheat cultivation in the Canadian lowlands.

Foehn is the wind that blows towards the southern valleys of the Alps.

As the air heats up due to pressure from the descend, it helps in reducing the severity of cold in that region.

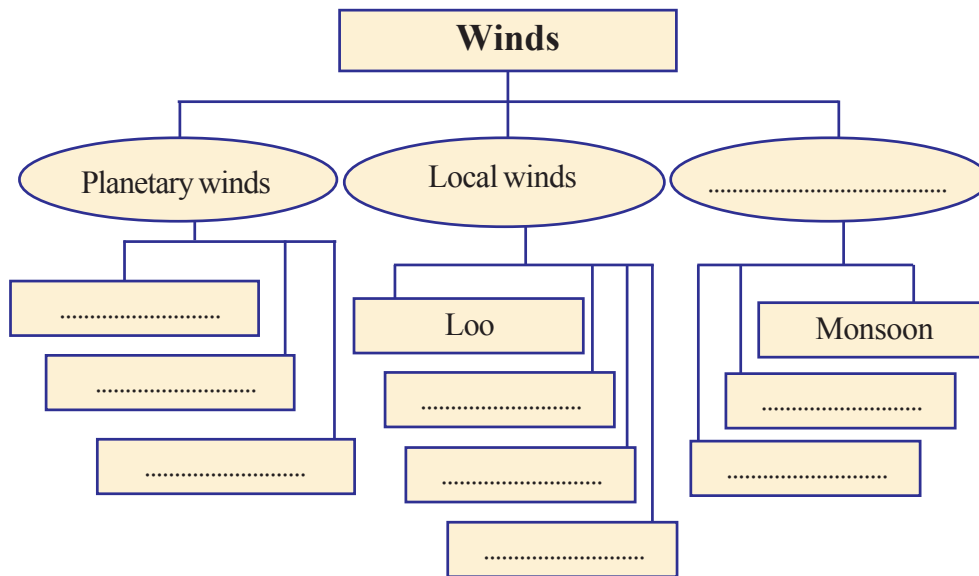


Find out from the atlas the countries along the southern slope of the Alps.

Harmattan is a dry wind which blows from the Sahara desert towards the West Africa. On the arrival of these winds, the humid and sultry conditions of West Africa is improved significantly. Hence, people call these winds as doctor Harmattan.

Loo is another hot wind blowing in the north Indian plain. These winds blowing from the Rajasthan desert cause a rise in the summer temperature of the north Indian plains. The winds that blow in south India during this season are called Mangoshowers. It acquires its name owing to the fall of ripe mangoes on its arrival.

You now know the different types of wind on the earth's surface. Complete the following flow chart based on this.



The sun's aura

Haven't you convinced how dynamic the earth's atmosphere is? The driving force behind this continuous movement of air is the Sun. Without the Sun's energy there would have been no temperature or pressure difference, nor any wind. The role of the atmospheric phenomena in keeping the earth's surface dynamic is immense. Information on the diversities in the nature are interesting as well as informative. May all of you be able to continue the enquiries regarding the Earth and its diversities.



Significant learning outcomes

The learner

- explains that the atmospheric pressure is not uniform everywhere.
- explains the relation between temperature and atmospheric pressure.
- explains the relation between humidity and atmospheric pressure.

- illustrates the global pressure belts.
- describes how the pressure gradient force, Coriolis force, and friction influence the speed and direction of wind.
- classifies the different types of wind.



Let us assess

- Temperature, altitude and humidity are inversely proportional to atmospheric pressure. Justify.
- Prepare notes on the role of solar energy and the Earth's rotation in the formation of pressure belts.
- Describe how the Coriolis Effect causes the deflection of winds on the basis of the direction of the winds mentioned below.
 - a. Trade winds
 - b. westerlies



3

Human Resource Development in India



Observe the pictures. Who all can be seen and what jobs are they engaged in? Which are the goods and services made available as a result of these efforts?

List in the table the different jobs and the goods and services provided by them.

<ul style="list-style-type: none"> • Taxi driver • Farmer • • 	<ul style="list-style-type: none"> • Arranges transportation • Produces agricultural crops
---	--

Manpower is an important factor in making available the above mentioned goods and services. Therefore, human resource is necessary for the progress of any country. Let us examine some aspects of human resource development and its status in India.

Human resource

Many goods and services are necessary for improving human life and for the progress of a country. To facilitate this the manpower of many has to be utilised. Human resource refers to people who have the manpower which can be utilised in the production sector.

Increase in production and progress of a country can be accelerated only if the human resource is developed to the maximum. How can human resource be developed? Human resource development is the development of man's physical and mental abilities through education, health care, and training. There are different levels of human resource development.

- Individuals take efforts to develop their own skills.
- Family creates an environment for the development of the potential of individuals.
- Various institutions and agencies provide facilities for education and training.
- Nation provides the necessary facilities for its people to develop their skills.

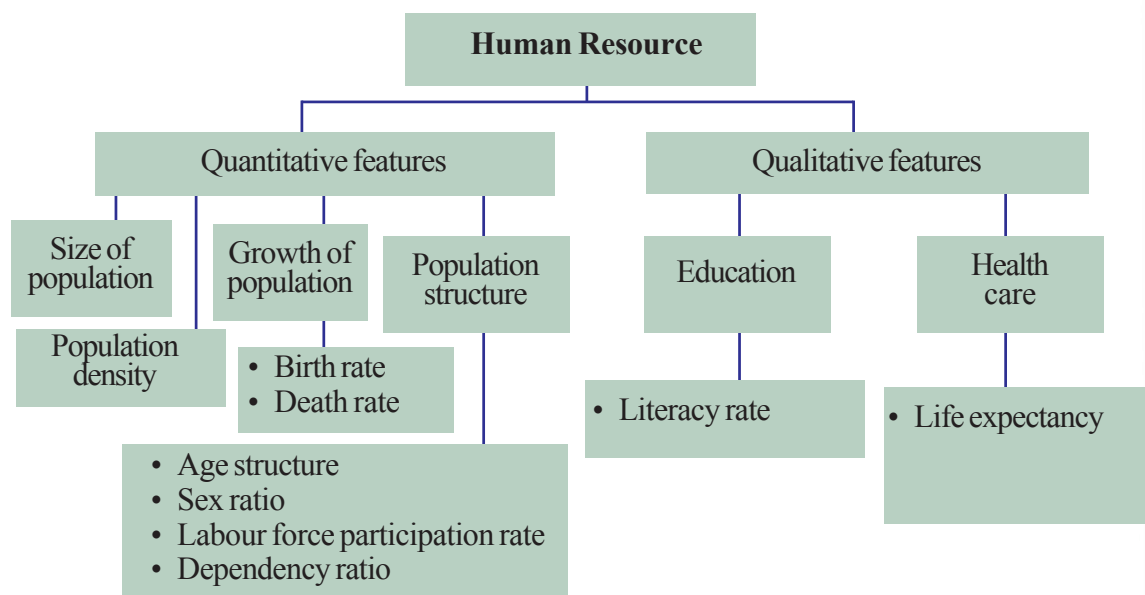


What facilities are provided by India for the development of human resource? Discuss.

Features of human resource

What features are to be considered while studying human resource? Human resource has quantitative as well as qualitative features.

Examine the chart given below.



Hope the qualitative and quantitative features of population are clear from the given chart. Let us analyse the quantitative aspects.

Size of population

Size of population refers to the total number of people residing in a country at a particular time. The branch of social science that analyses the population, the changes in its size, its structural aspects, etc is known as demography.

Every country collects information on the number of people in the country, their age, sex, socio - economic status, etc. and analyses these at specific intervals of time. This activity is known as population census. In India, census activities are spearheaded by the Office of the Population Registrar General and Census Commissioner.

In India, population census is conducted once in ten years. The last census was conducted in 2011. Information related to the population were collected as on 1 March 2011. According to this census there are 121.02 crore people in India. Out of this, 58.65 crore are females and 62.37 crore are males.

Why are population studies conducted?

Population studies help the government to quantitatively assess the different needs of the people and to plan activities and programmes accordingly.

What other help do they offer?

- Informs the availability of human resource in a country.
- Depicts the extent of basic facilities required by the people.
- Quantifies the goods and services required.
- Determines the socio - economic development policies.



- Find out from your elders what information was collected from your home for the 2011 census.
- Collect more information on the population by visiting the website www.censusindia.gov.in

According to the United Nations Organisation Report 2014, the world population is 724.4 crores. One in six person of the world population is an Indian. 17.5 percentage of the world population is in India. China ranks first in position with 19.4 percent and India ranks second. In terms of land area, India ranks seventh with only 2.4 percent.

India and China can play a major role in making human resource available. It has been proved by the experience of countries like the USA, Japan, and China that a nation can attain high economic development through better human resource development.



July 11 World Population Day

UNDP has declared 11 July as the World Population Day since 1989 and is observed. This day was selected because the world population reached 500 crore on July 11, 1987.

Density of population

Inhabitation is not the same everywhere in India. We have already understood the factors that influence population. Density of population refers to the number of people per square kilometer area. This differs in various states in India.



How does the population density of an area influence the availability of human resources?
Discuss.

Population growth rate in India

Population growth refers to the increase in the number of people in an area within a specific period of time. It is

indicated in terms of percentage and states the increase in a year as compared to the previous year. Examine the table indicating population growth rate in India.

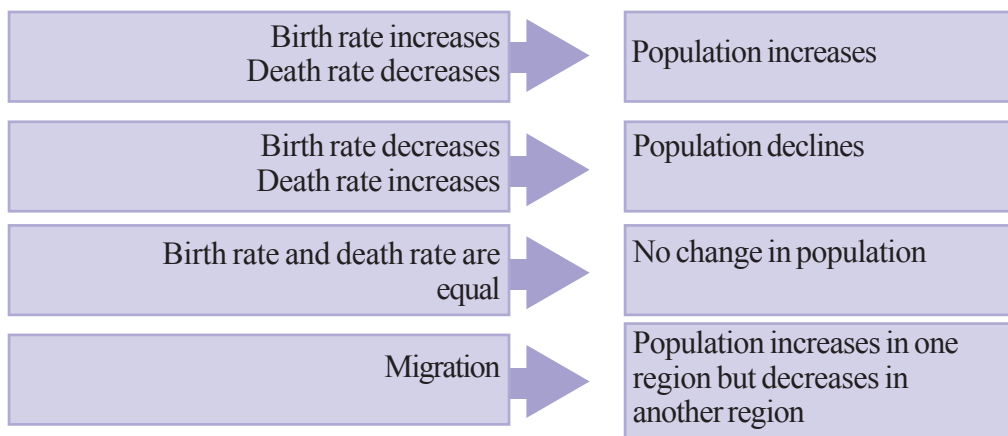
Year	Population (in crores)	Decadal growth rate (in percentage)
1951	36.11	13.31 (1941 - 51)
1961	43.90	21.64 (1951 - 61)
1971	54.82	24.80 (1961 - 71)
1981	68.33	24.66 (1971 - 81)
1991	84.64	23.87 (1981 - 91)
2001	102.87	21.54 (1991 - 2001)
2011	121.02	17.64 (2001 - 11)

Source : Census of India 2011 (Provisional)



- Which decade has marked the maximum population growth?
- From which year onwards is there a decrease in the population growth rate?
- How much decrease did the population growth rate record in the decade 2001-2011?

It can be seen that India's population growth rate has been declining since 1971. The birth rate, death rate, and migration are the factors that affect the population of a country. Observe the chart given below.



