

Social Science **II**
Standard x
Part - 1



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT, Kerala)
2019

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.

Dear Students,

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

The educational portal-Samagra and textbooks with QR code will make class room activities easy and interesting. The Textbook has been revised considering the National Skill Qualifications Frame work (NSQF), the disaster mitigation measures which is of contemporary relevance and ICT possibilities. You can take part in this life oriented informative and joyful learning activities and enrich this textbook further more. I believe that this textbook will help you interact responsibly with the nature and that you can transform into responsible citizens.

With love and regards

Dr. J. Prasad
Director, SCERT

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**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



Let us assess



Extended activities



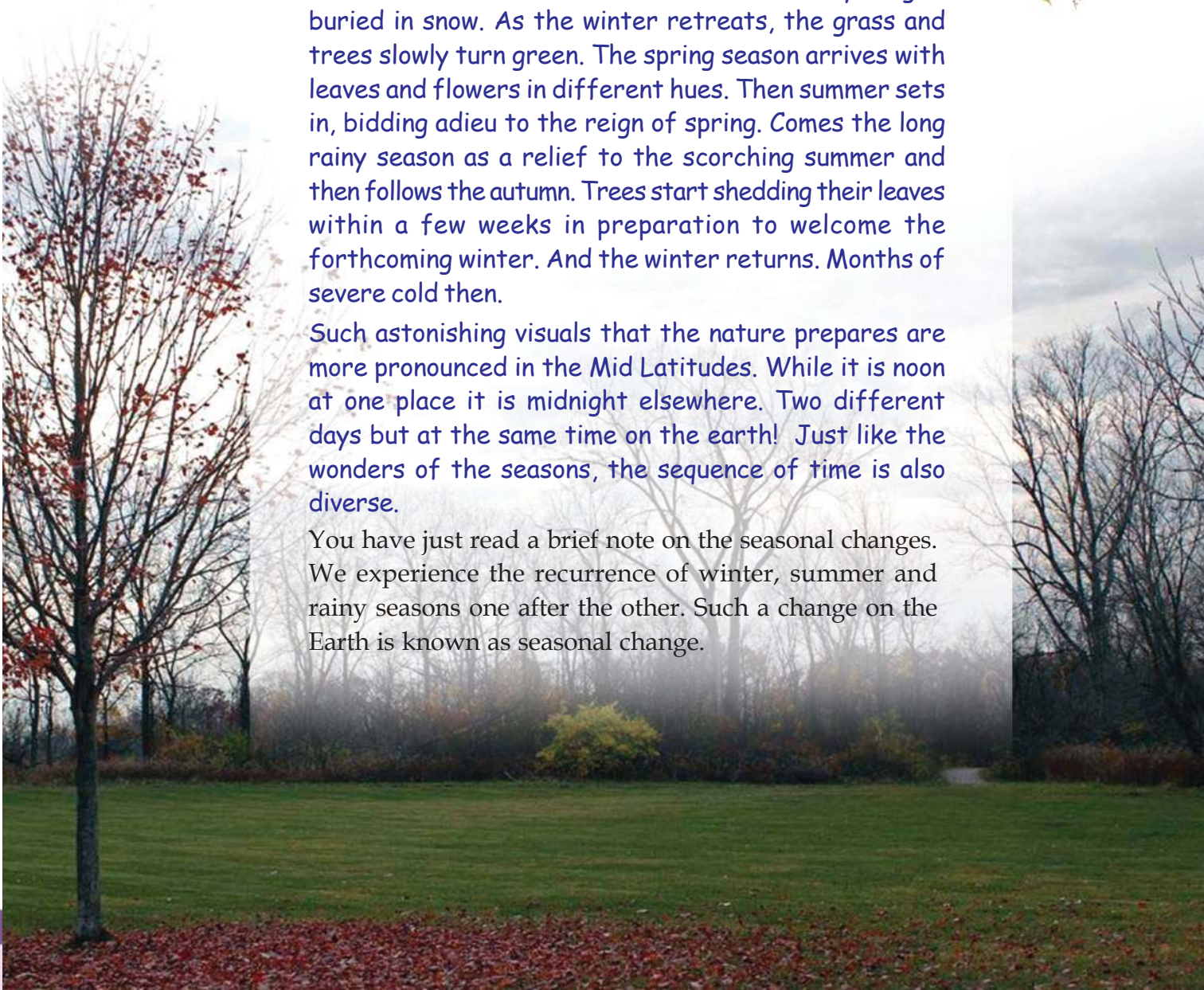
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Seasons and Time

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 summer sets in, bidding adieu to the reign of spring. Comes the long rainy season as a relief to the scorching summer and then follows the autumn. Trees start shedding their leaves within a few weeks in preparation to welcome the forthcoming winter. And the winter returns. Months of severe cold then.

Such astonishing visuals that the nature prepares are more pronounced in the Mid Latitudes. While it is noon at one place it is midnight elsewhere. Two different days but at the same time on the earth! Just like the wonders of the seasons, the sequence of time is also diverse.

You have just read a brief note on the seasonal changes. We experience the recurrence of winter, summer and rainy seasons one after the other. Such a change on the Earth is known as seasonal change.



Why seasons 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 does this happen?

Variations in the amount of sunshine are the important special feature of the different seasons. The Earth's revolution and the tilt of the axis are the reasons for this variation.

You know that it is in an elliptical orbit that the Earth revolves around the Sun. This is known as revolution.



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

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.

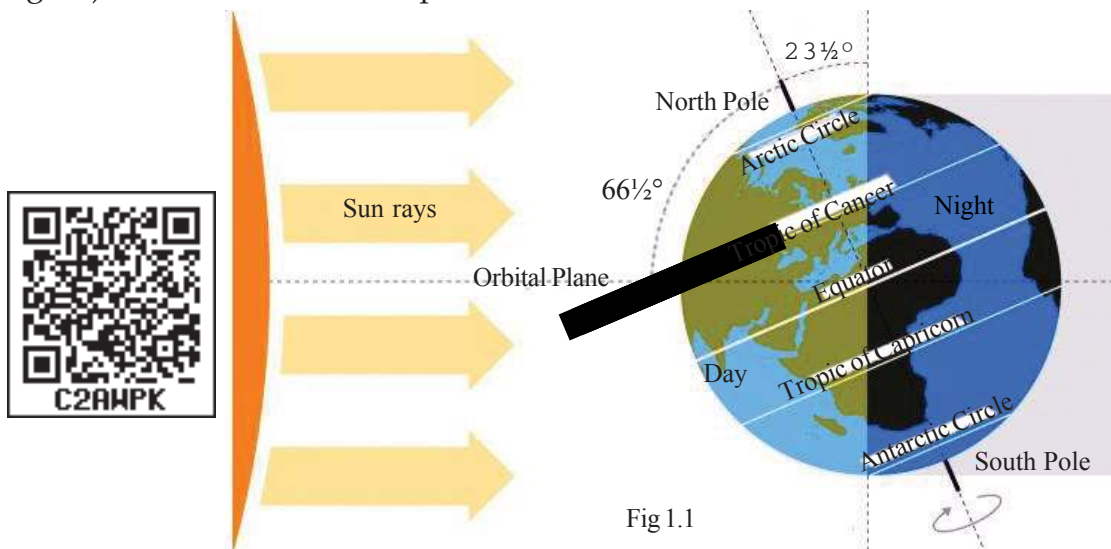


Fig 1.1



Sun and Earth: near and far

The distance between the Earth and the Sun will vary continuously throughout the period of one revolution. The days on which the Sun and the Earth are nearest and farthest are shown in the diagram. These days are known as Perihelion and Aphelion respectively.



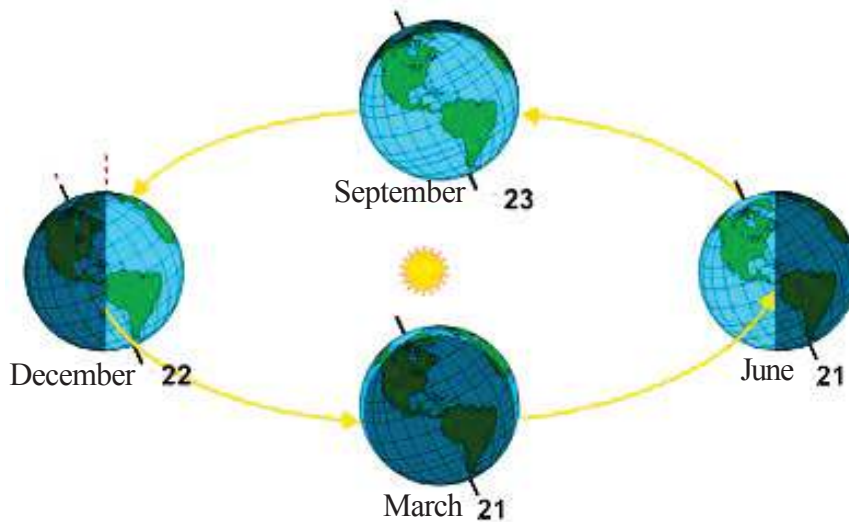


Fig 1.2

Observe the parallelism of the Earth's axis from the diagram (Fig.1.2). Since the parallelism is maintained same throughout the revolution, the position of the Sun in relation to the Earth varies 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 Fig. 1.2. Four different positions of the Earth during a single revolution (one year) around the Sun are depicted in it. There is variation in the sunlight that falls on the 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 those places where the vertical rays of the Sun fall. The temperature will be low at places where the Sun's rays are slanting.

Seasons and apparent movement of the Sun

As a result of the apparent movement of the sun between Tropic of Cancer ($23\frac{1}{2}^{\circ}$ N) and Tropic of Capricorn ($23\frac{1}{2}^{\circ}$ S), the different seasons - Spring, Summer, Autumn and Winter - get repeated in a cyclic manner.

Seasonal changes are not usually very obvious in the tropical regions because of the incidence of large amount of Sun's rays throughout the year.

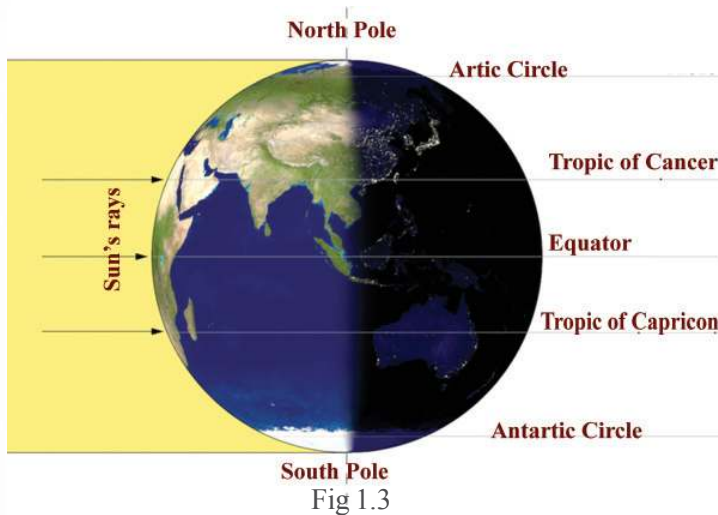


Seasons are not distinctly felt in Kerala. Why?

Characteristics of different seasons are clearly felt in the mid latitudinal or temperate zones.



The frigid zones do not experience all the seasons. Discuss the reason.



Equal amount of sunlight is received in the Northern Hemisphere as well as in the Southern Hemisphere when the Sun is vertically over the Equator. The apparent position of the Sun during the Earth's revolution will be 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.

From 21 March onwards, the Sun apparently shifts from the Equator northwards and reaches vertically over the Tropic of Cancer ($23\frac{1}{2}^{\circ}\text{N}$) on 21 June. This day is known as the Summer Solstice in the Northern Hemisphere. On this day the Northern Hemisphere experiences its longest day and shortest night.



Fig 1.4



What is the peculiarity of the day and the night in the Southern Hemisphere on 21 June?

The Northern Hemisphere generally experiences spring season between 21 March and 21 June. Spring is the season of transition from winter to summer. Haven't you noticed the plants sprouting, mango trees blooming and jackfruit trees bearing buds and the like? These are the peculiarities of spring season. Read Table 1.1 and identify the season in the Southern Hemisphere during this period.

The southward apparent movement of the Sun begins from 21 June and again reaches vertically above the Equator on 23 September. Summer season is experienced in the Northern Hemisphere during this period.



What are the changes observed in nature during the summer season?



