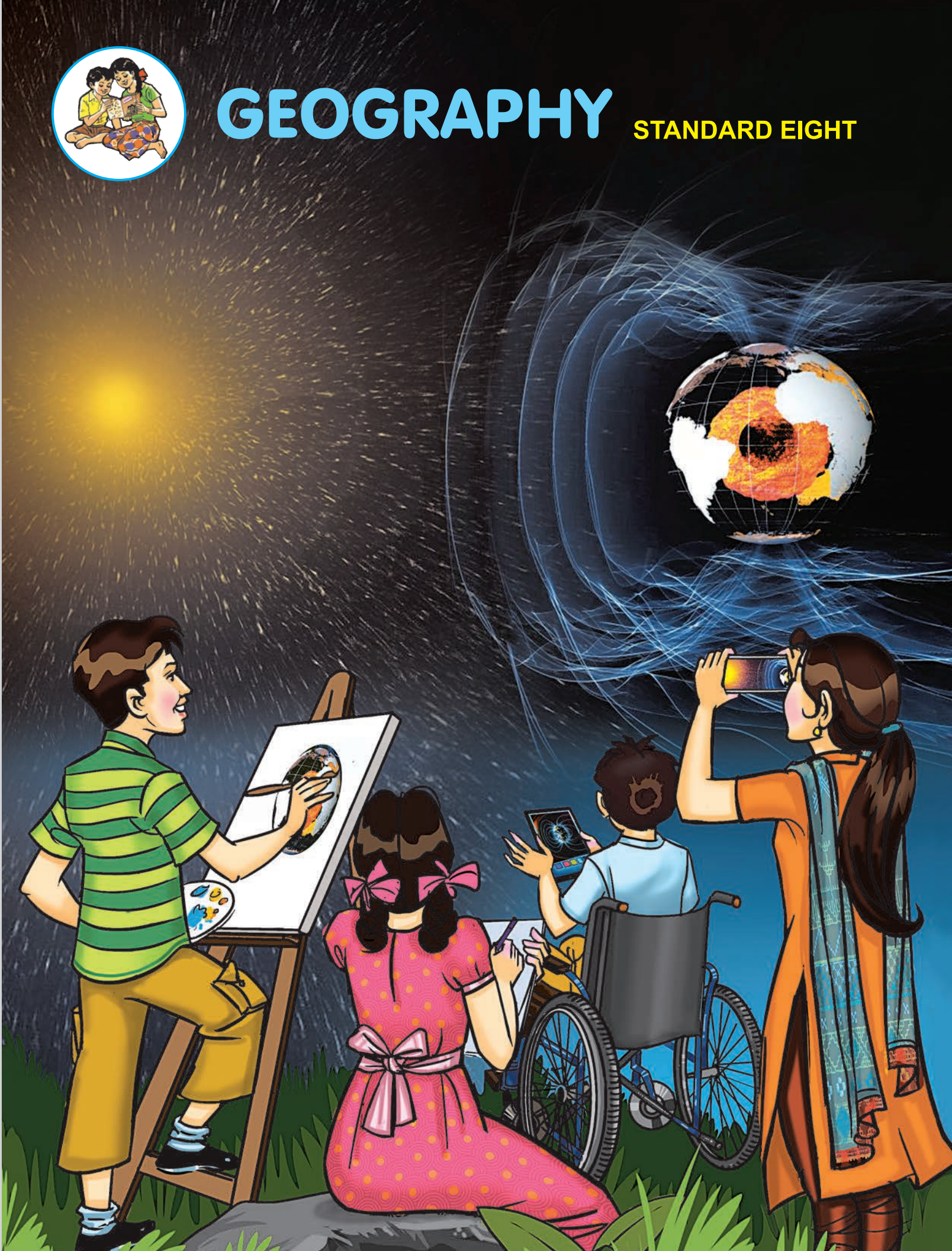




GEOGRAPHY

STANDARD EIGHT



The Coordination Committee formed by GR No. Abhyas - 2116/(Pra.Kra.43/16) SD - 4
Dated 25.4.2016 has given approval to prescribe this textbook in its meeting held on 29.12.2017

GEOGRAPHY

STANDARD EIGHT



**Maharashtra State Bureau of Textbook Production and
Curriculum Research, Pune.**



GVHLTZ

The digital textbook can be obtained through DIKSHA App on a smartphone by using the Q. R. Code given on title page of the textbook and useful audio-visual teaching-learning material of the relevant lesson will be available through the Q. R. Code given in each lesson of this textbook.

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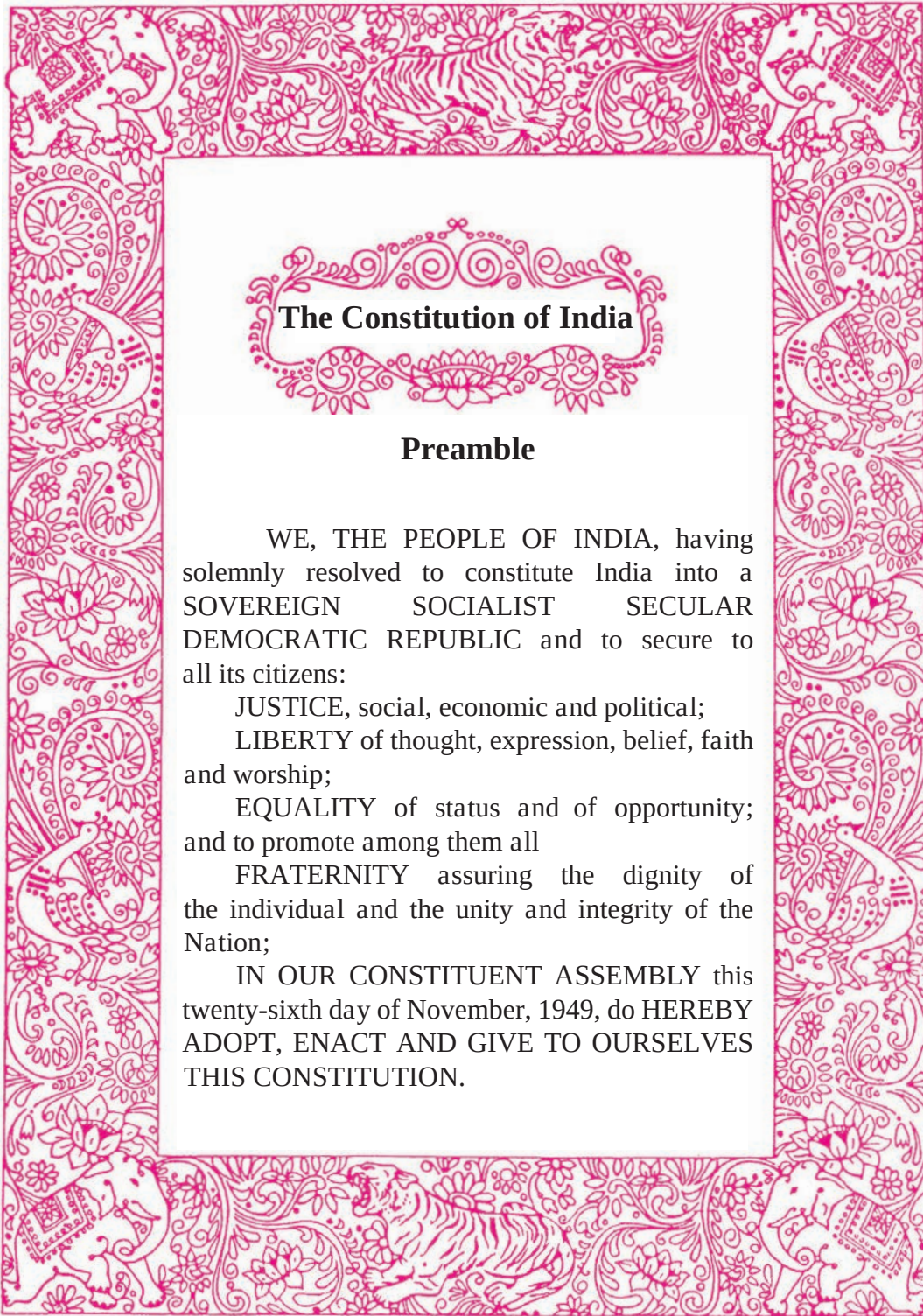
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The Constitution of India

Preamble

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

JUSTICE, social, economic and political;

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

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

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

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

NATIONAL ANTHEM

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

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

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

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

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

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

PLEDGE

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

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

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

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

Preface

Dear Students,

Standard eight is the last year of higher primary education. Welcome to this class. You have been studying geography from standard three to standard five as part of environmental studies and as a separate subject from standard six onwards. It gives me great pleasure putting forth this geography text book for standard eight before you.

In this textbook you are going to study some advanced concepts in geography. Special focus will be on the rain and the clouds you have been seeing in the sky since childhood. How is the interior of the earth? On what basis have estimates been made about the interior of the earth? Some explanation about this has been made briefly in this textbook. You will be studying about the motion of water which covers the largest part of the earth, the currents and the influencing underlying energy behind them. The use of land, industries and population are all an indispensable part of human life. These aspects will be introduced igniting an intellectual curiosity. These concepts will be useful to you even in the future. Clearly understand the rural and urban components and try to correlate man's development with these components.

While studying all these facets, the textbook sets out many task and projects. Questions on the topics have been posed under titles such as think about it, use your brain power, find out etc. These will definitely be beneficial to you.

Please use the maps and diagrams given in the textbook. They will facilitate in making the geographical concepts easy to comprehend. Personally do the tasks given in the textbook. Make use of the discussions given in earlier text books.

With good wishes to all of you !



(Dr. Sunil Magar)

Director

Maharashtra State Bureau of
Textbook Production and
Curriculum Research, Pune

Pune

Date : 18 April 2018 (Akshay Tritiya)
Indian Solar Year : 29 Chaitra 1940

CLASS 8 GEOGRAPHY

Learning process suggested	Learning outcome
The teachers should give learning opportunities to students in groups/pairs / individually and encourage them to :	The Students
- understanding what time will it be in different countries / regions with the help of longitudes on a globe or map - calculating the difference in time between the Prime Meridian and local times of various places in the world	08.73G.01 calculates the Standard Time and Local time with the help of longitudes on maps and globes 08.73G.02 uses local time and standard time effectively with the help of longitudinal location correlating them
Using various audio-visual /visual images/models/ diagrams to understand the interior of the earth	08.73G.03 Explains the composition of the interior of the earth with the help of diagrams, models, images ,etc.
- Understanding the processes of evaporation and condensation with the help of experiments - Understanding the factors affecting humidity - Obtaining information regarding clouds with the help of diagrams or audio-visuals	08.73G.04 Gives information regarding the natural processes of evaporation and condensation 08.73G.05 Explains clearly the factors affecting humidity 08.73G.06 Identifies the cloud types and forecasts rainfall.
- Understanding the sea-floor with the help of diagrams/ models / audio visual medium - Understanding the process of ocean currents with the help of experiments - Understanding the effects of ocean currents on climate, fishing and marine navigation	08.73G.07 Identifies the marine landforms with the help of diagrams /figures 08.73G.08 Discusses marine deposits 08.73G.09 Explains the reasons responsible for ocean currents 08.73G.10 Explains the effect of ocean currents on human life with examples
- Explaining the land use in urban and rural areas with the help of maps, figures and images - Identifying the patterns of land use	08.73G.11 Differentiates between the urban and rural land use 08.73G.12 Presents information regarding rural and urban settlements on the basis of land use maps
- Understanding that population is a resource - Studying the sample graphs of various characteristics of population according to age-sex, sex ratio, birth rate, death rate, urban and rural population, composition according to occupation, literacy, etc	08.73G.13 Explains the importance of studying population (demography) 08.73G.14 Explains the composition of population 08.73G.15 Explains with reasons the factors affecting the quality of population 08.73G.16 Explains the uneven distribution of population by reading world maps
- Understanding the difference between various occupations through examples - Obtaining information through visits to industrial regions and through various references. - Discussing the social responsibilities of industries - Understanding the industrial development of India and Maharashtra with the help of maps	08.73G.17 Classifies various industries 08.73G.18 Tells the importance of industries 08.73G.19 Explains the Corporate Social Responsibility (CSR) 08.73G.20 Explains the factors affecting industrial development 08.73G.21 Obtains information regarding industry - friendly policies
- Drawing conclusions with the help of scales on maps - Converting one type of scale given on a map into another - Understanding the map type on the basis of the scale of the map - Visiting a region through the process of field –visit , preparing questionnaires - Interpretation through analysis of data/information, preparing report	08.73G.22 Determines the scale on the basis of distance between two points on a map and on the ground 08.73G.23 Explains various methods of map scales giving examples 08.73G.24 Identifies types of maps on the basis of scales 08.73G.25 Uses map scales directly 08.73G.26 Plans a field-visit 08.73G.27 Prepares a questionnaire 08.73G.28 Presents a report on the basis of information collected during field-visit

- For Teachers -

- ✓ To begin with, get familiar with the textbook yourself.
- ✓ Please refer to textbooks of earlier classes before teaching this textbook.
- ✓ Please plan carefully and independently for the activities in each chapter. Please do not teach without planning.
- ✓ The teaching-learning interactions, processes and participation of all students is very necessary and so is your active guidance.
- ✓ Please use the geographical teaching aids in the school as required for the appropriate understanding of the subject. It is necessary to use the globe, the maps of the World, India and the State, atlases, etc.
- ✓ Though the number of chapters has been reduced the number of periods required for each chapter has been given a thought. Abstract concepts are difficult to follow and therefore you are expected to use the given number of periods fully. Do not finish the chapter in short. This will help the students to assimilate the content without feeling the 'burden of learning'.
- ✓ Like other social sciences, geographical concepts too are not easy to understand. Major concepts of geography have a scientific base and they deal with abstractions. Encourage group work, learning through each other's help, etc. Facilitate peer learning as much as possible by reorganizing the class structure frequently.
- ✓ Do not ask questions on statistical information. Instead, ask questions on their trends or patterns.
- ✓ The present book has been prepared for constructivist and activity-based teaching.
- ✗ Please do not teach the lessons in the book by just reading them aloud.
- ✓ Follow the order of the chapters as given in the contents because the concepts have been introduced in a graded manner to facilitate knowledge-building.
- ✓ Do not use the boxes titled 'Do you know?' for evaluation.
- ✓ Use QR Code given in the textbook. Some websites have been given for reference at the end of the chapter. Also, a list of references used is also given. You as well as the students are expected to use these references. These references will surely help you to go beyond the textbook. Please bear in mind that extra reading is always helpful for understanding any subject in depth.
- ✓ Use thought-provoking, activity-oriented, open-ended, multiple choice questions for evaluation. Some examples are given at the end of the chapters in the 'exercises'.
- ✓ Use outline maps given on page numbers 35 and 60 for xerox.

- For Students -



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



Contents

S.No.	Name of the lesson	Field	Page No.	Expected Periods
1.	Local Time and Standard Time	General Geography	01	09
2.	Interior of the Earth	Physical Geography	09	10
3.	Humidity and Clouds	Physical Geography	16	10
4.	Structure of Ocean Floor	Physical Geography	24	09
5.	Ocean Currents	Physical Geography	29	09
6.	Land Use	Human Geography	35	10
7.	Population	Human Geography	42	10
8.	Industries	Human Geography	52	10
9.	Map Scale	Practical Geography	60	08
10.	Field Visit	Practical Geography	68	08
11.	Glossary	--	70	--
12.	Activity Page	--	75	--

S.O.I. Note : The following foot notes are applicable : (1) © Government of India, Copyright : 2018. (2) The responsibility for the correctness of internal details rests with the publisher. (3) The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line. (4) The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh. (5) The interstate boundaries amongst Arunachal Pradesh, Assam and Meghalaya shown on this map are as interpreted from the “North-Eastern Areas (Reorganisation) Act. 1971,” but have yet to be verified. (6) The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India. (7) The state boundaries between Uttarakhand & Uttar Pradesh, Bihar & Jharkhand and Chattisgarh & Madhya Pradesh have not been verified by the Governments concerned. (8) The spellings of names in this map, have been taken from various sources.

DISCLAIMER Note : All attempts have been made to contact copy right/s (©) but we have not heard from them. We will be pleased to acknowledge the copy right holder (s) in our next edition if we learn from them.

Front Page : Students have studied geography from standard three and have now come to standard eight. The horizon of their experience has expanded. They are now looking at experiments of the interior of the earth and geo magnetic field.---- (imaginary picture)

Back Page : 1) Students doing an experiment based on shadows : courtesy, Satish Jagdale, Shrimant Rani Nirmala Raje Kanya Prashala, Akkalkot. 2) A type of migration. 3) Clouds : courtesy Aalisha Jadhav. 4) An instrument measuring temperature and humidity. 5) A small submarine surveying the Mariana trench.

1. LOCAL TIME AND STANDARD TIME



Let's recall.

- Why does the duration of day and night keep changing?
- How many longitudes can be drawn on a world map keeping an interval of 1° each?
- The apparent movement of the sun from east to west is a result of what?
- What is the direction of the rotation of the earth?
- While the earth rotates, how many longitudes face the sun daily?
- At which longitude does the date change?
- How was time measured in olden days?
- In present times, what are the instruments used for time measurement?

Geographical explanation

We get up early in the morning, brush our teeth and take a bath. Then we have breakfast and go to school. We study in our classrooms. We return home. We go to the playground to play in the evening. We have dinner; brush our teeth and go to sleep. We keep doing similar activities throughout the day. Considering our daily routine, we need to decide the time for all our activities.

In olden days, people used to take the help of various tools and also depend on various natural events for the measurement of time. On the basis of observation and experience, they divided the day into the following parts: from sunrise to sunset, **daytime** and from the sunset to the next sunrise **nighttime**. A whole day meant the duration from one sunrise to the next. Earlier, natural events and instruments like Ghatikapaatra (a bowl with a minute hole at its base which would float in a large water filled

vessel.); sand timer, etc. were used to tell time.

The Earth takes 24 hours i.e. one day to complete one rotation. We consider the direction where the sun rises to be the east. Thus, the Earth rotates from west to east. As a result we experience, sunrise, noon, sunset and midnight. During rotation, the longitudes in the western part face the sun gradually while those in the east experience darkness. The longitude which faces the sun experiences sunrise while, on the other hand, the one in the darkness experiences sunset.

While travelling in a bus, we often see trees, electric poles, buildings, etc outside the window. They appear to be moving in the opposite direction. Actually, they are stationary and our bus is moving forward. Similarly, because of the rotation of the earth, we feel that the sun is changing its position from east to west daily.



Try this.

Perform this activity in the kho-kho ground on a bright sunny day. Consider the following points:

- ✓ Choose one pole on the ground that stays under the sun for the whole day for this activity.
- ✓ Observe the directions in which the

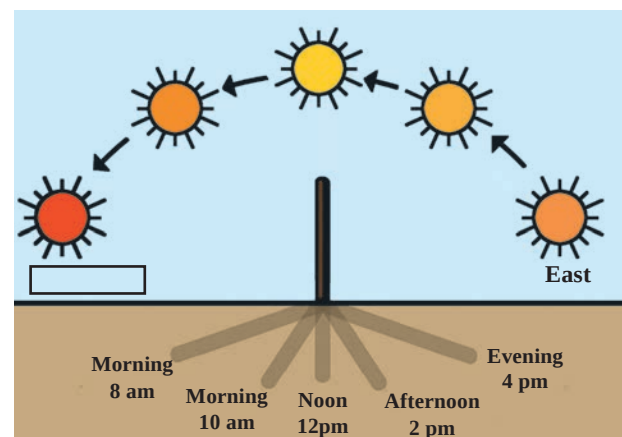


Figure 1.1: The different locations of the sun during the day and changes occurring in the shadow

shadow of this pole falls at different times of the day.

- ✓ Measure the shadows and record in your notebooks.
- ✓ Note the relative directions of the shadows and the sun in your notebook. (Fig 1.1)
- ✓ Where is the sun located in the sky when the shadow is the shortest?
- ✓ At what times are the shadows longest during the day?

Geographical explanation

You would have realized by observation that the shadows in the early morning and evening were the longest while those at the noon were the shortest. Because of the change in the apparent location of the sun in the sky, the length and direction of the shadow of the pole kept changing. See figure 1.1. This is because a specific part of the earth faces the sun during rotation and moves forward. See figure 1.2. Incidentally, we also experience that it is cooler in the morning and evening and warmer in the afternoon.

LOCAL TIME :

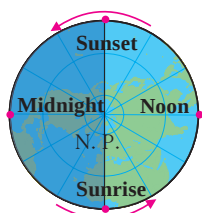


Figure 1.2 : Rotation and the relative location of the sun

As soon as the sun starts moving up in the sky after sunrise, the length of our shadow reduces. Normally, the length of the shadow is shortest at noon. As the sun moves towards the horizon in the afternoon, the length of our shadow increases again by evening. The noon time is the same at any given longitude across the earth i.e. from the North Pole to the South Pole. The time of a place as decided by the location of the sun in the sky, is known as its **local time**.

In the regions lying in between the polar circles and the poles, the daytime could be more

than 24 hours depending upon the season. As a result, understanding the timings of sunrise, noon, sunset and midnight at these places becomes important. At the poles, the daytime and the duration of the day lasts around 6 months. To tell the time of sunrise or sunset at the poles, one has to consider the date. When the sun rises on a specific day, it moves around the horizon and therefore, here, the length of the shadow cannot be considered for telling the noon time.



Think about it.

- At the poles, sunrise occurs on one equinox and sun sets on the next equinox. If you happen to be at any of the poles during this time, then what would be the route of the sun in the daytime?
- On which day, would the sun appear at the highest point in the sky?

Different longitudes have different timing for sunrise, noon and sunset. When it is noon at Mumbai, it wouldn't be the same at Kolkata. Because Kolkata lies to the east of Mumbai, it would already be afternoon in Kolkata.

The local time of a place on the earth's surface is determined with reference to its noon time. This implies that places lying on the same longitude have the same local time. There is no difficulty when local time is used for a small



Always remember -

- The earth takes almost 24 hours to complete one rotation (360°).
- The earth rotates by $360^\circ / 24 \text{ hours} = 15^\circ$ in one hour around its own axis.
- The earth takes 60 minutes / 15 degrees = 4 minutes to cover 1°
- This means that for each degree of longitude, the local time differs by 4 minutes.

area. When people living in a larger area across different longitudes have to interact with each other, then using the local time could lead to chaos and confusion. In such cases, using the local time is not convenient.



Try this.

The local time of a place can be calculated with reference to the time at the Prime Meridian. Examine the examples given below.

Example 1 :

Mashad, a town in Iran, is located on the 60° E longitude. When it is 12 noon at Greenwich, calculate the local time of Mashad town.

Statement : As we move towards the east of the Prime Meridian, the local time increases by 4 minutes for every longitude.

The difference between the longitudes of Greenwich and Mashad

$$= 60^{\circ}$$

$$\text{Difference in local time} = 60 \times 4$$

$$= 240 \text{ minutes}$$

$$= 240 \div 60 \text{ minutes}$$

$$= 4 \text{ hours}$$

This implies that the time at Mashad would be _____ in the _____.

Example 2 :

Manaus city in Brazil is located on 60° W longitude. What would be the local time at Manaus when it is 12 noon at Greenwich?

Statement : -----

The difference in longitudes between the two places :

$$= \boxed{}$$

$$\text{Total difference in time} = \boxed{} \times \boxed{}$$

$$= \boxed{} \text{ minutes}$$

$$= \boxed{} \div 60 \text{ minutes}$$

$$= \boxed{} \text{ hours}$$

As Manaus is located to the _____ of Greenwich, the local time of Greenwich is ----- of Greenwich time by ----- hours. And, therefore, when it is noon at Greenwich, it would be ----- at Manaus.



Can you tell?

We have studied that the local time is different in different parts of the world. The daily routine of the people there, is determined according to the local time in those places. Figure 1.3 shows the local times of different longitudes. Study this map and answer the following questions. Use the relation between degrees and time for this.

- Between which longitudes does the region experience daytime?
- Which longitudes experience noon and midnight respectively?
- Edward from New Orleans is on which longitude?
- What is the time at Accra city?
- At the same time, what is Sharad from Patna and Yakaito from Japan doing? What time is it in these cities?
- Select any one longitude. Calculate the local time of the longitudes lying 1° to the west and east of this longitude.



Think about it.

- What is the maximum number of local times that can there be in the world?
- How many longitudes pass the sun in one hour?



Do you know?

When the sun is directly overhead at a place on the earth, it is noon over there. While telling the time between midnight and noon, we put a.m. in front of the time. This means Ante Meridiem. When the longitudes cross the noon time, then the time is past midday or afternoon. The time in between noon and midnight is denoted by p.m. means Post Meridiem.



Make friends with maps!

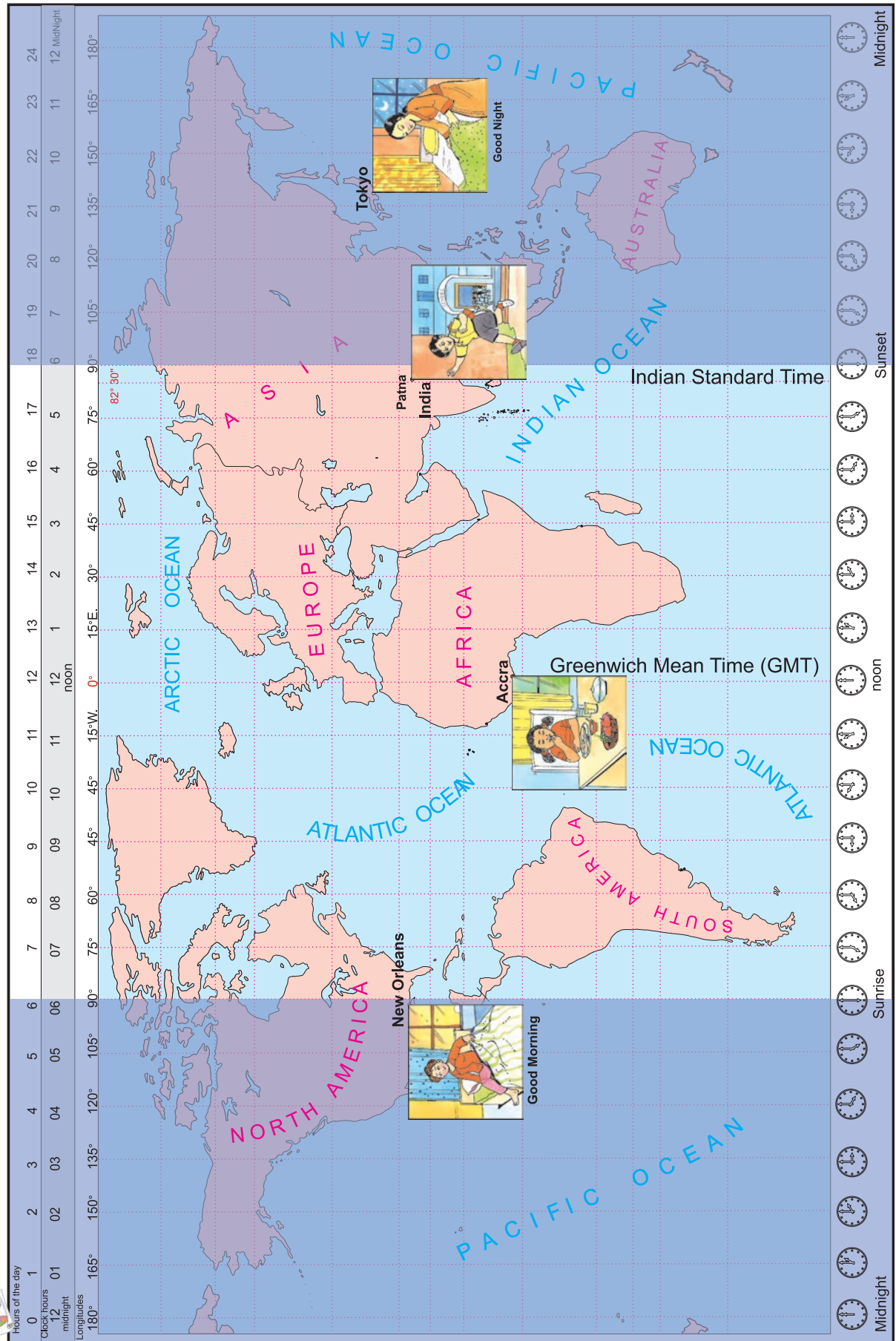


Figure 1.3



Use your brain power!