Birth rate

Birth rate is the number of live births per 1000.

Death rate

Death rate is the number of deaths per 1000.

Migration

Migration is the settlement of people of a region in another region.



What changes are made in the population of a country by birth rate, death rate, and migration? Prepare a note.

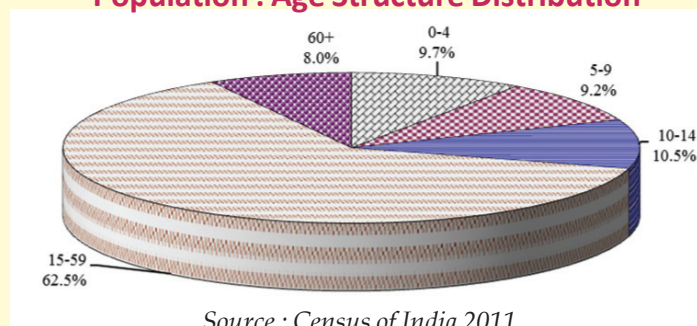
Population Structure

Age structure is the classification of population into different age groups and presenting the ratio of each group in the population. For example, classification is done in age groups like 0- 14 years, 15-59 years, and 60 and above years.



Given below is the age structure based on Census of India 2011.

Population : Age Structure Distribution



Source : Census of India 2011

- What percentage of the total population belongs to the age group of 0-14 years?
- What percentage of the total population belongs to the age group of 60 years and above?
- What percentage of the total population belongs to the age group of 15-59 years?

Labour force participation rate is the ratio of the population in the age group 15 - 59, who are either employed or actively looking for jobs. This age group has the capability to contribute to the progress of the nation. The age groups 0- 14 years and 60 years and above are included in the dependent group. Their proportion in total population is known as dependency ratio. This group depends on the working force of the country. An increase in the dependency ratio decreases the per capita income.

Many people in the age group 15 - 59 years do not have a job. This points to the necessity of utilising the human resource aptly.



Discuss the problems in the economy as a result of a decrease in the labour force participation rate and increase in the dependency ratio?

The sex ratio plays an important role in determining the human resource of a country. According to census 2011, the sex ratio in India is 940. Sex ratio is the number of females per 1000 males.



Conduct a discussion in class on the topic sex ratio and the nation's economic development.

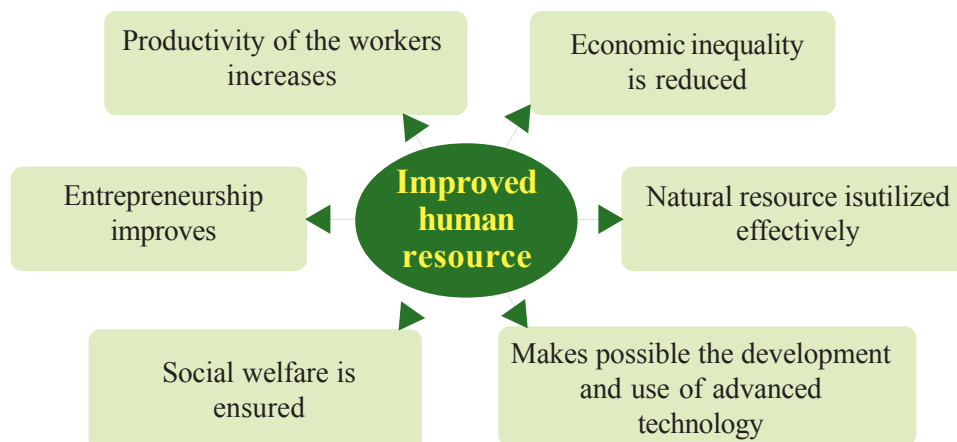
So far we have discussed the quantitative aspects of the population. There are certain aspects that improve the quality of human resource. Let us look at them.

Qualitative aspects of human resource

The population that can contribute to the manpower of the nation is its strength. What are the qualitative factors that improve the labour potential?

- Education
- Healthcare
- Training
- Social capital
-

Let us see the advantages in developing human resource. Observe the diagram.





Prepare a note on how human resource development helps in economic development.

Lets observe how each qualitative factor improves human resource.

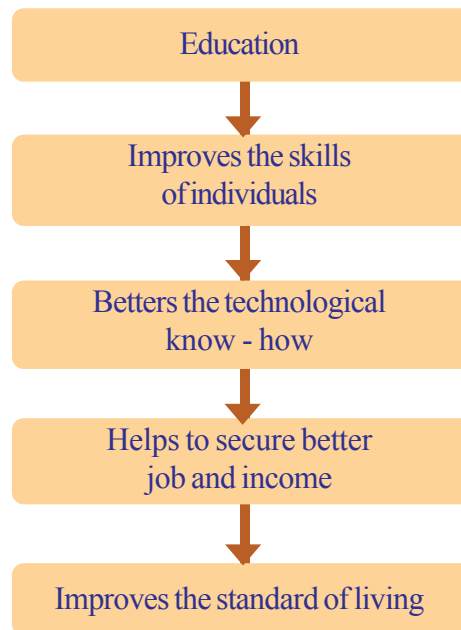
Education and human resource development

A mere increase in the population will not lead to the development of a country; it requires people with potential and skills. Education has a major role in moulding skilled people. Let's see how education helps in the development of a country. Observe the flowchart.



Ministry of Human Resource Development

In India, a department operates for human resource development. The Government of India started this department in the year 1985. The main responsibility of this department is to plan and implement the activities necessary for human resource development.



Experts argue that at least 6% of the national income must be spent for providing facilities in the education sector. During the year 2013 - 14 Government of India spent only 3.3% of the Gross Domestic Product (GDP) on education. Hence the literacy rate could not be improved along the expected lines. Observe the table given below.

India : Literacy rate	
Female	65.46
Male	82.14
Total	74.04

Source : Census of India 2011

Literacy rate refers to the percentage of population that can read and write with comprehension.

Let us see the projects implemented in India to develop education and skills.

Projects	Goals
Integrated Child Development Scheme (ICDS)	<ul style="list-style-type: none"> • To ensure integrated development of children upto 6 years • To provide healthcare for pregnant and lactating women •
Sarva Shiksha Abhiyan (SSA)	<ul style="list-style-type: none"> • To ensure universal primary education to all. • To improve educational facilities •
Rashtriya Madhyamik Shiksha Abhiyan (RMSA)	<ul style="list-style-type: none"> • To ensure access to secondary education • To improve educational facilities •
Rashtriya Uchthal Shiksha Abhiyan (RUSA)	<ul style="list-style-type: none"> • To increase the access to higher education • To improve the quality of higher education •
National Skill Development and Monetary Reward Scheme	<ul style="list-style-type: none"> • To improve the working skills of the youth • To ensure the availability of people with employable skills •

Apart from these, several programmes are also initiated by state governments.



Prepare a report by collecting details about the different educational development programmes undertaken by the state and local government institutions in Kerala.



National Skill Development Corporation (NSDC)

In order to compensate the shortage of skilled people, the NSDC has been giving skill training in various fields such as construction, tourism, banking, and engineering.

There are institutions at various levels to provide education in a country. Schools, colleges, universities, technical education institutions, etc are among them.

Our country has made education a fundamental right and has passed the Right to Education Act (RTE Act) in 2009. The constitution ensures the goal of "elementary education for all" through RTE.

However, problems still exist in the education sector.

- Certain sections drop out from schools without completing primary education.
- There is a lack of availability of basic facilities in the education sector.
- Quality of education has to be improved.



Conduct a discussion on the topic 'Educational facilities in India and the existing problems'.

Human resource development and healthcare

What is health? According to the World Health Organisation (WHO), health is a state of physical, mental and social wellbeing. Along with physical conditions, importance is given to mental and social conditions as well. It is the government's responsibility to ensure healthcare for all. Only then can each individual work for the economic development of a country. Let us see how healthy persons can participate in the progress of a country.

- Production increases with the increase in efficiency and the number of working days.
- Natural resources can be utilised properly.
- Medical expense can be reduced, thereby reducing the government's expenditure.

- Economic development is possible through increase in production

Let's list the facilities to be ensured for healthcare.

- Availability of nutritious food
- Availability of clean water
- Preventive measures
- Cleanliness
- Medical facilities
- Ensuring of leisure and entertainment
- Healthy environment

Various institutions operate to ensure the availability of the above - mentioned facilities. The government has set up institutions that work at different levels in the medical sector.

Medical Colleges

District Hospitals

Community Health Centres

Primary Health Centres

Health Sub Centres

All India Institute of Medical Sciences

AIIMS has been established to make available the services of the best doctors and modern medical facilities. Now there are 7 such institutions working in different parts of the country.



Discuss how the different institutions working in the health sector help in making available the medical attention and preventive measures to the people.



There are various hospitals in the cooperative and private sectors. Many multispecialty hospitals operate to make available modern treatment facilities. There are several institutions which provide different systems of medicine like ayurveda, yoga, naturopathy, unani, sidha and homeopathy;

National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM) function to make available quality

health services to all. The National Rural Health Mission operates in the rural sector. The National Urban Health Mission provides improved health services to the residents of urban slums and other marginalised people in towns with a population of more than 50,000.

As a result of these programmes and activities, the life expectancy in India has been improved. Observe the table below.

India : Life expectancy	
Female	67.7
Male	64.6
Total	66.1

Source : Census of India 2011

Life expectancy is the average number of years that a person lives.



Organise a seminar on the topic 'The role of education and healthcare in human resource development'.

Various resources are to be used properly for the economic development of a country. We have understood that human resource is as important as natural resources. When the natural resources are combined with human efforts there is an increase in production leading to economic development. Therefore, planned efforts are required in the education and health sectors to develop human resource. Only then can resources then can the quality and development of human resource be attained.



Do you agree with the statement that the main reason for prosperity and poverty in the world is the difference in human resource development? Prepare a note.



Significant Learning Outcomes

The learner

- analyses and present the need for human resource development
- prepares a flowchart depicting the qualitative and quantitative aspects of human resource.

- presents India's population size and the nation's rank by comparing with the world population.
- analyses the factors that affect the population and present a report.
- analyses the graph showing the population age structure, labour force participation rate and dependency rate.
- discusses how the sex ratio, life expectancy, and literacy rate help in the progress of a country.
- analyses the qualitative aspects of human resource and present the findings.
- prepares a note on the role of education and healthcare in human resource development.
- discusses and prepare a note on the mechanisms that work for education and healthcare.



Let us assess

- List out the quantitative and qualitative aspects of human resource?
- Prepare a note by analysing the importance of population studies.
- Compare the changes in population due to birth rate, death rate and migration.
- Labour force participation rate and dependency rate as per the census of India 2011 is given below. Prepare a graph based on this.