Fig 1.5

The Sun continues its southward apparent shift from the Equator from 23 September and reaches vertically above Tropic of Capricorn ($23\frac{1}{2}^{\circ}\text{S}$) on 22 December. This day is known as Winter Solstice in the Northern Hemisphere. On this day the Northern Hemisphere experiences its shortest day and longest night.



What is the peculiarity of the day and the night in the Southern Hemisphere on 22 December?

It is autumn season in the Northern Hemisphere from 23 September to 22 December.

Autumn marks the transition from the severity of summer towards winter. During this period, the atmospheric temperature decreases considerably. There is shortening of day and lengthening of night during the period. 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 dry winter.



Fig 1.6



What is the season in the Southern Hemisphere, when it is autumn in the Northern Hemisphere? (see Table 1.1)

The northward apparent shift of the Sun begins by 22 December and again reaches vertically above the Equator on 21 March. This period marks the winter season in the Northern Hemisphere.



What are the peculiarities of winter season?

Which will be the season in the Southern Hemisphere when it is winter in the Northern Hemisphere? Observe Table 1.1 and find out.



Fig 1.7

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

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

Utharayanam and Dakshinayanam

You might have understood the apparent movement of the Sun and the resultant seasons in both the hemispheres. Following the winter solstice, the Sun sets its northward apparent movement from Tropic of Capricorn ($23\frac{1}{2}^{\circ}\text{S}$) and it culminates on Tropic of Cancer ($23\frac{1}{2}^{\circ}\text{N}$) on 21 June. This northward apparent movement of the Sun from Tropic of Capricorn to Tropic of Cancer is termed as 'Utharayanam'. The duration of day in the northern hemisphere gradually increases during this period.

Following the summer solstice, the Sun sets its southward apparent movement from Tropic of Cancer ($23\frac{1}{2}^{\circ}\text{N}$) and it culminates on Tropic of Capricorn ($23\frac{1}{2}^{\circ}\text{S}$) on 22 December. This southward apparent movement of the Sun from

Tropic of Cancer to Tropic of Capricorn is termed as 'Dakshinayanam'.



What is the change that occurs in the duration of day in the Southern Hemisphere during 'Dakshinayanam'?

During the period from March to September, as the Sun is in the Northern Hemisphere, the north polar regions experience continuous daylight for six months.

During the remaining period, that is from September to March, as the Sun is in the Southern Hemisphere north polar regions experience continuous night for six months.



What is the duration of day and night in the south polar regions, when the Sun is respectively over the Northern Hemisphere and Southern Hemisphere?

Rotation and calculation of time

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.

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

Hope you read the extract from "Pathirasoorayante Naattil", the famous travelogue by the renowned author S.K. Pottekkatt. Aren't you now convinced that time in other countries is different from the time in India. Let's examine the reason behind this difference.

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. Thus the time estimated at each place, based on the position of the Sun, is termed as the local time.



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



The 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. Daylight 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.

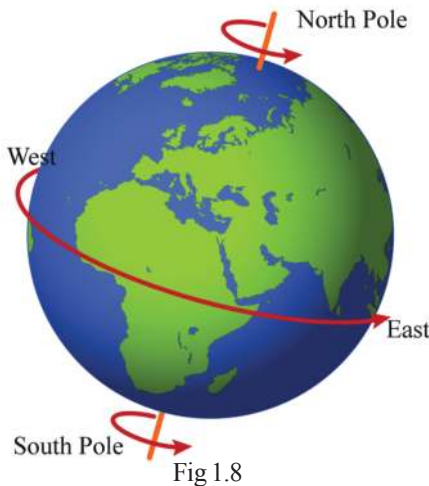




What will be the hardships if there are several local times in a country?

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

Later on, the calculation of time became more scientific and accurate. Let's 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 in the east.



The people of which Indian State can see the Sun rise 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

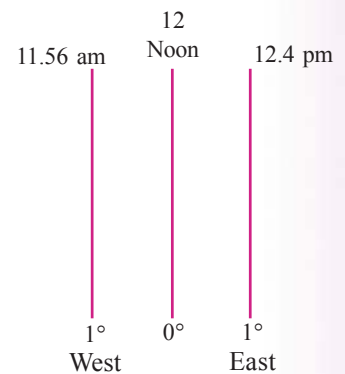
$$\frac{1440}{360} = 4 \text{ minutes.}$$

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

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

In other words, 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.1.9) and through which this line passes. Time is calculated worldwide 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 Meridian, 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 a 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 countries with large longitudinal extent estimates more than one local time by considering more than one standard meridian. The local time at the standard meridian is the standard time of that country.



Fig1.9

Indian Standard Time (IST)

The longitudinal extent of India is from 68°E to 97°E . The $82\frac{1}{2}^{\circ}\text{E}$ longitude which passes almost through the middle of these longitudes has been fixed as the standard meridian of India.

The local time along this longitude is generally considered as the Standard 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 - Friday 10 A.M.					
<i>To the west of Greenwich</i>			<i>To the east of Greenwich</i>		
Longitude	Day	Time	Longitude	Day	Time
15°	Friday	9 am	15°	Friday	11 am
30°	Friday	8 am	30°	Friday	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 (Fig. 1.10) is located at 180° longitude. Which day would it be for those residing at place 'A' in Fig. 1.10?

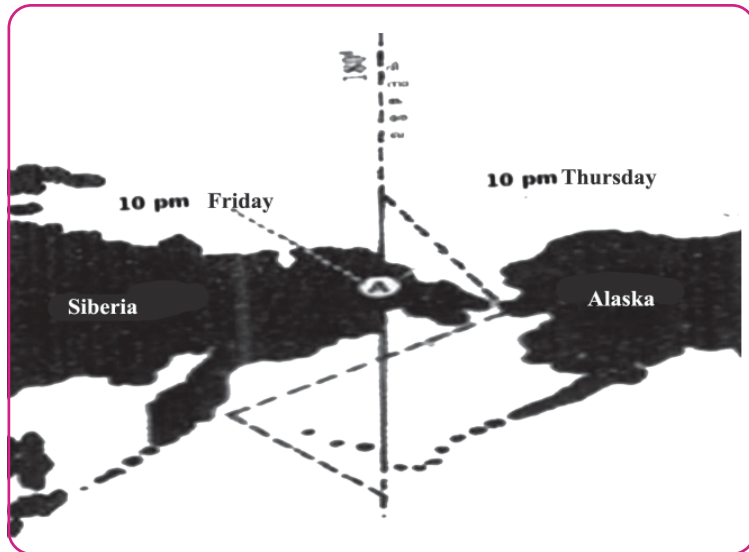


Fig 1.10

If 180° longitude passes through a country, the places situated East and West of this line will be having two different days. Think about the practical difficulties caused by this. To avoid this, certain necessary adjustments have been effected in this line with the result that it doesn't pass through the corresponding land areas. Note the longitude marked with broken lines. The line is in such a way that it passes through Bering - strait in Pacific Ocean and avoid some of the inhabited islands. The travellers who cross this line from the West calculate the time by advancing it by 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?



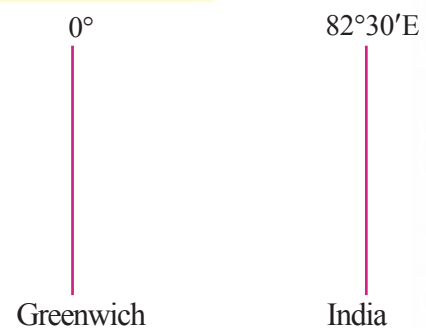
Let's calculate time

Example 1

What will be the time in India when it is 12 noon at Greenwich?

Let us see how the time of India is calculated:

- The longitudinal difference between India and Greenwich = $82^\circ 30'$

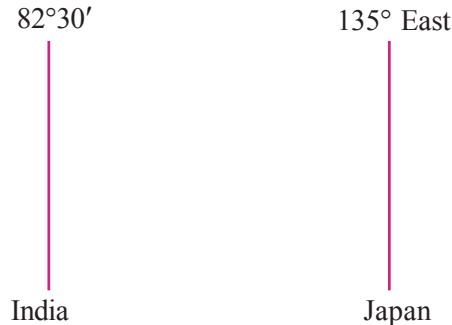


- The time difference for 15° longitude = 1 hour
- The time difference for $82^\circ 30'$ longitude =
 $= 5\frac{1}{2}$ hours
 $= 5$ hours 30 minutes
- As India is located to the east of Greenwich, the time in India will be 5 hours and 30 minutes ahead of Greenwich Mean Time.

$$\begin{aligned} \text{Therefore the time at India} &= \text{Time at Greenwich} + \text{Time difference} \\ &= 12 \text{ Noon} + 5 \text{ hours} \\ &\quad 30 \text{ minutes} \\ &= 5.30 \text{ pm} \end{aligned}$$

Example 2.

What will be the time in Japan (135° East) when it is 11 pm on Monday in India?



- The longitudinal difference between India and Japan
 $= 135^\circ - 82^\circ 30'$
 $= 52^\circ 30'$
- Time difference for 1° longitude is 4 minutes.
- Time difference for $52^\circ 30'$ longitude = $52\frac{1}{2} \times 4$
 $= 210$ minutes
 $= 3$ hours 30 minutes

- As Japan is situated at the east of India, the time in Japan would be 3 hours and 30 minutes ahead of that time in India.
- When it is 11 pm on Monday in India, the time in Japan = 11 pm Monday + 3 hours 30 minutes = 2.30 am Tuesday



Let us assess

- Identify the factor not responsible for the occurrence of seasons.
 - a. Revolution of the Earth
 - b. Tilt of the earth's axis
 - c. Parallelism of the Earth's axis
 - d. Rotation of the Earth
- The Sun's rays fall vertically between Tropic of Cancer and Tropic of Capricorn. Why?
- Explain the geographical importance of March 21, June 21, September 23, and December 22.
- Why is there an eastward increase and westward decrease in time?




Extended activities

- In the class, exhibit pictures along with short notes depicting the seasonal changes in nature.
- Record your observations on the changes in nature in each season 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



8 July 1497

Vasco da Gama started his voyage in four ships from the Port of Lisbon with a crew of 170. It was the longest voyage ever attempted in search of a country. They reached the coast of Brazil and from there they travelled to south east. The winds identified by Bartholomeo Dias aided Gama and took him to the southern coast of Africa. However Gama left the place due to disputes with the local government. He sailed past Mombassa and reached Malindi. On sighting Indian merchants there, he sought the help of a local navigator and set sail on 24 April 1498. With the help of the southwest monsoon winds, he reached Kappad near Kozhikode on 20 May after a voyage of 23 days. But Gama struggled a lot when he tried to return during the southwest monsoon season itself neglecting the advice of experts. It took him 132 days to reach Malindi!



It was the winds and an unyielding will that helped the mariner named Vasco da Gama to sail thousands of kilometres 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's look into a few factors like the different types of wind, their formation, and effects.

You have learnt that atmospheric pressure is the weight of atmospheric air and that the variations in the atmospheric pressure are the basic reason for wind. Let's look into the variations behind this and their effects.

Variations in atmospheric pressure

The average weight that air exerts on the earth's surface is 1034 mg per cm^2 . 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 1013.2 hPa.

Look at the following diagram.

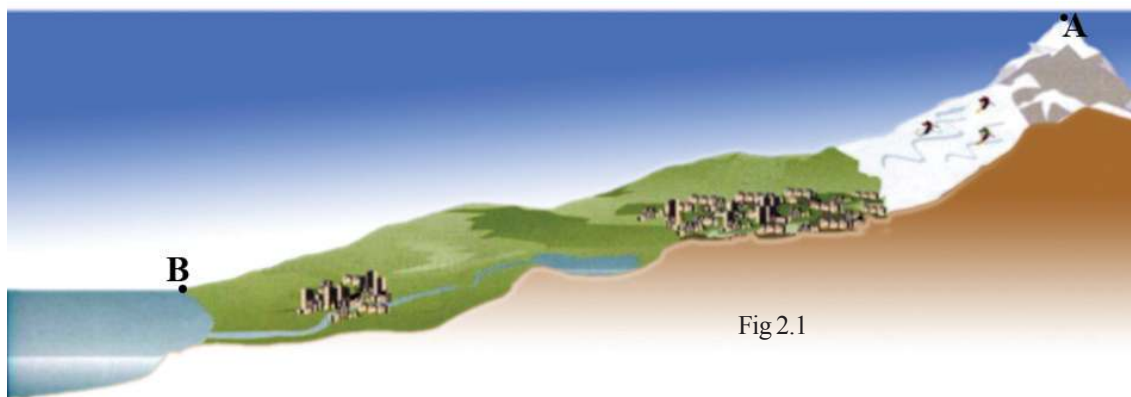


Fig 2.1

Did you notice 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.