➤ Tick ✓ the time in the boxes which you can tell without using clock.

• Sunrise ☐

• Sunset ☐

• Noon ☐

• Midnight ☐

Geographical explanation

- Longitudes lying to the east of any longitude are ahead of the time at that longitude while those lying to the west are behind.
- As the distance between two longitudes increase, their local times also starts differing
- If we multiply the difference between longitudes in degrees by 4 minutes, then the difference in the respective local times can be calculated.
- The difference in longitudes can be known with the help of a globe or map.

Carry out the activity given on Page 75 and 76 and understand the standard time of various locations. See if you can find out the **standard time** at two opposite longitudes with this activity?

STANDARD TIME :



Can you tell?

- Mumbai is located at 73° E longitude. Kolkata is located at 88° E longitude. Find the difference between the longitudes of these two cities.
- If the local time at Mumbai is 3 pm then what would be the local time at Kolkata?

Geographical explanation

Both Mumbai and Kolkata are located within India but on different longitudes. Their local times differ by an hour.

If there are different local times within a country because of longitudinal differences,

then there will be a lack of synchronization in the routine activities in the country. If each one follows their local time, discrepancies emerge in carrying out daily business in the country. Therefore, generally, the local time at the longitude which generally passes through the middle of the country is deemed to be the standard time for that country. This standard time is used all over the country.

With respect to businesses at global level, there should be compatibility between the standard times of various countries. To facilitate this, the world has been divided into 24 time zones. These time zones have been created with reference to the Prime Meridian itself.

Normally, if the difference between the longitudinal extent of the country is less than one or two hours, only one standard time is considered for the country. But if the longitudinal extent (east-west extent) is more than that, then, one standard time is not enough and in such countries, more than one standard time zones are considered.



Give it a try.

Look for the map of world time zones from reference books and see in which time zone India falls into?



Find out.

With the help of an atlas find out which countries need more than one standard time

INDIAN STANDARD TIME :

The Indian Standard Time (IST) has been decided according to the $82^{\circ} 30'$ E longitude which passes through Mirzapur (near Allahabad, Uttar Pradesh). This longitude passes through the middle of the country with reference to its longitudinal extent. The local time at this longitude has been selected as the standard time of the whole country. When the sun is directly overhead on this longitude, then it is assumed that it is 12 noon everywhere in India. There is no difference of more than one hour between



Make friends with maps!

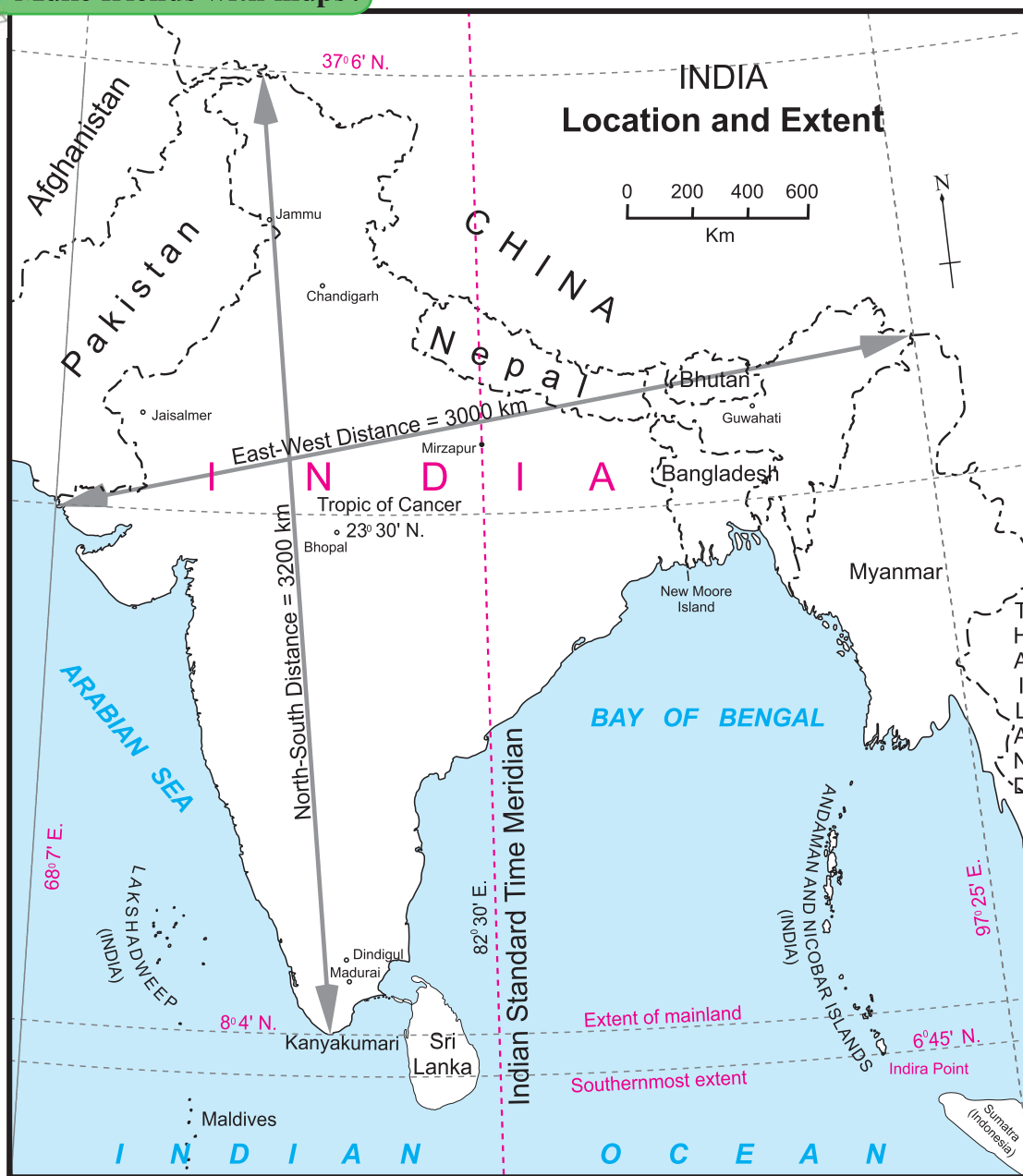


Figure 1.4

the local time at $82^{\circ} 30'$ and other places in the country.



Can you tell?

Look at the figure 1.4 and answer the following questions :

- Considering the longitudinal extent of India, how many longitudes with a difference of 1° can be drawn on the map?
- By how many minutes do two consecutive longitudes differ?
- What is the value of degrees of longitude at Mirzapur?
- If it is 8 a.m. at $82^{\circ} 30' E$, what would be the time in their clocks at the following places?
- Jammu ● Madurai ● Jaisalmer ● Guwahati
- Though the distance between them is more why doesn't the standard time differ in these places?

Universal Standard Time :

For an international coordination between countries, the local time at Greenwich (Greenwich Mean Time) in England is considered to be the international standard time. The difference in standard times of various countries is calculated with reference to GMT. The Indian Standard Time is 5 hours 30 minutes ahead of GMT. If it is 5 p.m. at Greenwich then in India it would be 10.30 p.m.



Give it a try.

- If it is 8 a.m. in India, what is the time in Greenwich?
- When it is 2 p.m. in India, in which countries would it be 2 p.m. too?
- When it is 9 a.m. in India, what would be the time at $82^{\circ} 30' \text{ W}$ longitude?
- What would be the time at Prime Meridian when a new day starts at 180° longitude?



Do you know?

National Institute of Standards and Technology (NIST), an institute in the United States of America has developed the most accurate clocks in the world. Clocks have to be adjusted by 1 second (added or subtracted) once in 20 million years.

In India, the National Physical Laboratory of India, (NPL) New Delhi gives services of accurate time-keeping. The clocks used here are accurate up to 1 lakh part of a second.

As accurate time is required for space research, artificial satellite launching, etc., these clocks are used in these activities.



Do you know?

Jantar-Mantar: Astronomical Observatories

Maharaja Sawai Jaisingh II, the king of Jaipur, Rajasthan, was a great astronomer, mathematician and architect. He built five astronomical observatories called Jantar-Mantar at Ujjain, Varanasi, Jaipur, Delhi and Mathura.

The one at Mathura doesn't exist today but one can visit the other four. Even today, one can know the exact time up to seconds through shadows. Jantar Mantar do not only house sundials, but they are complete astronomical observatories. One can observe the sky from here too.

With the help of instruments at Jantar-Mantar, it is still possible to see astronomical observations. After the advent of modern instruments, now these instruments are more of a 'cultural heritage'.



Think about it.

- In which of the following countries, does only one standard time exist?
● Mexico ● Sri Lanka ● New Zealand ● China
- Why does a country having a large latitudinal extent have only one standard time?

Exercises

Q 1. Complete the sentence by selecting the correct option:

- (a) The earth requires 24 hours for one rotation. In one hour,
- 5 longitudes will face the sun
 - 10 longitudes will face the sun
 - 15 longitudes will face the sun
 - 20 longitudes will face the sun
- (b) To calculate the difference between the local times of any two places on the earth,
- the noon time at both the places should be known
 - the difference in degrees of their longitudes should be known
 - the difference in standard times of both the places should be known
 - Changes need to be made according to International Date Line
- (c) The difference between the local time of any two consecutive longitudes is
- 15 minutes
 - 04 minutes
 - 30 minutes
 - 60 minutes

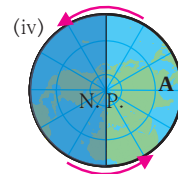
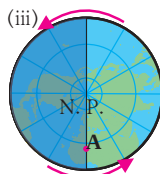
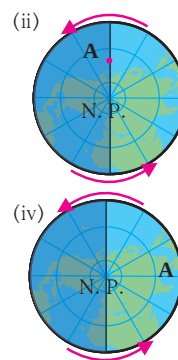
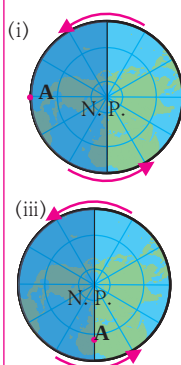
- c) A football match being played at Sao Paulo, Brazil started in India at 6 am IST. Explain what would be the local time at Sao Paulo?

Q 4. If it is 10 pm on 21st June at Prime Meridian, write the dates and time at A, B and C in the table.

Place	Longitude	Date	Time
A	120° E		
B	160° W		
C	60° E		

Q 5. Write the situations of place A shown in these diagrams in the boxes below them :

- (i) Sunrise (ii) midnight (iii) noon (iv) Sunset



Q 2. Give geographical reasons:

- The local time is decided by the noon time.
- The local time at Greenwich is considered to be the international standard time.
- The standard time of India has been decided by the local time at 82.5° E longitude.
- Canada has 6 different standard times.

Q 3. Answer in brief:

- If it is 12 noon at 60°E longitude, then explain what would be the time at 30° W longitude?
- How is the standard time of a place determined?

Activity:

- Look for the actual granny's clock in Shri Acharya Atre's poem : "Aajiche Ghadyal " (granny's clock). Look for this poem on the internet or in reference books.
- Find out the velocity of the earth's rotation in km/ hour.



2. INTERIOR OF THE EARTH



Let's recall.

In the previous classes, you have been introduced to rock types, volcanoes and earthquakes. Answer the following questions on the basis of that.

- When earthquake occurs, what happens exactly ?
- How are igneous rocks formed?
- What is a volcano ?
- Which materials come out during a volcanic eruption?
- In which state of matter are these materials?
- Are these materials cool or hot? Why?



Try this.

Boil half a liter of milk. When the milk comes to a boil, switch off the gas. Keep a lid on the vessel. *(The latter part of the experiment is very important. You have to use your observational skills and arrive at some conclusions.)*

After ten minutes, remove the lid, take it to a side and tilt it. Observe what happens. What can you see on the milk? In what form do you see the layer of matter on the milk? Remove this layer of matter. Take note of the difference in temperature of this matter and the milk and answer the following questions.

- When the milk was kept for boiling, in which state was it?
- When the milk was boiling, what did you observe?
- What had accumulated over the lid of the vessel?
- Tell whether the matter accumulated on the milk is liquid or solid?
- Was it cooler or hotter than the milk below?
- On which other substances can similar experiments be carried out?

Geographical explanation

Before boiling, the milk was in the liquid state. After it came to a boil, steam started coming out from it. After some time, a thick layer of cream develops over the milk. The temperature of the cream is lesser than the milk below. Thus, it can be implied that the creamy layer cooled faster than the milk below it, which remained hot and in a liquid form. A similar process occurred when the earth cooled.

The scientists unanimously believe that the Earth was formed out of the solar system itself. Initially, earth was a gaseous hot balloon. It cooled down as it rotated around itself. The process of cooling took place from the outer surface towards the earth's center. As a result, the outer layer (crust) of the earth became cooler and solid but as we move from surface to the core, heat increases and at certain depths, the interior of the earth is semi liquid.

Man has always been inquisitive about what lies in the **interior of the earth**. A direct observation of the earth's interior has not been possible as yet. Through various methods, the scientists have tried to estimate about the same. To infer about these, study of the materials coming out of a volcanic eruption and the seismic waves is most important.

Matter coming out of volcanic eruptions consists of hot magma, gases, steam, etc. When lava cools and solidifies, igneous rocks are formed. Through the estimates of the study of temperature, density, gravitational force and pressure the interior of the earth was understood. For instance, when we go deep into a mine, we feel an increase in temperature. Similarly, the magma coming out of volcanoes from the earth's interior is hot. Such estimations were made by the geologists. Several earthquakes occur in various places on the earth every year. Seismic waves are generated. These waves travel through the interior of the earth.

The study of their direction and velocity helps us to estimate about the interior of the earth. Man has also tried to dig deep bore holes in the interior to know more about the same.



Think about it.

Can we dig deep from one side of the earth and come out from the other side? Write your imaginations in your notebooks and discuss in class.

(Note: Teachers should listen to the ideas of the students and direct the topic towards the earth's interior)



Do you know?

Our earth was formed approximately 4.6 billion years ago. Initially, the earth was in a gaseous state. It started cooling through the process of radiation. The earth then liquefied. With time, the outermost part of the earth cooled first and became solid. This outermost layer of the earth is called the crust. Even today outer planets of the solar system are in a gaseous state.

The Composition of The Earth's Interior :



Try this.

(Carry out the following activity by dividing the students into two groups. Use the pictures on the back cover for reference.)

- ✓ Take clay balls of 3 colors- red, yellow and blue. (As available in the market)
- ✓ Make the red ball bigger.
- ✓ Roll out the yellow colour ball. You will get a flat roti-like structure. Place the red colour ball inside the yellow one like you fill puran in a puranpoli. Give it the shape of a sphere.
- ✓ Now roll out the blue ball and fill the yellow one in it as done earlier. Make a sphere out of this too.

- ✓ Show the continents in yellow on this sphere like a globe. Now your globe made from clay is ready.
- ✓ To see the interior of the earth, cut the sphere exactly in half. You can see various layers of colors inside like the layers of the earth's interior. Name these layers.

Geographical explanation

While going from the earth's surface to its core, major changes occur in temperature and density. With respect to these two elements, the earth's interior can be divided into following layers.

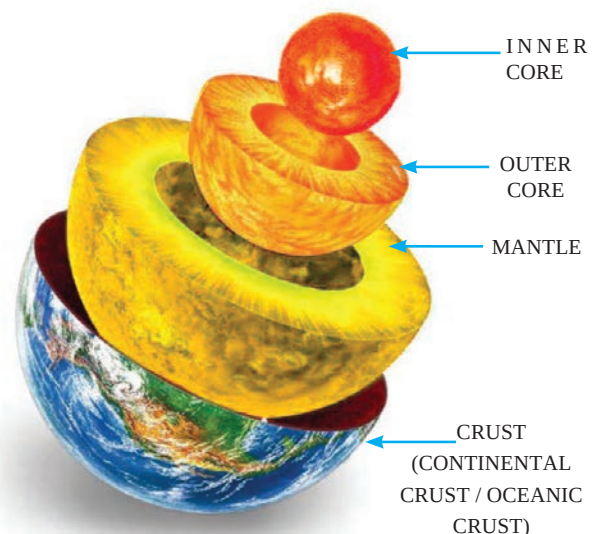
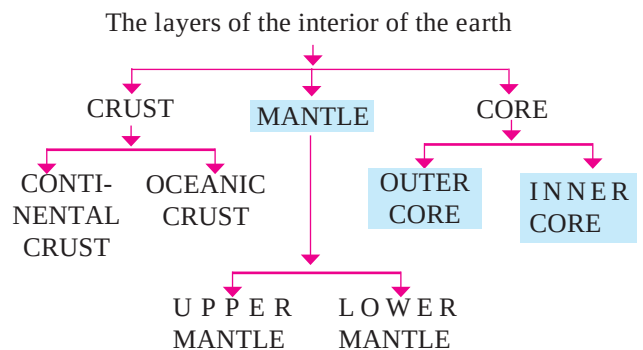


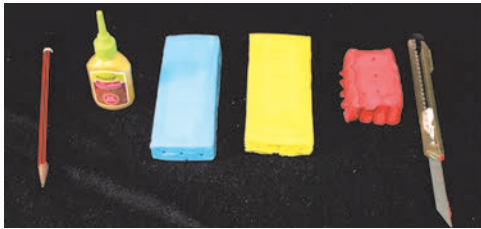
Figure 2.1 Diagram showing the structure of the earth's interior

THE CRUST :

The uppermost layer of the earth's surface is in solid state and is called the crust. The thickness of the crust is not the same everywhere. On an average, it is 30 to 35 km

Steps in the process of knowing the interior of the earth

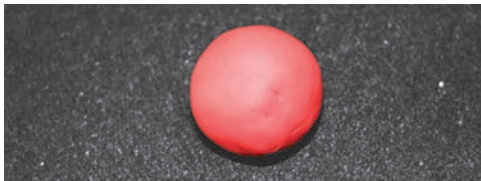
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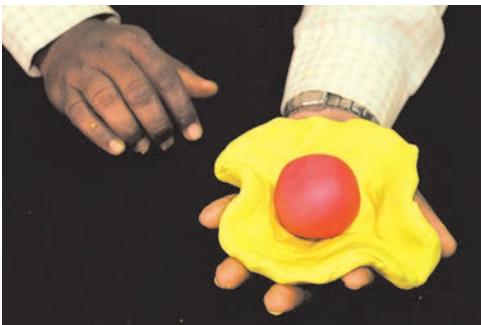
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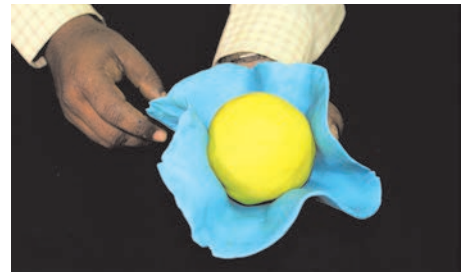
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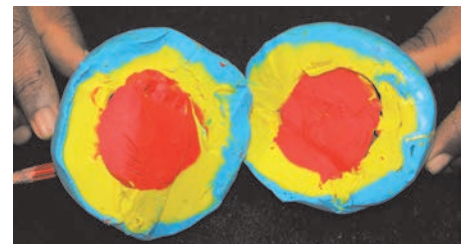
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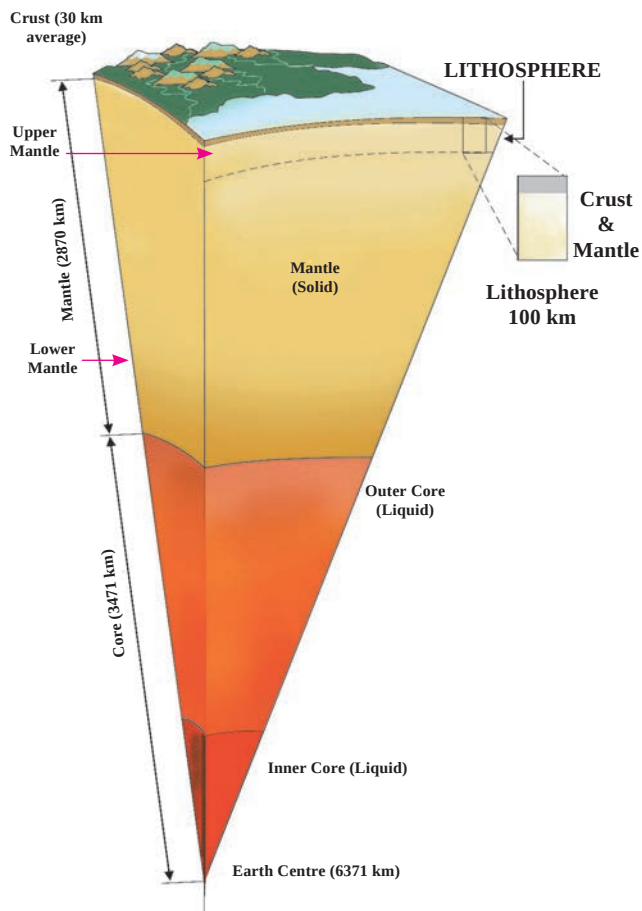


Figure 2.2 : Image showing earth's interior

thick. The thickness of the crust below the continents is from 16 to 45 km, 40 km under the mountain ranges and less than 10 km under the oceans.

As we move deeper under the surface, temperature increases. After that, the rate of increase in temperature reduces and again increases in the core. At the centre of the earth, the temperature is around 5500° to 6000° C.

The crust is the thinnest of all the layers when compared to the mantle and the core. It can be divided into two sub-layers.

Continental Crust : The continents are mainly composed of Silica (Silica is the compound of Silicon Elements) and Aluminum. Because of their high proportion in this layer, the layer was earlier known as Sial. The density of continental crust is 2.65 to 2.90 gm/cm³. The thickness of this layer is approximately 30 kilometers. Granite rocks are mainly found in this layer.

Oceanic Crust : This is the second layer of the crust. It is made up of silica and magnesium. It was earlier called Sima. This layer is approximately 7 to 10 km thick. The density of this layer is 2.9 gm/cm³ to 3.3 gm/cm³. In this layer, basalt and gabbro rocks are mainly found.



Always remember -

Elements found in various layers of the earth's interior

Low	Silicon	(Si)
	Aluminium	(Al)
	Silicon	(Si)
	Magnesium	(Mg)
	Nickel	(Ni)
High	Ferrous (Iron)	(Fe)



Do you know ?

There is a discontinuity between the continental crust and oceanic crust. It was first deduced by a scientist called Conrad and is named after him as Conrad discontinuity.

There is **discontinuity** between crust and mantle too. This discontinuity was deduced by a scientist called Mohorovicic. It has been named after him as Moho discontinuity.

There is discontinuity between mantle and core too. It has been named after Gutenberg, a scientist, who discovered it.

MANTLE :

Below the crust lies the mantle. Mantle can be divided into two layers: upper and lower mantle.

The upper layer is more in liquid state. Here, one finds magma chambers. It is through these chambers that magma comes out on the earth's surface during volcanic eruptions.

This layer is also known as asthenosphere. Epicenters of deep seated earthquakes are usually found here. Mantle begins at a depth of around 42km from the earth's surface.

The internal energy released due to endogenetic movements occurring in this layer is responsible for mountain-building, rifts, volcanic eruptions earthquakes, etc.

In this layer, it is inferred that the temperature at a depth of 2400 to 2900 km depth would be around 2200°C to 2500°C . Here, there is a sudden change in the structure and density of material. It is estimated that this layer extends upto a depth of 2870 km. Average density of this layer is 4.5 gm/cm^3 and it increases with depth. Increasing pressure is the reason behind this. The density of lower mantle is about 5.7 gm/cm^3 .

CORE :

The core starts from around the depth of about 2900 km from the earth's surface. The part of the earth's interior extending from the mantle upto the centre of the earth is the core. The thickness of the core is about 3471 km. This layer can be divided into outer core and inner core.

OUTER CORE : Outer core extends from around 2900 km to 5100 km. The secondary waves cannot pass-through the core. They get absorbed in this region. This has led the scientists to believe that the core could be liquid or semi-liquid in nature. The primary waves travel through this layer. But their speed reduces when passing through this layer. The density of outer core is 9.8 gm/cm^3 . The temperature of the liquid outer core is around 5000°C .

We have learnt that the outer core of the earth's interior is in a liquid state and the proportion of iron is more in this layer. Vertical currents originate in this liquid layer. This is another characteristic of this area.

The difference between the temperatures of the outer and inner core gives rise to vertical currents. The earth's rotation gives them eddy (circular) motion. Electric currents develop

in these spiral eddies of liquid iron and thus magnetic field is generated. It is sometimes called the **geo-dynamo** too. This magnetic field of the earth is functional even outside the earth's surface for quite a distance. As a result, a cover develops around the earth because of the magnetic field. The earth's atmosphere is protected from **solar winds** coming from the sun. The magnetic field thus developed around the earth, is called magnetosphere. This is the fifth and an important sphere of the earth. See fig 2.3.