	Labour force participation rate (in percentage)	Dependency rate (in percentage)
Female	62.8	37.2
Male	62.2	37.7

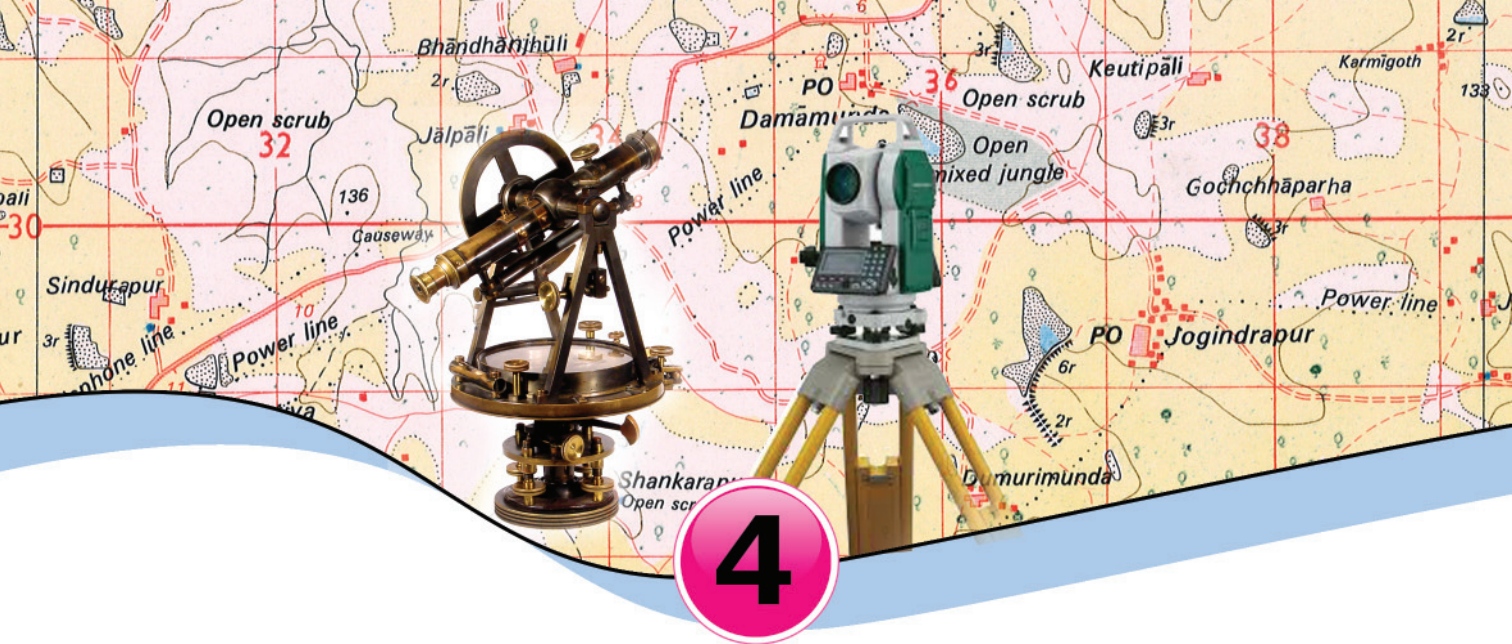
- List the advantages of the increase in labour force participation rate and disadvantages due to increase in dependency rate.
- What are the factors that improve human resource? How does this influence a country's development?

- How does education help in a country's development? Prepare a flowchart.
- List the existing problems in the health sector.
- Explain how education and healthcare help in human resource development.



Extended activities

- Visit the website of the Census India and collect the latest population data.
- Organize various programmes in connection with the World Population Day.
- Find out the dependency rate and the labour force participation rate by collecting the age structure from the families of your classmates.
- Prepare a report by interviewing the headmaster on the programmes which are undertaken by the school to improve the quality of education.

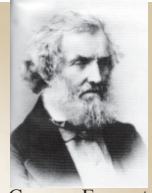


Terrain analysis through Maps



വില്യം ലാంഗ്റ്റൺ

Recognizing the importance of understanding the geographical peculiarities in establishing power in their colonies and in collecting revenue, the British decided to prepare maps based on various surveys. Three surveys namely the tax survey, the topographic survey, and the trigonometric



George Everest

survey were carried out by the East India Company in the Indian subcontinent. These surveys were undertaken by Col. William Lambton over a period of fifty years.

Several Indians were involved in these surveys through difficult terrains and hostile climate carrying the heavy metallic survey instrument called theodolite which weighed half a ton. The surveys incurred immense expenditure and took a toll on many. Col. George Everest joined as an assistant to Lambton in 1818. This was the first survey that recorded the correct measurements of the Himalayan mountain ranges.

As a tribute to George Everest who took charge of the survey after Lambton, the highest peak in the Himalayan mountain ranges was given the name Mount Everest. The first topographic maps of the Indian subcontinent were prepared after the completion of the survey in 1854.

Haven't you read the above description? Finding the precise location of the earth's surface features is essential for the preparation of maps. Every inch on earth is measured with the help of survey instruments and maps are prepared based on these measurements. What are the features of the topographic maps that are mentioned in the description? How do these differ from other maps? Let's look into these aspects.

Topographic Map

You have learnt that large scale maps are maps prepared by incorporating minute details of comparatively small areas. Topographic maps depict in detail all natural as well as manmade features on the earth's surface. These maps contain the important surface features such as the undulations of the terrain, rivers,



Toposheets

The English term 'topographic' is derived from the Greek terms 'topo' and 'graphie' which mean 'place' and 'to write or draw' respectively. Topographic maps are also known as toposheets.

other water bodies, forests, agricultural land, barren land, villages, towns, and transport and communication systems.

In India the Survey of India is entrusted with the preparation of topographic maps. Certain restrictions have been imposed on the use of topographic maps of strategic regions owing to the national security concerns.

Uses of topographic maps

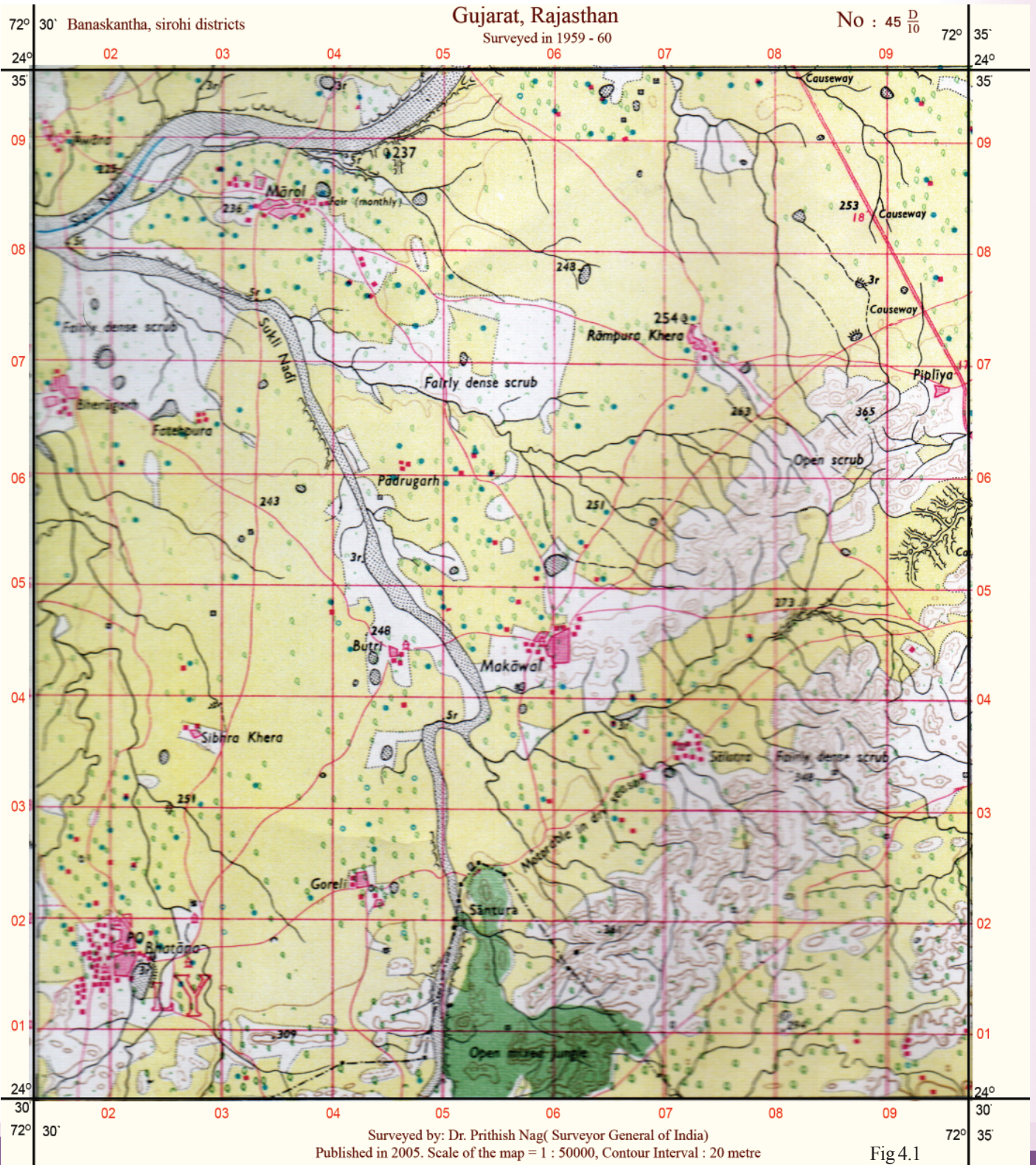
Topographic maps are used for various purposes. They are:

- To analyse the physical and the cultural features of the terrain.
- For military operations and the preparation of military maps.
- To identify and study the natural as well as the cultural resources of a region as part of economic planning.
- For urban planning.
-

Proper training and practical experience are essential for reading topographic maps. It requires a thorough knowledge of the numbering scheme, locational aspects, the conventional signs and symbols, the elevation and slope of the terrain, and the methods of their representation.



The following map is part of a toposheet (Fig 4.1). Find out how it differs from the maps you are familiar with.





Look at the number ($45\frac{D}{10}$) noted above the given toposheet (Fig 4.1). What does this indicate? Do all the toposheets contain such numbers?

Layout and numbering of toposheets

The number of the toposheet denotes the area which it represents. For example, the number of the given toposheet is 45D/10. This number denotes certain parts of Gujarat and Rajasthan. Similarly unique numbers are given to toposheets covering different regions. Let us see how these numbers are obtained.



Survey of India

The official agency responsible for the preparation of topographic maps in our country is the Survey of India with its head quarters at Dehradun. In India, the topographic maps are prepared in scales 1 : 1000000, 1 : 250000, 1 : 50000 and 1 : 25000 for various purposes. The topographic maps prepared in India are generally known as the 'Survey of India Maps' (SOI maps).

Toposheets for the whole world have been prepared in several sheets of same size and shape. The whole world is picturised in 2222 sheets as follows. 1800 sheets for regions between 60° latitude in the northern and southern hemispheres, 420 sheets for regions between 60° and 88° latitudes in both hemispheres and 2 sheets for both the poles. Analyse the given description and figures (Figs. 4.2, 4.3, 4.4, 4.5, 4.6) and understand the numbering and order of the toposheets representing India.

The numbering of India's toposheets are done on the basis of the India and Adjoining Countries Map Series. As each of the maps in this series is in 1:1000000 scale, these are known as million sheets.