As one goes up, there is a decrease in atmospheric pressure due to the rarification of air with altitude.



Why do mountaineers carry oxygen cylinders?



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

The atmospheric pressure and the altitude are inversely proportional. You would have understood now that altitude is an important factor influencing the atmospheric pressure.

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

Temperature and atmospheric pressure

Like any other object, 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 it starts cooling. 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 now 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 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?

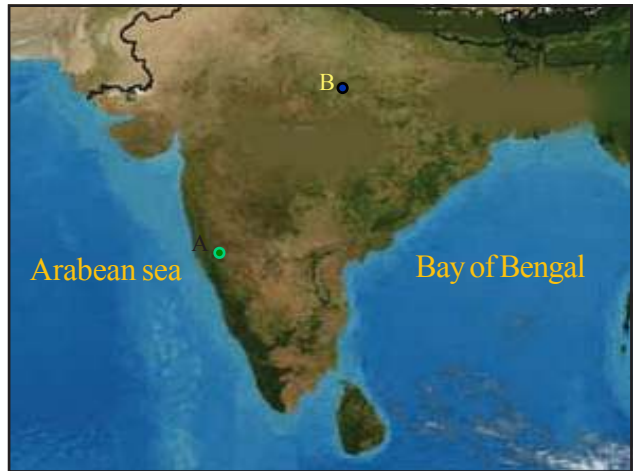


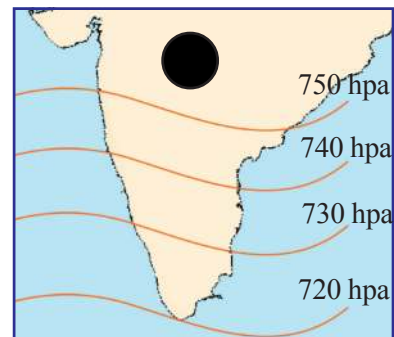
Fig 2.3

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.

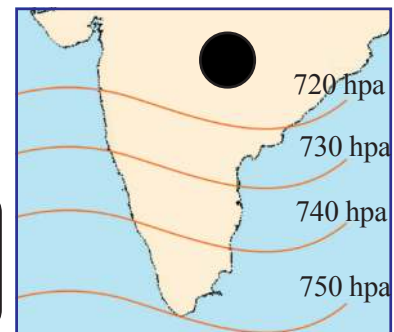
If the atmospheric pressure of an area is higher than that of the surrounding regions, it can be designated as 'high pressure' (High - H). In that case, what would low pressure be?

You have learnt about the isotherms in the previous classes. Similarly isobars are the 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.

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



A



B

Fig 2.4



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

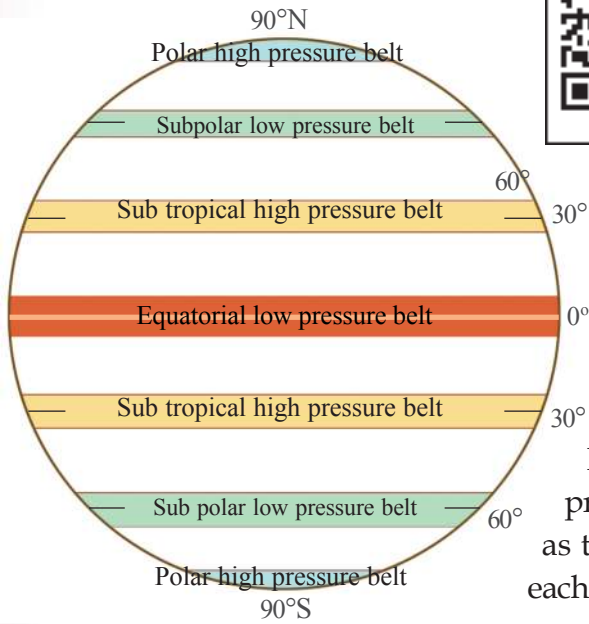


Fig 2.5

Global pressure belts



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 more or less the same between certain latitudes. Based on this, the earth's surface is divided into different pressure belts. Look at Fig 2.5.

Haven't you understood 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.



Horse latitude

Superior breeds of horses were once a major export from Europe to America 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 to facilitate easy voyage, they used to throw many of these horses into the sea. Thus the zone acquired the name 'horse latitude'.

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 now understand the reason for the occurrence of high pressure all along this zone.

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 the Earth, the air is thrown away 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 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 contribute 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
- Coriolis force
- Friction

Let's examine them one by one.

Pressure gradient

Atmospheric pressure is not uniform everywhere on the earth's surface. The change in pressure with horizontal distance is termed as pressure gradient. 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:

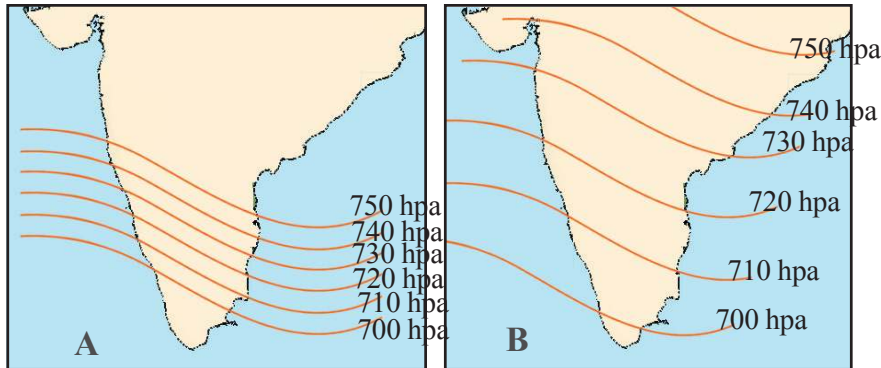


Fig 2.6

- Mark the direction of winds in both the diagrams, using arrow marks.
- 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. This is due to the force generated as a result of Earth's rotation which 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.

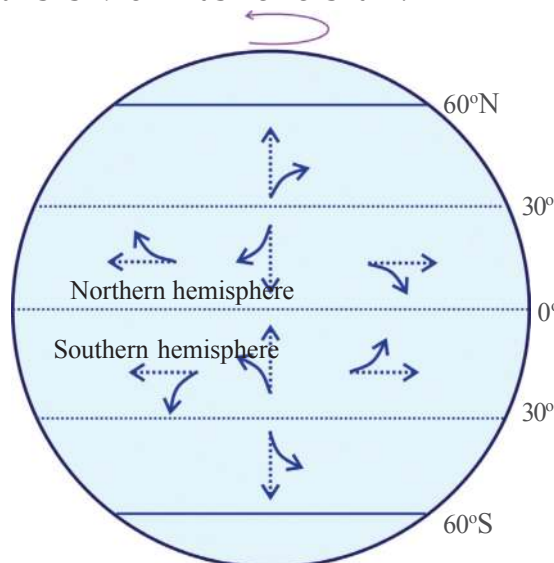


Fig 2.7



Fig 2.8

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.

Friction

Look at the given pictures (Fig 2.8).

In which of these situations do winds blow smoothly? The speed of wind will be high over ocean surfaces and plains 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.

Pressure belts and winds

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

The latitudinal locations of the different pressure belts have been identified from Fig 2.5 and marked in Fig 2.9.

Haven't you noticed the different planetary winds?

Let's study them in detail.

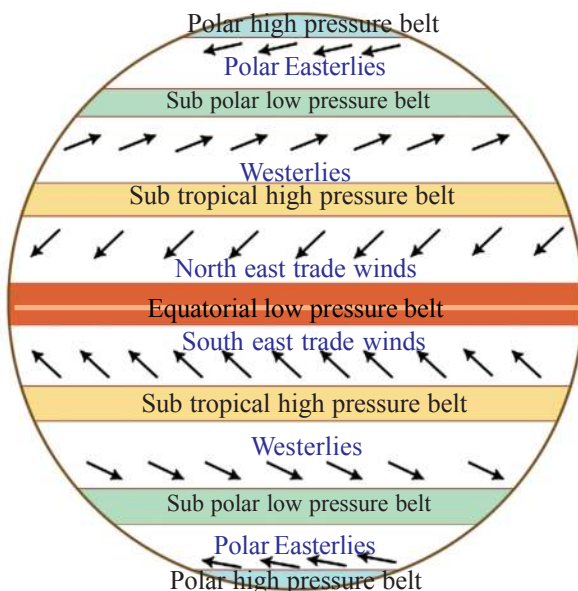


Fig.2.9 Global Pressure belts and Planetary winds

Trade winds

The sub tropical high pressure belts in both the hemispheres can be seen in 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 equatorial low pressure zone

where the trade winds from both the hemispheres converge is known as the Inter Tropical Convergence Zone (ITCZ).

On the hands of wind...



In the past, the trade winds 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'.

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 the northeast directions?

Westerlies

Haven't you seen the sub polar low pressure belts situated between the sub tropical high pressure belts and polar High pressure belts? Winds blow continuously from the sub tropical high pressure zones to these low pressure zones. As the direction of these winds is mostly from the west, they are known as the westerlies.

Identify 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 at the beginning of this chapter. It was the

westerlies that helped Gama 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 it in the class.

You have learnt that the planetary winds are permanent winds blowing between the global pressure belts throughout the year. There are also winds of seasonal and local occurrence.

Periodic winds

Periodic winds are winds that repeat at regular intervals of time and can be seasonal or diurnal. Monsoon winds are example for seasonal winds.

What is monsoon?

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

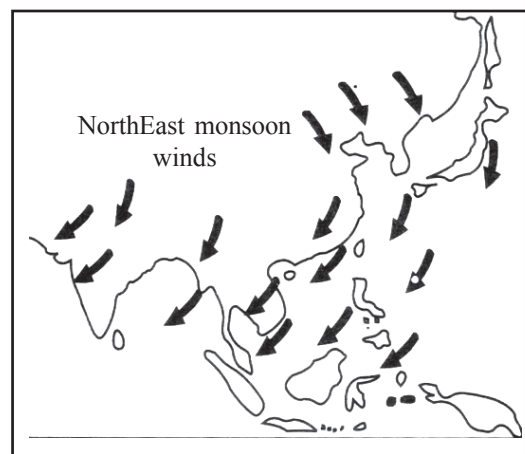
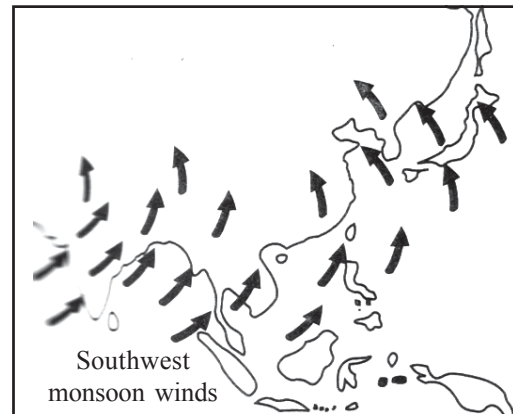


The Arab scholar Hippalus was the first to observe the shift in the direction of Monsoon winds.

Many factors are responsible for the formation of the monsoon wind like

- 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 are transformed into southwest monsoon winds due to 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 and low pressure zones over the Indian Ocean during winter, the northeast trade winds get strengthened. These are the North East monsoon winds.

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



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

Land and sea breeze



Fig 2.10

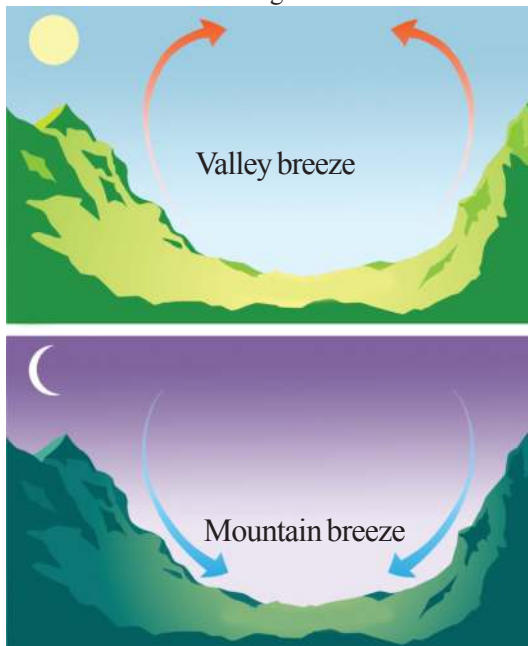


Fig 2.11

You have already learnt that atmospheric pressure is different during day and night at the same place. Similarly the reaction of land and sea to Sun's heat is also 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 daytime. 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 early in the morning and ceases by sunrise.