INNER CORE : Inner core extends from around 5150 km to the depth of around 6371 km (earth's centre.) It is the core of the earth which is in a solid state. The density of this sphere is around 13.3 gm/cm^3 . Iron and nickel are the major elements found here. Therefore,

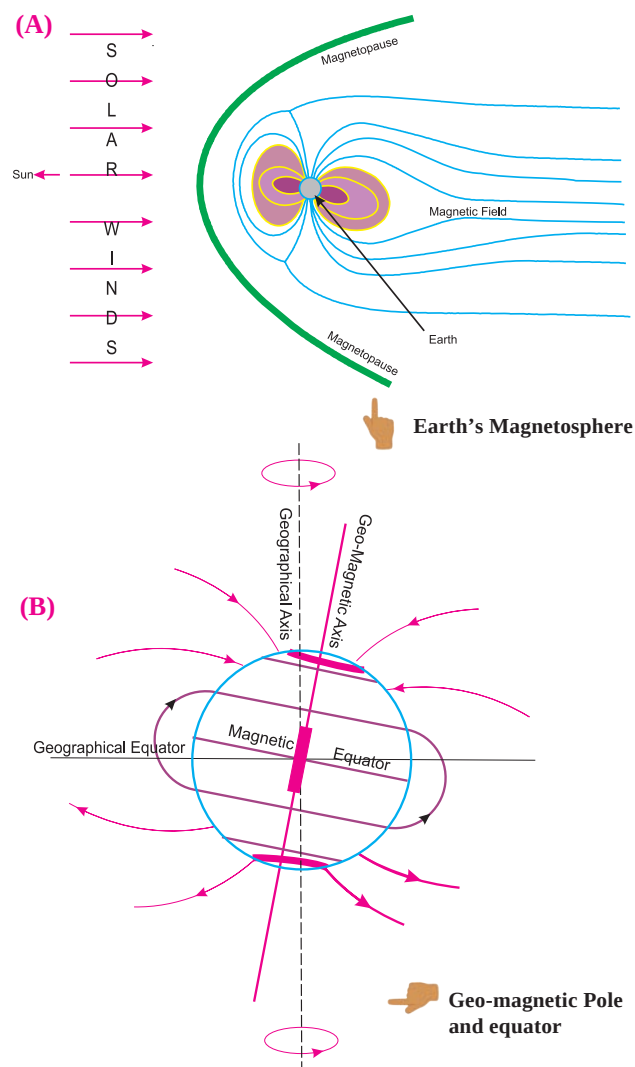


Figure 2.3 (A) and (B) : Earth-a magnet

this layer is also called Nife. As the materials in this layer are under extreme pressure, the inner core is in solid state. The temperature here is almost equivalent to the surface temperature of the sun.



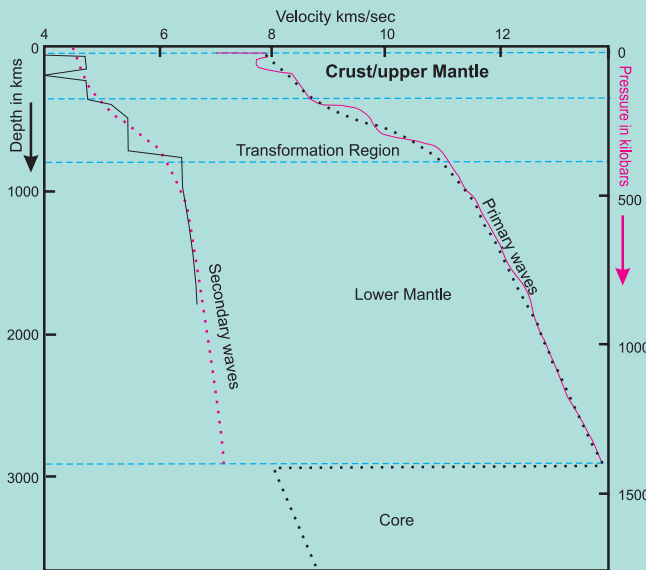
Use your brain power !

As you go in the interior of the earth, guess what changes will you notice in your weight? Try to find out the reason behind it.

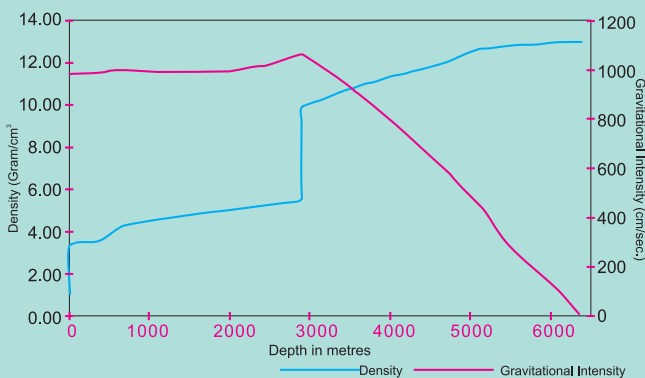


Always remember -

Observe the velocity curves of the given seismic waves.



(A)



(B)

The left curve in figure 'A' shows the velocity of secondary (S) waves, while the curve on the right shows Primary (P) waves. There are many changes occurring in the curve of the secondary waves. The curve drawn with the help of dots shows the average velocity of the waves. The curve of the secondary waves seems to have ended around the depth of 2900 km. Changes are visible even in the curves of the primary waves. The velocity of the primary waves increases according to depth till 2900 km. The velocity of secondary waves is around 6 to 8 km/sec around the boundary of the outer core and the curve has stopped there. These waves do not enter the core. At 2900 km, the velocity is around 12 km/sec. But when it enters the core, the velocity reduces to 8 km/sec. See this as shown in the dot curve. On the basis of these curves, the scientists have inferred the densities at various depths.

The density curve of the earth's interior is shown in figure 'B'. Red curve in figure 'B' shows gravitational force at various depths. Gravitational force increases at certain depth from the surface and then reduces according to depth. At the centre, it is zero as is visible from the curve.

Observe these figures minutely, find various discontinuities in the density curve and show them on the figure.



Think about it.

Imagine the earth's interior and write 10-12 sentences on it.



Find out.

What is World Earth Day? Why is it celebrated?

Q 1. Tick ✓ the correct options in the box

- (A) There are two layers in the crust.
 (i) Inner and outer crust ☐
 (ii) Continental and oceanic crust ☐
 (iii) Surface and oceanic crust ☐
 (iv) Mantle and Core ☐
- (B) Which element is found in both mantle and crust ?
 (i) Silica ☐
 (ii) Magnesium ☐
 (iii) Aluminium ☐
 (iv) Iron ☐
- (C) Which of these minerals are found in the core of the earth?
 (i) Iron-magnesium ☐
 (ii) Magnesium-nickel ☐
 (iii) Aluminium- Iron ☐
 (iv) Iron-nickel ☐
- (D) The inner core is in which state?
 (i) Gaseous ☐
 (ii) Solid state ☐
 (iii) Semi-solid state ☐
- (E) The outer core is made up of
 (i) Iron ☐
 (ii) Gold ☐
 (iii) Hydrogen ☐
 (iv) Oxygen ☐
- (F) The layer of the earth on which we live.
 (i) Mantle ☐
 (ii) Core ☐
 (iii) Crust ☐
 (iv) Continental crust ☐
- (G) Which seismic waves can travel through liquid medium?
 (i) Primary waves ☐
 (ii) Secondary Waves ☐
 (iii) Surface waves ☐
 (iv) Oceanic waves ☐

Q 2. Tell whether right or wrong. Correct the wrong statement

- (A) The density of various materials is not the same in the interior of the earth.
 (B) The core of the earth's interior is made up of hard rock
 (C) Secondary waves cannot pass through outer core.
 (D) Continental crust is made up of silica and magnesium

Q 3. Answer the following

- (A) What are the two parts of the crust? What is the basis of classification?
 (B) Why is the upper mantle called the asthenosphere?
 (C) Magnetosphere of the earth is a result of rotation. Explain.

Q 4. Draw neat diagrams, label them and explain.

- (A) The interior of the earth
 (B) Magnetic pole and equator

Q 5. Give geographical reasons:

- (A) There are discontinuities in the interior of the earth.
 (B) There is correlation between the density of metals and their location in the interior of the earth.
 (C) Mantle is the centre of earthquake and volcanic eruptions.
 (D) The thickness of the crust below the continents is less as compared to oceans.
 (E) Earth is protected because of the magnetosphere

ACTIVITY :

Prepare a model of the earth's interior.



3. HUMIDITY AND CLOUDS



Can you tell?

Look at the pictures shown in figure 3.1. Discuss the weather conditions shown in these pictures in the class and write the descriptions in the boxes below.

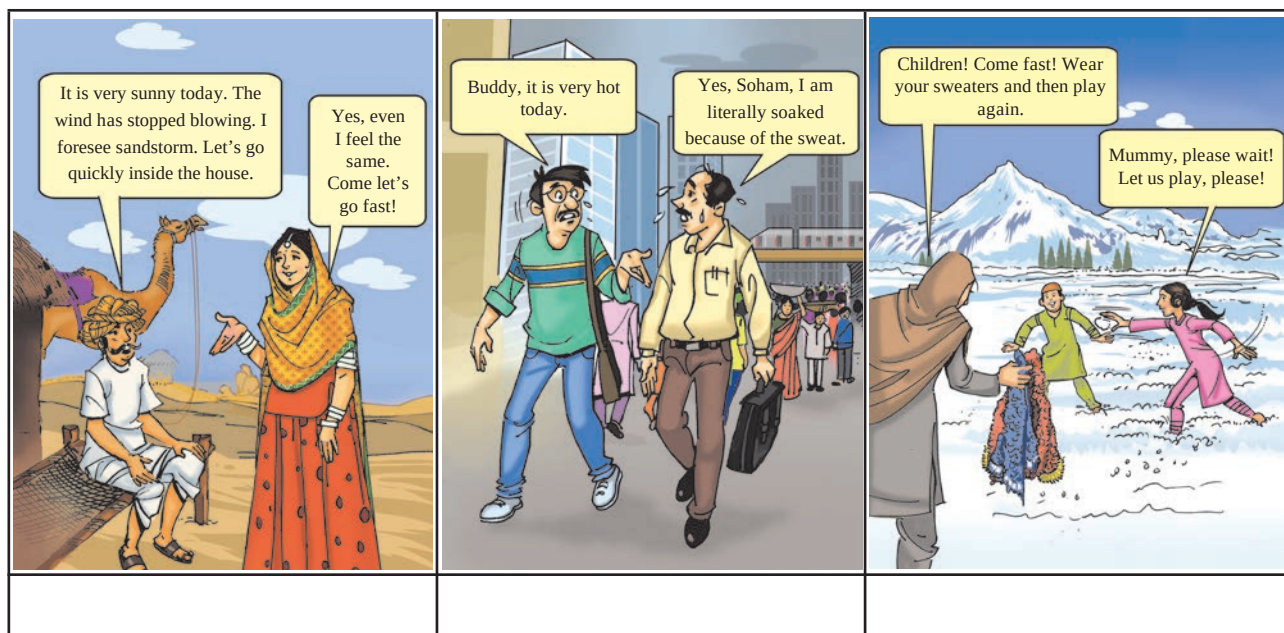


Figure 3.1

Geographical explanation

Generally, we keep talking about the weather conditions. We can identify the weather conditions through the conversations above. We experience the dampness or dryness in the air throughout the year. The changes occurring in the weather conditions in desert areas, coastal areas and mountainous areas is evident from the figures.

- Rajasthan lies in a region with dry and hot air. There is hardly any moisture in the air. People wear loose cotton clothes.
- Kashmir valley lies in a region with cold and dry air. Moisture is minimal in the air. People cover themselves with warm clothes.
- In Mumbai, the air is hot and humid. There the proportion of moisture is very high in the air. In addition, if dark clouds cover the sky, the content of moisture in the air increases.

In the above discussion, the words hot, moist, cool etc. show the condition of the air. They relate to the content of the moisture in the air. Moisture in the air is invisible. But it is the major component of air which is taken into consideration while discussing the weather of any place. For precipitation to occur in any place, presence of moisture in the air is very important.



Think about it.

During winters, when you exhale on the glass of your mirror, what happens. If you try to do this in summer why doesn't this happen?

EVAPORATION :

Evaporation is the process of converting water into steam or water vapour. Because of the sun's heat, the water on the earth gets

converted into water vapour. The process of evaporation is dependent on the dryness, temperature and the speed of the wind.

If the air is dry and hot, the rate of evaporation increases. The process of evaporation continues even in dry and cold air. On the other hand, evaporation occurs very slowly in moist air. If the velocity and temperature of the air is high, then evaporation occurs rapidly. If the wind is blowing slowly and the air is cooler, then evaporation occurs slowly.



Use your brain power!

- In which season do the clothes dry fast?
- In which season do the clothes take time to dry? What could be the reason?

Humidity in the air :

The proportion of water vapour in the air is called its humidity. The dryness or dampness of the air depends on the proportion of water vapour.

Air can hold moisture in specific quantity at specific temperature only. As air cools down, its **moisture holding capacity** reduces. This implies that warmer air can hold more moisture than cold air.

At a certain temperature, the moisture holding capacity of air becomes equal to the proportion of moisture present in it. This condition of the air is called **saturation of the air**.



Try this.

(Carry out the following activity in a group).

- ✓ Take a colander/ tray which is deeper in the centre.
- ✓ Take a piece of sponge.
- ✓ On the flat part of the tray, make holes with the help of nails.
- ✓ Keep the sponge on the centre of the tray/ colander.
- ✓ Make sure there is no water in the sponge.

- ✓ Pour water on the sponge with a big spoon.
- ✓ The students in the group should note how many spoons of water have been poured.

Keep pouring water with the spoon till the sponge becomes wet with water. Note what happens if you keep pouring water even after that. Now answer the following questions.

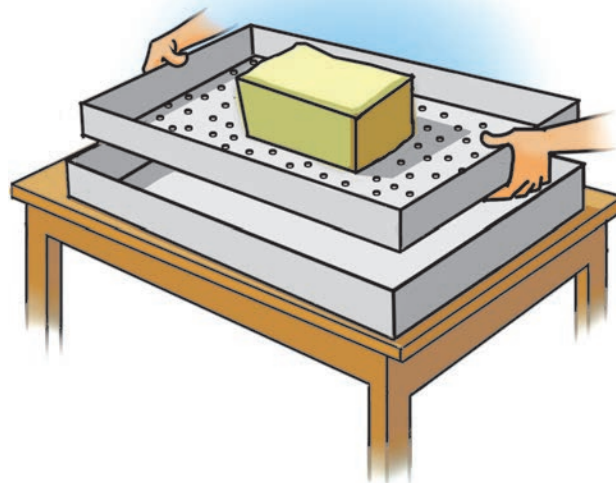


Figure 3.2

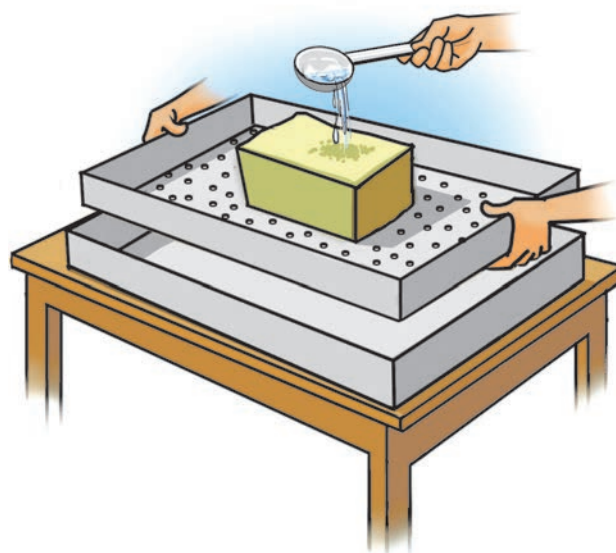


Figure 3.3

- What happened to the water which was poured initially?
- When you were pouring water on the sponge, what did you expect?
- What happened when you poured more water on the sponge?
- What conclusions can you draw from this?

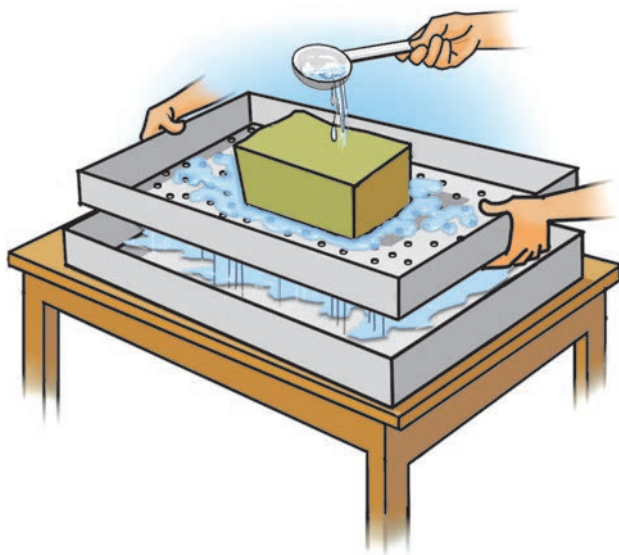


Figure 3.5

Geographical explanation

Let's suppose that the air is like the piece of sponge. How many spoons of water does the sponge absorb? After the sponge is full of water, drops of water start trickling out. One can tell, the number of spoons of water required to make the water trickle down the sponge by observation. This implies that the water-holding capacity of the sponge is fulfilled. This makes it saturated.

Similarly, when the proportion of moisture in the air exceeds its vapour holding capacity, precipitation in the form of rain or snow occurs on the earth.

The moisture-holding capacity of the air depends on its temperature. Higher the temperature, higher is the holding capacity. We have learnt earlier that as we go higher in the sky, the air becomes cooler. So, as per this rule, as we go higher, the vapour holding capacity of the air will decrease. The following table will make it clear.

Always remember -

Generally, humidity of the air is measured in grams per cubic meter. When the humidity in the air is 0 gm/cu.m., the air is said to be dry. If the humidity in the air at 30° C temperature is 37 gms/ cu.m. , then the air is said to be saturated.



Give it a try.

The vapour holding capacity of 1 cu.m. of air in various temperatures is given here. Calculate the difference in the capacities by observing the table.

Tempera- ture of the air(0 C)	Vapour holding capacity (gm/ cu.m.	Difference in the capacities (gm/ cu.m)
-5	3.26	---
0	4.85	1.59
5	6.80	
10	9.40	
15	12.83	
20	17.30	
30	30.37	
40	51.12	

At 15° C, the capacity of 1 cu.m air is to hold 12.8 gm of moisture. If this amount of vapour is present in the air, the air is said to be saturated. This humidity in the air is expressed in different ways.

ABSOLUTE HUMIDITY :

The amount of water vapour in 1 cu.m. of air is the **absolute humidity** of the air. For example, the absolute humidity of the air near coastal areas is higher than air in the interior. Absolute humidity is higher in the equatorial areas while it reduces as we move towards the



Use your brain power !

- In which season is humidity generally more?
- How does humidity affect the human body?
- Observe how humidity affects the food materials at our home.
- Is there a relation between the formation of fungus and humidity?
- How is the early or late drying up of clothes related to humidity?

poles. The distribution of land and water on earth and the seasons also affect absolute humidity.

RELATIVE HUMIDITY :

The amount of water vapour present in air can be expressed as a percentage of the amount needed for saturation at the same temperature and same volume. It is expressed in percentage.

$$\text{Relative humidity (R.H.) (\%)} = \frac{\text{Absolute humidity}}{\text{Vapour holding capacity}} \times 100$$

- What will be the relative humidity of air whose absolute humidity is 20 gm/m^3 and vapour holding capacity is 30 gm/m^3 ?
- If the absolute humidity of the air is 15 gm/m^3 , and the vapour holding capacity is 15 gm/m^3 , then what is the relative humidity of the air?



Think about it.

What will happen if the temperature of saturated air at 20°C drops down to 10°C abruptly?

- On the basis of the examples given above, tell which air is saturated?

The amount of water vapour changes according to difference in temperature. Similarly, relative humidity also changes. Generally, relative humidity is more in the mornings and nights. In the afternoon, as temperature increases, relative humidity decreases. Near coastal areas, the relative humidity is more and so the air is moist. In desert areas, relative humidity is less.



Try this.

The teacher should make two groups of the students in the class. The first group should do the following activity under the supervision of the teachers carefully. See fig 3.4.

- ✓ Take water in a pressure cooker
- ✓ Take off the whistle of the pressure cooker
- ✓ Now heat the cooker
- ✓ Take a lid with a handle
- ✓ After the water starts boiling, hold the lid at a distance from where the steam is coming out.



Figure 3.5

- ✓ Observe what happens.
You must have observed that water changed into water vapour after it was heated.



Figure 3.6 (A)

This vapour turns into water droplets when it touches the cooler lid. We can see the water droplets deposited on the lid.

The other group should carry out the following activity. See fig 3.6a

- ✓ Take a glass with flat bottom.
- ✓ Put some ice cubes in it.
- ✓ Keep this glass in a room for 2-3 minutes
- What did you see?



Figure 3.6 (B)

In sometime, you will see droplets of water on the outer surface of the glass. See fig 3.6B

When the water vapour in the air comes in contact with the cold surface, **condensation** take place. These droplets form on the outer surface of the glass.

In the first activity, the steam from the cooker cooled and condensed into water droplets. In the second activity, the vapour in the air condensed into water droplets.

Condensation/Densification /Sublimation :

The process of changing of water vapour in the air into water is called condensation or densification. Also, the process of vapour (gas) changing into solid state is called sublimation. If the temperature of the air reduces, its vapour holding capacity also reduces. When relative humidity of the air becomes 100%, vapour starts condensing. At this time, the temperature of the air should be at **dewpoint**. It implies that for condensation, temperature should be low and relative humidity must be high. In the free environment, condensation of the vapour in the air occurs around fine particles (dust, salt, etc.) in the air.

Dew, frost and fog are the forms of condensation at ground level while clouds are a form of condensation at higher elevation.

Clouds and Types of Clouds :

- Clouds are a form of condensation at higher elevation



Always remember -

There is a difference between fog and smog. Fog is made of vapour in the air only. Smog is a combination of dust particles of polluted air in the region and fog.

- Condensation occurs around minute particles in the atmosphere. Condensed water or snow particles in the clouds are very fine and almost weightless. And so, clouds float in the air. See fig 3.7

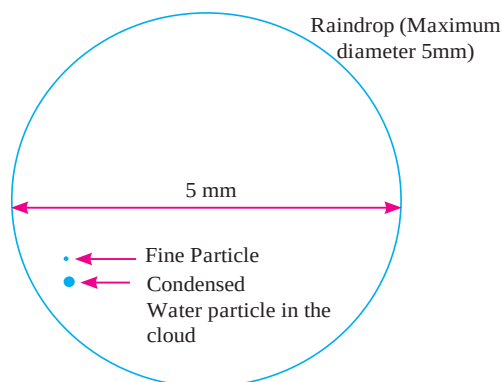


Figure 3.7 : Raindrop

Land and water get heated because of the heat of the sun. Air near the surface heats up, rises and becomes less dense. Hot air rises up. As it goes higher, the temperature of the air reduces and the moisture holding capacity of the air reduces. Relative humidity keeps increasing. The water vapour in the atmosphere turns into water and snow. This is the dewpoint level of that air. The level of condensation is determined by the water vapour in the air. Keep in mind that the freezing point is also dependent on the altitude and water vapour.

Because of condensation, fine particles of ice and water float in the air at a greater height. They accumulate around dust particles in the air and become larger in size. Their accumulation together is called a cloud. Because of vertical flow of the wind, they float in the atmosphere. Like a kite which floats in the air as it moves higher and higher, the clouds too float in the atmosphere because of vertical flow.

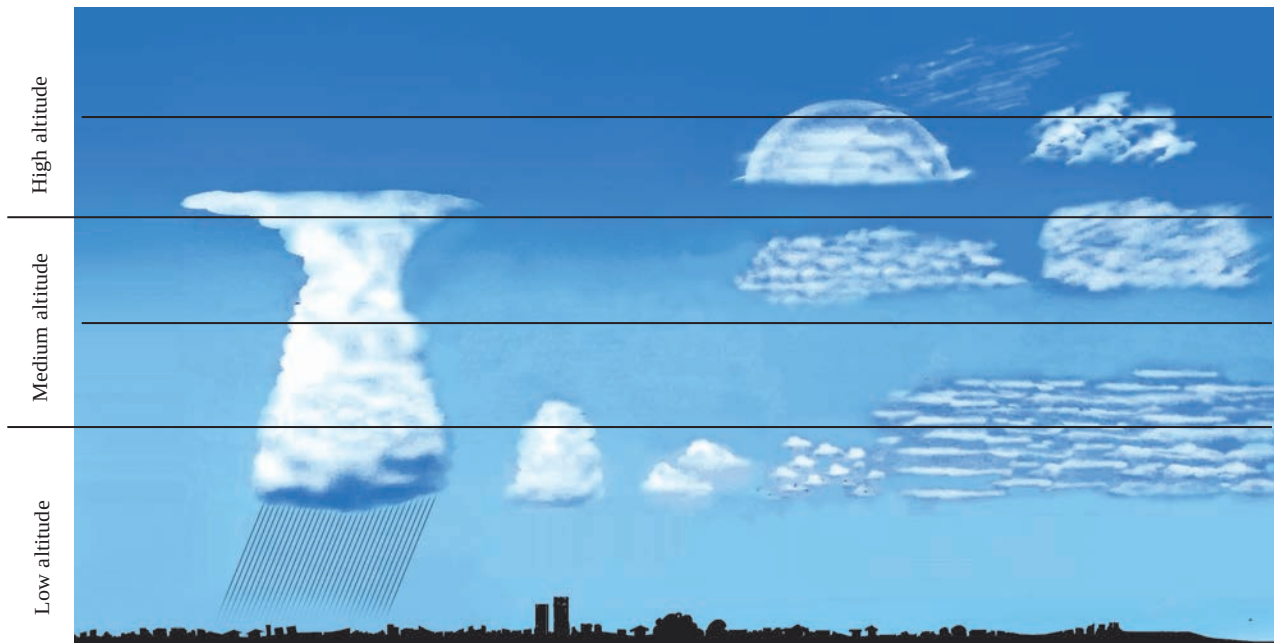


Figure 3.8 : Types of Clouds

Clouds are found at different altitudes above mean sea level. Clouds which form at greater altitudes are formed from very fine snow particles. The process of evaporation and condensation occur consecutively in the clouds. Specific type of clouds cause rainfall on earth. The proportion of vapour is more near the earth's surface. As we go higher away from the sea level, the amount of vapour decreases. Hence, the clouds at a lower altitude are larger in size while the clouds at a higher altitude are smaller.

Cloud types according to international classification

No.	Types of Clouds	General Altitude (meters)
1.	Cirrus	7000 to 14000
2.	Cirro-Stratus	
3.	Cirro-Cumulus	
4.	Alto-Stratus	2000 to 7000
5.	Alto-Cumulus	
6.	Strato-Cumulus	Less Than 2000
7.	Stratus	
8.	Nimbostratus	
9.	Cumulus	The extent could be variable
10.	Cumulonimbus	

Clouds are formed at different altitudes in the atmosphere. After observation, we can divide these clouds into 3 main types on the basis of their altitude. The height from the base

of the clouds is taken into consideration. If the clouds are at an altitude of 7000-14000m, then they are considered as very high clouds. If they are at an altitude of around 2000-7000m, then they are considered to be medium clouds. If they are at an altitude of less than 2000m, then they are low clouds. See fig 3.8.