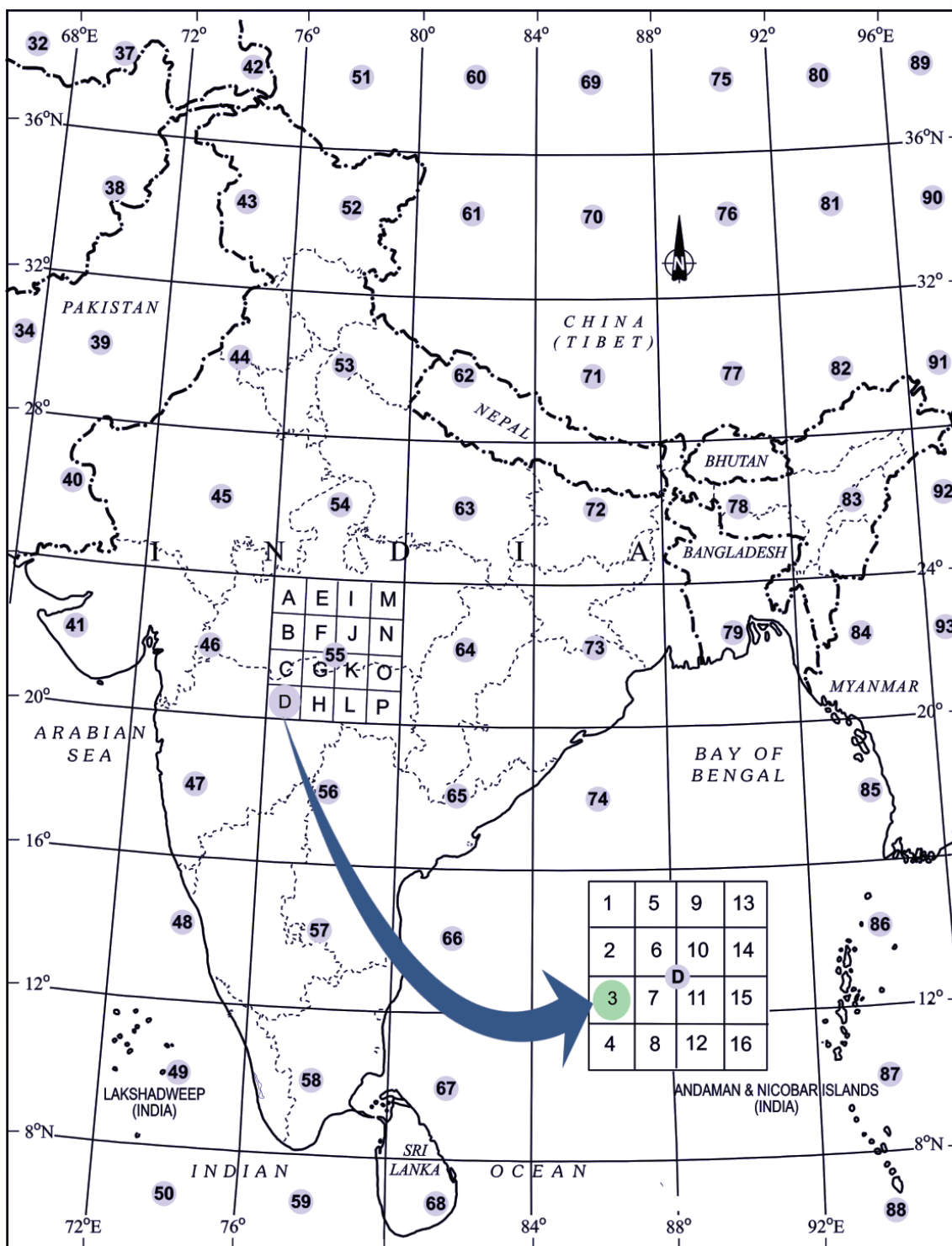


Fig. 4.2

Million sheets

45	54	63
46	55	64
47	56	65

Fig. 4.3

- The million sheets covering 4° latitudinal and 4° longitudinal extent are given numbers from 1 to 105. These numbers are known as index numbers. Look at Fig. 4.3. Each of the sheets in this category is divided into 16 parts known as degree sheets.

Degree sheets

55

A	E	I	M
B	F	J	N
C	G	K	O
D	H	L	P

Fig. 4.4

- Each million sheet is divided into 16 parts in the order A, B, C, D, upto P as in Fig. 4.4. For example, the million sheet numbered 55 is divided into 16 parts as 55A, 55B, 55C, etc. Each of these sheets with 1° latitudinal and longitudinal extent is prepared in 1:250000 scale. The degree sheets are further divided into 16 equal parts.

55D

1	5	9	13
2	6	10	14
3	7	11	15
4	8	12	16

Fig. 4.5

- Each degree sheet has 15' (15 minutes) latitudinal and longitudinal extent (Fig. 4.5) and are numbered as 1, 2, 3, 16, for example, $55\frac{D}{2}$, $55\frac{D}{3}$, up to $55\frac{D}{16}$. These sheets are prepared in 1 : 50000 scale (Fig 4.6).

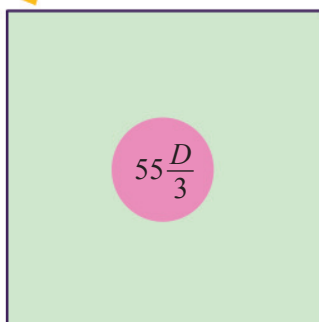


Fig. 4.6



Can you explain how the toposheet in the Fig. 4.1 got the number $45\frac{D}{10}$?



Answer the following questions by analyzing Fig. 4.2.

- The parts of states that are included in toposheet number 45.
- The index numbers of toposheets which cover the state of Odisha.

- The states that are included in toposheet number 73.
- The index numbers of toposheets which cover the state of Karnataka.
- The index numbers of toposheets which cover kerala.

Now you might have understood the layout and numbering of toposheets. Let us look into the ways in which the surface features of the earth are represented in these maps.

Conventional signs and symbols

You have learnt in previous classes that various features on the earth's surface are represented in topographic maps using different colours and symbols. As the colours and symbols used in the toposheets are internationally accepted, the maps prepared in one country can be easily understood and analysed by the people of another. Look at Table 4.1. It contains the conventional signs and symbols used in toposheets.

Table 4.1





















Signs and symbols	Geographic features	Signs and symbols	Geographic features
    	<p>Road</p> <p>Metalled road</p> <p>Unmetalled road</p> <p>Footpath</p> <p>Cart track</p> <p>Bridge with road</p>	   	<p>Boundary</p> <p>International boundary</p> <p>State boundary</p> <p>District boundary</p> <p>Taluk boundary</p>
    	<p>Railway</p> <p>Railway-broadgauge</p> <p>Railway with station</p> <p>Railway- metergauge</p> <p>Level crossing</p> <p>Railway with bridge</p>	     	<p>Waterbodies</p> <p>Stream</p> <p>River</p> <p>Tidal river</p> <p>Spring</p> <p>Well</p> <p>Tube well</p>

Table 4.1. (cont'd)

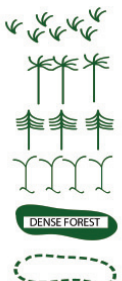



Signs and symbols	Geographic features	Signs and symbols	Geographic features
	<p>Vegetation</p> <p>Grass</p> <p>Palms</p> <p>Coniferous trees</p> <p>Bamboo</p> <p>Dense forest</p> <p>Reserve forest</p>	   <p>PO</p> <p>TO</p> <p>PTO</p> <p>PS</p> <p>IB</p> <p>RH</p>	<p>Lighthouse</p> <p>Health centre</p> <p>Airport</p> <p>Post office</p> <p>Telegraph office</p> <p>Post and telegraph office</p> <p>Police station</p> <p>Inspection bungalow</p> <p>Rest house</p>
	<p>Settlements</p> <p>Permanent house</p> <p>Temporary house</p> <p>Clustered settlements</p> <p>Dispersed settlements</p> <p>Linear settlements</p>		
	<p>Monuments and buildings</p> <p>Fort</p> <p>Temple</p> <p>Church</p> <p>Mosque</p> <p>Tomb</p> <p>Grave</p>		<p>Elevation</p> <p>Contour lines</p> <p>Form line</p> <p>Spot height</p> <p>Triangulated height</p> <p>Benchmark</p>

Table 4.1. Conventional signs and symbols

Find out the conventional colours used to represent information and complete Table 4.2.



Feature	Colour
<ul style="list-style-type: none"> • Latitudes and longitudes • Non perennial waterbodies • Railway lines, telephone and telegraph lines • Boundary lines 	
<ul style="list-style-type: none"> • Oceans, rivers, wells, tube wells..... (perennial waterbodies) 	•
<ul style="list-style-type: none"> • Forests • Grasslands • Trees and shrubs • Orchards 	•
<ul style="list-style-type: none"> • Cultivable land 	•
<ul style="list-style-type: none"> • Barren land 	•
<ul style="list-style-type: none"> • Settlements, roads, paths 	•
<ul style="list-style-type: none"> • Grid lines (eastings, northings and their numbers) 	•
<ul style="list-style-type: none"> • Contour lines and their values 	•
<ul style="list-style-type: none"> • Sand dunes and sand hills 	•

Table 4.2



Representing elevation

Elevation or height is represented in toposheets using contour lines, form lines, spot height, triangulated height, and benchmarks.

Contour lines

Contour lines are imaginary lines joining places having the same elevation above the sea level.

Form lines

When it is difficult to measure the elevation of places through land surveys due to rugged terrain, the elevation is represented with the help of broken lines. These are form lines.

Spot height

Spot height represents the actual height of a place by recording the height in digits beside a black dot. Sometimes the height alone is recorded without the black dot.

Triangulated height

Height of places estimated through trigonometric surveys are recorded in maps using 'Δ'symbol.

Benchmark

The height of reservoirs and prominent buildings are recorded along with the letters BM.



Look at the given toposheet (Fig 4.1). Find out the symbols and colours you have familiarized.

You are now familiar with the conventional signs and symbols in toposheets. Let us see how the location of places is identified in these maps.



Haven't you noticed the red lines drawn lengthwise and breadthwise in the given toposheet (Fig 4.1)? What are they? What are their uses?

Grid reference

You know that places are located on maps and globe with the help of latitudes and longitudes. But it is difficult to show the precise location of minor geographical features in toposheets.

To solve this difficulty north-south and east-west lines in red are incorporated in the toposheets. The north-south lines are called eastings and the east-west lines are called northings. Their corresponding values are also recorded.



Find out the eastings and northings in the given toposheet (Fig 4.1)

Analyse the figures (Fig 4.7, 4.8) and their descriptions to understand the salient features of eastings and northings.

Eastings

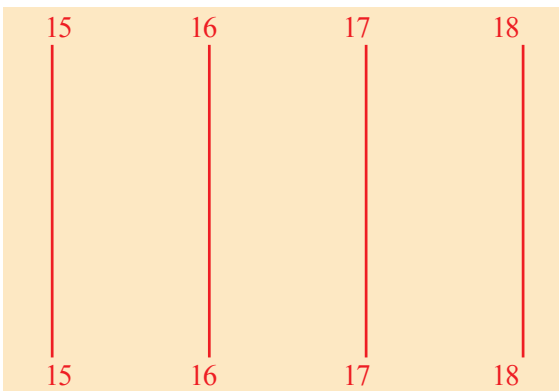


Fig 4.7

- These are north-south lines
- Their value increases towards the east.
- The value of the eastings immediately left to the geographic features is considered for identifying a location.

Northings

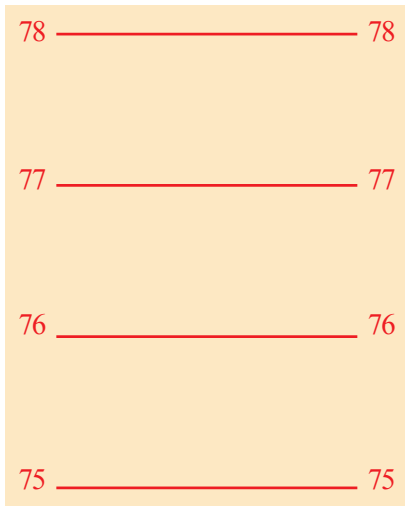


Fig 4.8

- These are lines drawn in the east-west direction.
- Their value increases towards the north.
- The value of the northings immediately to the south of the feature in the map is considered for identifying a location.