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 above the mountains gets heated and rises up. As a result, the wind blows upslope from the valley with relatively lower temperature. 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 dense, it blows towards the valley. This is known as mountain breeze.

Local winds

Local winds are winds whose effects are limited to a relatively smaller area. Formed as a result of the 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 hot 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 down? The term Chinook means 'snow eater', an apt term that describes its peculiarity. Since this wind reduces the severity of the cold, it is helpful for wheat cultivation in the Canadian lowlands.

Foehn is the wind that blows down the northern slopes of the Alps mountain.

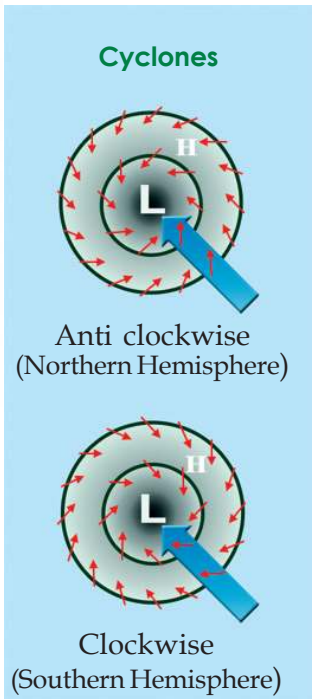
As the air heats up due to pressure from the descent, it helps in reducing the severity of cold in that region.



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 West Africa. On the arrival of these winds, the humid and sultry conditions of West Africa improve significantly. Hence, people call these winds as the *doctor*.

Loo is another hot wind blowing in the North Indian plain. These winds blowing from the Rajasthan desert raise the summer temperature of the North Indian plains. The winds that blow in South India during this season are called Mango showers. These wind cause the ripening and fall of mangoes and hence the name.



Variable winds

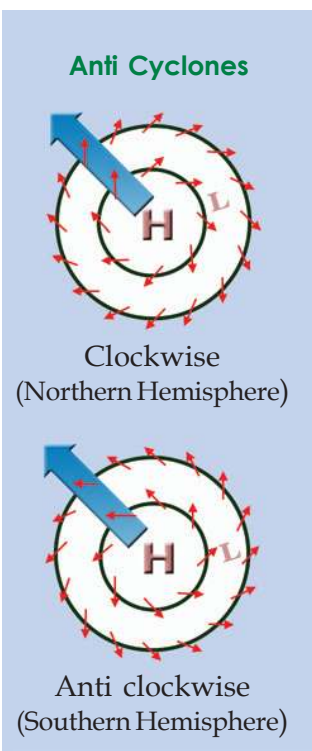
Variable winds are winds with entirely different characteristics formed during certain atmospheric situations. Cyclones and anticyclones are variable winds.

Cyclones

Cyclones are caused by the formation of low atmospheric pressure at the centre surrounded by high pressure regions. Strong whirl winds blow towards such low pressure centres from the surrounding high pressure areas. Due to Coriolis effect winds flow in the anti-clockwise direction in the Northern Hemisphere and in the southern Hemisphere. Based on the climatic region of their formation, cyclones can be classified as tropical cyclones and temperate cyclone. Cyclones often cause extensive damage and destruction wherever they occur. You might have heard of the Ockhi - cyclonic winds that struck the coastlines of Kerala and Lakshdweep during November 2017. This was a tropical cyclone. Tropical cyclones are caused due to local pressure differences in the tropical oceans, especially the Indian ocean.

Ockhi cyclones left the Indian coasts after wreaking havoc on life and property.

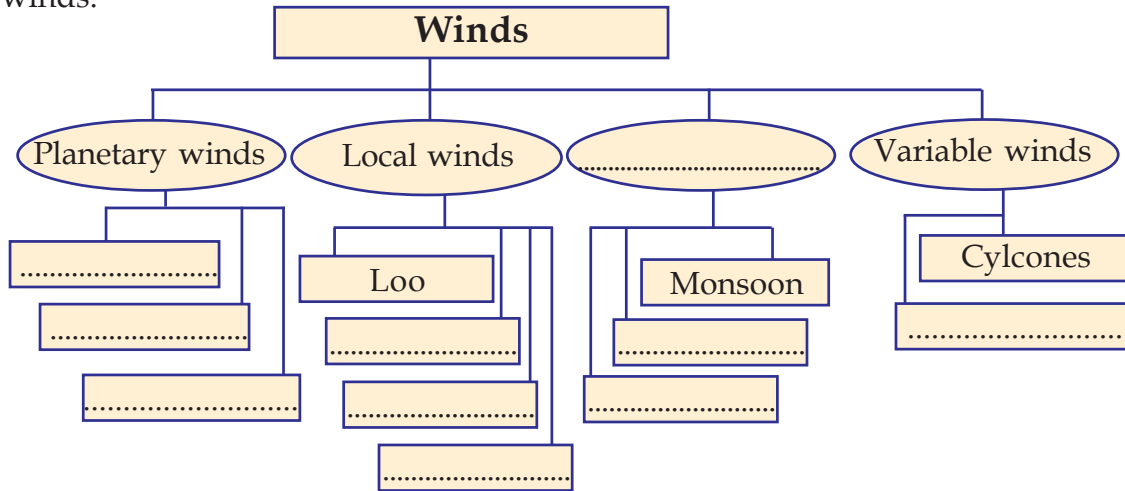
Prepare a report on the distress caused by Ockhi and suggest measures to mitigate the impact of such disasters in future by collecting information from internet and other sources.



Anti cyclones

Anti cyclones are phenomenon where strong whirl winds blow from the high pressure centres to the surrounding low pressure areas. Due to Coriolis effect the pattern of winds in anti cyclones is clock wise in the Northern Hemisphere and anti clockwise in the Southern Hemisphere.

Complete the following flow chart showing the classification of winds.



The Sun's aura

Don't you now realize how dynamic the earth's atmosphere is? The driving force behind this continuous movement of air is the Sun. Without its energy there would be no temperature or pressure difference, or any wind. The role of the atmospheric phenomena in keeping the earth's surface dynamic is immense. Information on the diversities in the nature not only arouses our curiosity but is informative as well. May all of you be able to continue your quest regarding the Earth and its diversities.



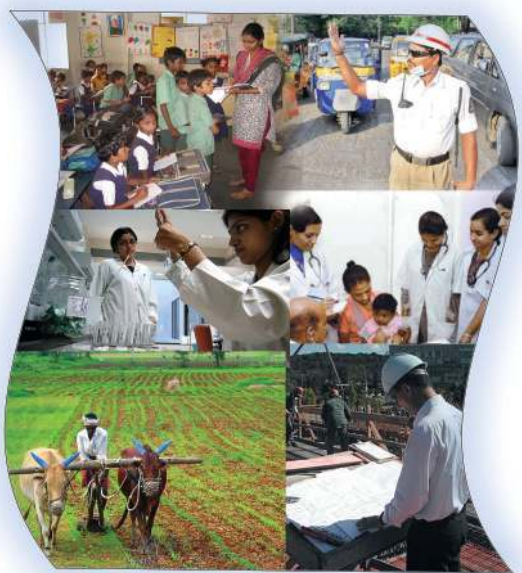
Let us assess

- 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 produced 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.

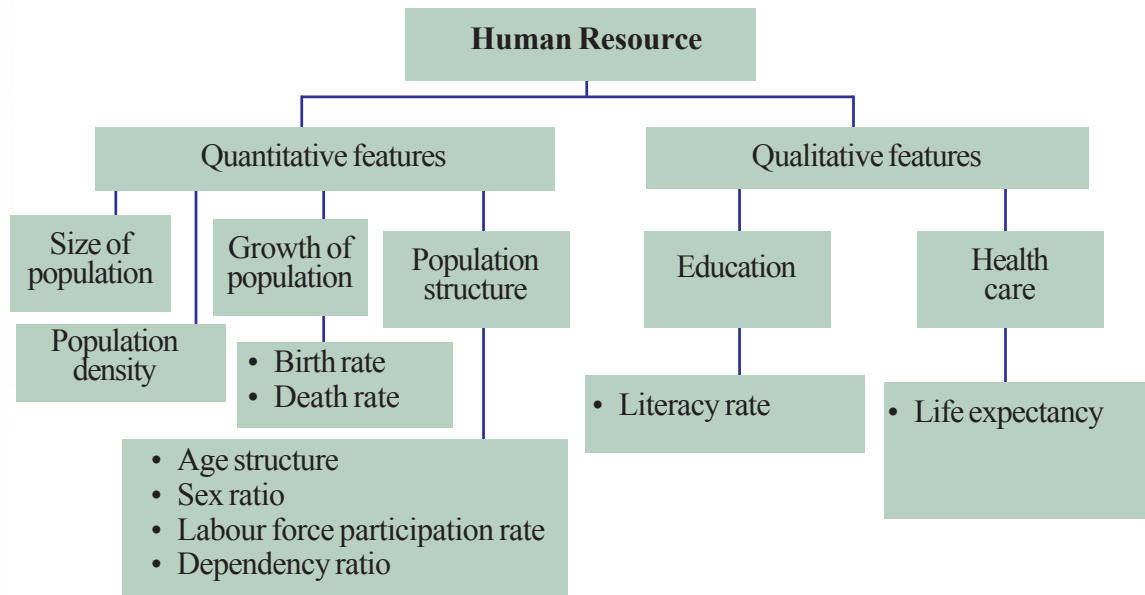


Prepare a note on the facilities provided in your area for the development of human resource?

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.

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.



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.

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.



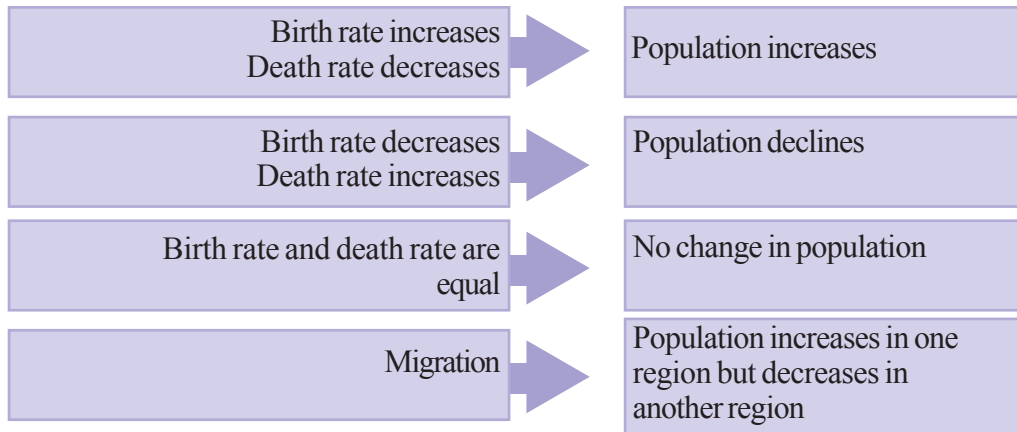
Year	Population (in crores)	Decadal growth rate (in percentage)
1951	36.11	13.31 (1941 - 51)
1961	43.90	21.64 (1951 - 61)
1971	54.82	24.80 (1961 - 71)
1981	68.33	24.66 (1971 - 81)
1991	84.64	23.87 (1981 - 91)
2001	102.87	21.54 (1991 - 2001)
2011	121.02	17.64 (2001 - 11)

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.



<p>Birth rate Birth rate is the number of live births per 1000.</p>	<p>Death rate Death rate is the number of deaths per 1000.</p>
--	---

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.

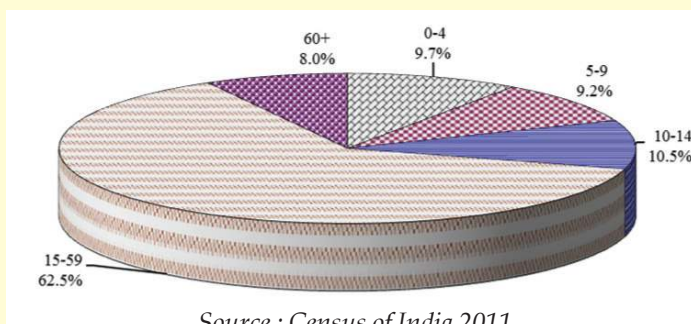
Population Structure

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



- 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.