High Clouds :

These clouds are mainly made up of ice particles. They can be classified into cirrus, cirrocumulus and cirrostratus. Cirrus clouds are mainly wispy. Cirro-Cumulus clouds look like groups of small waves. Cirrostratus are like a bedsheet with wrinkles. They generally have a halo around them.

Medium Clouds :

These include alto-cumulus and alto-stratus. Alto-cumulus are in the form of layers and have a wave-like structure. They are mostly white in colour and have a grey shade. Alto-stratus are not very thick. The sun can be seen through them as if seen through a milky glass.

Low Clouds :

These consist of five types of clouds. Strato-cumulus have layers. Their colour is white to earthy. Round clusters of clouds can

be here. Stratus clouds also have layers. They are ash coloured and their base is uniform. Nimbo-stratus has thick layers. They are grey-ash in colour and cause continuous rainfall and even snowfall.



Give it a try.

Look at figure 3.8 first. Now go out of the classroom in the ground. Observe the clouds in the sky. Discuss the following points in the class and write answers in your notebook.

- What was the colour and size of the clouds?
- What type of clouds did you observe? (Take help from fig 3.8)
- Can these clouds bring rain? Give reasons.

Cumulus Clouds : These clouds are formed extensively from 500 m to 6000 m altitude. The vertical flow of the air adds to the formation of these clouds. These are huge and dome-shaped. They are grey in colour. Cumulus clouds are an indicator of pleasant weather. The vertical expanse of these clouds increases so much that they turn into cumulonimbus clouds and bring rain.

Cumulonimbus Clouds : These are characteristic clouds which are indicators of thunderstorm. These look like huge mountains. These are dense and dark in colour. There is thunder accompanied by lightening. They bring rain with storm and may sometime bring hailstones. But such a type of rain does not last long. See fig 3.9

The largest of these clouds bring rainfall accompanied with lightning. The top portion of these clouds has an anvil like shape. The clouds have a positive charge at the upper end and negative charge at the lower end. The land below them always has negative charge. Due to difference in the charges, electric charges are formed and lightning occurs lighting up the sky for a moment. The air around the lightning rises up because of the heat and this leads to a large thundering sound.

As compared to other clouds, the rain drops of these clouds are larger because they move up and down a lot of times and accumulate more and more water. Drops become larger and larger and are unable to float in the clouds because of their weight. They fall in the form of rain. Sometimes, the air in the clouds is very cold. As a result, these drops freeze and fall in the form of hail. We call them hailstones.

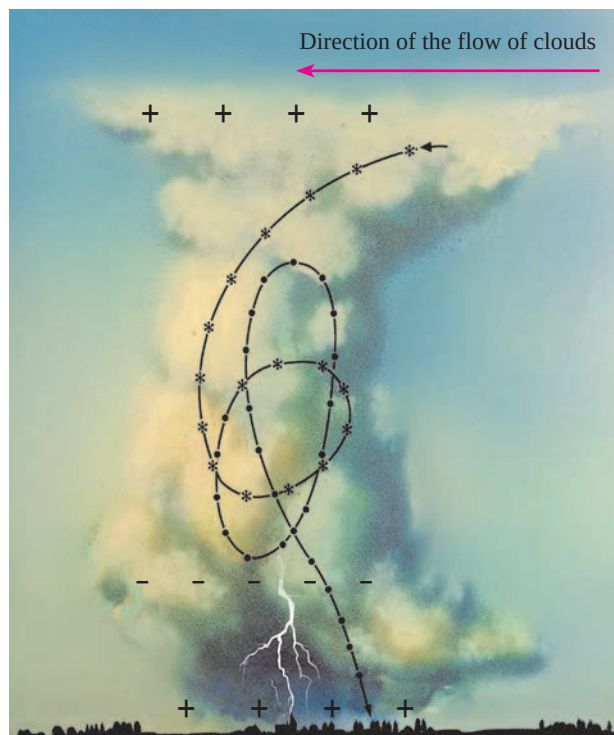


Figure 3.9 : Cumulonimbus Clouds



Use your brain power!

Find where the adjacent symbols are used while showing the weather of a place. Write their meanings in the boxes given below









Do you know?

Cloudburst is a type of precipitation. Raindrops coming towards the earth are stopped in the clouds itself because of strong vertical winds. These drops change into hail. This makes the clouds heavier. The vertical winds are unable to bear this weight. This leads to heavy rainfall with large-sized hail. This

is called cloud-burst. It leads to a rainfall of more than 100mm in a small area or particular region. This type of precipitation mainly occurs in mountainous regions. The states through which the Himalayan ranges pass experience such a type of rainfall.



Exercises

Q 1. Match the column and complete the chain:

- | A | B | C |
|------------------|--------------------------------|-------------------------|
| (A) Cirrus | (i) Vertical extent in the sky | (a) Roaring clouds |
| (B) Cumulonimbus | (ii) higher altitude | (b) Floating clouds |
| (C) Nimbostratus | (iii) Medium altitude | (c) continuous rainfall |
| (D) Alto-cumulus | (iv) Low altitude | (d) snow flake clouds |

Q 2. Choose the correct word from the brackets and complete the sentence:

(Cumulonimbus, Relative humidity, Absolute humidity, Condensation, Vapour-holding capacity)

- The ----- of air is dependent on the temperature of air.
- The amount of vapour in 1 cu.m. of air shows the -----.
- As ----- is less in desert areas, the air is dry there.
- type of clouds are indicators of storm
- In a free environment, the ----- of the vapour present in the atmosphere takes place around dust particles.

Q 3. Differentiate between:

- Humidity and clouds
- Relative humidity and Absolute humidity
- Cumulus clouds and cumulonimbus clouds

Q 4. Answer the following questions:

- Why is the air in a region dry?
- How is humidity measured?
- What are the prerequisites for condensation?
- What is a cloud? Write its types.
- Which type of clouds give rain?
- On what does the percentage of relative humidity depend?

Q 5. Give geographical reasons:

- Clouds float in the sky.
- The proportion of relative humidity changes according to altitude.
- Air becomes saturated.
- Cumulus clouds change into cumulonimbus clouds

Q 6. Solve the following:

- When the temperature of the air is 30°C, its vapour-holding capacity is 30.37 gms/ cu.m. If absolute humidity is 18 gms / cu.m. then what would be the relative humidity?
- What would be the absolute humidity of air if 1 cu.m. air contains 4.08 gms of vapour at 0°C temperature? .

Q 7. Collect the weather related information from newspapers for the month of July. Relate the difference in the maximum and minimum temperatures with humidity.

ACTIVITY :

Make a table showing the types of clouds. Use various photographs.



4. STRUCTURE OF OCEAN FLOOR

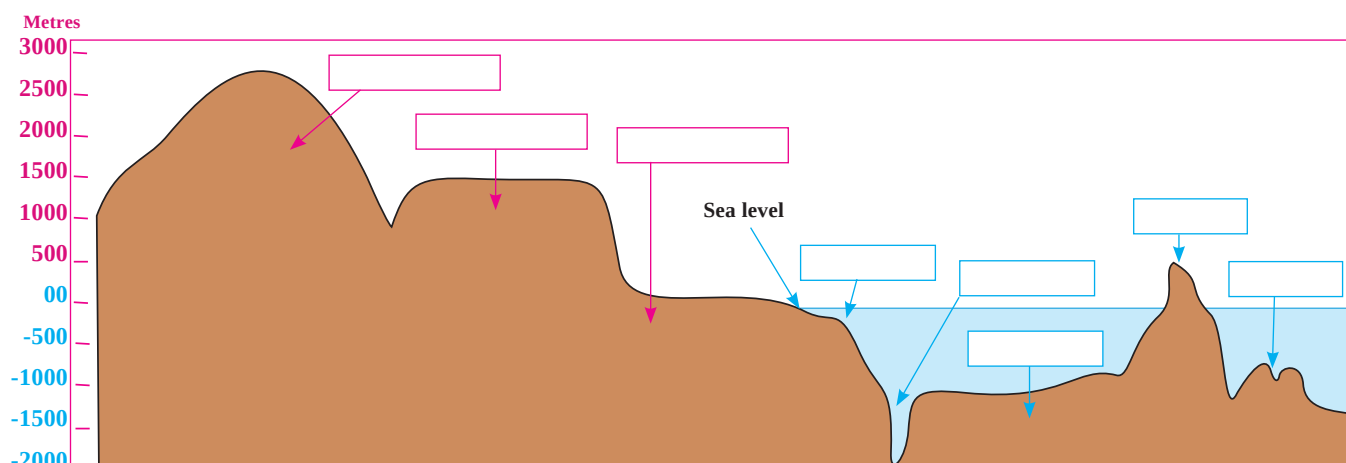


Figure 4.1 : Various landforms



Can you tell?

- Continents and oceans are a part of the lithosphere and hydrosphere respectively.
- Continents and oceans lie on plates
- During low tides, the level of ocean water goes down and the land below the water near the coast is exposed.
- Ships wreck when they strike against the rocks in the ocean.

If the above points are correct, then select the most appropriate option from the following:

- ❖ The surface of the earth is occupied by land and water
- ❖ There is land below the ocean too.
- ❖ Even if the water has the same level, the land submerged is not even.
- ❖ The level of water and land is uneven.

Discuss in the class regarding the choice of your options. Know from your teachers about the correct option.

Geographical explanation

We know that the proportion of water and land is uneven on the earth. Around 71% of the surface is covered by water but there is land even below this water. But like water, it is not at the same level.

We classify the various landforms on the earth on the basis of altitudes. A similar classification can be done for landforms submerged under the water.



Think about it.

If the classification of landforms on land can be done on the basis of altitude and size, then how can the landforms submerged under water be classified?



Can you tell?

- Try to name the landforms shown in figure 4.1
- What parameters were used for classifying the landforms on the earth?
- What parameters were used for naming the landforms below water?

Geographical explanation

The Relief of Ocean Floor :

Land submerged below oceanic water is called the **ocean floor**. The relief of ocean floor is decided upon by the depth from the sea floor and the shape of the land there.

The average depth of the oceans is around 3700 metres. The ocean bed is also uneven like the land on the continents. The ocean floor

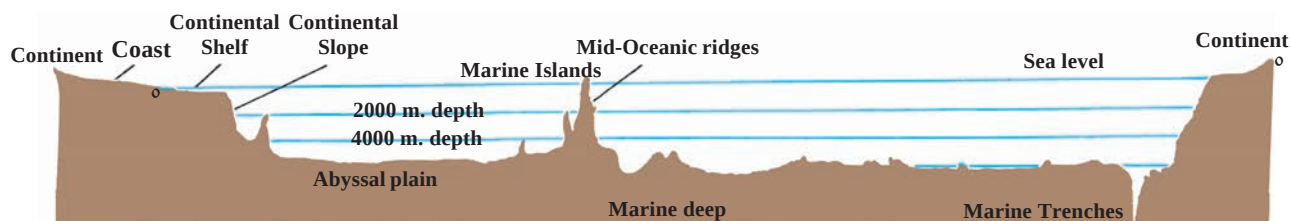


Figure 4.2 : Ocean relief

relief consists of all submerged landforms. The structure of the ocean floor differs from ocean to ocean. We will look at the sequence of landforms and the details of major landforms on the ocean floor. As we go away from the coast, the structure of the ocean floor changes. Study the explanation below and figure 4.2 together.

CONTINENTAL SHELF : The land near the coast and submerged under the sea is called continental shelf. This is the shallowest part of the ocean bed. It is also called submerged coastland. Its slope is gentle.

The extent of the continental shelf is not uniform everywhere. It is narrow along the coasts of some continents while it is broad for hundreds of kilometers at others. Its depth is upto 200 meters below the sea level.

The continental shelf is very important from the point of view of humans. Extensive fishing grounds are found in the continental shelf. As this part is shallow, the sunlight reaches its bed. Algae, plankton, etc. grow here. This is food for fish. Natural gas, mineral oil and various minerals can be obtained by mining the continental shelf. For example, Mumbai High located on the continental shelf of the Arabian Sea. It is a source from where we obtain mineral oil and natural gas.

CONTINENTAL SLOPE : After the extent of continental shelf is over, the slope of the sea bed becomes steeper. This is called continental slope. The depth of the slope is from 200 m to 3600 metres. In some places, it is more. The continental slope is narrow. The lower boundary of continental slope is considered to be the boundary of continents.

ABYSSAL PLAINS : Beyond the continental slope lie the abyssal plains which are the flat part of the sea bed. The abyssal plains consist of various submerged landforms like hills, plateaus, etc

MOUNTAIN RANGES AND PLATEAUS : The hills and mountains found on the ocean-bed are called **submerged hills and mountains**. These hills are hundreds of kilometers wide and thousands of kilometers long. Peaks of some of the submerged hills come above the sea level. They are visible to us as marine islands. Iceland in the Atlantic Ocean, Andaman and Nicobar Islands in the Bay of Bengal are examples.

The summits of some marine islands are flat and extensive. They are called oceanic or submarine plateaus. For instance, Chagos Plateau in the Indian Ocean.

MARINE DEEPS AND MARINE TRENCHES : On the ocean-bed, there are some landforms which are deep, narrow and steep. They are called marine deeps or trenches. Generally, the shallower ones are called marine deeps while deeper ones and extending for longer distance are called trenches. The trenches are thousands of meters deep from the sea level. The Mariana Trench, in the Pacific Ocean, is the deepest trench in the world. Its depth is around 11034 metres. The mid-oceanic submerged hills and marine trenches are geologically the most active areas of the ocean-bed in the world. There are many active volcanoes here. These areas are also earthquake-prone areas. Earthquakes and volcanic eruptions occurring in the ocean-bed give rise to tsunamis in the nearby coastal areas.

MARINE DEPOSITION :

The marine-beds are the deep parts of the world in respective regions. Hence, various deposits are found in these parts. The deposits are as follows:

(1) Pebbles, clay, soil etc. brought by rivers, glaciers, etc. from the continents.

The deposition occurs mainly on the continental shelf. These are called **marine deposits**.

(2) Lava and ash erupting out of volcanic eruptions is also found here. Fine soil particles are deposited on a large scale. Remains of marine plants and animals are mixed in these deposits. This mixture is made up of fine particles and lies in the form of fine clay. This is around 30% of the deposits. These are called **marine oozes**. To understand the form of the marine life in the ocean and the availability of minerals on the ocean bed these deposits are



Figure 4.3 : Marine deposits

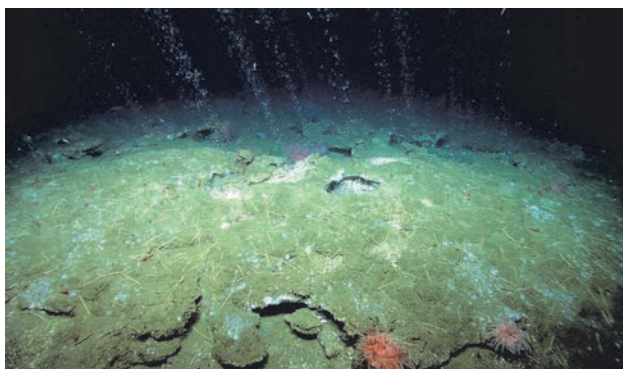


Figure 4.4 : Marine sediments



Figure 4.5 : Anthropogenic deposits

very important. Sedimentary rocks are formed due to the depositing of layers over layers of the sediments and the pressure of sea water.

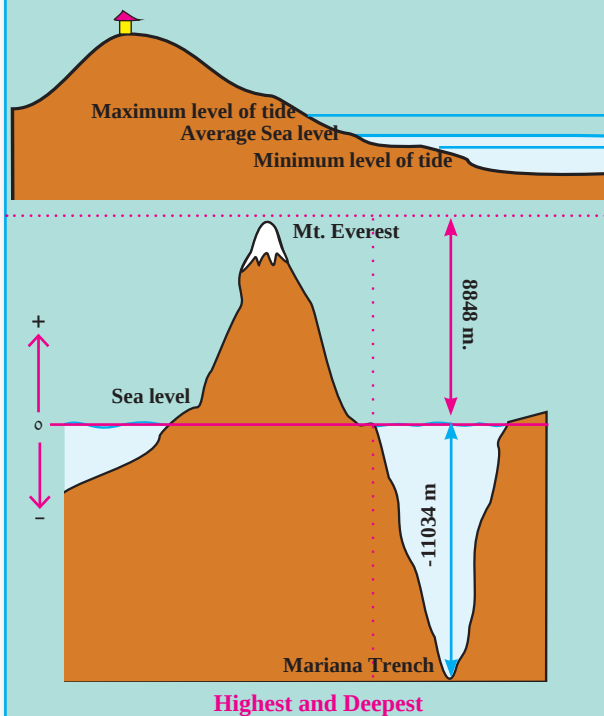
(3) Besides, some human-induced material is also found here. This includes sewage, solid waste, radio-active material, waste chemicals, plastics, etc. These wastes prove hazardous to the hydrosphere. These materials are extremely harmful to the marine life and its environment. Though the polluting components are less, their nuisance value is more.



Always remember -

Mean Sea Level : Elevation or depth of any place is measured from the sea level. The average of the highest high tides and the lowest low tides is considered as sea level. This average is taken to be zero and altitudes or depths are measured and shown in positive or negative values. For example, Mount Everest is 8848 metres high and Mariana Trench is -11034 metres.

For survey purpose in India, the height of sea level at Chennai is considered to be zero and the elevation of any place in India is measured with reference to this.





Give it a try.

- From the map of the ocean floor identify the ocean.
- Can you identify and name the submerged landforms shown in the diagram?
- Which region would be ideal for fishing and why?



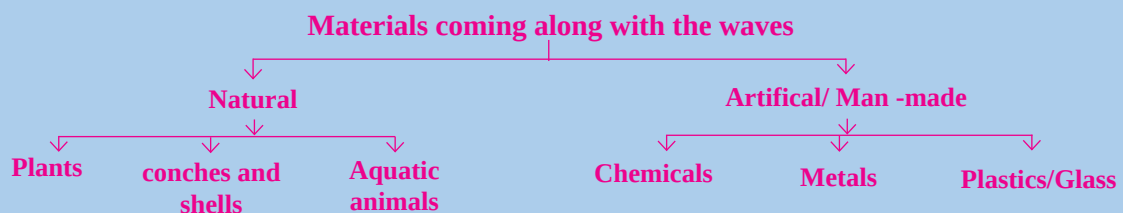
Always remember -

Deposition of many materials coming from land keeps occurring in the seas and oceans. This is in the form of natural deposits and sediments. But, man disposes unwanted materials in the sea. This poses a hazard to the ocean bed and the sea-water. Also it is harmful to marine life. We must keep in mind that the biodiversity found in seas and oceans is higher than on the land.



Use your brain power !

Do this activity when you go to the sea-shore with your parents or teachers. Observe the materials which have come with the waves. Classify them as per the flowchart given below:

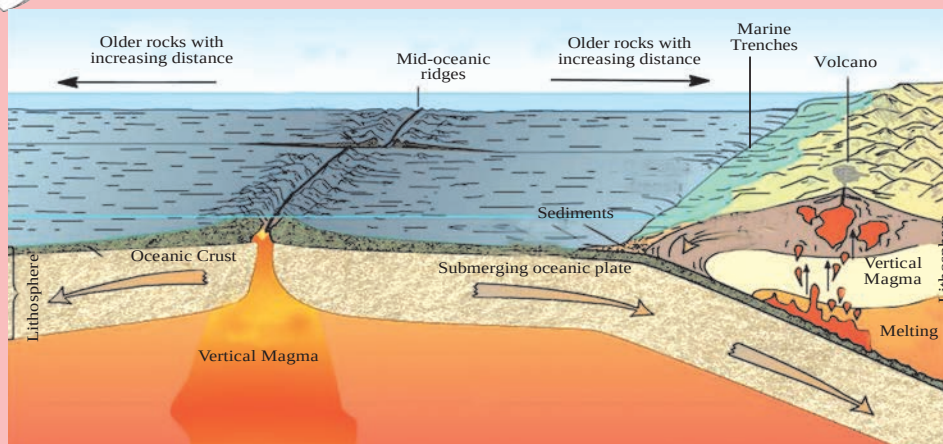


Answer the following:

- Which of these are perishable items?
- Which are non-perishable?
- What will happen because of perishable items?
- What will happen because of non-perishable items?
- Suggest measures to control deposition of non-perishable items on the coast
- How will you run a campaign of environmental conservation to keep the coasts clean?



Do you know ?



While studying the ocean floor, we must keep in mind the age of the ocean bed. By studying the deposits on the ocean bed, it occurred to the scientists that the deposits at the ocean floor are not older than 200 million years. The maximum age of the rocks on

the continents is supposed to be 3200 million years. Then where have the deposits on the sea bed which are older than 200 million years gone? This made the scientists restless. Then they started the study of the rocks along with the deposits. This made them realize that the

rocks are also not older than 200 million years. It was inferred that the ocean floor is very young as compared to the earth's surface. Now this is unanimously accepted. This research was then used in the study of the concept of plate tectonics.

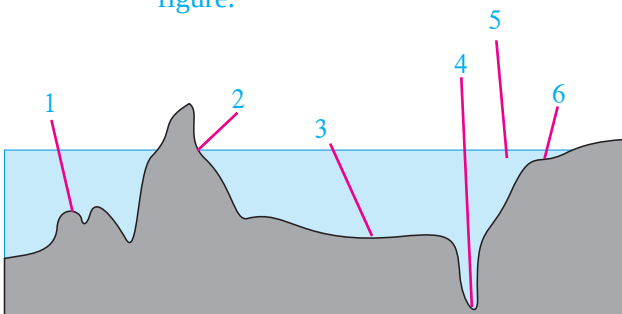


Exercises

Q 1. Choose the correct option:

- (a) Like there are landforms on land, ocean floor also has submerged landforms because
- (i) There is land under water
- (ii) There are volcanoes under water
- (iii) Land is continuous and there is water in deeper parts.
- (iv) Though land is continuous, its level is not the same everywhere like that of water .
- (b) Which part of the ocean floor is most useful to the man ?
- (i) Continental shelf
- (ii) Continental slope
- (iii) Abyssal plains
- (iv) Marine deeps
- (c) Which one of the following option is related to marine deposits?
- (i) Rivers, glaciers, remains of plants and animals
- (ii) Volcanic ash, continental shelf, remains of plants and animals
- (iii) Volcanic ash, lava, fine particles of soil
- (iv) Volcanic ash, remains of plants and animals, abyssal plains

Q 2. (a) Name the landforms shown in the figure.



- (b) Which of these landforms is useful for deep sea research?
- (c) Which of these are appropriate to be used for the protection of marine borders and naval-base building?

Q 3. Give geographical reasons:

- (a) The study of ocean floor is useful to man.
- (b) The continental shelf is a paradise for fishing activity.
- (c) Some marine islands are actually the peaks of sea mountains.
- (d) The continental slope is considered to be the boundary of continents.
- (e) The disposal of waste materials in the oceans by man is harmful to the environment.

Q 4. Observe the map on Pg 27 in 'Give it a try' and answer the following questions:

- (a) Madagascar and Sri Lanka are related to which landform of the ocean floor?
- (b) Near which continent are these land forms located?
- (c) Which islands in our country are examples of peaks of submerged mountains?

ACTIVITY :

Prepare a model of the ocean floor.



5. OCEAN CURRENTS



Let's recall.

- When does any material flow?
- What happens exactly when it flows?
- Which anomalies in the material is responsible for the initiation of the flow?



Try this.

Materials required: A large metal tray, water, plastic sequins, spirit lamp, etc.

Note: The following activity should be carried out by students under supervision of teachers.

Focus on observation.

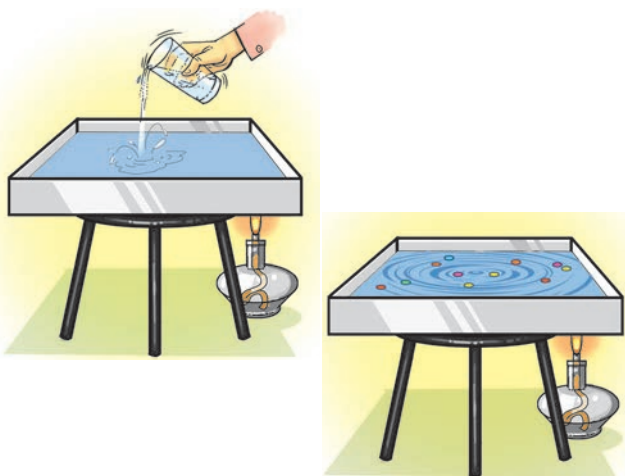


Figure 5.1

- ✓ Keep the large metal tray on a stand. Fill it with water. After the water becomes still, leave the sequins in them. After sometime, the sequins will start floating in the water and become still too.
- ✓ Observe all these things. After sometime, light the spirit lamp and place it below one corner of the tray. Observe what happens. See fig 5.1
- ✓ On the basis of observation, discuss in the class and put forth your opinions regarding the experiment. Consider the following questions for the same.

- What did you understand initially by observing the sequins?
- When the temperature of water started increasing, what changes did you see?
- Observe the movement of the sequins.
- What conclusion can be drawn from the same?
- Where can such processes take place on the earth's surface?
- What are those processes and why do they happen?

Note: In the experiment the heat is given by the spirit lamp. Please keep in mind that in reality, the source of heat for oceans is the sun.

Geographical explanation

It will occur to you that as the temperature of water increases, the plastic sequins move from one place to another. As the temperature rises, the density of water decreases and it becomes lighter. And, therefore, the water having lower temperature which is heavier replaces the water with higher temperatures. After sometime, the sequins start moving in a circular motion. There is movement of these sequins because of the flow of water.



Can you tell?

A very strange incident occurred in the Pacific Ocean in the year 1992. A cargo ship sailed towards America from Hong Kong. While travelling through the Pacific Ocean, near the Hawaii Islands, a container full of toys fell into the ocean and broke. Around 28000 rubber toys started floating on the ocean. This incident occurred on 10th January, 1992. Now a strange thing happened. After around 10 months, on 16th November, 1992, some of these toys reached the coast of Alaska. Some of them crossed the Bering Strait and moved upto the Arctic ocean by the year 2000. Some of



Make friends with maps!