Find the eastings and the northings values from the given toposheet (Fig 4.1).

The grid formed by the eastings and the northings are called reference grid. Each grid with 2 cm width & 2 cm breadth covers an area with 1 kilometre length & 1 kilometre breadth on the earth's surface (in 1:50000 toposheets).

Let us see how features can be located in toposheets using these grids.

Look at the model grid (Fig 4.9) given below. Don't you see the symbols of some geographic features in the grid? We need to find the location of these features. Are the size of the geographic features included in the grid the same? Since they differ in size,

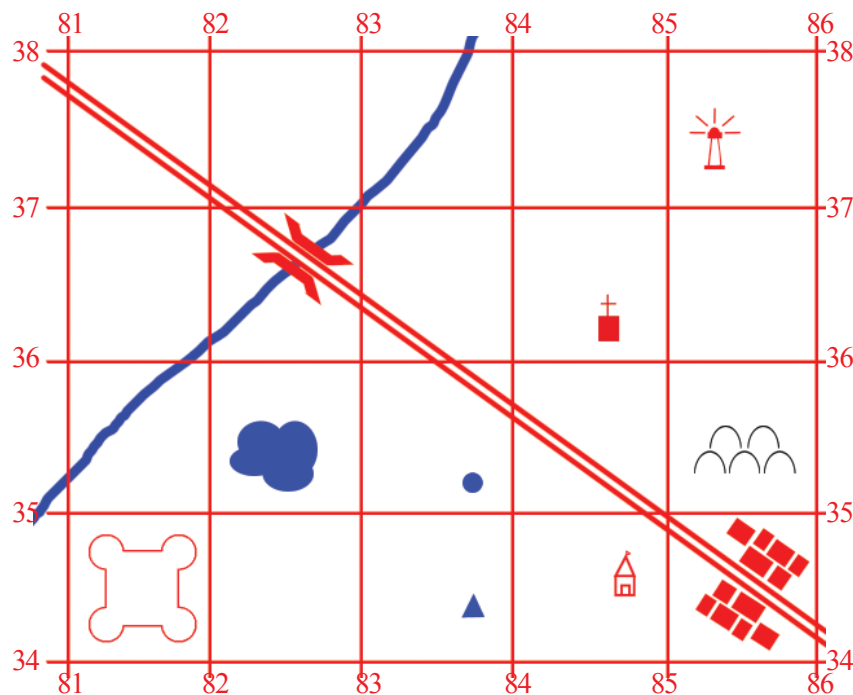


Fig 4.9

the location of these features can be found out in two different ways, namely, 4 - figure grid reference and 6 figure grid reference.

4 figure grid reference

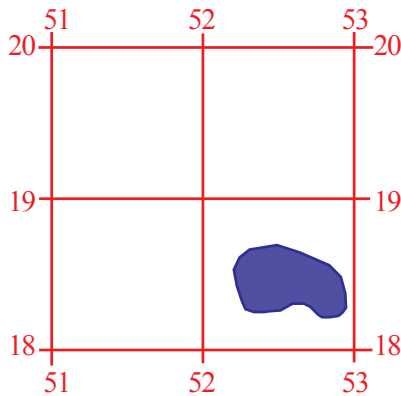



Fig 4.10

Look at the grid with a lake in Fig. 4.10. Let's examine how the lake can be located.

In the 4 - figure grid reference method, the value of the easting to the immediate left of the feature (lake) is to be written (here it is 52). Then the value of the northing just south of the feature is to be written (18). Thus the location of the lake as per the 4 figure grid reference will be 5218 (Fifty two eighteen).

 *Locate the geographic features - fort, graveyard, and settlements shown in the model grid (Fig 4.9) using the 4-figure grid reference method.*

6-figure grid reference

Comparatively smaller geographic features are generally located through the 6-figure grid reference method. Look at the given grids (Fig 4.11) depicting a tube well. Let's examine how the tube well can be located.

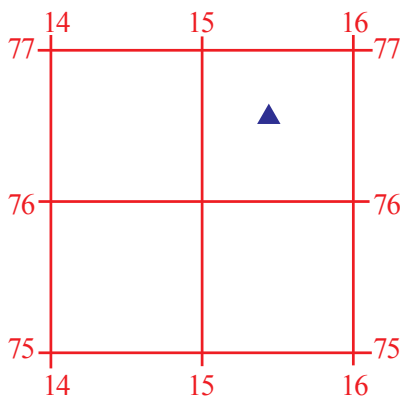


Fig. 4.11

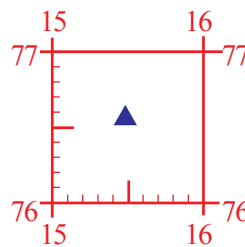


Fig. 4.12

While determining the location of the tube well, the value of the easting to the left of it (15) is to be written first. Then divide the area up to the next easting into 10 equal parts as shown in figure (Fig 4.12). Find the exact division on which the tube well is located and write it next to the value of easting already found. (155). Now the

value of the northing just below the tube well is to be written along with the easting's value (15576). Consider the area up to the next northing as being divided into 10 equal parts as shown in Fig. 4.12. Then find the exact division on which the tube well is located and write it with the values already written (155766 - Fifteen five seventy six six). What is obtained is the exact 6 grid reference of the given tube well.

Locate the smaller geographic features - temple, church, well, light house and bridge shown in the model grid (Fig 4.9) using 6-figure grid reference method.



Now you have understood how the location of features is determined in topographic maps. Let's see how the shape of the terrain is assessed.



Look at the smooth curved brown lines shown in the topographic map (Fig. 4.1). By what name are these lines known? What is their use?

Contour Lines

Observe the pictures given (Figs. 4.13 and 4.14). These are the pictures of contour lines and the shape of landforms represented by them. Contours are imaginary lines drawn connecting places having equal elevation from the sea level. The respective altitude will be marked with each contour line. These are called contour values. With the help of contour values we can find out the altitude of the places shown in maps.

Two different landforms and their contour representations are given Figs. 4.13 and 4.14. Which are the landforms you can see in these pictures?

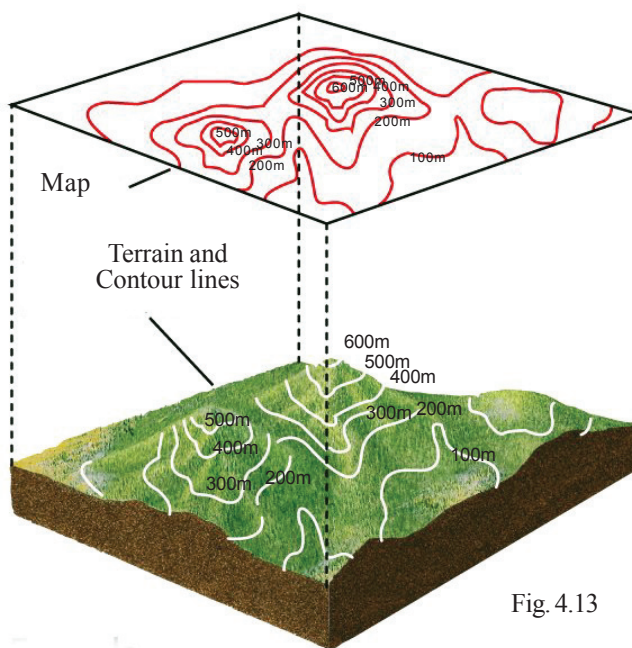


Fig. 4.13

Haven't you observed that the difference in values of the contours is always the same? This difference between the value of two adjacent contours is called contour interval. For example, the contour interval in Fig. 4.13 and 4.14 is 100 metres.

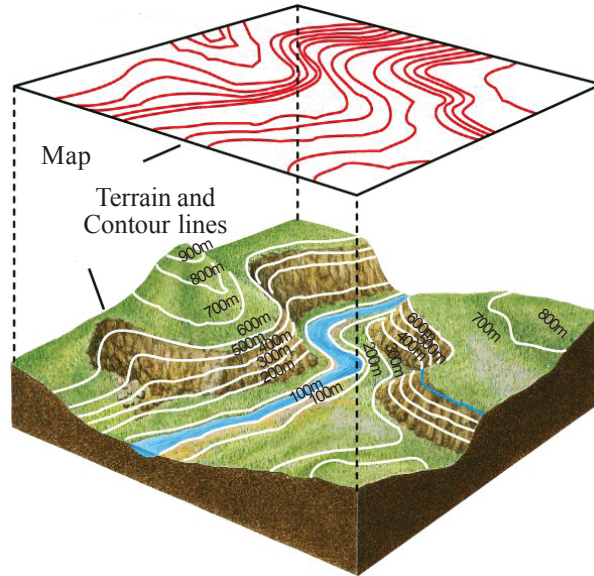


Fig. 4.14



Find the contour interval in the toposheet provided (Fig. 4.1).



Contour interval

The contour interval of toposheets in the 1:50000 scale is generally 20 metres. By analysing the values of the contours, the altitude of places represented in the maps can be found out. To understand the relief of elevated landforms, contours with 100 metre interval are used.

You might have noticed that in the given picture (Fig. 4.14) the contours are closely spaced in certain places and are farther apart elsewhere. The closely spaced contours represent steep slopes and the widely spaced contours represent gentle slopes.

The following three things can be assessed from the contour lines in topographic maps.

- Altitude of the place
- Nature of the slope
- Shape of the landform

Let's see how the shapes of landforms are determined using contour lines. This can be done using two methods.

Method 1

Assessing the topography directly from the contours

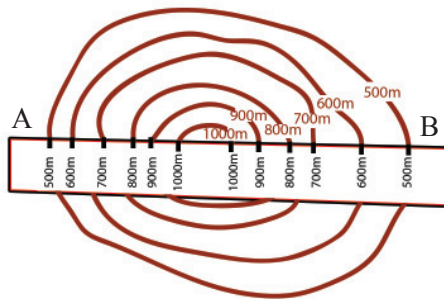


Figure 4.15

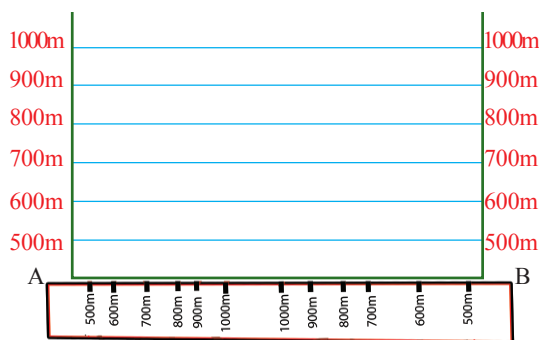


Fig. 4.16

- As shown in Fig. 4.15, place a paper strip, across the contour pattern of which the topography is to be assessed. Mark A and B at either ends of the paper strip. Mark and label the values of the contour lines cutting across the paper strip.
- Transfer these contour values on to the X-axis of a graph paper (Fig. 4.16). Choose a convenient scale and mark the contour values on the Y-axis.
- Draw vertical lines from the points of contour values on the X-axis (Fig. 4.17). Intersect these vertical lines against the corresponding values in Y axis and mark the intersecting points. Join these points by smooth curves.

- Shade the area using a pencil. Thus we get the shape of the landform represented by the contour lines.