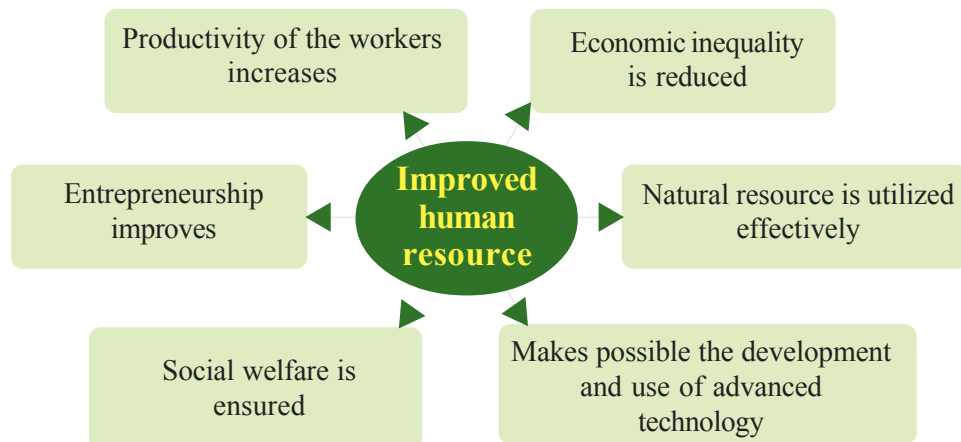
So far we have discussed the quantitative aspects of the population. There are certain aspects that improve the quality of human resource. Let us look at them.

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.



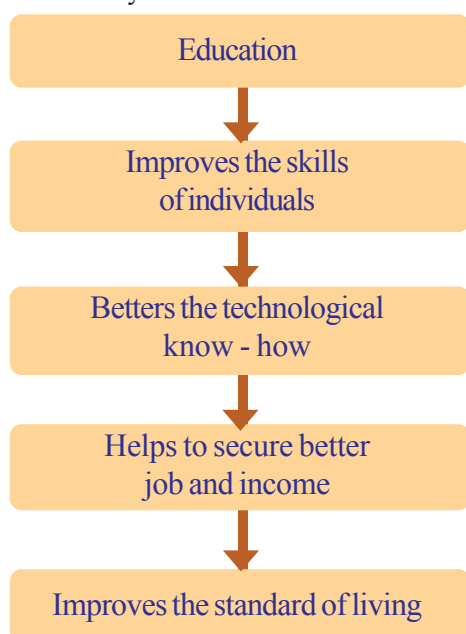


Prepare a note on how human resource development helps in economic development.

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 2017 - 18 Government of India spent only 3.7% 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
Samagra Shiksha Abhiyan (SSA)	<ul style="list-style-type: none"> To ensure universal education to all up to higher secondary level To ensure quality and equity To promote the vocational education strenthen
Samagra Shiksha was formed by integrating Sarva Shiksha Abihyan (SSA) and Rashtriya Madhyamik Shiksha Abhiyan (RMSA)	<ul style="list-style-type: none"> To the teacher training institutes like SCERT/DIET
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.

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 of India which need to be solved.

- 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'.



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.

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.



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 9 such institutions working in different parts of the country.



- Medical Colleges
- District Hospitals
- Community Health Centres
- Primary Health Centres
- Health Sub Centres



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 expected average years of life of 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.



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.



Landscape analysis through Maps

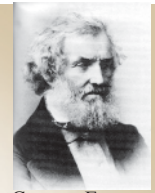


Col. William Lambton

The British realized that they could ascertain power and collect the taxes in their colonies only if they clearly understood the special geographical features of each of them. This made them decide to conduct various surveys and prepare maps on their basis. Accordingly three surveys namely the Tax Survey, the Topographic Survey, and the Trigonometric survey were carried out by the East India Company in the Indian subcontinent. These surveys that were began with the stewardship of Col. William Lambton in 1802 which took more than 50 years to be completed, were very accurate.

Several Indians were part of these surveys conducted 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 up the survey as Lambton's successor the highest peak in the Himalayan mountain ranges was named as Mount Everest. The first topographic maps of the Indian subcontinent were prepared after the completion of the survey in 1854.



George Everest

Haven't you read the above description? Finding the precise location of the earth's surface features is essential for the preparation of maps. Each part of the 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? How do these differ from other maps? Let's look into these aspects.

Topographic Map

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



Toposheets

The English term 'topography' 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.

terrain, rivers, other water bodies, forests, agricultural land, barren land, villages, towns, and transport and telecommunication systems.

In India, the preparation of Topographic maps is entrusted to a central government agency named Survey of India. 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; let's see what they are:

- Analysis of the physical and the cultural features of the earth surface.
- For military operations and the preparation of military maps.
- Identification and studying of the natural and the cultural resources of a region as part of economic planning.
- For urban planning.
-

Topographic maps can be read only through proper training and practical experience. 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 are very essential for comprehending topographic maps.



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

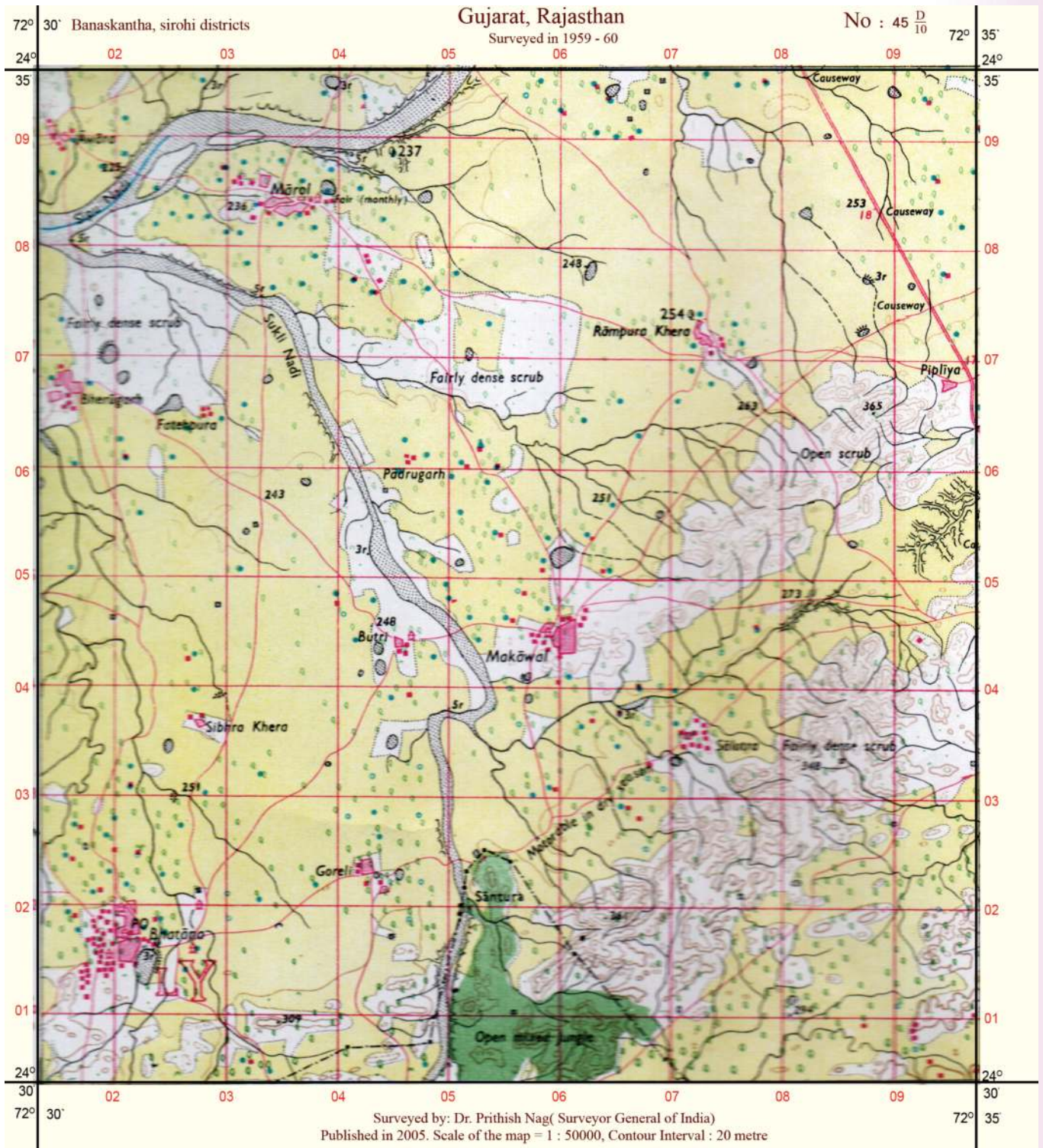


Fig 4.1



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 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's 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 headquarters at Dehradun. In India, the topographic maps are prepared in scales 1 : 1000000, 1 : 250000, 1 : 50000 and 1 : 25000 for various purposes. Survey of India made topographical maps for all the places in India. 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. There are 1800 sheets for regions between 60° North and South latitudes, 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.

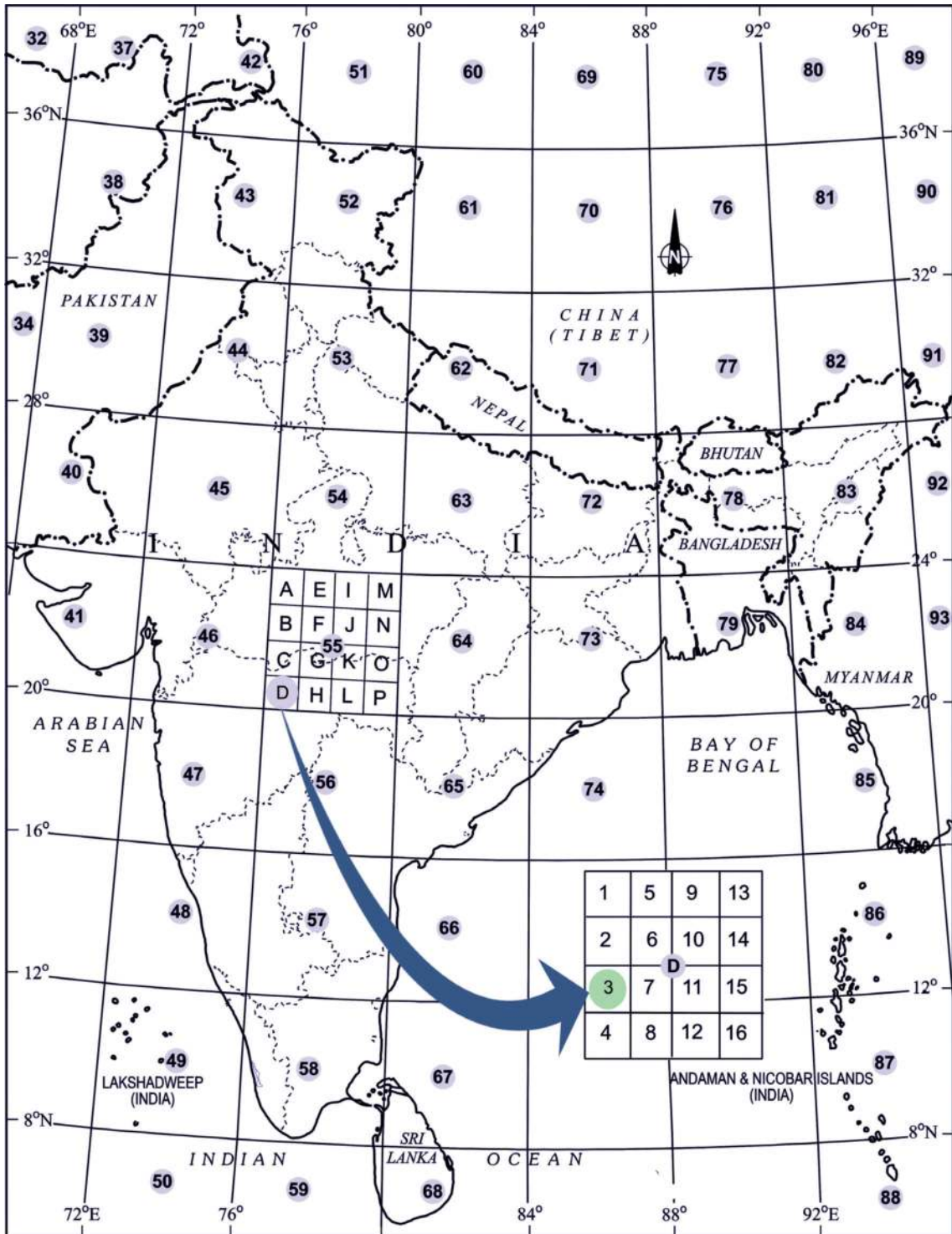


Fig. 4.2

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, 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).