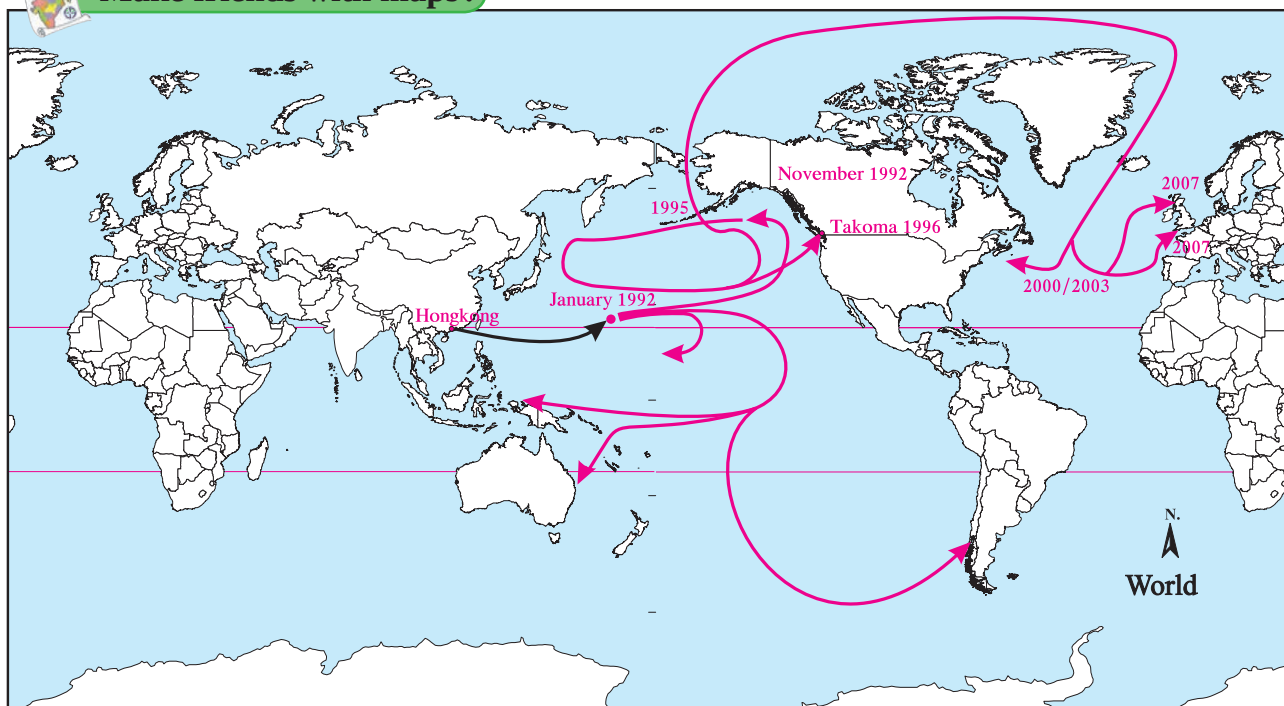


Figure 5.2 : Map showing the distribution of toys in the ocean

them also floated to Atlantic Ocean from the Arctic. Some of these reached the eastern coast of America in 2003 and some of the toys had even reached the European coast by 2007. From the Hawaii Islands, some toys took the route to Australia! See figure 5.2 and 5.3.

Why did the toys travel in this way?



Figure 5.3 : A toy duck

Geographical explanation

The ocean water can be divided into two parts based on depth-surface water and deep water.

- (1) The upper layer extends upto 500 meters from the sea level.
- (2) Below 500 m. depth.

The region from sea level to the depth of 500 m. is considered to be the surface water. Sunlight can reach till this depth. The movements in this layer occur mainly due to differences in temperature and salinity. The planetary winds give speed to the ocean currents.

Horizontal (Surface) Ocean Current :

The flow on the surface of the ocean moves only 10% of the oceanic water. The surface flow is considered up to 500 metres of depth. The discharge of water in the oceans is measured in Sverdrup unit. It is equivalent to 1 million cu.m./second discharge. The horizontal flow of ocean water occurs as warm and cold currents. These currents flow from the equator to the poles and from the poles to the equator. These currents are pushed to long distances by the planetary winds. As a result, the ocean waters flow from equator to both the poles and vice versa. You have studied the map given in figure 5.4 earlier. Study the map again and answer the following questions.

- What are the major types of ocean currents?
- What do you call the currents flowing from the equator to the poles?



Make friends with maps!

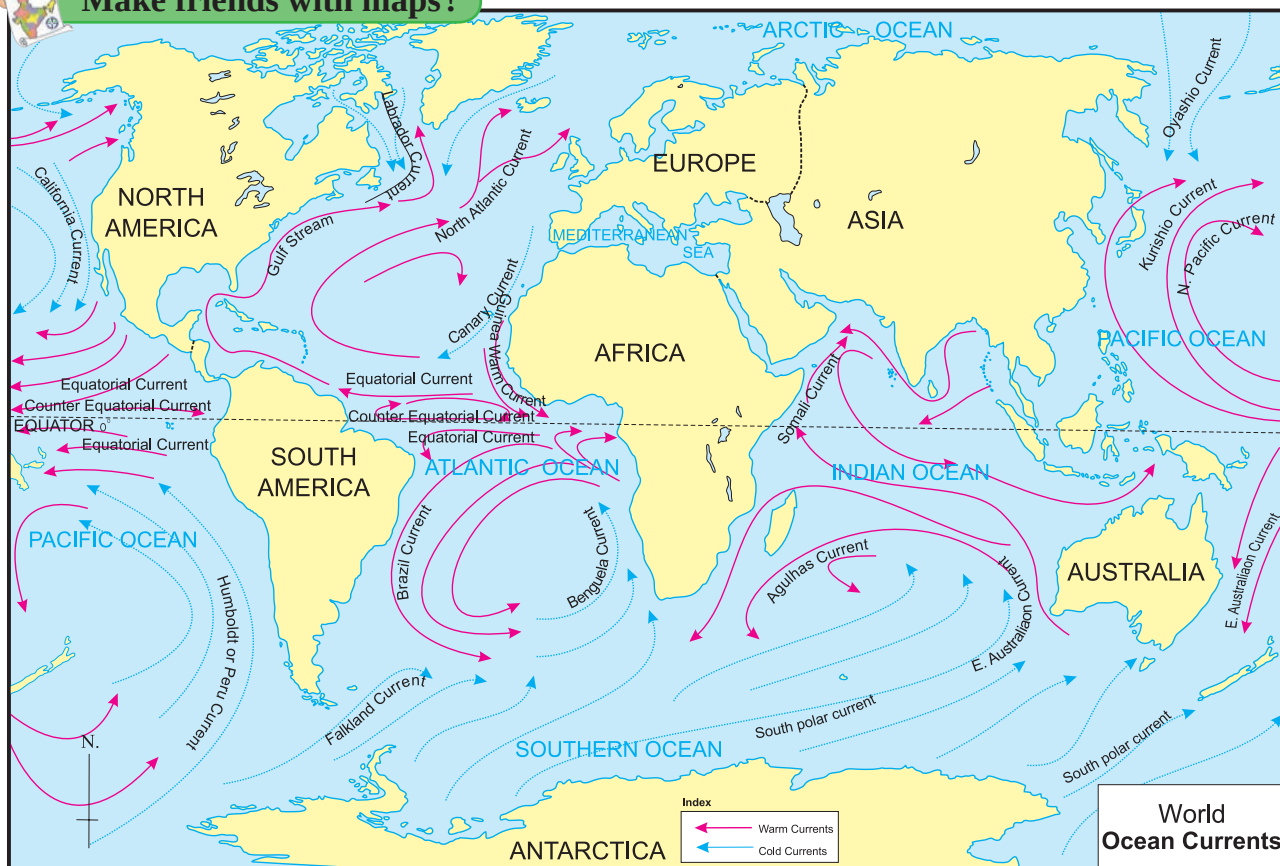


Figure 5.4 : Ocean Currents

- What do you call the currents flowing from the poles to the equator?
- When the currents are moving in a circular manner, what difference is visible in their direction in Northern and Southern Hemisphere respectively?
- What might happen at the places where these currents meet?
- When two different types of currents meet along the coast then what type of human settlements and occupations are seen.

Geographical explanation

We have studied that ocean currents are formed due to differences in temperature, density and planetary winds. In addition, the following reasons are also responsible for the direction of flow of ocean currents and their velocity.

Rotation of the Earth : Because of the rotation of the earth, the ocean currents move in



Do you know ?

THE OCEAN CURRENTS OF THE INDIAN OCEAN :

There is similarity between the patterns of the ocean currents of the Pacific and Atlantic Ocean but the flow of the ocean currents of the Indian Ocean are different.

The Indian Ocean is land-locked in the north. The equator divides this ocean into two parts- northern and southern. The Monsoon winds influence this ocean tremendously. These winds change their direction according to the season. In the northern part of the Indian Ocean, currents flow in clockwise direction in summer while in winter they flow in the opposite direction due to reversal of Monsoon Winds.

clockwise direction in the Northern Hemisphere and in anti-clockwise direction in the Southern Hemisphere.

Continental structure : According to the alignment of the coastline, the direction of the ocean current changes. The velocity of the ocean currents is around 2 to 10 km per hour. The ocean currents are divided into two types- cold currents and warm currents.

Effects of Ocean Surface Currents on Human life :

Ocean currents especially affect the climate of the regions having proximity to the sea. In cold regions where warm ocean currents flow, climate becomes warmer. In some regions, the amount of precipitation increases. For example, the warm ocean currents flowing near Western Europe, Southern Alaska, and Japanese coast, reduce the intensity of the winters there and make them warmer. As a result, these ports do not freeze in winters.

Had ocean currents been absent, the ocean water would have remained still. In such waters, the biotic components would have been devoid of food. Consequently, marine life and its ecosystems would have been limited in its

extent. In regions where cold and warm currents meet, plankton, vegetation, algae, etc. grow. This is food for the fish. Therefore, fish come here in large numbers and breed. This has, in turn, led to formation of large fishing grounds. Grand Bank near the North American coast in Atlantic Ocean and Dogger Bank near the European coast are some of the examples.

With respect to the water transport too, the ocean currents are very important. If the transportation is done according to the flow of ocean currents, the speed of the ships increase and the fuel is saved too.

Near the coasts where cold currents flow, the amount of precipitation is low. For example, in Peru, Chile and the arid desert of South-West Africa.

At places where the cold and the warm currents meet, thick fog is formed. Such fogs create problems for transportation. The warm Gulf Stream and the cold Labrador currents meet near the Newfoundland island. This leads to dense fog. Because of the cold currents, icebergs are carried away from the polar areas. If such icebergs come along the marine routes, they are hazardous to the ships.



Make friends with maps !

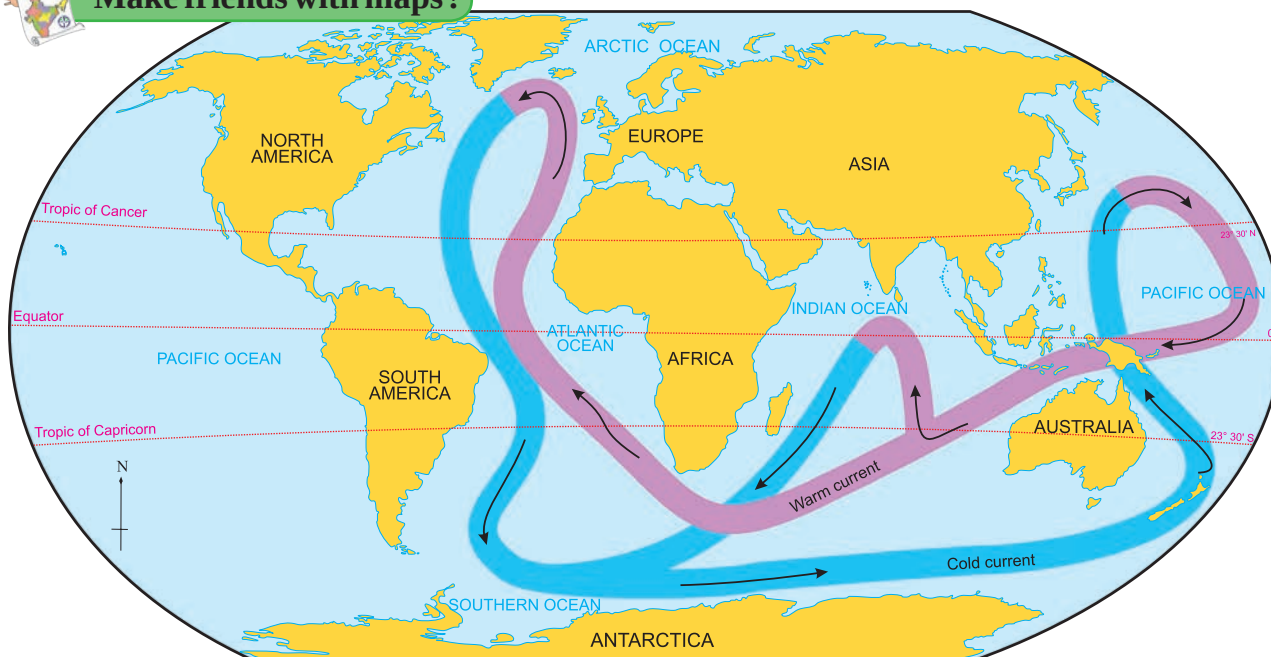


Figure 5.5 : Deep ocean currents

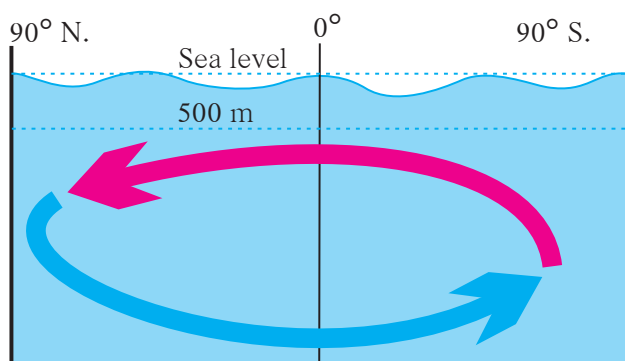


Figure 5.6 : Deep ocean currents

Deep Ocean Currents :

Water currents beyond the depth of 500 metres are known as deep water/ocean currents. These currents are formed due to the differences in temperature and density of the water in different parts of the ocean. This is known as thermohaline circulation. These currents flow till the sea-bed of the ocean. They flow like rivers continuously below the surface of the sea. See Figure 5.5.

The difference in temperatures of various parts of the ocean is the major reason behind the deep-sea currents. Warm water has lower salinity and density. Such water comes to the surface of the sea. Cold water with high density goes down. This movement causes the deep sea water currents. See figure 5.6. Generally, the surface water near Greenland and Europe moves to more depths. This water moves to the Antarctica at these depths. Later the water moves to the surface. Thus, the redistribution of the ocean water keeps occurring. This redistribution takes around 500 years to complete. This type of movement is also known as conveyor belt.

Importance of deep ocean currents :

Due to thermohaline circulation, movement of sea water occurs on a large scale. Because

of this circulation, ocean water moves from the surface to the bottom and from the bottom to the surface. Warm water is transferred to the bottom from the surface and the nutrient-rich cold water is circulated to the surface.



Do you know ?

These circular pattern of the movements of the ocean currents, give rise to certain peculiar features in the ocean. They are called gyres. The Sargasso Sea in the Atlantic Ocean is such an example. It is marked by the circular patterns of ocean currents . It does not have land boundaries and is only surrounded by ocean currents. It gets its name from the Sargassum seaweed. The water is still here. This sea is 1100 km wide and 3200km long.



Always remember -

- The ocean currents do not flow very close to the coast. They flow near the lower limit of the continental shelf.
- Even though the velocity of the ocean currents is less, the water carried by them is immense.
- Under the influence of the Westerlies, in the mid-latitudes, the ocean currents flow from west to east, but near the equator they flow from east to west. This leads to a circular pattern. See figure 5.4.



Exercises

Q 1. Choose the correct option :

- | | |
|--|---|
| (a) In which ocean does the Labrador current flow? | (iii) North Atlantic |
| (i) Pacific | (iv) Indian |
| (ii) South Atlantic | (b) Which current out of the following flows in the Indian Ocean? |

- (i) East Australian Current
- (ii) Peru current
- (iii) South Polar current
- (iv) Somali current
- (c) Which factor out of the following does not affect the region along the coast?
 - (i) Precipitation
 - (ii) Temperature
 - (iii) Land breezes
 - (iv) Salinity
- (d) Which of the following occurs in the area where the cold and warm currents meet?
 - (i) High temperature
 - (ii) Snow
 - (iii) Low temperature
 - (iv) Thick fog
- (e) Which of these following currents flows from the northern polar region upto Antarctica?
 - (i) Warm ocean currents
 - (ii) Surface ocean currents
 - (iii) Cold ocean currents
 - (iv) Deep ocean currents

Q 2. Examine the given statements and correct the wrong ones.

- (a) Ocean currents give specific direction and velocity to the water
- (b) The deep ocean currents flow with high velocity
- (c) Generally, surface ocean currents are formed in the equatorial regions.
- (d) Ocean currents hold great importance for human life.
- (e) The movement of icebergs is not dangerous for water transport.
- (f) Water becomes warm near Brazil due to ocean currents. On the other hand, it becomes cold near African coast.

Q 3. Explain the effect of -

- (a) Warm ocean currents on climate
- (b) Cold ocean currents on the movement of icebergs
- (c) The shape of the coast line on ocean currents
- (d) Meeting of warm and cold ocean currents
- (e) The transportation capacity of ocean currents
- (f) Deep ocean currents

Q 4. Look at the map of ocean currents and answer the following :

- (a) How does the Humboldt current affect the climate of the South American coast?
- (b) In which oceans are counter equatorial currents not observed and why?
- (c) Which currents are absent in northern part of the Indian Ocean and why?
- (d) In which regions do the cold and warm ocean currents meet?

Q 5. Answer the following questions:

- (a) What are the reasons responsible for the formation of deep ocean currents?
- (b) What is the reason behind the dynamics of the ocean water?
- (c) How do winds give direction to the ocean currents?
- (d) Why do the ports in the eastern coast of Canada freeze in winter?

ACTIVITY :

Look for more funny and interesting information related to ocean currents.



6. LAND USE



Try this.

- Draw a sketch of your house. On this sketch show the following with proper directions.
- kitchen, bathroom, courtyard, living room, bedroom etc.
- After the sketch is ready have a discussion on the following points. (A) Why do we need to fix a place for everything in the house? (B) What would happen if there were no fixed places?

Geographical explanation

You may have realised that there is a fixed place for everything. If this is not done the house appears disorganised. There will be difficulties while moving around the house.

Even if these arrangements are changed there will be confusion for a few days. The land available in your house is used for different purposes.



Try this.

This activity has to be performed by all the students together.

Commercial	Residential	Open ground	Entertainment
Industry	Transport	Agri-culture	Institute
			Mixed Land Use

- ✓ Prepare boards with these names. Let the students stand in a circle holding these boards.
- ✓ Now prepare chits with the following names and put them in a box.
shop, garden, bank, utensil factory, school, bungalow, residential building, mall, hockey field, cinema house, hospital, bus stop, port, airport, swimming pool, badminton court, reserved forest.
- ✓ Each student will pick up one chit and as per the land use category will stand close

to the person holding the respective board. Once the activity is completed, have a discussion based on the following points.

- Why did you select the particular board
- Explain how you will use this chosen land.
- Correlate our needs with land use.

Land Use :

Geographical explanation

Land use is the way or purpose for which land in a region is used. The interaction between geographical factors and man have resulted in land use. Land use undergoes changes with time. As man's needs have increased the use of land for different purposes has also increased. Mineral rich land is used for mining. Fertile plains are used for agriculture

Types of Land Use :

Rural Land Use : In rural areas, agriculture is the main occupation. Agro based activities are also common in rural areas. This influences the location for the rural settlements. Hence these settlements are located close to the agricultural fields and forest areas. The settlements of miners are close to the mining areas while fishermen's settlements are near the seashore. In rural areas the availability of land is more and the population is less, hence population is sparse. In rural areas the extent of residential areas is less. Land use in the rural areas can be classified in the following manner.

Arable Land : This is the land under cultivation. Normally this land is under individual ownership. This land can be classified as per the ownership of the land and types of agriculture.

Fallow Land : This is agricultural land which is temporarily not in use. In order to improve the fertility of the soil, the farmer does not use a part of his agricultural land for one or two seasons.

Forest Land : A demarcated forest area is also a type of rural land use. From this area forest products like firewood, gum and grass are obtained. Forests comprise of large trees, bushes, creepers and grass.

Grassland/Pastureland : This land is under the ownership of the village Panchayat or the government and is used for grazing purpose. This land belongs to the entire village. Very little grassland is under individual ownership.

Urban Land Use : There has been an increase in urban settlements in the twentieth century. In urban areas land is used for different purposes. It is necessary to make maximum use of the land. In urban areas with reference to population the land is limited. Therefore the distribution of population is dense. Urban land use can be classified in the following manner.

Commercial land use : Some parts of cities are only used for commercial purposes. In these areas there are many shops, banks and offices. This has given rise to the concept of the **Central Business District**. (CBD) For example. In Mumbai, the Fort Area or the BKC (Bandra Kurla Complex)

Residential land use : Here the main land use is for residential purposes. In this area houses and residential buildings are included. Since population is more in the urban areas, residential land use has increased.

Transport Land use : In urban areas, transportation facilities are important for the movement of goods and people. For this purpose different types of transportation facilities are found in cities like public bus stops, railway lines, metro, monorail, commercial vehicles etc. In addition to this, the number of private vehicles is also large. Hence in cities roads, railway lines, station, petrol pumps, transport depots and vehicle repair centres occupy large areas. These are included in the transport land use.

Public Utility Area : For the various needs of the population some services are provided by the local governing bodies, state government or central government. The area under these services comes under this category eg. hospitals,



Give it a try.

Take a map of your surrounding area and using different colours, show the land use of your area.

post offices, police stations, police grounds, schools, colleges, universities etc. The land use under the category is important. These services diffuse the tensions caused due to burgeoning population.

Recreational land use : In cities some areas have to be specially reserved for the entertainment of the population. The use of such spaces is mainly for fields, gardens, swimming pools, theatres etc.

Mixed land use : In some areas we find all these uses together. Such areas are said to have mixed land uses. Eg. residential areas and entertainment areas.

On maps special colours are used to indicate such areas. Red-residential, Blue-Commercial, Yellow- agricultural and Green- Forest areas.

Transitional areas and Suburbs :

Rural settlements start outside the boundary areas of urban settlements. But the intermediate area in between is called the transitional area. In this area there is a blend of rural and urban land use. In these areas land use is of a mixed nature. In this zone cultural activities are also of a mixed type. Over time this area is converted to an urban area and these regions become



Think about it.

If land is left fallow, or is not in use, then can it be termed as a kind of land use?

suburbs eg. Bandra, Bhandup etc. are suburbs of Mumbai city.

Planned Cities : After the industrial revolution, urbanisation occurred on a large scale throughout the world. Since this urbanisation was not well-planned, cities began to grow in a haphazard manner. Because of employment opportunities there, a large scale migration to cities occurred. As a result, the availability of land is always a serious problem in cities. A lot of diversity is visible in the land use of cities. Limited land, varied land uses and burgeoning cities resulted in the thought of having planned cities for the future. Even before a city grows, its land use is pre-determined and a planned layout is prepared. Accordingly, the cities are developed. Singapore, Seoul (South Korea), Zurich (Switzerland), Washington D.C. (USA), Brasilia (Brazil), Chandigarh, Bhubaneswar (India), etc. are all examples of planned cities.



Can you tell?

Examine the pie charts showing land use in figure 6.1 and answer the following questions:

Land use in Japan 2011

Land use in India 2011

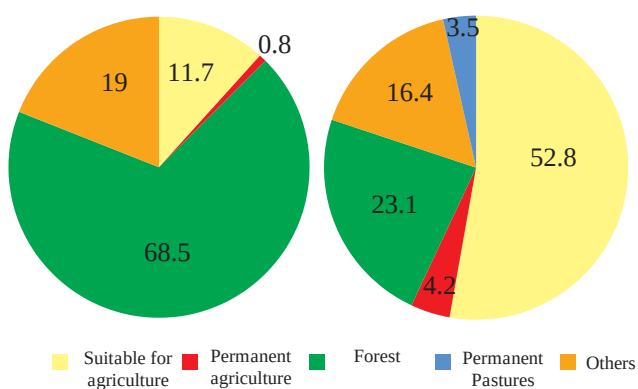


Figure 6.1 : Land use in Japan and India (%)

- In which country is the land under forests more?
- In which country is the land under agriculture more?
- Considering the two questions above, how will you relate the physiography and climate of India and Japan with their respective land uses?

- Correlate their land use and development.
- Which land use is found in Japan?
- Considering the land use in both the countries, make a list of factors affecting the land use.

Geographical explanation

You may have realised that in different countries, the percentage under various land uses differ. Based on the availability of land the population of a country, its quality and needs, land use types vary. In Japan for example the percentage of land under forests is more and the percentage of land under permanent agriculture is very low. As compared to that in India the percentage of land under forest is low while the percentage of land under permanent agriculture is high.

Ownership of land and ownership rights :



Can you tell?

- What kind of land use is shown in Fig 6.2 and Fig 6.3
- Can you tell in which area the property is located?

Geographical explanation

7/12 Extract :

Under land utilisation we have seen how land is put to different uses. The ownership of land could be private or public. Land registration in this context is done under the **revenue department** of the government. All the information about the registered land can be obtained from the revenue department in the 7/12 extract. Let us get some information about this.

One can get to know under whose **ownership** the land is from the 7/12 extract. The extract is a record kept by the public revenue department. Serial Number 7 and 12 are distinctive sections of the law pertaining to the ownership of land.

The seven by twelve extract is a kind of mirror about the land. This is because just by reading the extract sitting in one place one can

गाव नमुना सात

अधिकार अभिलेख पत्रक

(महाराष्ट्र जमीन महसूल अधिकार अभिलेख आणि नोंदवह्या (तयार करणे व सुस्थितीत ठेवणे) नियम, १९७१ यातील नियम ३, ५, ६ आणि ७)

गाव :- वडझिरे तालुका :- पारनेर जिल्हा :- अहमदनगर

गट क्रमांक व उपविभाग 757	मुधारणा पद्धती भोगवटाद्वारे वर्ग -I	भोगवटाद्वारे नांव	
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https://mahabhulekh.maharashtra.gov.in/Nashik/pg712_changes.aspx

1/2

गाव नमुना बारा

अधिकार अभिलेख पत्रक

(महाराष्ट्र जमीन महसूल अधिकार अभिलेख आणि नोंदवह्या (तयार करणे व सुस्थितीत ठेवणे) नियम, १९७१ यातील नियम २९)

गाव: वडझिरे तालुका: पारनेर जिल्हा: अहमदनगर

वर्ष	हंगाम	पिकाखालील क्षेत्राचा तपशील									निर्भळपिकाखालील लागवडीसाठी उपलब्ध नसलेली जमीन	जल सिंचनाचे साधन	शेरा
		मिश्र पिकाखालील क्षेत्र						निर्भळ पिकाखालील क्षेत्र					
		मिश्रणाचा संकेत क्रमांक	जल सिंचित	अजल सिंचित	पिकांचे नाव	जल सिंचित	अजल सिंचित	पिकांचे नाव	जल सिंचित	अजल सिंचित			
2014-15	रब्बी							ज्वारी		2.1000			
	खरीप							बाजरी		2.1000			
2015-16	रब्बी							ज्वारी		2.1000			
2016-17	रब्बी							ज्वारी		2.1000			

सुचना : या संकेतस्थळावर दर्शविलेली माहिती ही कोणत्याही शासकीय अथवा कायदेशीर बाबींसाठी वापरता येणार नाही.