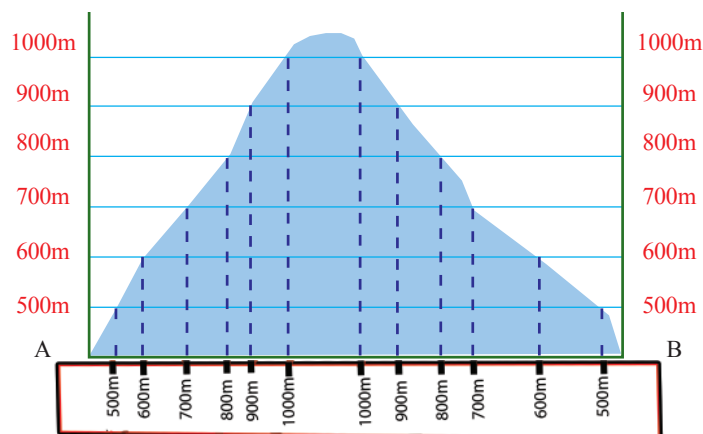


Fig. 4.17



Find out the contour lines of the elevated regions in Fig. 4.1. Mark their contour values on a piece of paper and identify the shape of the land form.

Method 2

Assessing the topography by tracing out the contour lines

- Copy the contour lines on a tracing paper and transfer them on to another paper.
- Draw a line AB through the centre of the contours as shown Fig. 4.18.

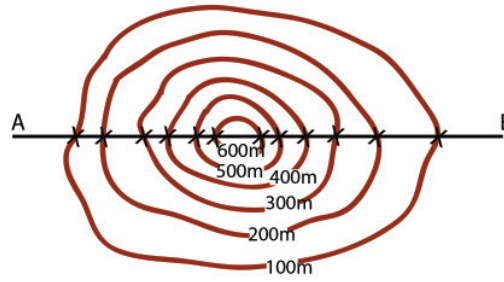


fig 4.18

- Draw the X and Y axes below the line AB as shown in Fig. 4.19. Mark the values of the contours on both the Y-axis in appropriate scale (0.5cm=100m or 1cm=100m). Join equal values on both the Y-axes using narrow lines.

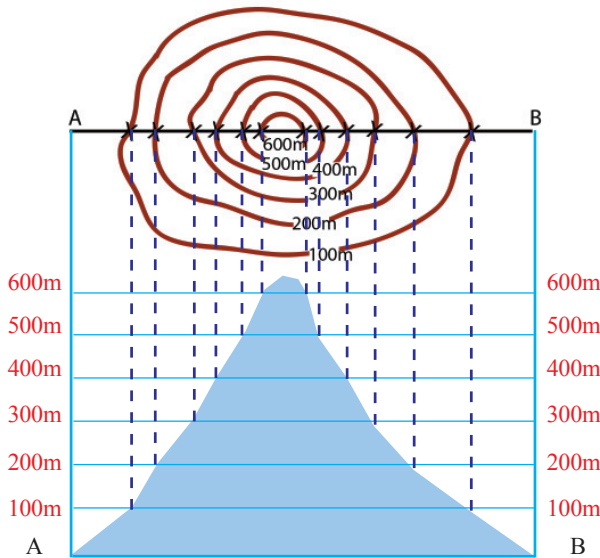
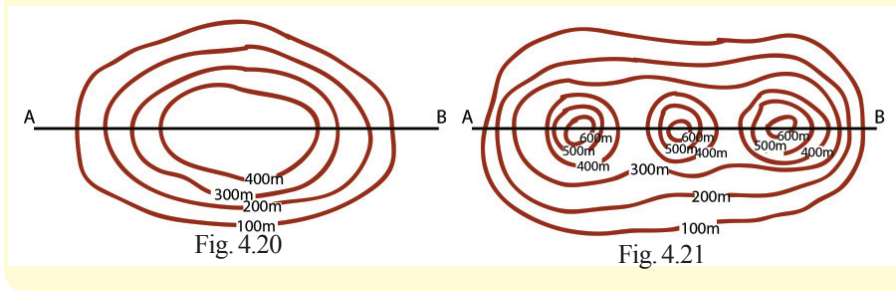


fig 4.19

- Draw vertical lines from the points where contours cut across AB. Mark the points at which these vertical lines intersect the horizontal lines (as in Fig. 4.19).
- Join the points with smooth curves and shade the area using a pencil. Thus we get the shape of the landform represented by the contours.



Plot the topography represented by the following contour patterns (Fig. 4.20 and Fig. 4.21).



Now you might have understood the methods of plotting the topography from contour lines. Let's examine how the visibility between two places is determined.

Intervisibility

As part of topographical map interpretation, there arises a need to find out whether two places are intervisible. This can be solved only by finding out the relief as well as the slope of the region. If any two places are mutually visible, then we can establish that these places are intervisible. Intervisibility assessment is being applied for erecting electric posts, mobile towers, wireless transmission towers, etc.

Look at Fig. 4.22. You can see the points marked as P, Q, R, and S between the contours. Can you identify the points which are intervisible?

For assessing the intervisibility, the shape of the terrain must be inferred from the contour lines. The given picture (Fig 4.23) represents the shape of the landform inferred from the contour lines.

By analysing this picture, we can assess the intervisibility between places.

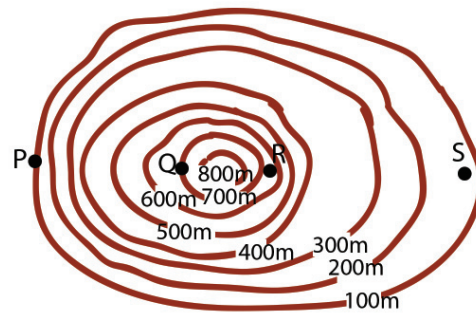


Fig. 4.22

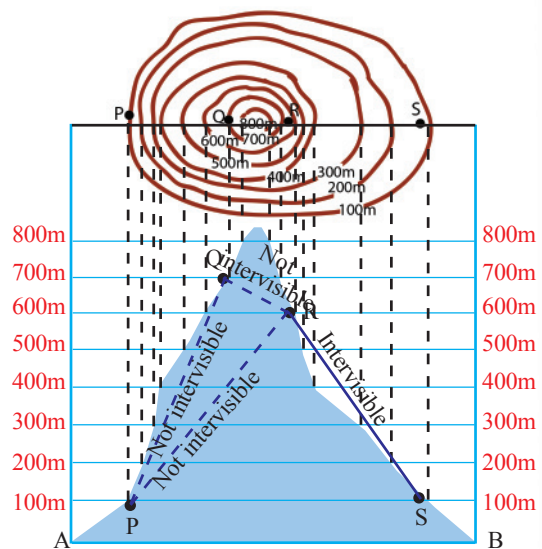


Fig. 4.23



Determine the shape of the terrain represented by the given contours (Fig. 4.24) and complete Table 4.3 by checking the intervisibility between the places M, N, O and P.

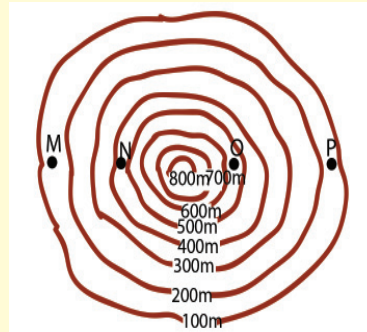


Figure 4.24

Places	Intervisible/ Not intervisible
• Between M and N	•
• Between N and O	•
• Between O and P	•
• Between M and O	•
• Between M and P	•
• Between N and P	•

Table 4.3

Now you might have got some basic knowledge required for the interpretation of topographic maps. Let's examine how the toposheets can be interpreted based on it.

Toposheet interpretation

In the toposheet you have familiarised (Fig. 4.1) haven't you observed some marginal information regarding the sheet as well as the physical and cultural features pertaining to the area represented?

The study and interpretation of such maps can be done in different stages as mentioned below.

1. Marginal Information/Primary information
2. Physical/Natural features
3. Cultural/Man-made features

Marginal information

The general information given outside the margins in topographic maps are known as marginal/primary information. The toposheet number, name of the area, latitudes and longitudes, values of northings and eastings, scale of the map, contour interval, years of survey and publication as well as the agency in charge of the survey are the marginal information in the toposheets.

The indicators regarding the marginal information of toposheets and a toposheet labelled with such information are given (Fig 4.25). Read the sheet based on the indicators and write down the marginal information.



Marginal information indicators

- Toposheet number - (a)
- Name of the place represented - (b)
- Latitudinal location - $(c)_1, (c)_2$
- Longitudinal location - $(d)_1, (d)_2$
- Easting - $(e)_1, (e)_2$
- Northing - $(f)_1, (f)_2$
- Scale of the map - (g)
- Contour interval - (h)
- Year of survey - (i)
- Year of publication - (j)
- Agency in charge of survey - (k)

List the marginal information of the given topographic map $\left(45 \frac{D}{10}\right)$



in Fig. 4.1 as was done with the toposheet $56 \frac{D}{11}$.

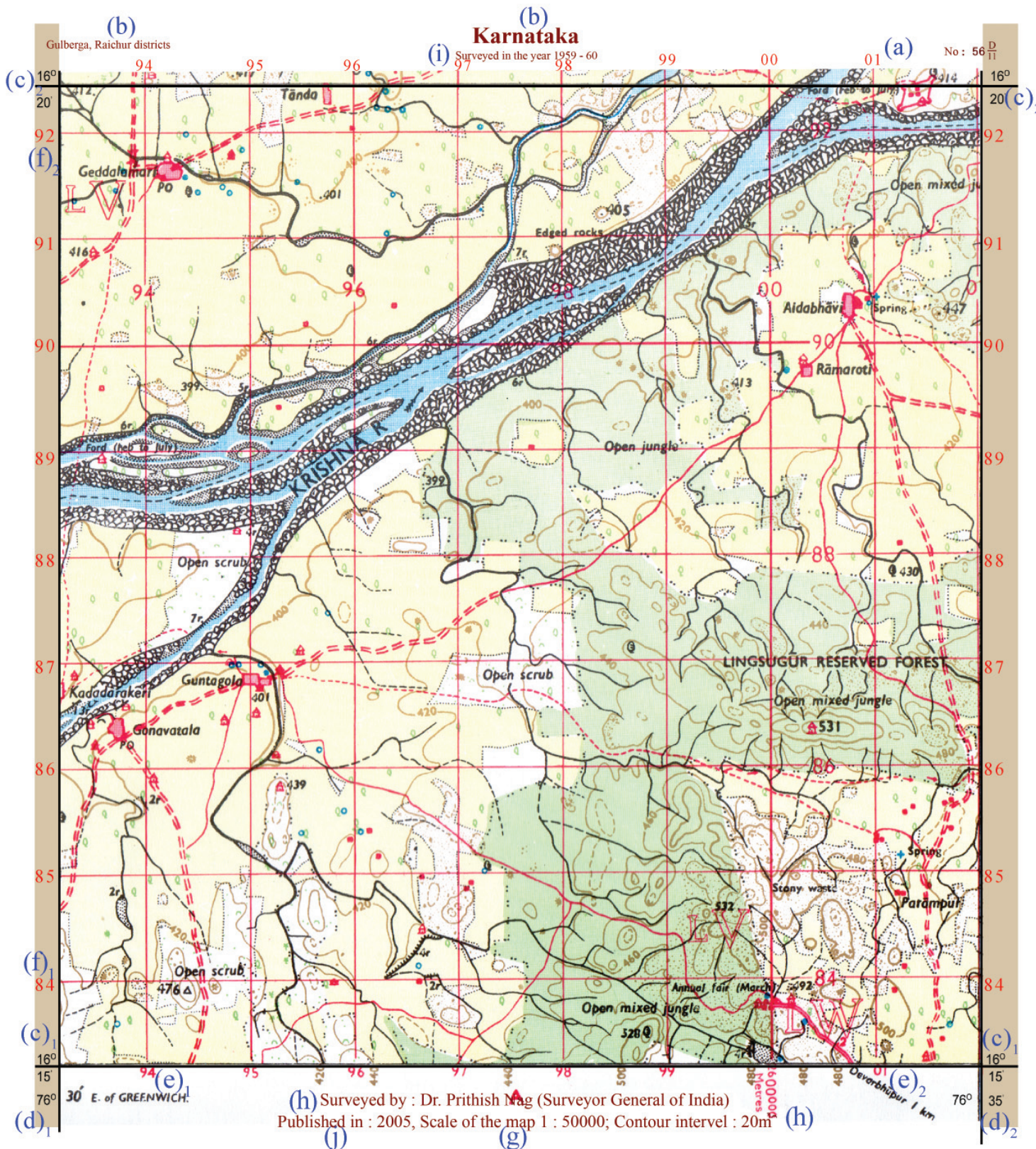


Fig. 4.25

Physical features

Waterbodies such as rivers, streams, wells, tube wells, springs, etc. as well as the different land forms are the physical features in topographic maps. Their locations are to be found based on direction or grid reference method.