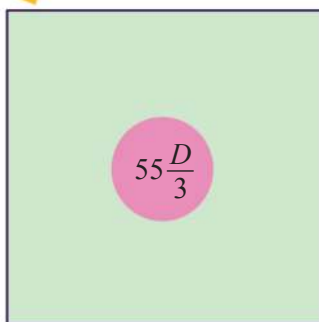


Fig. 4.6



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



Answer the following 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's take a look at how 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













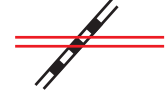







Signs and symbols	Geographic features	Signs and symbols	Geographic features
    	<p>Road</p> <p>Metalled road</p> <p>Unmetalled road</p> <p>Footpath</p> <p>Cart track</p> <p>Bridge with road</p>	   	<p>Boundary</p> <p>International boundary</p> <p>State boundary</p> <p>District boundary</p> <p>Taluk boundary</p>
    	<p>Railway</p> <p>Railway-broad gauge</p> <p>Railway with station</p> <p>Railway- meter gauge</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>• 240</p> <p>▲ 200</p> <p>• BM215</p>	<p>Elevation</p> <p>Contour lines</p> <p>Form line</p> <p>Spot height</p> <p>Triangulated height</p> <p>Benchmark</p>
	<p>Monuments and buildings</p> <p>Fort</p> <p>Temple</p> <p>Church</p> <p>Mosque</p> <p>Tomb</p> <p>Grave</p>		     	

Table 4.1. Conventional signs and symbols

Find out the conventional colours used to represent different geographic features 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 Conventional colours



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, which are large scale maps.

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. The values of the lines would also be recorded appropriately.



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

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

Eastings

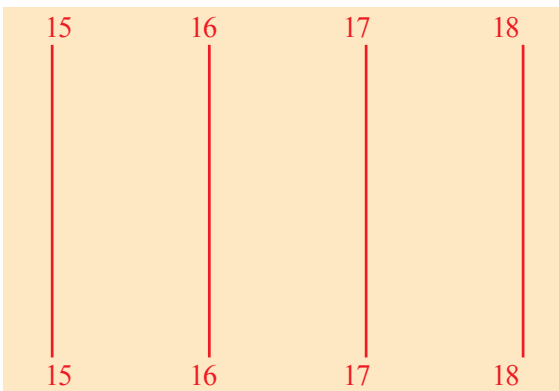


Fig 4.7

- 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

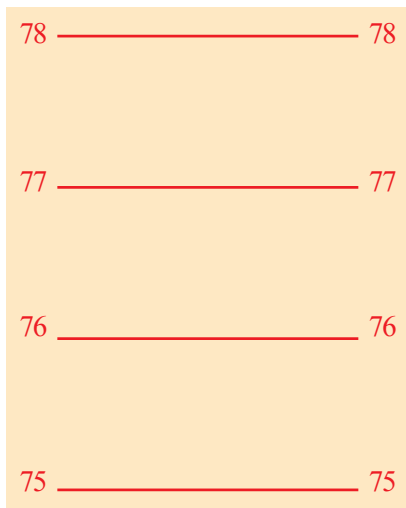


Fig 4.8

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

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

Let's 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? It is their location we need to find. The sizes of the geographic features included in the model grid are not one and the same. Since they differ in size, the location of these features can be found out in

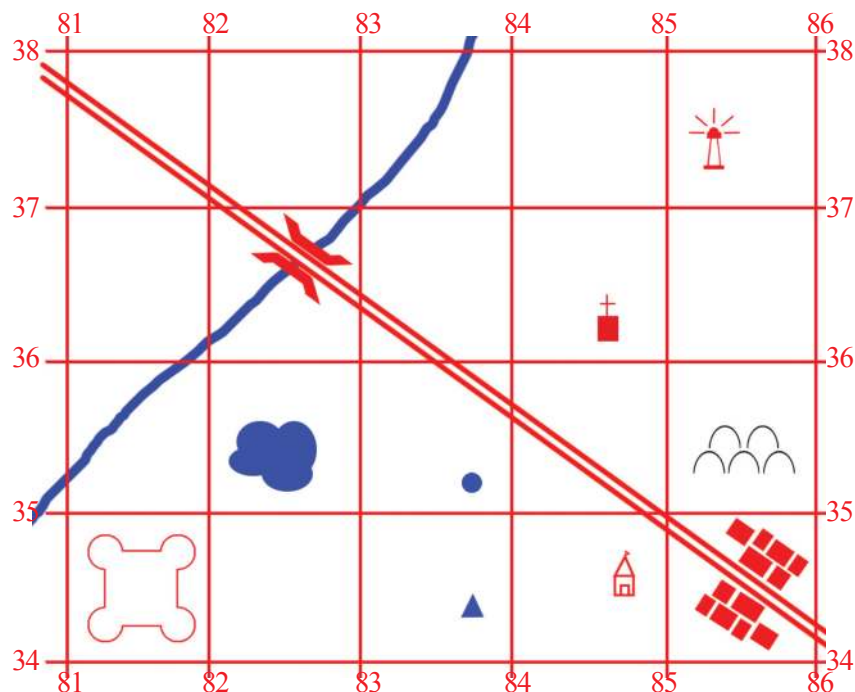


Fig 4.9

two different ways, namely, 4 - figure grid reference and 6 - figure grid reference.

4 - figure grid reference

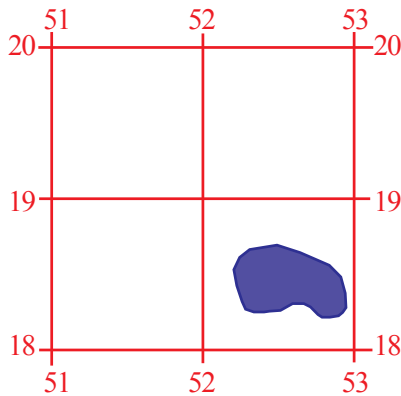



Fig4.10

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 (18) is to be written. Thus the location of the lake, as per the 4 - figure grid reference, will be 5218 (Fifty two eighteen).

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

6-figure grid reference

Relatively 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.

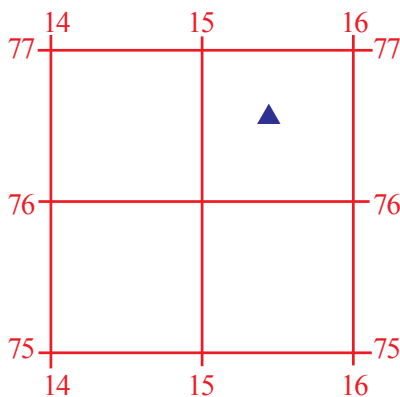


Fig. 4.11

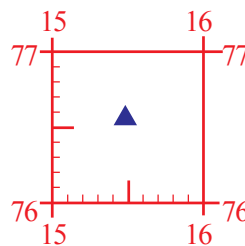


Fig. 4.12

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 (5) and write it next to the value of easting already found. (155).

- Now write the value of the northing just below the tube well (76) along with the easting's value (15576).
- Divide the area up to the next northing as being divided into 10 equal parts as shown in Fig. 4.12 and find the exact division on which the tube well is located (6) and write it with the values already written (155766 - Fifteen five seventy six six). What is obtained (155766) is the exact 6 grid reference of the given tube well.

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



Now you have understood how to determine the location of features 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 shapes of the landforms they represent. Contours are imaginary lines drawn on maps connecting those places having equal elevation from the sea level. A contour line joins points of equal elevation above a given level such as mean 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 in Figs. 4.13 and 4.14. Which are the landforms you can identify in these pictures?

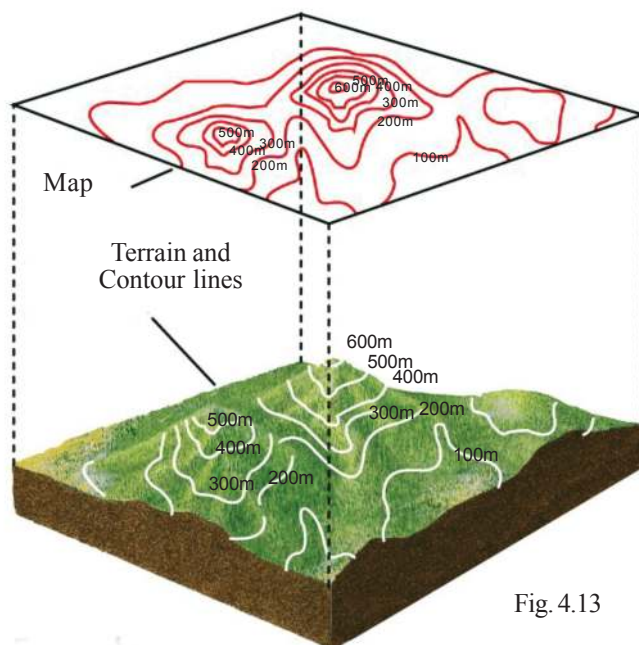


Fig. 4.13

Don't you see that the value difference between contours will always be equal? This difference between the value of two adjacent contours is called contour interval. For example, the contour interval in Figs. 4.13 and 4.14 is 100 metres.

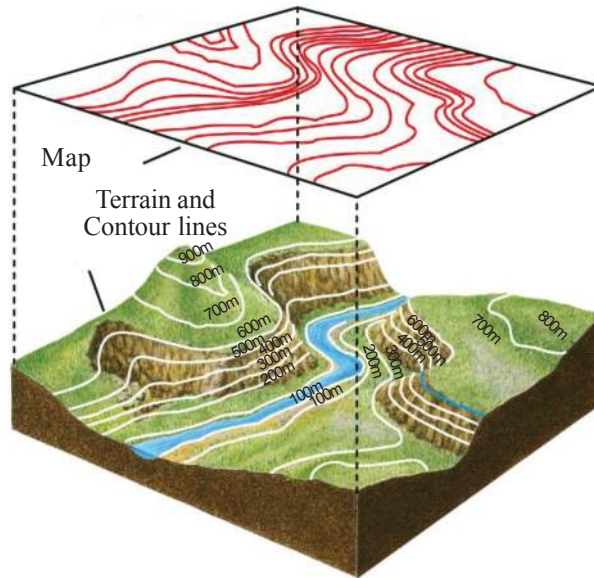


Fig. 4.14



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 at 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.

Assessing the topography

Method 1

Directly from the contours

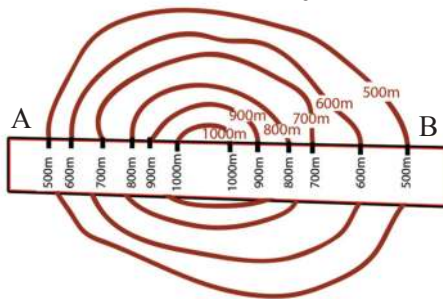


Figure 4.15

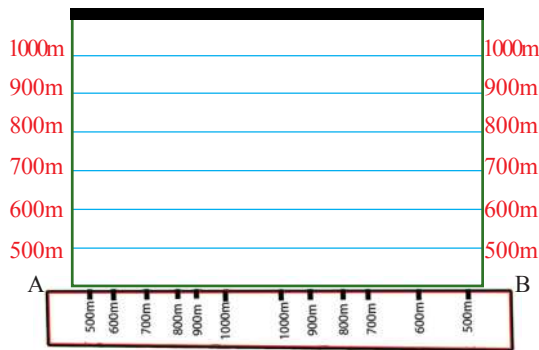


Fig. 4.16

- 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.

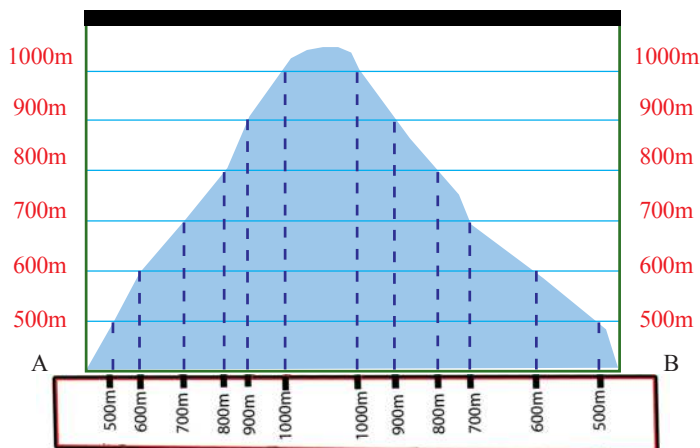


Fig. 4.17



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 landform.