ग्रामाध्यक्ष, वडझिरे तालुका
सजा-वडझिरे, तालुका पारनेर
जिल्हा अहमदनगर

Figure 6.2 : A sample of 'Satbara'

मालमत्ता पत्रक

शेताग/पौजे -- भांडूप तालुका/न.पु.मा.का. -- न.पु.अ. मुलुंड जिल्हा -- मुंबई उपनगर जिल्हा

साल नंबर २०२ प्लॉट नंबर २०२ क्षेत्र चौ.मी. ४१५५.० धारणाधिकार [शेती] क

मुद्राधिकार -

हस्ताया मुळ धारक १९९८ भांडूप मिळकतीचे मालक.

पट्टेदार -

हतर भार -

हतर रीत -

दिनांक	क.व.हतर	खंड क्रमांक	नविन धारक (पट्टेदार (प) किंवा भार (प))	क्रमांक
२०/०५/१९७७	मा. अ. उप जिल्हाधिकारी अंधेरी यांचेकडील क्र. ADC/LND/D/५३५९ दि.१४.५.७६ नुसार १६९४ चौ.मीटर क्षेत्र वि.शेतीकडे वर्ग रुबब सत्ता प्रकार C केला. द. सा. वि. शे. सारा रु.२५४-१० दि.१.८.७९ पासून पुढील सुधारित दर होईपर्यंत.			२०७३
१६/०५/१९७७	SI श्री. निता राम शिवन.यक श्री. र.।.के. राह यांचेकडून रु.१८०००/- रकमेस खरेदीने क्षेत्र १४६०.६ चौ.मी.	SR १३०/४ १२-८-७४	(H) १) श्री. वसुधाम रामगति मोर्य २) श्री. रामधनी रामगति मोर्य ३) श्री. नानकुराम रामगति मोर्य	१९७७-७८-२६ न.पु.अ. मुलुंड
१४/०८/१९७९	SI मा.अ. उप.जिल्हाधिकारी अंधेरी विनमोदी आदेश क्र.AJ/C/LND/D-६१९२ दि.२८.९.७७ प्रमाणे क्षेत्रफल २६३९.३ चौ.मी.र.	-	न.पु. क्रमांक १९४ प्रमाणे.	१९७९-८०-१४ न.पु.अ. मुलुंड
२६/१२/१९७९	SI मा.न.पु.अ.क्र.१ आदेश क्र.न.पु. भांडूप अ.नं.१६/७९ दि.२६.१२.७९ व रजिस्टर ख.खत र.रु.१५३६७.०० क्षेत्र २१.३९.३ चौ.मीटर	रजिस्टर नं. ३७०५/ दि.०३.१२.७९.	(H) श्रीमती दिनबाला रमणिकबाल राह्या.	१९८०-०१-३१ न.पु.अ. मुलुंड

Figure 6.3 : Property card

get complete information about that piece of land without actually going there. The register of the revenue department records the details of the ownership rights of the family, status of debts and loans, transfer of ownership and the area under different crops. 'Village Form' No.7 and 'Village Form' No.12 are combined to prepare as 7/12 extract, hence it is termed as 7/12 extract. These village forms are available with the talathi of every village for land and revenue collection purposes.

How is the 7/12 extract read?

- Occupant class 1 means the land over which ownership rights are available through generations. This is ancestral property.
- Occupant Class 2 means the land given by the government to marginal farmers or landless people. Such land can be sold, leased, pledged, given as charity or transferred only with the sanction of the district collector.

- Below that under “Assessment” the amount of tax levied on the land is given in Rs/Paise
- In “other rights” the names of other joint holders are included. This also shows the status of loans taken for agriculture and whether they have been repaid or not.

Property Card :

Ownership of non agricultural land is recorded on the property card. This document showing ownership rights and the area of the property is made available from urban land records. It has the following information - city survey number, plot number, amount of tax, area of the property assessed, right to access etc.



Can you tell?

Give the answers on the basis of figure 6.4

- Which are the land uses of 1990-91 that show a decline in 2010-11? What could be reasons for this?
- Which type of land use is maximum? What would be the impact of this on India's environment?
- Can a decline in the area under agriculture be equated with a food shortage?

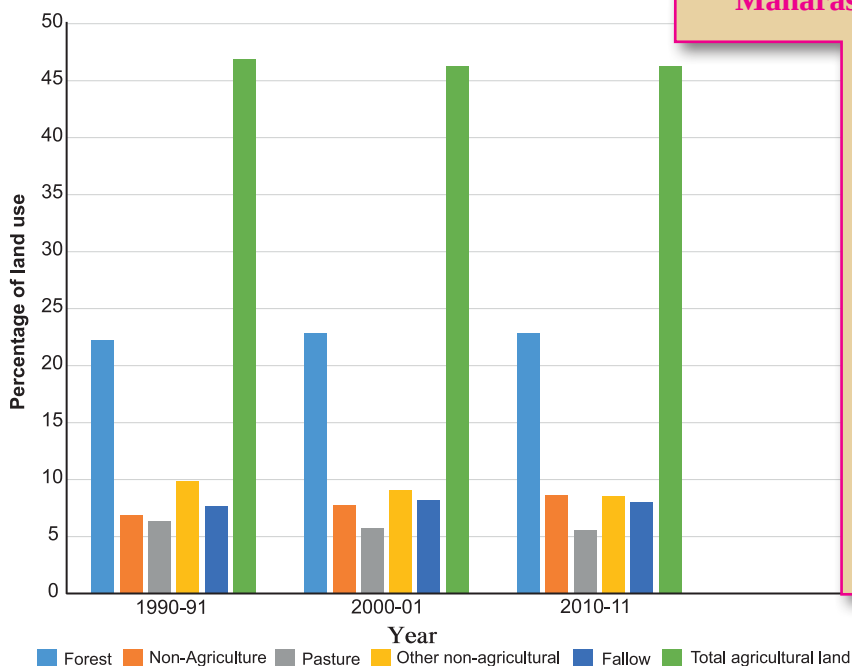
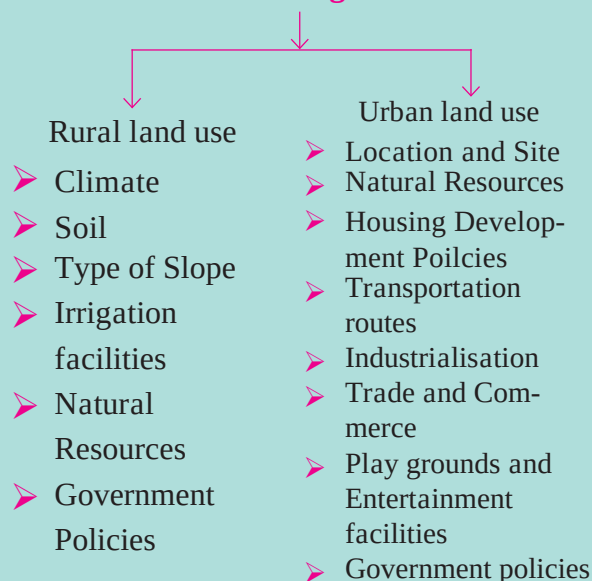


Figure 6.4 : General land use and its changes in India (1990-2011)

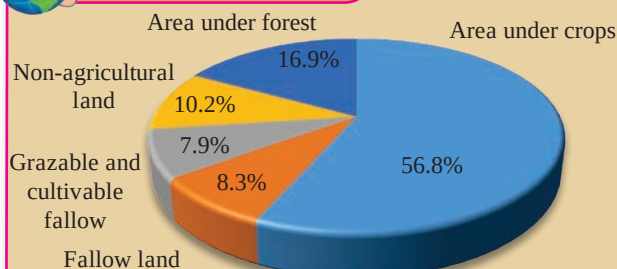


Always remember -

Factors affecting Land Use



Give it a try.



Maharashtra State Land use 2010-11

Study the given figure and answer the following questions.

- What is the percentage of land suitable for cultivation?
- What is the percentage of barren land?
- What is the percentage of land under forest in Maharashtra?
- What is the percentage of non agricultural land in Maharashtra?



Give it a try.

2003



2010



2017



- In the figure showing the satellite images of Mondha Village (Taluka- Hingna, District-Nagpur) find out the changes in land use pattern over time and write a note.

- (C) In urban areas, the largest area is used for residential purposes.
- (D) The village attendant issues the 7/12 extract.
- (E) In rural areas residential areas occupy large tracts.
- (F) Extract 7 indicates Record of Rights.
- (G) Extract 12 indicates change in ownership.

Q 2. Give geographical reasons.

- (A) Land use for public facility are extremely important in urban areas.
- (B) The record of the ownership of non-agricultural land is the same as that of the agricultural land.
- (C) A region can be classified as developed or developing on the basis of land use.

Q 3. Write answers.

- (A) Why is agriculture important in rural land use?
- (B) State the factors affecting land use.
- (C) Clarify the differences between rural and urban land uses.
- (D) Differentiate between 7/12 extract and property card.

ACTIVITY :

- (A) Obtain information about a town close to your village based on the following points and make a presentation in class. (site, condition, development, land use pattern work)
 - Classify your settlement as rural or urban
 - Note the changes in land use from Central Business District outwards to the periphery in your settlement after consulting elders. Prepare a land use pattern.
- (B) Study the 7/12 extract or the Property Card in your house and write a note.



Exercises

- Q 1. Examine the statements and correct the incorrect ones.
- (A) Mining is not a type of land use.
 - (B) There are factories in the Central Business District.



7. POPULATION



Find out.

Obtain the following information for a particular day.

- How many students are there in your class?
- Out of the total number, how many are boys and how many girls?
- How many are absent?
- What is the total strength of students in your school?
- What is the total number of boys and girls in your school?
- Which class has maximum strength of student?
- Which class has the most absentees?

Geographical explanation

In the above exercise, you obtained information about the strength of students in your school. In a similar manner information can be obtained about the population of a village, taluka, district, state, nation and world. While obtaining this information we have to also consider age and sex ratio, literacy etc.

Several factors are responsible for the development of a region. Out of these, population is an important factor. While studying the population of any region, the following aspects have to be considered.

- Population growth ● Population distribution
- Population density ● Structure of population



Can you tell?

Particulars	Change	A City	B City
Total Population in 2016		1,00,000	1,10,000
Total number of children born	+	2,000	2,750
Total number of deaths	-	1,500	2,200
People who have migrated from outside	+	23,000	15,000
People who have migrated out	-	2,000	5,000
Total Population in 2017		?	

- Which city has greater number of newly

born children?

- Which city records greater number of deaths?
- Looking at the figures of in-migration and out-migration which city has received more migrants?
- Calculate the population of both the cities in 2017.
- After considering all the points, which city has recorded more growth of population in one year?
- The total number of births are given. What would be this figure per thousand population? What is the term for this?
- What would be the number of deaths per thousand population? What is the term used for this?

Geographical explanation

Population Growth :

From the above exercise, it can be seen that there is a constant change in the population of a region. Sometimes there is a decrease in population and at other times there is an increase. This increase or decrease is related to the following factors.

- **Birth rate** : The number of live births per one thousand people in a year shows the birth rate.
- **Death rate** : The number of deaths per one thousand people in a year, shows the death rate.
- **Life Expectancy** : The average lifespan of an individual expected in an area at the time of birth.
- **Migration** : The movement of an individual or a group out of an area or into an area is called migration. When people move into

a region from outside, for residence, it is called in migration and when people move out of a region for residential purpose it is called out-migration.

All the above factors affect the population growth. The difference between the birth rate and the death rate is clearly responsible for the natural changes in population. Similarly the migration of an individual or a group constantly results in the change of population. The unchecked growth of population puts pressure on the resources of a region. On the other hand a controlled growth of population will lead to the availability of resources in the right proportion. A controlled population is an indicator of the development of a region.



Try this.

- ✓ Take about 100 grains of black eyed beans (chawali)
- ✓ First scatter these beans on a square of 30 x 30 cms.
- ✓ Now scatter 100 more beans on a square of 15 x 15 cms.
- ✓ While scattering the grains take care to see that the grains do not touch one another or pile up one on top of the other. See fig. 7.1

Answer the following questions.

- In which of the squares can the grains of chawali be easily scattered?
- In which of the squares do the grains of chawali appear crowded?
- Can there be a correlation between the distribution of chawali grains and the distribution of population in a region?



Figure 7.1

Geographical explanation

Distribution of Population :

When the grains of chawali are scattered over two areas of different sizes, in the larger area, the distribution appears sparse. See fig 7.1

Similarly we can understand the distribution of population in a region. Some regions are mountainous while others are flat plains. Geographical conditions vary. Some regions are well endowed with natural resources, while others have limited resources. These conditions affect the distribution of population.

In areas with abundant resources, naturally the population is more. In these areas there is dense population distribution. In areas with scarce resources, unfavourable climate, undulating terrain etc. the population, distribution is sparse.



Try this.

Draw a square of 2 x 2 m. In this square ask two students to stand. Slowly increase the number of students and ask the following questions.

- In the space provided can you move around easily?

Factors Affecting Population Distribution

Physical Factors	Economic Factors	Political Factors	Social factors
(1) Location	(1) Agriculture	(1) Wars	(1) Race
(2) Relief	(2) Industry	(2) Political Instability	(2) Religion
(3) Climate	(3) Urbanisation	(3) Government Policies	(3) Language
(4) Soil	(4) Transport		(4) Customs and Traditions
(5) Mineral Resources	(5) Markets		

- Can more students be accommodated in the square?



Figure 7.2 : Students carrying out the activity

When the answers to the above questions are negative, then ask all the students to write their observations about the experiment and initiate a discussion on population density in the class.

Geographical explanation

Density of Population : The ratio of the population of a country to its area is population density. While discussing population distribution density of population is also considered. The density is calculated as per the formula given below.

$$\text{Density of population} = \frac{\text{Population of a region}}{\text{Area of a region}}$$

Complete the table

(Census - 2011)

Sr No.	State	Population (2011)	Area (Sq. km)	Density
1.	Uttar Pradesh	19,98,12,341	2,40,926	
2.	Maha-rashtra	11,23,74,333	3,07,713	
3.	Tamil Nadu	7,26,26,809	1,30,058	
4.	Rajas-than	68,54,837	3,42,239	
5.	Mani-pur	27,21,756	22,327	
6.	Goa	14,58,545	3,702	

From the area of a region and its population one can calculate how many people live in a square km. Density of population is not the same everywhere. In some regions, the area is small but the population is large, For example,



Think about it.

Even though areawise Rajasthan is a large state the population is less. Which geographical factors may be responsible for this?

Kerala. In other regions the area is large but the population is small. Therefore, the density of population is low. For example Rajasthan.



Try this.

Think of 20 people in your neighbourhood and divide them into the following categories. young, adult, old, educated, uneducated, females, males, students, labourers, merchants, industrialists, unemployed, housewives etc

- From the above classifications, what are the salient features of your neighbourhood?
- Can such a classification be done for the country as a whole?
- Correlate these categories with the qualities of the population.
- Discuss the problems which you faced while doing this classification.

Geographical explanation

Structure of Population : Population can be subdivided into various categories. By studying the correlation between the subdivisions, an understanding of the structure and quality of the population is possible.



Can you tell ?

Groups :

- Male • Adolescent • Illiterate • Children
- Unemployed • Infants • Literate • Rural
- Working population • Urban • Female • Old
- Young • Dependant population • Adult

Classify the above groups into the categories below

Sex, Age, Rural, Urban, Literacy, Productive Population. Population can be subdivided as per the groups given above. These sub groups and their relationship with one another is studied in the structure of the population.

Geographical explanation

Sex ratio :

As per the gender, population can be divided into males and females. This is a natural division which can be easily understood. In a population, when both the genders are around the same number it indicates a balanced population. In population studies the ratio of men and women is considered important.

This ratio is calculated as follows :

$$\text{Sex Ratio} = \frac{\text{Total number of females}}{\text{Total number of males}} \times 1000$$

When for every one thousand males the number of females is less, the sex ratio is said to be low and when for every one thousand males the number of females is more, the sex ratio is said to be high.

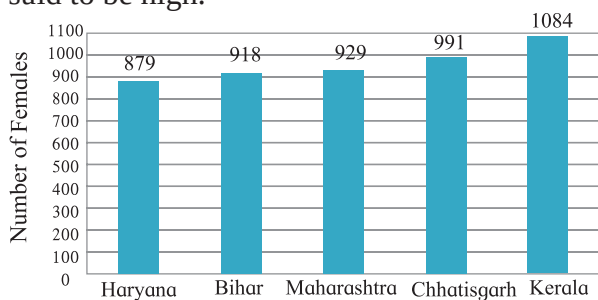


Figure 7.3 : Sex ratio 2011

Study the graph given above and answer the following questions.

- Which state has the highest sex ratio?
- Which state has the lowest sex ratio?
- What changes should take place in Maharashtra, to bring about a balanced sex ratio and how much change is necessary?

Geographical explanation

In regions where the proportion of females is more than males, predominantly the out-migration of men is high. The out-migration is very often for employment purposes, for example, Kerala. But where the proportion of females is less than males, in most cases, the birth rate of females is less.



Give it a try.

- How do imbalanced sex ratios affect the society?
- What measures can be taken to strike a balance in the sex ratio?



Can you tell ?

Have a class discussion based on the following questions.

- How many people in your house are studying? What is their age?
- How many people in your house are working for a living? How old are they?
- Do your grandparents still work? What is their age?

Geographical explanation

Age Structure :

In a region, when the population is subdivided as per the age groups this is called the age structure of the population. Age structure is useful for the projection of population and for understanding the dynamics of the age structure arrangement. Similarly, it also helps in understanding the proportion of active and dependant population.

In India, the **productive population** is the population between the ages 15 and 59. This group of people is active in service and business. They directly participate in the economic activities of a region. In regions where the proportion of this population is more, especially youth, development is rapid.

The dependant population fall into two sub groups. The people below 15 years of age are totally dependant on the productive population. People above 60 years also fall in the dependant category but their knowledge and experience make them a valuable asset to the whole society.

Occupational Structure of the population :

The population of a region can be classified into working and nonworking groups. These people who are not in jobs or professions, despite being in the productive age group, come under the nonworking group. This nonworking group is dependant on the working group. If the proportion of working population is higher in a region then the population is termed as industrious. Such a region has rapid development.

Area of Residence :

The population of a region can be divided into two groups as per the area of residence that is rural and urban. People in the rural areas are mainly employed in primary occupations and in urban areas, the proportion of people working in secondary and tertiary occupations is large.

The population in the rural areas is involved in the production of food grains. The urban population is dependant on the rural population for the supply of food grains.



Try this.

Prepare bar graphs on the basis of the table give below. Discuss the issue of literacy in the country and write a note.

Sr No.	Country	% of Literacy
1.	Argentina	98.1
2.	Brazil	92.6
3.	India	72.1
4.	China	96.4
5.	Bangladesh	61.5
6.	Pakistan	56.4
7.	Iran	86.8
8.	Afghanistan	38.1

Statistics 2010



Can you tell ?

- In lesson no.6 (page 41) what do you think are the reasons for the changing land use pattern of Mondha village?
- What kind of changes have taken place?
- Due to this change in land use, do you think there has been a change in population. If yes, what is the change and why?

Literacy : In society, some people are literate and others illiterate. In our country a person who can read and write is termed as literate. This definition can vary from one country to another. The percentage of literacy throws light on the quality of the population.

People above the age of seven can be classified into literates and illiterates. Literacy is an indicator of the social and economic development of a society. If the percentage of

literacy is higher then the country developes socially and economically. Literacy leads to the development of a cultured and progressive society.

Geographical explanation

Migration :

The movement of an individual or a group from one place to another is termed as migration. This could be for a short period, long period or permanently. Marriage, education, business, transfer, tourism, natural calamities, wars etc. are the reasons, why people migrate. There are many kinds of migration. Regions from where people migrate show a fall in population. Such regions experience a shortage of manpower. On the other hand, the areas to which they migrate show an increase in population and a strain on the public amenities and facilities. Due to migration the composition of the population also changes.



Can you tell ?

Answer on basis of the given table.

Statistics 2010

Country	Percentage of immigrant population
Afghanistan	0.14
Brazil	0.34
Kuwait	62.11
Bangladesh	0.73
Germany	12.31
Hongkong	42.59
Israel	37.87
India	0.52
Oman	24.46
Saudi Arabia	25.25
Great Britain	8.98
U S A	12.81

- Which countries have less than 10% migrant population?
- Which are the countries with a migrant population of between 10% to 20%?
- Which are the countries with a migrant population of more than 20%?

- Find the reason behind the migrant population of more than 20%.
- Draw two pie diagrams for any two countries.
- Have a discussion on migration and development.



Use your brain power !

In India 0.52% of the population are migrants. What is the actual number of people who have migrated to India ?

Geographical explanation

Migration is an important factor affecting the distribution of population. Due to migration there is a redistribution of the population of a region. The structure of population also undergoes a change.

The above table has given the percentage of migrant population of some selected countries. In the countries where the percentage of migrant population is more, job opportunities, good business prospects, the availability of natural resources and economic development are the main causes. On the other hand, political and social factors, economic backwardness etc are some of the reasons accounting for a low percentage of this population. Even though the percentage of this population is low in India, when compared to the total population, the actual figures are large.



Can you tell ?

Have a discussion on the basis of the following questions and answer the following.

- What would you call the people who work in the places mentioned below?
farm, factory, hotel, hospital, shop, school, office

(Note : In case needed, you can add to this list)



Figure 7.4 : Migration

In the earlier exercise on page 42 you noticed that there was an increase in population in towns A/B. That only means, that there was a growth of population. But, can you say anything about the ‘development’ of those towns? If there are no houses for this increasing population, no adequate drinking water then of what use is this growth only? In those towns for how many people has additional drinking water been made available? How many children have started attending school? Or in which city are the people happier? Growth does not mean development! Then how can development be measured?

For many decades only a country’s **gross national product** was used for measuring development. It was assumed that the greater the economic prosperity, the more the development of a country. But this does not mean that the people are happy with the quality of life in that country. In reality, development is related to the quality of life, the opportunities available there and freedom.

In the decade of 1980 to 1990 Mahbub Ul Haq and Amartya Sen put forth the concept of Human Development Index (HDI). United Nations Development Programme. (UNDP) publishes a list of countries based on HDI scores every year.



Try this.

Try to complete the table on the basis of the information provided about a few countries and write a note on the human development index (HDI) of various countries.

HDI rankwise	Country	Value of the HDI	Level of development
1	Norway	0.949	Very High
2	Australia	0.939	"

3	Switzerland	0.939	"
4	Germany	0.926	"
5	Denmark	0.925	"
16	United Kingdom	0.909	"
17	Japan	0.903	High
73	Sri Lanka	0.766	"
90	Brazil	0.754	Statistics 2016
90	China	0.738	"
119	South Africa	0.666	Medium
131	India	0.624	"
132	Bhutan	0.607	"
147	Pakistan	0.550	"
169	Afghanistan	0.479	Low
187	Niger	0.353	"
188	Central African Republic	0.352	"

Human Development Index :

The Human Development index holds an important place in the study of human conditions related to international economic development. Today, it is commonly accepted that only economic prosperity does not mean development. This is not just the expectation of individuals but also of a region or of a country. The human development index is used as a yardstick to measure regional development. While computing this index, three main parameters have been considered.

- Economic parameter (Standard of living)
- Health parameter (Life expectancy)
- Education parameter (Number of years of Schooling)

The values of the Human Development Index range from 0 to 1. Highly developed regions have a value close to 1 and as the level of development goes down, the value of the HDI decreases. In an area with very little development the value of the index is close to zero.



Make friends with maps!

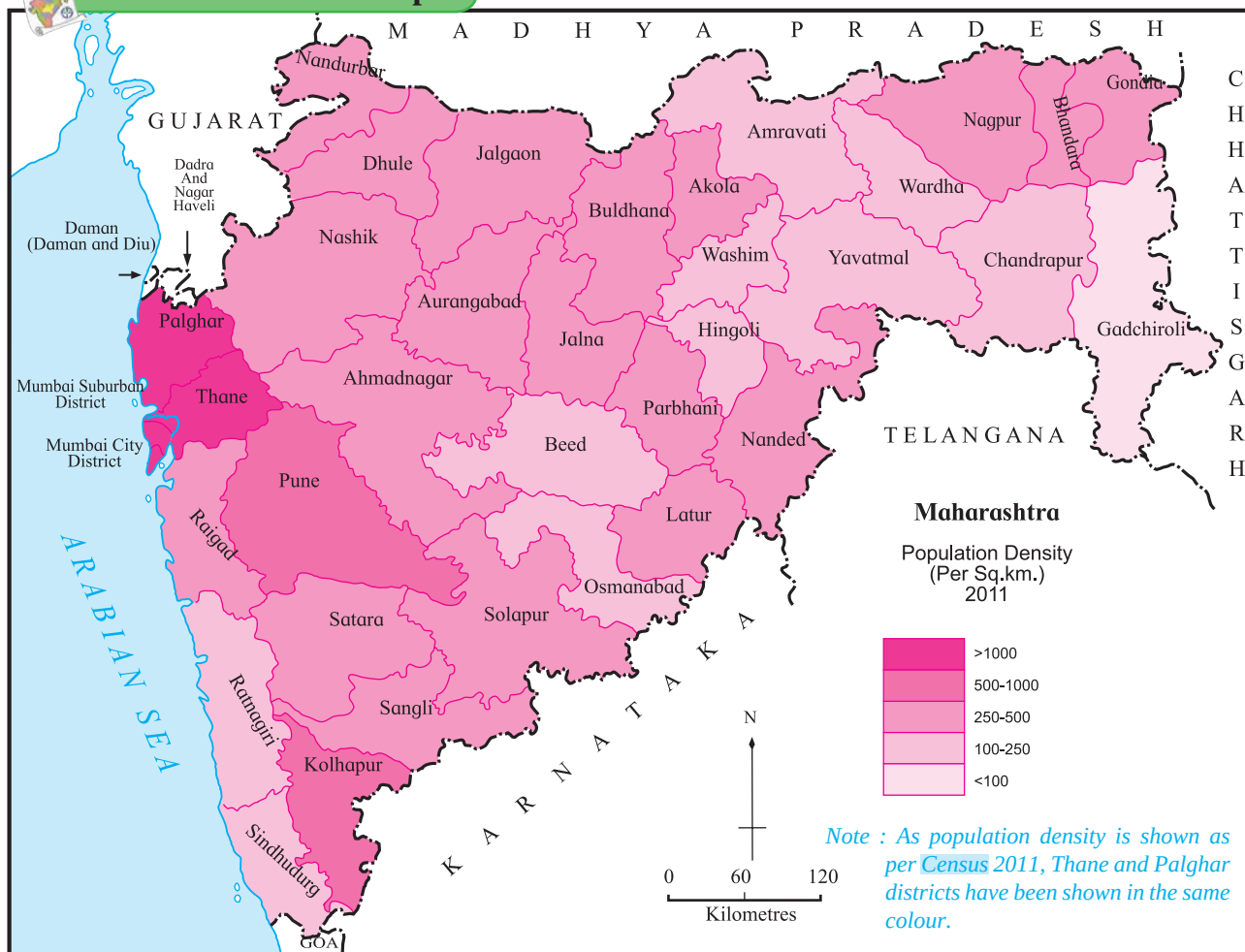


Figure 7.5

Density of population in Maharashtra :



Can you tell?