Find answers to the following questions by reading the given toposheets (Fig 4.25).



- *Which is the major river flowing through this area?*
- *In which direction does it flow?*
- *On which bank of the river are the forests seen?*
- *What is the name of the reserve forest in this area?*
- *How many springs are seen in this region? Locate them based on direction.*
- *Locate the open scrubs in this area*
- *Find out the location of the following using the 6-figure grid reference method.*
 - 476A
 - 447
 - the spring north of Parampur village

Cultural features

Settlements, different types of roads, boundaries, places of worship, agricultural lands, post office, police station, bridges, etc. are a few cultural features shown in toposheets. Their location can also be found based on direction or grid reference method.

Find answers to the following questions by reading the given toposheets (Fig 4.25).



- *Identify the districts in Karnataka to which the area belongs.*
- *Based on which natural feature is district boundary determined?*
- *Which is district on the right bank of River Krishna?*
- *Where is the metalled road seen?*

- *In which direction is the Gadalamari village situated?*
- *Which are the villages where post offices can be found?*
- *Find the location using the 4-figure grid reference method.*
 - *Aldobhavi village*
 - *Ganavathala village*
 - *Fort to the north-eastern corner*
- *Find the location using the 6-figure grid reference method.*
 - *Temple near Gadalamari village*
 - *Temple within the Lingusugar Reserve Forest*
 - *Post office in Ganavathala village*



Interpret the toposheet No. 45 $\frac{D}{10}$ given in Fig. 4.1 and prepare a report based on the physical and cultural features in it.



Significant learning outcomes

The learner

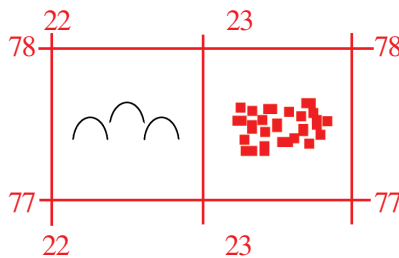
- identifies toposheets, and describes their preparation, uses, as well as layout and numbering.
- locates the exact position of geographical features on toposheets based on the concept of grid referencing.
- distinguishes the features represented by conventional signs and symbols in toposheets and make inferences on them.

- plots out the relief and intervisibility of land areas based on contours.
- prepares notes on marginal information as well as the physical and cultural features by analysing toposheets.

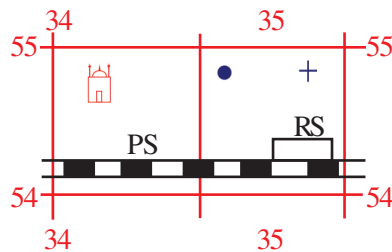


Let us assess













- Find out the location of settlements and graveyard in the given grid using the 4-figure grid reference method.



- Find out the location of spring, mosque, railway station, police station, and well in the given grid using the 6-figure grid reference method.



- Match the contour in Column A with the shape of landforms in Column B.

Contour A	Shape of landform B
1 	A 
2 	B 
3 	C 
4 	D 
5 	E 
6 	F 



Extended activity

- Collect different toposheets and interpret the marginal information as well as the physical and cultural features, and prepare short notes.



5

Public Expenditure and Public Revenue



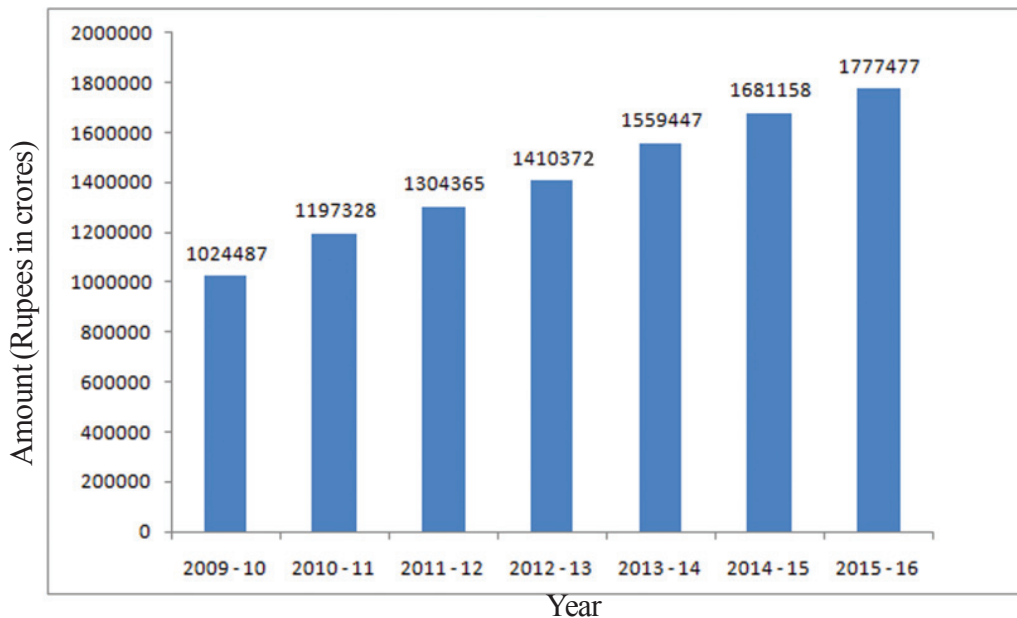
Observe the pictures given above. They are related to certain activities performed by the government. What are they ? Find out other activities of the government.

- Distribution of drinking water
- Distribution of welfare pension
- Protection of environment
-

We have seen that the government undertakes many activities. Why are these activities carried out? They are for the welfare of the people. Money is required for all these activities. The expenditure incurred by the government is known as public expenditure. Expenditure increases with an increase in the activities of the government.



Given below is the graph showing the public expenditure of India from 2009-10 to 2015-16.



Source : Central budget-2015 - 16

Observe the graph and find out the yearly increase in the public expenditure.

Public expenditure can be classified into developmental expenditure and non-developmental expenditure. The expenditure incurred by the government for constructing roads, bridges and harbours, starting up new enterprises, setting up educational institutions, etc. are considered as developmental expenditure. Expenditure incurred by way of war, interest, pension, etc. are considered as non-developmental expenditure.



Find out the government expenditure in your ward and classify them into developmental and non-developmental expenditure.

Hope you have understood from the graph that there has been a steady and continuous increase in India's public expenditure. Why does India's public expenditure increase? Let's see how an increase in population increases the government expenditure. As population increases, facilities for education, health, shelter, etc. for more people have to be provisioned for. For this, the government has to spend more money. Some other important reasons are listed below.

- Increase in the defence expenditure
- Welfare activities
- Urbanisation
-

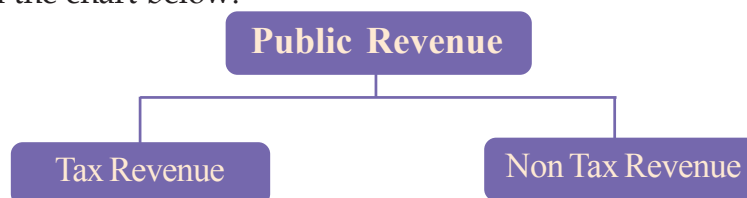
Discuss how these factors lead to an increase in public expenditure and make inferences.



A government needs income to meet the expenditure. Let's see what are the sources of revenue of the government.

Public revenue

The income of the government is known as public revenue. Think about the sources of revenue of the government. The government earns income primarily from two sources. They are given in the chart below.



Taxes

Taxes are the main source of income for the government. The amount to be compulsorily paid by the public to the government for expenditure such as welfare activities, developmental activities, etc. incurred in public interest is called tax. The person who pays tax is called tax payer. Taxes are of two types.



രസീത്

ബുക്ക് നമ്പർ ജി 4006 -ാം നമ്പർ തിരുവനന്തപുരം ജില്ലാ ഭരണകമ്മീഷൻ കൂറം 4006 ജി No 4006/2013

കുറം 4006 ജി No 4006/2013

സർവ്വേയും സബ് വിവിധ ഭാഗം നമ്പരും ലഭ്യവും	വിസ്തീർണ്ണം		പട്ടണങ്ങളോ പട്ടണങ്ങളോ ഉടമയോ പേര്	ബുക്കിന്റെ നമ്പരും	പണം ഒടുക്കിയ ആളിന്റെ പേര്	പുതു കാലത്തേക്കെന്നോ പുതു തവണയ്ക്കെന്നോ	തുക		വിവരങ്ങൾ
	ഹെ. ആർ	ച. ആർ					രൂപ	സ.	
194/1	00	4047	4006	82		13-14	82	-	

മേൽ വിവരിച്ച പ്രകാരം 82/- രൂപ വിലയ്ക്ക് വിറ്റുപോയ (അക്ഷരത്തിൽ) 2013 -മാറ്റം മുഴുവൻ തീയതിയായ ഇന്നേ ദിവസം സിവിൽ വില്ലേജ് കണക്കിൽ മുതൽ വച്ചിരിക്കുന്നു.

വില്ലേജ് ഓഫീസറുടെയും വില്ലേജ് അസിസ്റ്റന്റിന്റെയും പേരും ഒപ്പും

നമ്പരും തീയതി 29.7.13

CPV 19/149/2011 11,000 x 100 x 2 © Government of Kerala

Marketed by: ITC Limited 37, J.L. Nehru Road, Kolkata-700 071. Manufactured by: Southern Scribe Instruments Pvt. Ltd. 1084, Viswanathapuram Village, Perambakkam Road, Ulundai Post, Thiruvallur District, Tamil Nadu - 602 105.

Net Quantity : 1 Gel Pen

Ink Colour : Black

MRP Rs. 10.00 incl., of all taxes

Pkd: 02 / 2015

Liability Restricted to Replacement of Pen

FEEDBACK ? SUGGESTIONS ?

Quality Manager, ITC Ltd.- ESPB, ITC Centre, 5th Floor, 760, Anna Salai, Chennai. 600 002.

classmate@itc.in (18004253242) (toll-free from INDIA/ISD lines)

04030143Y

8 903183 301433

Among these, the first is a land tax receipt. Second is the outer packing of a newly bought pen. What is the difference in the payment of taxes indicated in both?