Method 2

By tracing out the contour lines

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

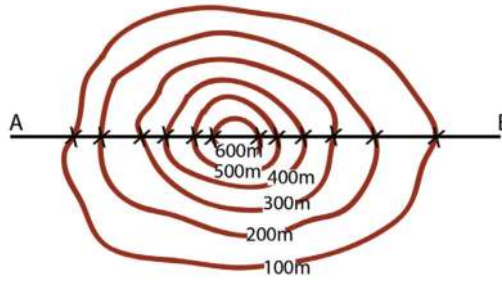


Fig 4.18

- 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 an appropriate scale (0.5cm=100m or 1cm=100m). Join equal values on both the Y-axes using narrow lines.

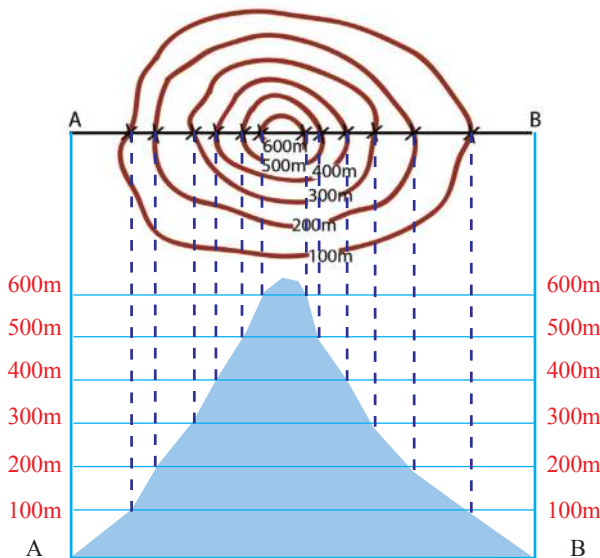
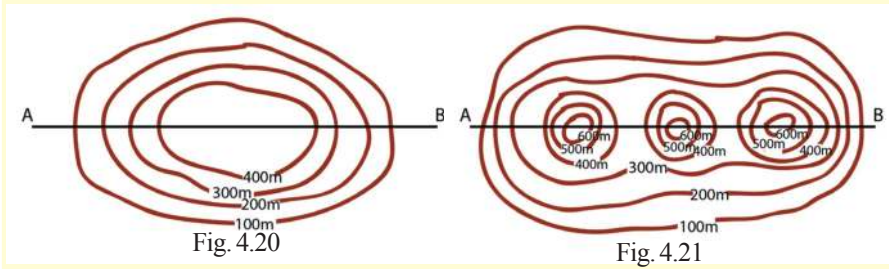


fig 4.19

- 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.



Using the methods mentioned above, 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 and wireless transmission towers.

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.

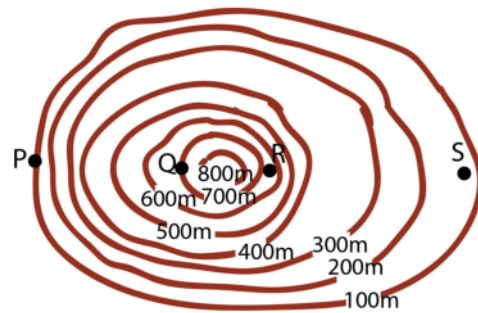


Fig. 4.22

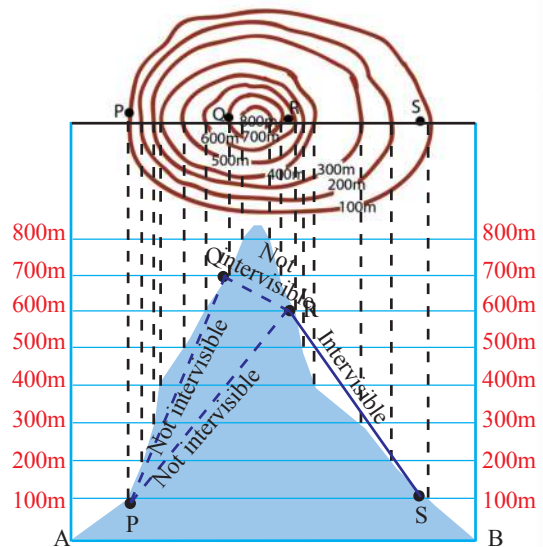


Fig. 4.23



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.

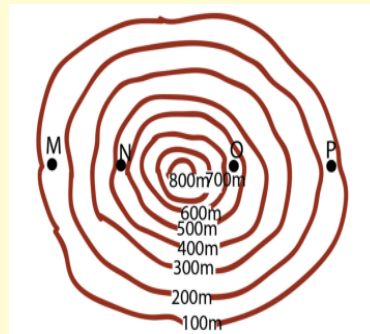


Figure 4.24

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

Let's examine how the toposheets can be interpreted based on the basic knowledge you've acquired so far.

Toposheet interpretation

You might have noticed that some basic information regarding the sheet as well as the physical and cultural features pertaining to the area represented are given in the toposheet (Fig. 4.1).

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 is 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 and the agency in charge of the survey are the marginal information in the toposheet.

Indicators regarding the marginal information of toposheets and a toposheet labelled with such information are given (Fig 4.25). Find out the marginal information from the map on the basis of the given indicators. Prepare a note on this.



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



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

Physical features

Water bodies such as rivers, streams, springs, etc. as well as the different landforms are the physical features in topographic maps. Their locations are to be found by direction or the 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, wells and tube wells are a few cultural features shown in toposheets. Their location can also be found based on direction or the 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 the district boundary determined?*
- *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*
- *Using the 6-figure grid reference method, find the locations of:*
 - *Temple near Gadalamari village*
 - *Temple within the Lingusugar Reserve Forest*
 - *Post office in Ganavathala village*

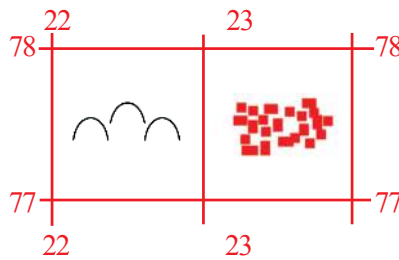


Interpret the toposheet No. _____ given in Fig. 4.1 and prepare a report based on its physical and cultural features.

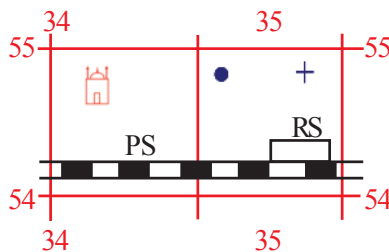


Let us assess






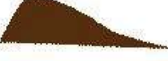






- Find out the location of settlements and graveyard in the given grid, using the 4-figure grid reference method.



- 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

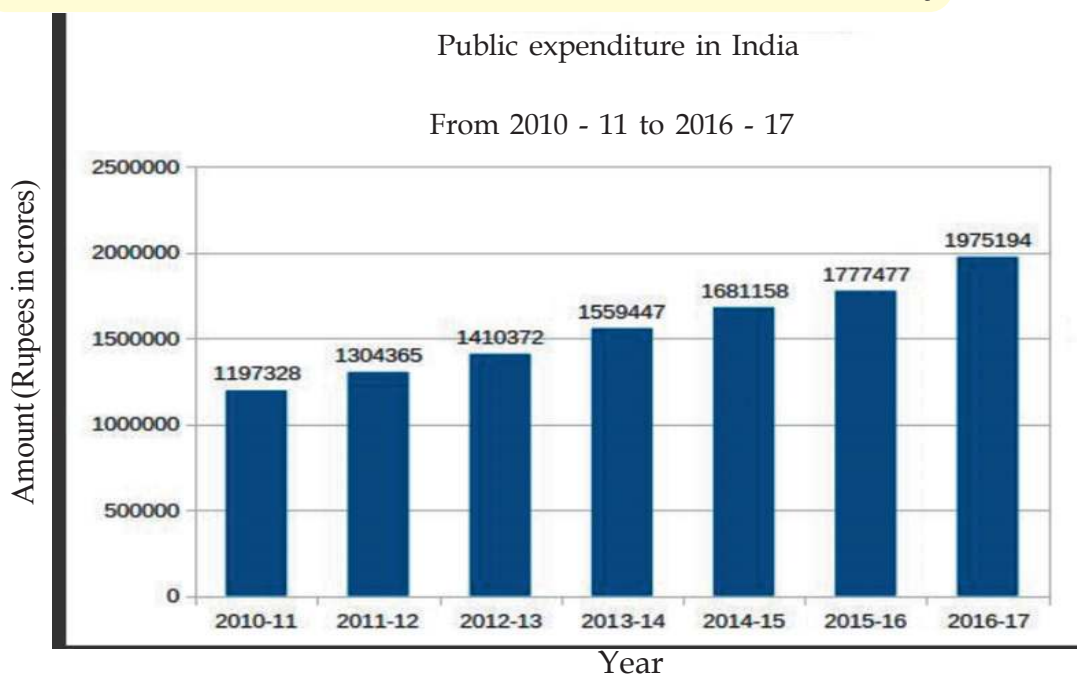


Observe the pictures given above. They are related to certain activities performed by the government. What are they ? Find out other activities of the government.

- 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 2010 - 11 to 2016 - 17.



Source : Central budget 2016 - 17 (www.indiabudget.gov.in)

Observe the graph and find out the annual 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 for 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. have to be provided for more people. For this, the government has to spend more money. Some other important reasons are listed below.

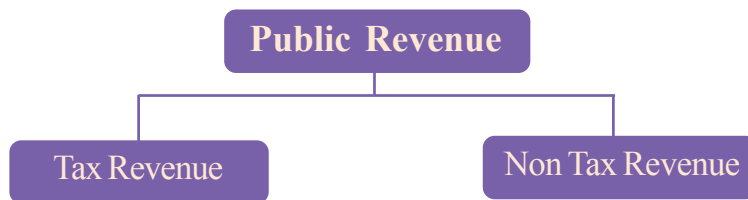
- Increase in the defence expenditure
- Welfare activities
- Urbanisation
-

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

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

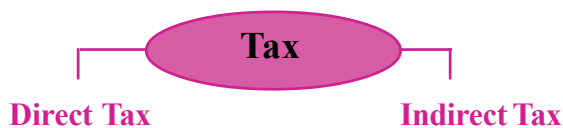
Public revenue

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



Taxes

Taxes are the main source of income to the government. Tax is a compulsory payment to the government made by the public for meeting expenditure towards welfare activities, developmental activities etc. The person who pays tax is called tax payer. Taxes are of two types.



Direct Tax



*Can you identify the receipt given?
Where do we remit land tax?*

Land tax is paid by the person on whom it is imposed. Here the burden of the tax is borne by the same person on whom tax is imposed. These types of taxes are called direct taxes. The unique feature of direct tax is that the tax payer undertakes the burden of the tax.

Major direct taxes in India

Personal Income Tax

It is the tax imposed on the income of individuals. The rate of tax increases as the income increases. Income tax is applicable to the income that is above a certain limit. In India the income tax is collected by the central government as per the Income Tax Act 1961.

Corporate tax

This is the tax imposed on the net income or profit of the companies.

Indirect tax

An important feature of indirect tax is that the tax burden can be shifted from the person on whom it is imposed to another person. For example in the case of sale tax the tax burden initially falls on the trader. But the trader transfers the burden of the tax along with its price to the consumer. The tax is included in the price paid by the consumer. With a view to simplify the indirect tax system and to introduce one tax across the country Goods and Services Tax (GST) was introduced by incorporating majority of existing indirect taxes. The prevailing system will continue for those items that are not included in GST.