Study fig 7.5 and answer the following questions.

- Which are the most densely populated districts?
- Name the sparsely populated districts with a density of less than 100 per sq. km.
- Name two districts with moderate population densities
- What is the density of the dark shaded regions?
- Why is the density of population less in Gadchiroli?
- Have a discussion in the class on the effect of physiography, climate, area under forest, industries etc on the density of population.

Geographical explanation

While considering the districtwise density of population in Maharashtra, the following features stand out. Population density is less in the eastern districts of Maharashtra, while they are more in the western districts. Higher density indicates urbanisation and higher levels of industrialisation. Therefore Mumbai city district and Mumbai suburb district, Thane, Pune and Nagpur districts have higher density. The rainshadow districts as well as the districts in the extreme east which are densely forested show less density.

HDI - Human Development Index
UNDP - United Nations Development Programme



Do you know?

Information about many parameters related to population is obtained through actual surveys. These surveys are called census. In India these surveys are conducted once in ten years at the start of the decade. The latest census was conducted in 2011. The statistical information obtained through these surveys is classified, presented graphically and used in comparative studies and planning.



Use your brain power!

Discuss and write the advantages and disadvantages of low population or high population with reference to the following factors.

Headings	Low population	High population
Per capita land availability		
Foodgrains		
Resources		
Per capita income		
Basic amenities and facilities		
Percentage of unproductive consumers		
Planning		
Employment		
Urbanisation		
Health		
Higher Education		
Social Environment		



Give it a try.

Since the past two centuries the size of family is decreasing. But inspite of this the population of the country is increasing. Find out why is this happening?

1810



1910



2010





Use your brain power!

- As per the population census of 2011, the population of India is 121 crores. For domestic use the per capita requirement per day is 50 litres of water. Taking this into account, what would be the total amount of water required in India for domestic purpose only?



Give it a try.

Have a discussion on population control with the help of the following points

- Public education • Education
- Public awareness • Health facilities
- Planning • Government policies
- Research



Exercises



Q 1. Complete the following sentences.

- (A) If the birth rate is greater than the death rate then the population.....
- (i) decreases
 - (ii) increases
 - (iii) remains constant
 - (iv) becomes surplus
- (B) People ofage group are included in the productive population
- (i) 0 to 14
 - (ii) 14 to 60
 - (iii) 15 to 60
 - (iv) 15 to 59
- (C) The spread of modern technology in society is mostly dependant on
- (i) Sex Ratio
 - (ii) Birth Rate
 - (iii) Literacy
 - (iv) Migration

Q 2. Examine the following statements and correct the incorrect ones.

- (a) The population density of a region can be understood from its area.
- (b) The quality of population is determined on the basis of literacy.
- (c) There is an adverse impact on manpower in the regions of out migration.
- (d) Greater economic prosperity indicates the development of a region.
- (e) Developing countries have an HDI of 1.

Q 3. Answer in brief.

- (a) What are the aspects considered in the structure of population?
- (b) Prepare a list of advantageous and disadvantageous factors, affecting population distribution.
- (c) What are the problems in areas of high population densities?
- (d) What are the problems in area of low population densities?

Q 4. Give Geographical Reasons.

- (a) Population is an important resource.
- (b) Productive population is an important group.
- (c) The study of age structures is important.
- (d) Literacy is directly related to development.
- (e) The real progress of a country is understood with the help of the Human Development Index.

Q 5. Write notes.

- (A) Sex ratio
- (B) Age Structure
- (C) Literacy

ACTIVITY :

Survey 5 families in your neighbourhood on the basis of the following points and make a presentation.

- (a) Sex
- (b) Age groups
- (c) Education
- (d) Occupation



8. INDUSTRIES



Let's recall.



Figure 8.1

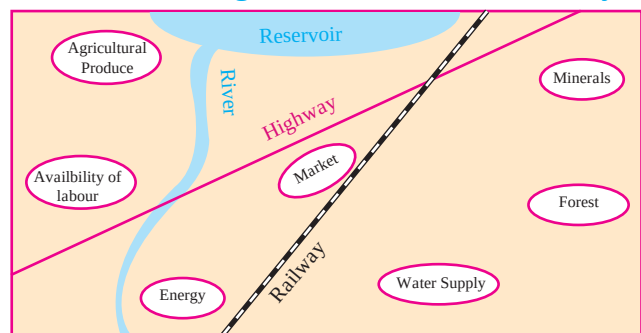
In figure 8.1 the sequence of two industrial processes has been given. Arrange the pictures in proper sequence and write the sequentian number in the box given below.

- Name the two industries
- Name the raw material and the finished product of both these industries.
- How is the raw material converted into the finshed product?
- Why is it necessary to convert the raw material into finished product?

Geographical explanation

The process of converting the available raw material into finished products is done in the factories. The finished product is durable, more useful and has an added value. Industries or manufacturing units provide secondary occupation. Due to the availability of resoures, development of science and technology and other favourable conditions, there is the development of industries and a boost to industrialization. Industries help in speeding up the economic development of humans and it also helps in achieving the economic development of a country.

Factors affecting the location of an industry :



Taking into account the above factors, note in different colours the favourable factors required for the factories and given below and the following.

(1) Iron and Steel, (2) Textiles, (3) Sugar.

- For each industry prepare a list of the necessary factors.
- For each industry give an explanation for the location suggested by you.
- In a similar manner for which other industries can you decide a suitable location?

Geographical explanation

In any given area the development of industries is dependant on several factors such as the availibility of raw material, water, labour,

transport, capital, market etc. As per the availability of these factors, specific industries develop. Because of the unequal distribution of these factors, industrial development does not take place at the same pace at all places. Some regions are suitable for the development of industries while in other regions, only particular industries develop. Dense forests and desert areas are not conducive to industrial development.



Give it a try.

Study the factors given below and state which industries could develop in these regions.

- Excellent transport facilities, skilled labour and uninterrupted supply of electricity.
- Limestone deposits, cheap labour, uninterrupted supply of water and electricity, increasing urbanisation.
- Fruit orchards, labour, excellent transportation facilities, unlimited water supply, uninterrupted electricity and ready market.



Can you tell ?

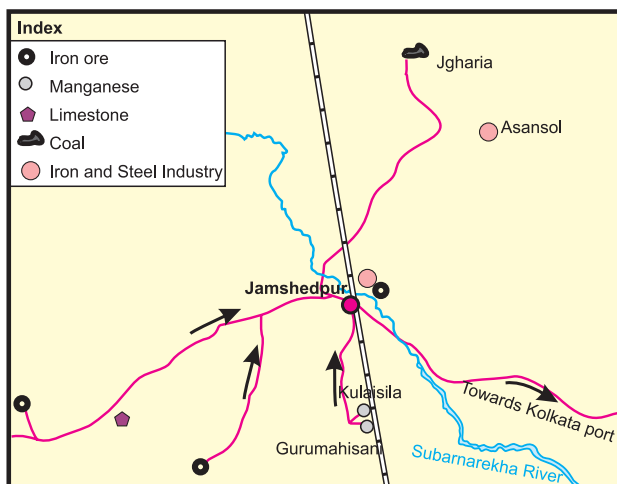


Figure 8.2 : Localisation of Iron and steel industry

Study figure 8.2 and answer the following questions.

- Name the industry at Jamshedpur?
- Which raw material is required for this industry?
- From which areas is this raw material obtained?
- Why is coal used in this industry?
- State with reasons if it would be feasible to set up an iron and steel industry in your district?

Geographical explanation

While looking for answers to the above questions you must have realised that for the **localisation** of the iron and steel industry, the most important factors are the availability of raw material and energy, both of which are available around Jamshedpur. The raw material is heavy and bulky and it is uneconomical to transport it to a factory far away. Hence it is favourable to establish this industry in the area where the raw material is available. This is the reason for the establishment of the iron and steel industry at Jamshedpur.

Classification of industries as per their nature :

Types of Industries

Small industry	Medium industry	Heavy industry
Making of earthen pots, bakery products, etc.	Fruit processing industries, Jaggery making, etc.	Cement, Sugar, Iron and steel, etc.



Use your brain power !

Which industries could be profitably set up in your surrounding area/locality?



Try this.

Obtain information about any one industry in your locality with the help of the following questions.

- Name of the industry -
- Name of the owner -
- How many people work here?
- What is the raw material used?
- What are the steps taken to reduce the pollution level in the vicinity of the factory?
- Through your industry how are you contributing to society?

Geographical explanation

All the three pictures above are related to the concept of industries, but the nature of their work is different. In these industries raw



Use your brain power!

Identify the industries shown in the pictures state suitable locations for these industries.



material, labour force, capital, land, etc. are all essential factors. As per the nature of the work, industries can be classified.

Very often the finished product from one industry is used as a raw material in another industry e.g. sugar produced in the sugar factories is used as a sweetener, a raw material in the manufacture of products such as biscuits, jams and jellies. Similarly iron rods are used as raw



Think about it.

Examine all the three picture shown below and answers the following questions.



- Name the industry shown in picture A
- What is the difference between the industries shown in pictures A and B.
- What is distinctive about the industry in picture C.
- Identify the industry shown in the picture above.
- Name some more similar industries.



Give it a try.

Complete the list with reference to industries

Industry	Type	Raw Material
Manufacture of iron rods		
Manufacture of candles		
Furniture manufacture		
Paper Manufacture		
Manufacture of Medicines		
Sugar Manufacture		
Jaggery Manufacture		
Agarbatti Manufacture		
Manufacture of cotton clothes		
Manufacture of Railway Engines		
Papad Making		

materials in the engineering industries, in the manufacture of steel furniture etc.

Agro Based Industries :

India is a predominantly agrarian country. In India a variety of agricultural products is available. Different types of agro-based industries have come up. In addition to these, industries processing agricultural products have also developed. These include the dairy industry, fruit processing, food processing, jaggery making etc. Industries dependent on agricultural products have been established everywhere. There has also been development of heavy industries like textiles and sugar.

Industrial Development :

The establishment of industries and industrial development have an important role in the economic development of a country. Industrial development is essential for improving the standard of living and increasing the per capita income of the citizens. The citizens of a country get employment opportunities and their life style improves. The per capita income of the country goes up and there is an increase in the export of finished products. This results in an increase in the foreign exchange reserves. For all these reasons it is necessary to give a fillip to industrialization in a country. The government



Figure 8.3 : Jaggery making



Figure 8.4 : Oil press



Figure 8.5 : Fruit-processing



Figure 8.6 : Dal mill

establishes industrial estates to boost industrial development and increase the employment opportunities in a region.

Industries have an important role in the economic development of a country. Hence all countries take special efforts for promoting industrial development. To enable this, industrial estates have been established. These estates are given concessional rates for electricity, water and taxes.

Maharashtra Industrial Development Corporation (M.I.D.C.) :

On 1st August 1962 in Maharashtra, the state government established the Maharashtra Industrial Development Corporation and through it, set up industries in every district of the state. Through this, the decentralization of industries is expected throughout the state.

Like Maharashtra, other states have also established such corporations. In these industrial estates very often auxiliary industries have been established. In addition employment opportunities have been made available to local people. In these industrial estates, various facilities necessary for industries have been made available.



Can you tell?

Study the factors given in fig 8.7 and classify them as per their advantages and disadvantages in relation to industries.

Geographical explanation

There are many advantages of industrial development. There are also some disadvantages also. Because of industrialization the youth

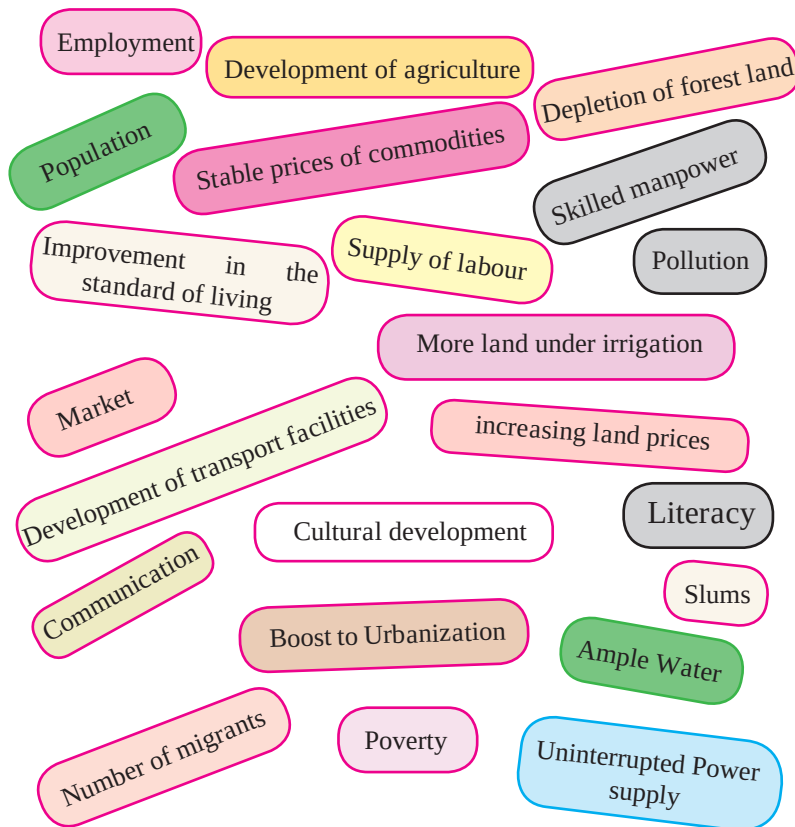


Figure 8.7

in an area get employment. It also helps in increasing the per capita income. For the economic development of an agrarian country, it is necessary to have industries based on agricultural products. Such industries not only result in agricultural development but also the economic development of a country. The standard of living of people also rises.

Information Technology Industry :



Let's recall.

- What are the different ways of obtaining information?
- Which is the fastest way of obtaining information?
- How do WhatsApp, Facebook, Google maps, etc. work?

Geographical explanation

Information Technology is an important engineering branch in today's world. In this branch, work is carried out by computers. In this industry, India has made rapid progress. The availability of skilled manpower is the most important reason for this.

In this industry searching for technical information, obtaining, analyzing and compiling it, presenting it graphically and providing it as per requirement is the nature of work. All this information is obtained from the internet on computers, mobiles and other devices. The creation or development of special softwares on these handsets is another important component of the industries.

Today there is an increase in the use of computers and technology. There is a great variety in the types of information collected, and it is used all over the world.

Corporate Social Responsibility :

When an industrialist or a group of industries work for the betterment of the society and for the conservation of the environment, it is known as **Corporate Social Responsibility** (CSR).

Showing responsibility to society by helping needy people or needy organizations is an important task. With this objective, when an industry or a group of industries have made a profit of over 5 crores, they are expected to spend at least 2% of their profits on acts benefitting the society. For this, their assistance in the areas below is expected.

- The provision of educational facilities
- The provision of facilities related to health.
- The development of the village or region.
- Establishing centres for people like environmental development centres etc.

There is a tax rebate on the amount spent by the industry or group of industries on various schemes under Corporate Social Responsibility.



Think about it.

Talk about the interrelationship between human resources and industry.



Do you know ?

Industrialization and Environment :

Manufacturing includes processing of raw material in order to obtain the finished product. During the manufacture of the products some harmful residual materials and pollutants are also left behind. As a result there is pollution of air, water, noise and land. This type of pollution is termed as industrial pollution.

Industrial pollution, the resultant environment and the problems relating to it are being seriously discussed at an international level. While deciding the location of industries, along with the traditional factors, serious thought is being given to environmental factors. To control the pollution caused by industries, proper disposal of sewage and harmful residuals and proper treatment of the pollutants should be done.

Fuel saving vehicles and other equipment must be manufactured. Pollution control, preservation of natural resources, environmental management etc. are factors which must be taken into account.

In India, in order to check industrial pollution many laws and regulations have been framed, both at the national and the state levels e.g. the Water and Air pollution control Act and the conservation of Environment Act. The Central Pollution Control Board of India looks into prevention and control of pollution. In this context, any contravention of these laws would mean that the management of the factory would be held responsible and would be liable for punishment.



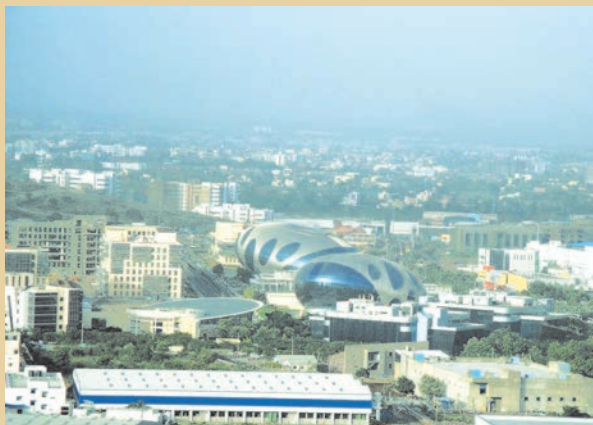
Give it a try.

In India many important public sector undertakings have been established. Their acronyms (abbreviated forms) have been given. Find their long forms and write them down. BHEL, BEL, HAL, ONGC, NTPC, NTC, SAL, GAIL, e.g. BHEL: Bharat Heavy Electricals Limited.



Give it a try.

Important information technology centers are called IT hubs. Find out with the help of internet in which cities such hubs have developed and mark them on an outline map of India.



Information Technology Industry



Use your brain power!

- Which type of industries can stem the flow of people towards urban areas?
- Where is it necessary to establish these industries?



Think about it.

If you become an industrialist, which of the following would you do?

- Only make profits
- Start a second industry from the earlier one as a supplementary industry.
- Will spend some amount for the society after the deduction of tax.
- Provide help for the creation of new industrialist.

Water Literacy- The need of the hour :

Water is a basic necessity in human life. Due to increasing population, changing climatic conditions, irregular rainfall, etc many countries in recent times are facing problem of acute water shortage. India also will also be facing a problem of acute water shortage in near future. This has come to light through a survey of water industries.

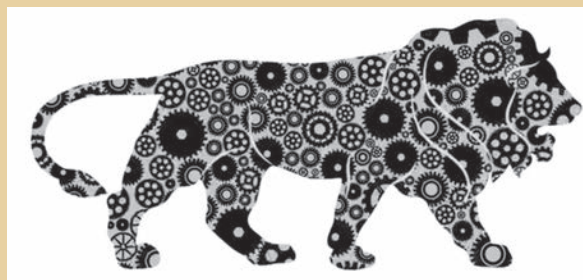
India is a country blessed with ample natural resources. The rivers of India are rainfed. It is essential to check this flow of water and use it judiciously.

Small check dams, canals, recharging our underground reservoirs, reusing water, reducing water pollution, treating waste water from industries and reusing them etc. are all methods of proper water management.

While using water for our personal needs we need to take care not to waste water and to use minimum possible water. Even these small steps will help in overcoming the problem of water shortage. Public awareness on water management is the need of the hour.



Give it a try.



- In what context is this logo ?
- What will be the benefit of this programme ?
- What is the correlation between this programme and employment ?
- Which are the Navaratana industries of India ?
- Why do you think they have been accorded this status of Navaratna ?

Q. 1. Mark ✓ in the box next to the right alternative

(A) Which factor amongst those mentioned below does not directly impact industrial development?

- (i) Water ☐
- (ii) Electricity ☐
- (iii) Labor ☐
- (iv) Air ☐

(B) Which of the following is a small industry?

- (i) Machine parts ☐
- (ii) Book binding industry ☐
- (iii) Silk Industry ☐
- (iv) Sugar industry ☐

(C) Which of the following cities is not an IT Centre?

- (i) Old Delhi ☐
- (ii) New Delhi ☐
- (iii) Noida ☐
- (iv) Bengaluru ☐

(D) An amount of 2% of the profits have to be utilized for which purpose by industries?

- (i) Income Tax ☐
- (ii) Corporate Social Responsibility ☐
- (iii) Goods and Service Tax ☐
- (iv) Sales Tax ☐

Q. 2. State whether the following statements are true or false. Correct the incorrect Statements.

- (a) Small and medium industries of a country are harmful to heavy industries.
- (b) The level of industrialization is an indicator of the economic development of a country.
- (c) The aim of the industrial development corporations is to decentralize industrialization.
- (d) Corporate social responsibility is compulsory for every industrialist.

Q. 3. Answer the following questions in three to four lines.

- (a) What are the facilities provided by the government to industrial estates?
- (b) Write in your own words how industrial development impacts national development.

(c) Give your opinion in short on the usefulness of Corporate Social Responsibility.

(d) Mention three features of small industries.

Q. 4. Write detailed answers to the following questions.

- (a) Explain the factors affecting industrial development.
- (b) State the advantages of the Maharashtra Industrial Development Corporation.
- (c) Explain the importance of the I. T. Industry.
- (d) Considering India's population, the development of industries is a good solution to the problem of unemployment. Explain.

Q. 5. Prepare a flow chart for the following statements.

- (a) The journey of clothes we use from the farm to ourselves.
- (b) Essential factors for the location of any one industry.

Q. 6. Highlight the differences.

- (a) Medium industries – heavy industries
- (b) Agro based industries – Information Technology industries.

Projects :

Collect information about any one project undertaken in your village/city under the Corporate Social Responsibility and present it in the class.



9. MAP SCALE



Can you tell?



Figure 9.1: A Painter Taking an estimate of a scene



Figure 9.2: Students looking at a map

After studying the picture have a discussion in the class and answer the following questions.

- Why is the painter holding the pencil in his hand in a particular way?
- How can the scene of this large landscape be depicted on paper?
- How is it possible to view all the countries of the world on one map?
- What is common to both these pictures?

Geographical explanation

The painter first takes an estimated scale of the scene in front of him with a pencil. After that he draws a sketch on the paper. The painter does this so that the picture is drawn to scale.

In the preparation of maps, the picture is first surveyed. At that time after special observation a scale is fixed. Using this scale, an outline map of the whole earth or a part of it is prepared.



Try this.

- ✓ In order to measure the height of students, make markings on the wall from the ground up to a height of 180 cm. with the help a ruler.
- ✓ Measure the height of each student and note it down.
- ✓ With the same wall as a backdrop take a photograph of the students in groups of five. Fig 9.3



Figure 9.3 : Measurement of students' heights

- ✓ Take prints of the photograph.
- ✓ With the help of ruler measure the heights of your friends from the photographs.
- ✓ Complete the following table with the actual heights and the heights as per the photograph. Calculate the ratio. The ratio of Gopal's height has been calculated and shown below.

Sr. No.	Name of the Student	Heights as per photographs (cms)	Actual Height (cms)	Ratio
e.g	Gopal	10	130	1:13
1.				
2.				
3.				
4.				
5.				

From the above table you must have realized the difference between the actual heights and the height in the photograph. You must have also realized that in the photograph everyone's height has decreased in the same proportion. The same principle is applicable in the case of a **map scale**.

Geographical explanation

We obtain information about the earth or some specific part of it from a globe or a map. While preparing a map, in order to get the actual ground distances on to paper, some conversions have to be made using Geometry and

Mathematics. The use of map scale is useful for this conversion. Lets us get acquainted with this aspect of maps.



Can you tell?

The actual distance between the two villages of Sahil and Minal is 50 km. The distance between the villages of Minal and Pragnya is 20 km and between Sahil and Pragnya's villages is 60 km. Fig. 9.4 shows the location of these villages on a map. The scale of the map is 1 cm = 10 km. Measure the distances on the map and find out which village belongs to whom? Note the names and the distances.

Geographical explanation

In a map scale it is essential to correlate the distance between two points on a map and the actual distance between these two points on the ground. The ratio of the map distance to the ground distance is map scale.

To draw a map true to scale it is essential to know the ground distances. These distance are measured during surveying. While preparing a map, based on the distances a suitable ratio is selected. After the preparation of the map it is necessary to mention the map scale. This facilities map reading and helps in understanding the distances on the ground.

There are three ways of expressing the scale on a map.

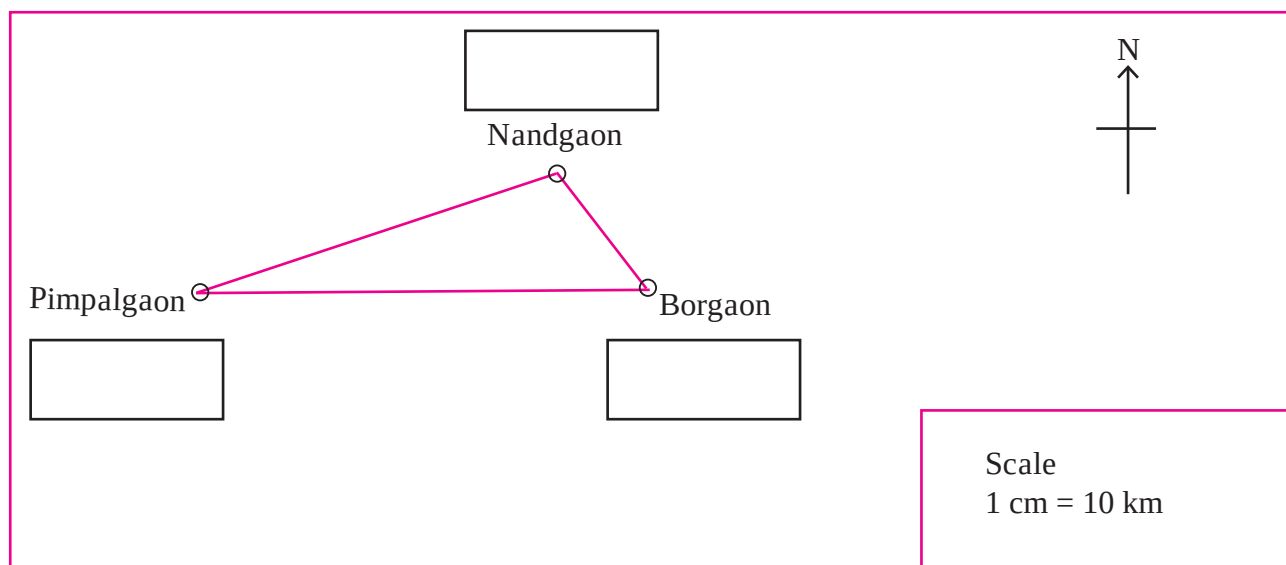


Figure 9.4

The importance of Graphical scale :

Very often it is necessary to reduce or enlarge the original map. During that process the scale of the map changes. There are many methods of reducing or enlarging maps. One of them is by taking a photo copy of the original map and reducing or enlarging it. When the map is reduced or enlarged by this method the verbal and the numerical scale on the original map does not change. But if a graphical scale is drawn on the original map, then the scale changes as per the changing size of the map. Although the font size

of the verbal and numerical scale changes the values do not change. Hence graphical scales are drawn in atlas and wall maps.