Land tax is paid by the person on whom it is imposed. Where is the land tax paid? In the second example the tax is paid by the company which manufactures the pen and then collects the amount from the consumers by including it in the price. That is why the outer packing states 'inclusive of all taxes'. In reality, the company does not have tax burden.

In other words, direct tax is the tax which is paid by the person on whom it is imposed. Indirect taxes are taxes which are imposed on one person but the tax burden is transferred to another. Let's observe the features of direct tax and indirect tax.

Direct Tax	Indirect Tax
<ul style="list-style-type: none"> • Tax is paid by the person on whom it is imposed • Tax burden is felt by the tax payer • Comparatively high expenditure is incurred for tax collection 	<ul style="list-style-type: none"> • Tax is imposed on one person and paid by another • Tax burden is not felt by the tax payer • Comparatively low expenditure is incurred for tax collection

Major direct taxes in India

- **Personal income tax:**

The tax imposed on the income of individuals is called personal income tax. Tax rate increases with income. Tax is imposed on income beyond a certain limit.

- **Corporate tax:** It is the tax imposed on the net income or profit of a company.

Main indirect taxes in India

Value added
tax



A product reaches the consumers through different stages. Value is added at each stage. Taxes which are imposed on such value is called value added tax.

For example, let us consider rice trade. Rice reaches the consumer through the farmer, rice miller, and trader. Assume that the farmer gives one quintal of paddy for Rs.1000 to the rice miller. The rice miller in turn sells the rice to the trader for Rs.2000. Trader sells the rice for Rs.3000 to the consumer. Additional value added at each stage is Rs.1000. If the value added tax is 10 percent, the total amount of tax to be paid is Rs. 300 (100 + 100 + 100). These taxes are fully included in the price and collected from the consumer.

Excise duty ➔


Tax imposed at the production stage of a commodity.

Customs duty ➔

Imposed on import and export of products. These are known as import duty and export duty respectively. For example, import duty is imposed when foreign cars are imported. Export duty is imposed on the export of pepper.

Service tax ➔

The tax imposed on services is called service tax. Tax imposed on telephone services is an example.

 *Which affects the common man more : direct tax or indirect tax?*
Discuss.
Hints :
Tax burden, rise in price, inequality

Along with tax, the government receives income from two other sources-surcharge and cess.



Goods and Services Tax (GST)

Goods and Services Tax is an indirect tax. It is a value added tax. The peculiarity of goods and services tax is that taxes are imposed on both goods and services. This is imposed at the levels of production, distribution, and consumption.

Surcharge

Additional tax imposed on tax is called surcharge. Generally, surcharge is imposed for a specific period. For example, assume that people with an income of more than rupees ten lakhs are paying ten percentage surcharge. Tax on rupees ten lakhs is estimated. Then ten percentage of the tax is estimated as surcharge and added to the tax.

Cess

Additional tax imposed by the government for certain specific purposes is called cess. Cess will be discontinued when enough money is received. Education cess imposed along with personal income tax is an example for this. This is with the aim of developing India's educational facilities.

So far we have discussed the tax revenue of the government. Taxes imposed by the central, the state, and the local self governments are given below.

Central government	State government	Local self government
<ul style="list-style-type: none"> • Corporate tax • Personal income tax • Union excise duty 	<ul style="list-style-type: none"> • Value added tax • Stamp duty • State excise duty • Land tax 	<ul style="list-style-type: none"> • Property tax • Professional tax • Entertainment tax

With the help of reading materials, find out the main taxes of the state government.



We have understood about taxes, which are a source of revenue of the government. Now let us look into non-tax revenue.

Sources of non-tax revenue

Fees

Fees is the reward collected for the government's services. License fees, registration fees, tuition fees, etc. are examples.

Fines and penalties

Fines and penalties are punishments for violating the laws.

Grants

Grants are the financial aid provided by one government to another. For example, grants are provided by central and state governments to local self governments.

Interest

Interest is the amount received for the loans provided by the government to various enterprises, agencies, and countries.

Profit

Profit is the income received from the enterprises operated by the government. For example, profit from the Indian Railways.

Visit your local self government institution and prepare a report on the grants they receive.



When the public income is insufficient to meet the expenditure, governments will borrow.

Public debt

Public debts are loans taken by the government. Loans are availed from within and outside the country. These are known as internal debt and external debt respectively.

Internal debt \Rightarrow Internal debts are the loans availed by the government from individuals and institutions within the country.

External debt \Rightarrow External debts are the loans availed from foreign governments and international institutions.

Given below is the table indicating the internal and external debt of India from 2010 -11 to 2015-16.

Year	Internal debt (Rupees in crores)	External debt (Rupees in crores)	Total debt (Rupees in crores)
2010 - 11	2667114	157639	2824754
2011 - 12	3230622	170087	3400709
2012 - 13	3764456	177288	3941744
2013 - 14	4240766	184580	4424346
2014 - 15	4775900	194286	4970186
2015 - 16	5298216	205459	5503675

Source : Central budget 2015-16

- How much did public debt increase in 2015-16 compared to 2010-11?
- What conclusion can be arrived at while comparing internal debt with external debt?

Reasons for the increase in India's public debt are given below.

- Increased defence expenditure
- Increase in population
- Social welfare activities
- Developmental activities
-



- Calculate the annual per capita debt of India.
- India's public debt is increasing. Discuss the advantages and disadvantages of this and present the findings.

Public finance

Public finance is the branch of economics that relates to public income, public expenditure and public debt. Public finance is presented through the budget.

Budget

Budget is the financial statement showing the expected income and expenditure of the government during a financial year. In India, financial year is from April 1 to March 31.

Budgets are of three types.

When income and expenditure are equal, it is called a balanced budget. When income is more than expenditure, it is called surplus budget. When expenditure is more than income, it is called deficit budget.

Let's examine the major items of expenditure included in India's 2015-16 budget.

Items	Expenditure (Rupees in crores)
Interest and repayments	456145
Defence	246727
Subsidies	243811
Grants to states and union territories	108552
Pension	88521
Police	51791
Social services (education, health, broadcasting)	29143
Economic services (agriculture, industry, energy, transport, media, science and technology, etc.)	28984
Grants to foreign governments	4342
Other public services	30936

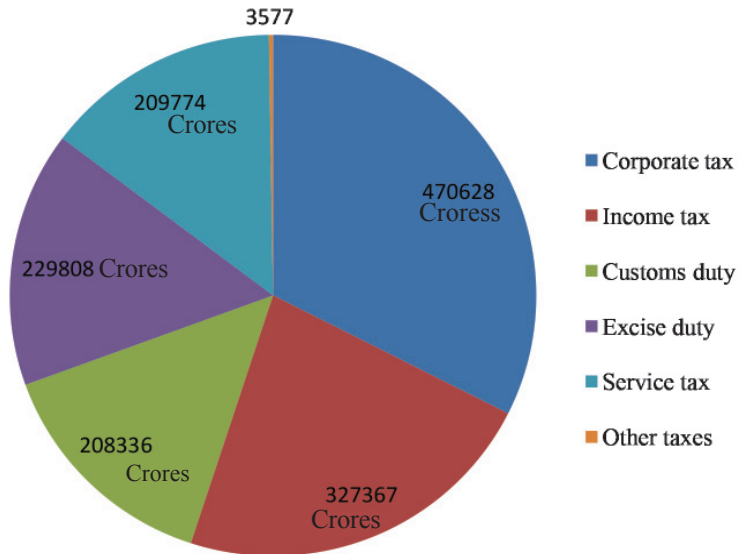
Source : Central budget 2015-16

Prepare a note analysing the major items of expenditure of the central government.

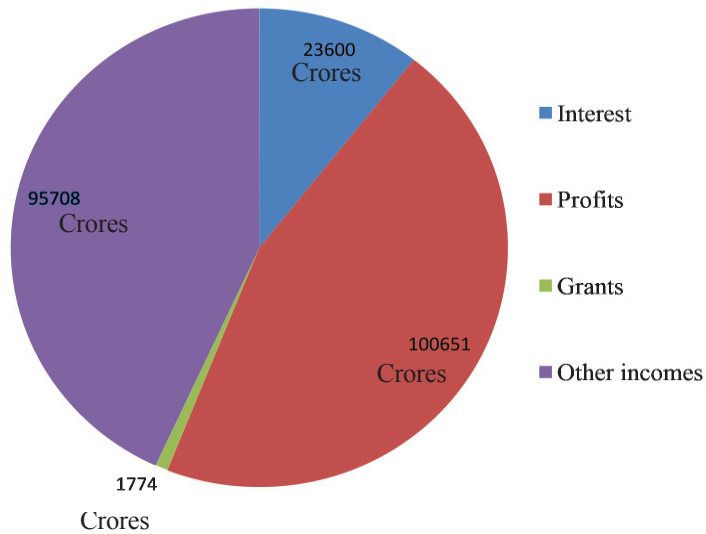


Observe the diagram related to the major income sources of the central budget 2015-16.

Central budget 2015-16 Tax revenue (In Rupees)



Central budget 2015-16-Non tax revenue (In Rupees)



Find out the following after observing the diagram.

- From which item does the central government receive maximum tax revenue?
- Which is the source of non tax revenue that yields maximum income to the central government?
- Which yields more income to the central government - tax revenue or non tax revenue?

Fiscal policy

Government's policy regarding public revenue, public expenditure and public debt is called fiscal policy. These policies are implemented through the budget. Fiscal policy influences a country's progress. A sound fiscal policy helps in nourishing the developmental activities and to attain growth. Some of the goals of the fiscal policy are given below.

- Attain economic stability
- Create employment opportunities
- Control unnecessary expenditure
-
-

Let's examine how the fiscal policy controls inflation and deflation which affect economic security. The tax rate is increased when there is inflation. As a result of this, the purchasing power of the people falls. For example, assume that tax rate is increased from ten percentage to twenty percentage. Then, for Rs. 100, the tax to be paid is Rs. 20 and the consumer can use only Rs. 80. When the products cannot be sold in the market, prices fall. Similarly, tax is reduced at the time of deflation. This will increase the purchasing power of the people. As a result the demand for products increases. This results in an increase in the price of the products. The timely application of fiscal policy helps the government to overcome such situations.

How do public expenditure, public income and public debt benefit a country? Discuss.



Significant learning outcomes

The learner

- presents the features of public revenue and public expenditure.
- analyses the features of direct tax and indirect tax with examples and lists them in a table.
- lists the central, state and local self government taxes.

- classifies and explains the sources of non-tax revenue.
- explains public finance
- presents the features of internal debt and external debt.
- differentiates the different types of budgets.
- presents the sources of income in the central budget in a table.
- presents the main features of the fiscal policy.



Let us assess

- Compare developmental and non-developmental expenditure and give examples for each.
- Describe the features of direct tax and indirect tax.
- Explain with examples public revenue and public expenditure.
- What are the sources of non tax revenue?
- Rewrite if required:
 Deficit budget - income = expenditure
 Surplus budget - income < expenditure
 Balanced budget - income > expenditure
- What is fiscal policy? Explain its aims.
- Public finance and fiscal policy determine a country's progress. Substantiate.



Extended activities

- Collect information about the benefits reaped by the government by imposing Goods and Services Tax.
- Identify the activities that can be undertaken to increase the income of the local self government in your locality and prepare a report based on it.