The receipt is from the Government of Kerala, dated 29.7.13. It details a payment of 82/- for land tax. The receipt includes a table with the following columns: 'സർവ്വതും സബ്സിഡി കസ്റ്റം നമ്പർ ബോധം', 'വിസ്തീർണ്ണം', 'പട്ടണങ്ങളിലോ മറ്റോ പട്ടണമല്ലാത്ത പട്ടണങ്ങൾ', 'പണം ഒടുക്കിയ തുകയുടെ പേര്', 'പട്ടണങ്ങളിൽ സമാഹരിച്ച', 'പട്ടണങ്ങളിൽ സമാഹരിച്ച', 'പട്ടണങ്ങളിൽ സമാഹരിച്ച', 'പട്ടണങ്ങളിൽ സമാഹരിച്ച', 'പട്ടണങ്ങളിൽ സമാഹരിച്ച', 'പട്ടണങ്ങളിൽ സമാഹരിച്ച'. The handwritten entries in the table are: '199/1', '004047', '4006', '82', '13-14', '82 -'. The receipt also includes a stamp from the 'Kerala Revenue Department' and a signature.



Goods and Services Tax (GST)

The major taxes merged into GST

- Central excise duty
- Service taxes
- Central sale tax
- State value added tax
- Luxury tax
- Advertisement tax
- Octroi
- Entertainment tax

Goods and Services Tax (GST) was introduced in India on 1st July 2017 merging different indirect taxes imposed by central and state governments. Taxes are levied at different stages starting from production to final consumption of goods and services. In each stage the tax is imposed on the value added. Hence tax is collected only on value addition. The tax paid in the earlier stages need not be paid by the final consumer. GST registration is



mandatory to the traders if the turnover is more than 20 lakh in a financial year.

Goods and Services Taxes (GST): Types

The Central and State government impose GST on goods and services traded within the state. The tax imposed by the central government is known as Central GST (CGST) and the tax imposed by the state government is known as State GST (SGST). These taxes are collected jointly from the consumers and are shared equally by the centre and state governments.

Should the tax be imposed on the goods and services traded from one states to the other? The GST on interstate trade is imposed and collected by the central government. This is known as Integrated GST (IGST). The share of the state government on IGST is given by the Central government.

GST Rates

No GST is imposed on essential services and daily consumption goods including unprocessed food items. GST is arranged under four slabs as 5%, 12%, 18% and 28%.

Let us examine a bill received from a shop and find out the following.

- The GST Registration number.
- GST rates as represented by symbols given in column 1.
- Are central and state GST rates same?
- Items that are exempted from GST.
- Whether higher GST rates are applicable to necessary or luxury goods?

GST Council

Union Finance Minister is the chairman of GST council and the members are Union Minister of State in charge of finance and state finance ministers. The council makes recommendation on the following.

- Taxes, cess and surcharges that are to be merged into GST.
- The goods and services that are to be brought under GST.



Items that do not come under GST at present

Petroleum products (raw petroleum, diesel, petrol, natural gas, aviation fuel) electricity, liquor do not come under GST. The existing indirect tax system will continue on these items.

- Determining GST rates.
- The time frame for including the excluded items into GST.
- Determining the tax exemption limit on the basis of total turnover.



Discuss whether direct or indirect tax seriously affect common people.

Hints: Tax burden, price rise, income inequality

The other two sources of income to the government are surcharge and cess.

GST RULE 2017-TAX INVOICE CASH					
GST32AAIFM9805BIZK					
PAN.AAIFM9805B					
DATE:08/09/2018 BILLNO:50704					
	Item Name	MRP	Qty	Rate	Total
\$	COMPLAN KESER B	305	1	299.32	299.32
@	SANTHIGIRI TURM	72	1	65	65
@	BRAH FRIED RAWA	89	1	86.08	86.08
	GARLIC	60	0.2	55.64	11.13
@	CYCLE 3 IN 1	50	2	49	98
@	SPYZEE ROASTED	70	1	66.2	66.2
\$	CADBURY'S D/M	20	2	19	38
\$	COLGATE STRONG	176	1	171.12	171.12
@	BRAH WHEAT POWD	53	1	51.25	51.25
@	PAVITHRAM GINGE	218	1	206.28	206.28
\$	VIM LIQUID YMI	155	1	152.88	152.88
\$	HARPIC 500 ML	80	1	78.05	78.05
\$	SURF EXCEL DETE	190	1	186.49	186.49
\$	SURF MATIC F/L	225	1	222.98	222.98
\$	HARPIC BATH CLE	40	1	38.3	38.3
!	DOPPI SSK DELUX	42	5	35	175
\$	UJALA CRI & SHINE	110	1	107.23	107.23
\$	X ALL LOTION	47	1	44	44
	UZHUNNU BALL	97	1	83	83
				Round Off	-0.31
				TOTAL	2180
TOTAL ITEM:19					
Gst % !=0%,@=5%,#=12%,%=18%,&=28%					
	Net Amt:	CGST%	CG Amt	SGST%	SGAmt
!	269.13	0		0	
@	545.53	2.5	13.64	2.5	13.64
#	0	6	0	6	0
\$	1134.21	9	102.08	9	102.08
&	0	14	0	14	0
	TOTAL :		115.72		115.72



Surcharge and Cess

Surcharge is an additional tax on tax amount. This is imposed for a certain period of time. Usually surcharge is imposed as a given percentage on the income tax.

Cess is an additional tax for meeting some special purpose of government. Cess is withdrawn once sufficient revenue is collected. Education cess on income tax is an example. So far we have been discussing the tax revenue of the government. Some of the taxes imposed by central, state and local self governments are given below.

Central government	State government	Local self government
<ul style="list-style-type: none"> • Corporate tax • Personal Income Tax • Central GST (CGST) • Integrated GST (IGST) 	<ul style="list-style-type: none"> • Land Tax • Stamp duty • State GST (SGST) 	<ul style="list-style-type: none"> • Property tax • Professional Tax



With the help of reading materials find out major taxes imposed by state government.

We have understood the revenue sources of government, i.e. taxes. Now let us think the non tax revenue sources of the government.

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 or organisations for meeting a specific objective. For example, grants are provided by central and state governments to local self governments.

Interest

Government receive interest for loans given to various enterprises, agencies and countries.

Profit

Profit is the net 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 public income is insufficient to meet the expenditure, governments resort to borrowing.

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 ⇒ Internal debts are the loans availed by the government from individuals and institutions within the country.

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

The table shows the internal and external debt of India form 2012 -13 to 2017-18.

Year	Internal debt (Rupees in crores)	External debt (Rupees in crores)	Total debt (Rupees in crores)
2012 - 13	3764456	177288	3941744
2013 - 14	4240766	184580	4424346
2014 - 15	4775900	194286	4970186
2015 - 16	5298216	205459	5503675
2016 -17	5741710	408108	6149818
2017 - 18 ^{BE}	6180027	423897	6603924

Status paper on government debt (Feb. 2018)

(www.dea.gov.in)

- How much did public debt increase in 2017-18 compared to 2012-13?
- 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.
- Statistics shows that India's public debt is increasing. Discuss the advantages and disadvantages of this and report 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 2017-18 budget.

Items	Expenditure (in crores)
Interest and repayment	530843
Defence	267108
Subsidies	229716
Pension	147387
Social Services (Education, health, social welfare)	173691
Economic services (Agriculture, Industry, trade, energy, transport)	231673
Interest	530843
Rural development, Urban development	176358
Other Public services	460974
Total Expenditure	2217750

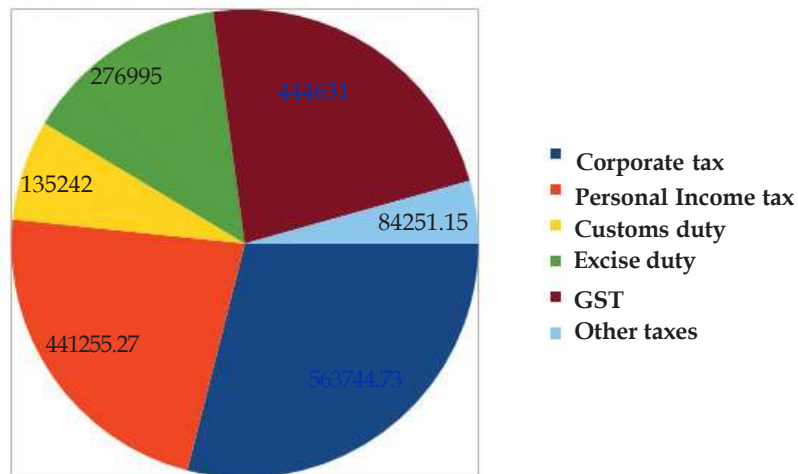
Source : Central budget 2017 - 18 (revised estimate) www.indiabudget.gov.in

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

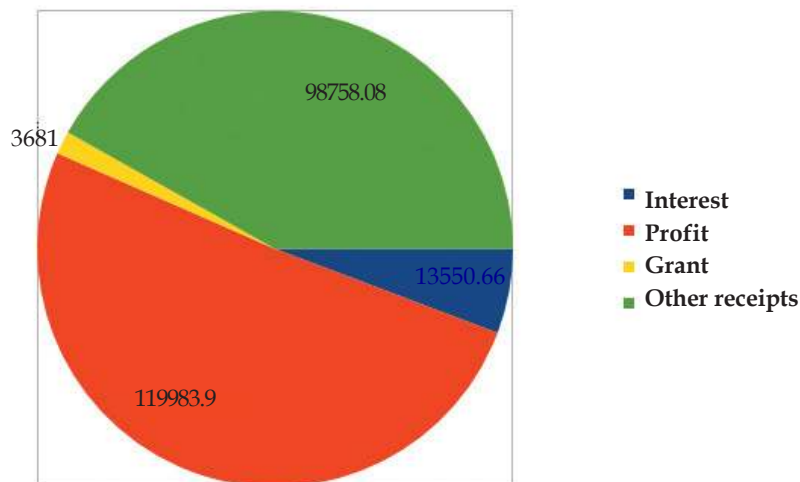


Observe the diagram related to the major income sources of the central budget 2017-18.

Central budget 2017 - 18 Tax revenue



Central budget 2017 - 18 Non tax revenue



Source : Central budget 2017 - 18 (revised estimate) www.indiabudget.gov.in

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 source 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.



Let us assess

- Compare developmental and non-developmental expenditure and give examples for each.
- Describe the features of direct tax and indirect tax.
- What are the important functions of GST council.
- 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

From the central budget 2017-18 find out the tax revenue collected from GST.

Collect bills for the goods and services bought in your house for a month. Do the following activities based on this.

- Classify the bills into GST bills and non GST bills.
- Calculate the amount paid from your house as GST.
- Visit the website www.services.gst.gov.in
- Click on search tax payer
- Enter GST number in GSTIN/UIN and collect the available information.

CONSTITUTION OF INDIA

Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A

Fundamental Duties- It shall be the duty of every citizen of India:

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements;
- (k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between age of six and fourteen years.

Security Features of a Genuine Indian Currency Note

We have to know more about currency notes used for financial transactions. Genuine currency notes have certain security features. Awareness of those features can save us from being duped.

▶ **Paper**

Banknotes are printed on special watermarked paper with substrate cotton and cotton rag. This gives the banknotes a unique “touch feel” and “crackling sound”.

▶ **Watermark**

The portrait of Mahatma Gandhi, the multi-directional lines and an electrolyte mark showing the denomination value appear in this section and these can be viewed better when the banknote is held against light.

▶ **Security Thread**

All banknotes carry a security thread, partially exposed and partially embedded, with readable window. The security thread of notes up to Rs 500 denomination contains “Bharath” in Hindi and “RBI” in English alternately. Rs 1000 denomination notes additionally contain “1000” as a numeral in the security thread.

▶ **Micro lettering**

The letters “RBI” and the denomination value as a numeral can be viewed with the help of a magnifying glass in the zone between the portrait of Mahatma Gandhi and the right vertical band. (However, only letters “RBI” is seen in Rs. 10 denomination).

▶ **Intaglio Printing**

The name Reserve Bank of India, the Guarantee Clause, the Promise Clause, the Signature of RBI Governor, the Portrait of Mahatma Gandhi, the Reserve Bank Seal, the Ashoka Pillar Emblem, the Central Denomination Value in words and figures are printed in intaglio, i.e., in raised prints which can be felt by touch.

▶ **Fluorescence**

The number panels of banknotes are printed in fluorescent ink.

▶ **Optically Variable Ink**

The colour of the denomination in numeral appears green when the note is held flat and changes to blue when the note is held at an angle. The font size also appears reduced. This feature is available only on notes of Rs. 500 and Rs. 1000 denominations.

▶ **Latent Image**

The vertical band contains the denomination in numeral. This can be seen by keeping the note flat on the palm of your hand at eye level and viewing it against the light.

Printing and circulation of forged notes are offences under Sections 489A to 489E of the Indian Penal Code and are punishable in the courts of law by fine or imprisonment or both.