Try this.

In figure 9.6, some locations within the premises of a university are given. The distance between the statue and the entrance gate is 0.5 km. Measure this distance and determine the scale.

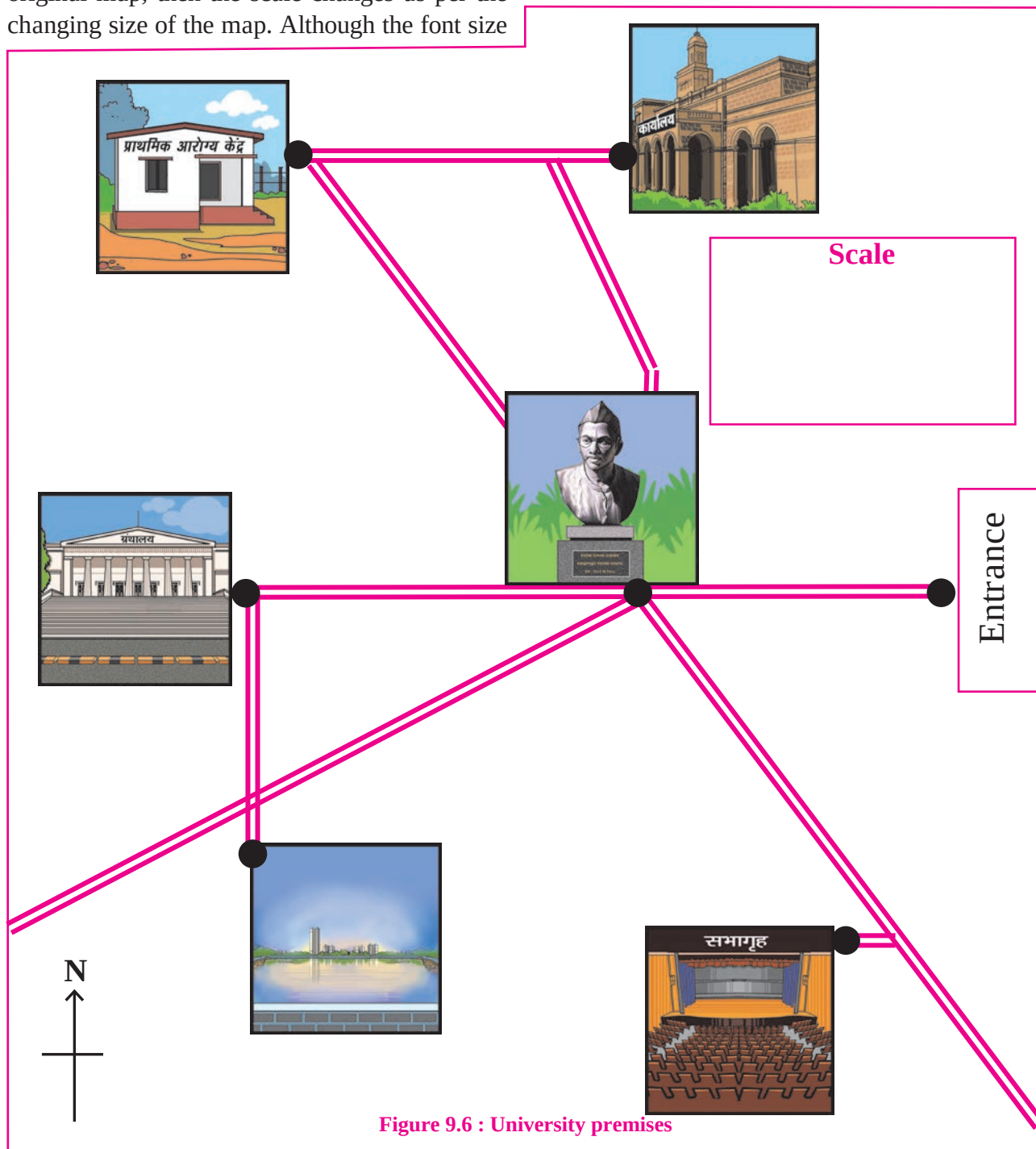


Figure 9.6 : University premises

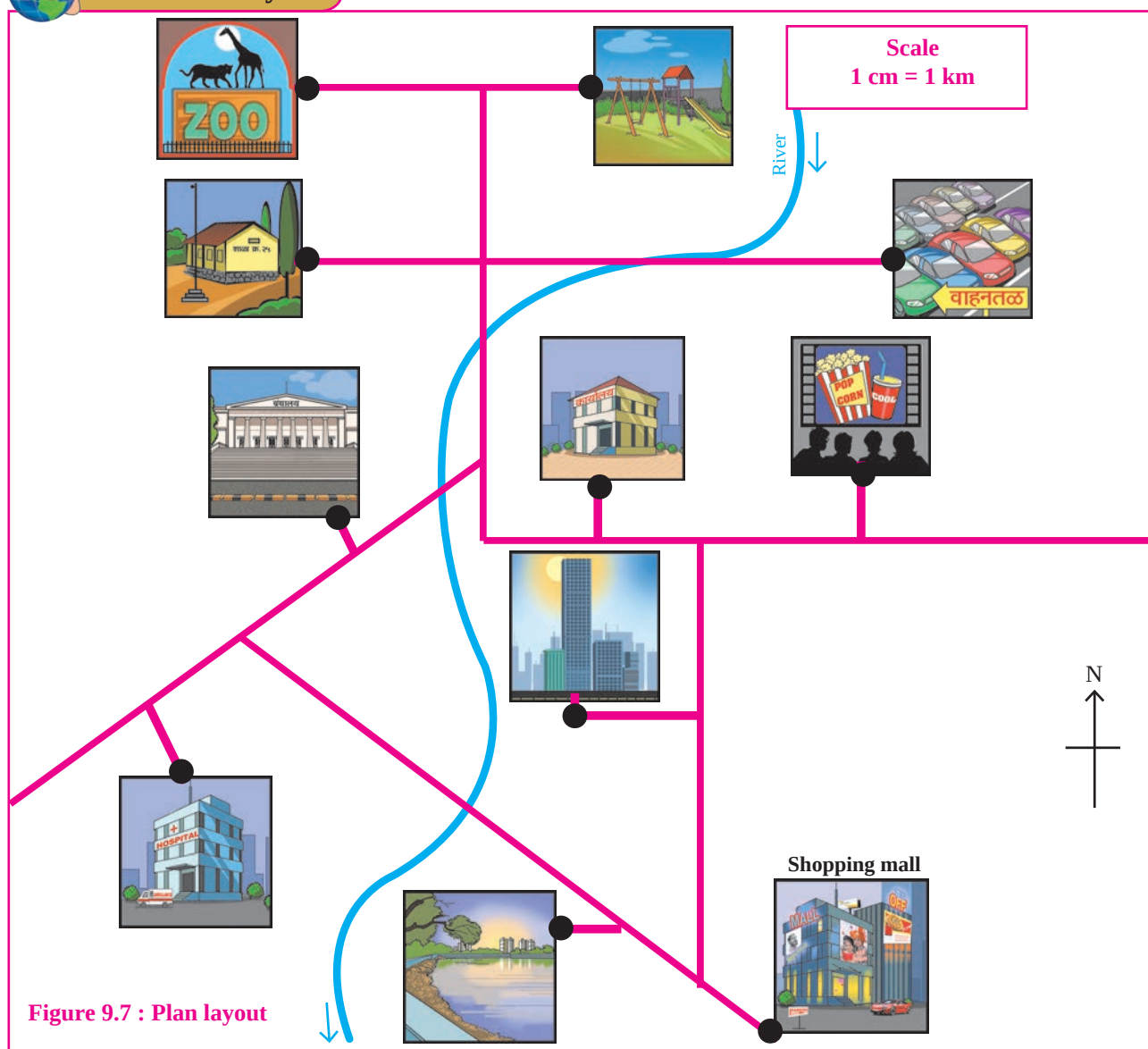
Write the verbal scale, numerical scale and graphical scale in the vacant box in the sketch.

On the basis of the road shown between the two locations, calculate the actual distances between two locations on the basis of figure 9.6

- (1) Health Centre to Library _____
- (2) Lake to Auditorium _____
- (3) Office to Lake _____
- (4) Auditorium to office _____
- (5) Health centre to Auditorium _____



Give it a try.



Distance from Shopping Mall (in km)	Vehicle Parking	School	Theatre	Office	Library	Hospital	Park	Lake	Zoo	Residential Buildings

(6) Lake to Library _____

On the basis of figure 9.7 , calculate the distance of various locations from the shopping mall and write in the table given below.

Large scale and small scale maps :

When a small area on the ground is shown covering a large area on the map, it is a **large scale map**. Maps of a city, village, agricultural fields etc. are all examples of large scale maps. Generally maps with a scale of less than 1:10, 000 are known as large scale maps.

(2) Length of the river in figure 9.7 _____

In mathematics when we compare two fractions then the fraction with the smaller number in the denominator has a higher value. Map scales are not in fractions but they are ratios. The same principle of fractions is used while comparing ratios. Hence a numerical scale of 1:10, 000 is called a large scale and a numerical scale of 1:50, 000 a small scale.

When a part of the ground covers a small area on the map, they are **small scale maps**. That means when a small scale is used to show the information about a large part of the earth, these are small scale maps.

Maps in an atlas and world maps are examples of small scale maps. Most of the maps in an atlas are example of small scale maps.



Always remember -

Distance on the Map

Verbal Scale

1 cm = 60 km

Distance on ground

Numerical scale

1 : 60,00,000

Distance on ground

Graphical Scale

Distance on the Map

Km 60 30 0 60 120 180 km

Distance on ground



Think about it.

What is the need to use map scale?
Think about it and write a paragraph.



Always remember -

On the map, the left side of the scale shows the distance on the map and the right side shows the actual distance on the ground.



Always remember -

Type of Map	Area	Information	Examples
Large scale	Small	Shows more details	Maps of villages, schools, agricultural fields
Small scale	Large	Less details	Atlas map, Country, Continent, World etc.



Give it a try.

Classify the following numerical scales into large scale and small scale. The symbol of a village as per the numerical scale of 1:1, 00, 000 is shown. Think, how the size would change as per the different scales and try to sketch them in a notebook.

1: 1, 00, 000 = ■

1: 2, 50, 000

1:25,000

1: 5, 000

1: 2, 500

1: 1, 000

1: 10, 00, 000

1: 50, 000



Find out.

Where will you find maps as shown in figure 9.8 ?



Figure 9.8 : Large scale map



Do you know ?

Different countries use different units of measurement. This could become a limitation

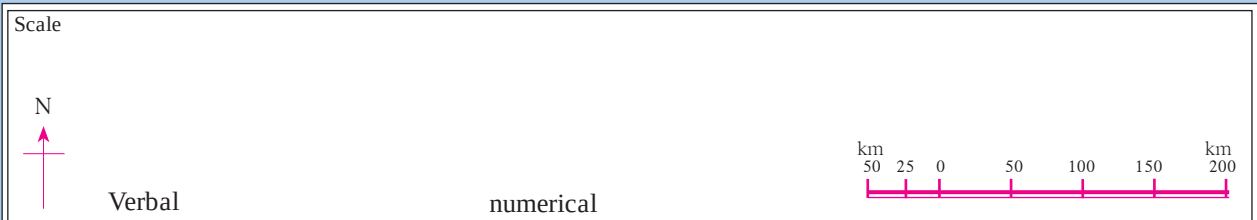
while reading a map. Hence it is necessary to have a numerical scale on maps. Numerical scale is a global scale.



Use your brain power !

The actual distance between two places A and B is 500 km. A is exactly to the west of B. The graphical scale is drawn in the figure

below. In the figure, using the given scale show both these places. Name them and write the verbal as well as numerical scale.





Exercises

Q. (1) (a) Classify maps showing the following areas into small scale or large scale

- | | |
|-----------------------|-----------------------------|
| (1) Building | (2) School |
| (3) Country of India | (4) Church |
| (5) Mall | (6) World Map |
| (7) Garden | (8) Dispensary |
| (9) Maharashtra State | (10) The north sky at night |

(b) There are two maps with respective scales of $1\text{cm}=100\text{m}$ and $1\text{cm}=100\text{km}$.

Give a well reasoned answer as to which of them would be a large scale map and which a small scale map.

Recognize the type of maps.

Q. (2) Using a map of India from the atlas measure straight line distance between the following cities and complete the table below.

Cities	Distance on map	Actual Distance
Mumbai to Bengaluru		---km
Vijaypura to Jaipur		---km
Hyderabad to Surat		---km
Ujjain to Shimla		---km
Patna to Raipur		---km
Delhi to Kolkata		---km

Q. (3) (a) The distance between two points A and B on the Ground is 500m . Show this distance on paper by a line of 2cm . Express the map scale by any one method and mention it.

(b) Convert verbal scale of $1\text{cm}=53\text{km}$ to a numerical scale

(c) Convert the numerical scale of $1:10,000,000$ to a verbal scale in the metric system.

Q (4) Help them, using road and railway maps of the state of Maharashtra. Use the scale given in the maps.

- (a) Ajay wants to arrange a family trip. Beed-Aurangabad-Dhule-Nasik-Mumbai-Pune-Solapur-Beed. He wants to visit tourist places along this route. The cost of the vehicle is Rs 12/- per km. What would be the approximate cost of travel?
- (b) Saloni has been asked to organize a trip by her teacher. She has selected Nagpur-Chandrapur-Nanded-Washim-Akola-Malkapur. What would be the total coverage in kilometers?
- (c) Vishawasrao is transporting goods in a vehicle from Alibag (district Raigad) to Naldurg (district – Osmanabad). How many km. will he be covering approximately for a to and fro travel?

Projects :

- Measure the length and breadth of your school. Prepare a sketch according to scale. Show different parts of your school on the sketch.
- With the help of google maps find the distance between your village and your neighbouring village. Represent all the three methods of map scale on paper.



10. FIELD TRIP

The field trip is an important method of geography. Through field trips one can get a first hand experience of geographical factors and processes. Geographical concepts can be understood. Geographical field trips are useful for understanding the relationship between man and environment. It is essential to plan the field trips according to the topic, place and duration of the visit.

One of the important objectives of a field trip is to pay a visit to an office in order to understand the kind of work done there. Different types of information are collected during a field trip. For this purpose a questionnaire is prepared. After compiling the information a report is prepared.

Preparations for the field trip :

A copy of the questionnaire, a notebook, camera, pen, pencil etc. are an essential part of the kit. Prior permission should be obtained from the concerned office before fixing the date and time of the visit. Care should be taken not to damage anything during the course of the field trip. In this lesson, a sample questionnaire regarding a visit to the election office has been provided. Please go through this questionnaire. This kind of questionnaire is used for obtaining information from any office. On the basis of the following questions you can prepare your own questionnaire for a visit to the following places e.g. Talathi's office or a visit to a small scale industry.

Questionnaire :

Visit to the elections division's office at the taluka and district level:

- (1) Name of the office.
- (2) What is the designation of the chief at this office?
- (3) What are the different duties performed by this office?
- (4) Who directs the work carried out in the election division?
- (5) Which are the various elections conducted through this office?
- (6) From where do they get the additional manpower required during election?
- (7) How many days prior to election is the notice given?
- (8) Who does the work of enlisting new voters and updating the electoral lists?
- (9) Who conducts the training programmes for the elections?
- (10) Which are the licenses issued by the office during elections?
- (11) How many people are appointed at the polling centre during voting?
- (12) When is the voting of officials appointed for election duty taken? How?
- (13) What are the timings of the voting?
- (14) Is the timing of voting extended under special circumstances?
- (15) What efforts are taken to make the process of voting transparent?
- (16) Tell the advantages /disadvantages of voting machine. (EVM)
- (17) How are voting machines obtained?
- (18) Since when are the voting machines being used?
- (19) What action needs to be taken if the voting machine becomes faulty?
- (20) How was voting conducted earlier?
- (21) The **Code of Conduct** is applicable for how many days before and after the elections?
- (22) Which departments do you seek help from to conduct the elections?
- (23) In which circumstances are by-elections held?
- (24) What do you do if the candidates get equal votes?
- (25) Who declares the end result of the election in the public?
- (26) Does the office maintain records of the earlier elections?
- (27) Do you issue certificates to the elected candidates? Who signs these certificates?

After you collect information from the office you visited, you have to write a report. You can use the maps, tables and layouts, graphs, pictures and photographs for the same.

- (1) Introduction
- (2) Personnel working in the office
- (3) Nature of work in the office'
- (4) Problems encountered/Solutions
- (5) Acknowledgement
- (6) List of references

- Present the report in class either in individually or in a group

Pictures of the election process

Prepare a plan for a fieldtrip of your class to a place of special interest/visit to an office and prepare a questionnaire.

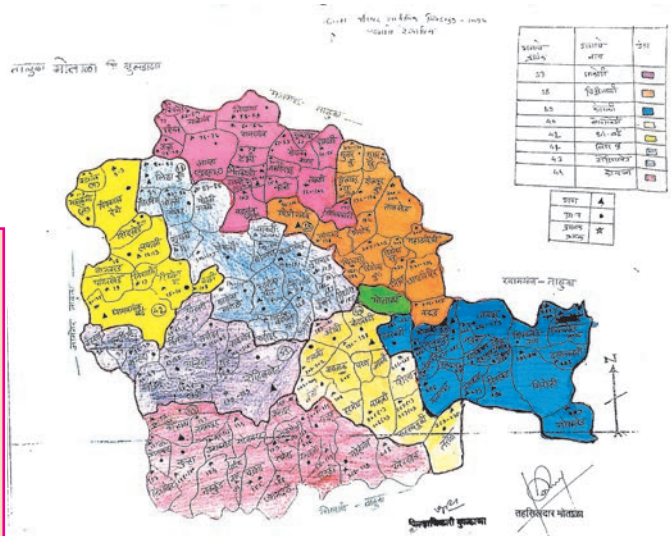


Figure 10.2: Map of the electoral constituency

Figure 10.3: Sample of the electoral roll



GLOSSARY

Detailed meanings of geographical terms

- **Absolute humidity:** The amount of vapour in the air at a particular time and place. It is expressed in gm/ cubic metre.
- **Bore hole:** A hole dug in the earth with a machine. Such holes are dug to take out groundwater from greater depths. To study the interior of the earth, many such holes have been dug at different places in the crust. For example, to study the earthquake in the Koyna- Varna region, a bore hole of 7 km depth is being dug.
- **Census:** The act of counting heads. People from a specific region are counted and this is called census. Such counting takes place after a specific time. It is very helpful in regional planning. In India, the Census takes place after every 10 years in the beginning of a decade. The earlier Census was conducted in the year 2011. There is also a Census taken of trees, animals and birds.
- **Central Business District (CBD):** A classification of urban land use. In larger cities, the trade or economic transactions are concentrated in a specific part of the city. This part is generally located in the center of the city. This is called the Central Business District (CBD). Generally, industries or residential areas are not found here. The population density is very less here. Administrative offices of many establishments are located here.
- **Cloud:** The accumulation of very minute floating water droplets or snow particles in the air. Clouds are found at higher elevations. When the air cools to the dew point, it becomes saturated and if the temperature reduces even more, then the vapour turns into water droplets. As these water droplets are lighter in weight, they start floating in the air and form clouds.
- **Code of Conduct:** Directions laid down by the Election Commission regarding behavior to be followed by the members and candidates of all the political parties during election period. The code of conduct is applicable from the day the elections are declared till the day of the results.
- **Condensation:** The process of changing of matter from vapour to liquid state. By this process, the vapour in the air turns into water droplets. If the process of condensation occurs at the ground level, then dew, fog, etc are formed. If it occurs at higher elevation, clouds are formed.
- **Corporate Social Responsibility:** It is a concept which was included in the Companies Act 2013. According to this, those companies whose net value is more than 500 crores and annual turnover is more than 1000 crores or whose profits are more than 5 crores, it is expected that they spend at least 2% of their profits in economic, social or environmental developmental work.
- **Dew:** Minute water particles deposited on cooled surfaces in morning or evening by the process of condensation in the air. Such small particles are found on the blades of grass or leaves of the trees. The temperature of the water is less than the surrounding air. When the vapour in the surrounding air comes in contact with cooler leaves, condensation occurs and water droplets are deposited on leaves.
- **Discontinuity:** In a graph, a discontinuity means the changes occurring in the trend of the graph shown. Scholars always look for the reasons behind such discontinuities. Seismologists found many such discontinuities in the trends of the velocities of the seismic waves according to depths. They studied the densities of the materials found in the respective depths and thus made estimations regarding the layers of the interior of the earth.
- **Duration of day:** The specific span of a day. From sunrise to the sunset, as we can see the sun in the sky, we experience light and so we called it daytime. On the other hand, from the sunset to the next sunrise, we do not see the sun and hence this duration is night time for us. The duration of a day changes according to seasons and also the latitudinal location.

- **Evaporation** : The changing of matter from liquid to gaseous state is called evaporation. The transformation of water into water vapour is the most common example of evaporation. If the amount of water vapour in the air near the surface of water is more, then the rate of evaporation is less, if the air is saturated, then evaporation does not occur. If there is breeze blowing over the surface of water i.e. air is being circulated, then the rate of evaporation is more.
- **Fallow land** : Farmers do not grow crops in some parts of cultivable land. Such land is called fallow land. The fertility of the land may reduce if it is cropped continuously. The farmer does not grow crops for some time on this land. This is called current fallow.
- **Fog** : Very minute ice or water particles floating in the air. Fog is different from the clouds. Fog is at lower elevations and fog occurs due to local weather conditions. The visibility in the area reduces because of fog.
- **Frost**: It is a form of condensation occurring near the earth's surface. Because of the lowering of temperature, the vapour in the air converts into ice particles. Layers of such ice particles are seen on leaves of the trees or grasses. Frost is generally seen in temperate regions during winters.
- **Geo-dynamo** : A part of the earth's core. It is mainly made of liquid (outer core) and solid iron (inner core). Because of temperature differences, vertical thermal currents develop in the outer core and hot liquid starts flowing in the upper direction. Comparatively cooler liquid starts flowing towards the centre of the earth. Such spiral currents, thus formed are parallel to the axis of the earth and in the form of columns. Many such currents are formed in the outer core of the earth. These spiral currents and the axis formed because of the rotation of the earth are together called the geo-dynamo.
- **Geo-magnetic field** : A part of the earth's core is mainly made of liquid (outer core) and solid iron (inner core). The inner and outer cores are hotter than the mantle. Because of temperature differences, vertical thermal currents develop in the outer core and hot liquid starts flowing in the upper direction. Comparatively cooler liquid starts flowing towards the centre of the earth. Such spiral currents thus formed are parallel to the axis of the earth and in the form of columns. Many such currents are formed in the outer core of the earth. This gives rise to the magnetic property of the earth. This gives rise to a magnetic field and a magnetosphere around the earth.
- **Gross National Product (GNP)** : Gross national Product (GNP) is an indicator of the economic activities of a country. It is the value of the goods and services produced by the citizens of a country. This includes the incomes of the citizens, incomes of the national companies located in foreign countries but does not include the income of foreigners generated in the country.
- **Gyre** : At some places, a circular pattern of movement of the ocean currents is seen. The equatorial currents flow from east to west because of the influence of the Easterlies. Near the continents, these currents turn towards the north or the south (according to the hemisphere) . Later, their direction changes because of the Westerlies and they start flowing towards the west. These currents get bifurcated near the continents and flow accordingly. One of these bifurcated currents again flows towards the equator and hence a circular pattern of movement of the currents is formed. The water in the centre of this circular pattern is somewhat still/calm. Such patterns are formed in all the oceans. In North Atlantic Ocean, a similar pattern is formed in the Sargasso Sea.
- **Heavy Industries** : The industries where the finished products are large in size and heavy, where large sized and heavy machinery is used or when the production process is multidimensional or where the industries occupy a large area eg. iron and steel industry, automobile industry etc.

- **Horizontal distribution** : A distribution parallel to the horizon. In the study of climate, there are changes in temperature and pressure on the earth's surface at different places. Similar changes also occur according to elevation. The distribution of these along the surface of the earth is called horizontal distribution. Study of these according to their elevation is called vertical distribution.
 - **Industrialisation** : The process of the establishment and development of industries in a region.
 - **Inner Core** : Part of the earth's core. In 1935, Inge Lehman, a Danish seismologist discovered that a part of the core is different from the outer core. He propounded that though the outer core is liquid, the inner core is solid. Later, scientists from Japan confirmed the same in around 1940. On the basis of the information gathered with the help of advanced and accurate seismometers, this was accepted in 1970.
 - **Interior of the earth** : The part of the earth from its surface to its centre is called its interior. It contains three layers within each other. From the surface they are the crust, the mantle and the core respectively.
 - **Land used for Public purpose**: Generally, such provisions are made in urban land use. As the population density is higher in urban areas, some land is reserved for recreational purpose of the citizens like playgrounds, gardens, green zones, etc. and it is used only for those purposes.
 - **Large scale map**: A type of map according to scale. These maps give detailed information about small areas. Generally, maps having a scale of 1: 10000 or greater R.F. are called large-scale maps. Village maps, maps of farms are examples of large-scale maps.
 - **Level of dew point temperature**: The temperature at which the vapour present in the air changes into water droplets. The level of temperature is different in different air masses. The height of this level is dependent upon the proportion of water vapour in that particular air mass.
- The proportion of water vapour is not the same in all air masses. The elevation at which the temperature of the air mass reduces and it becomes saturated is called condensation level.
- **Literacy** : The proportion of literate people in a region. It is expressed in percentage. It is understood to be an indicator of the social progress or development of the population of a region. The percentage of literacy is calculated from the population which is above 7 years of age.
 - **Local Time** : The time of a place decided with reference to noon time. It is different at different longitudes.
 - **Localisation** : When we establish industries, many factors affect its location. Supply of capital, nature and availability of raw materials, market, governmental policies, supply of labour, etc. affect the localization of industries.
 - **Mantle**: The layer below the crust is called mantle. It is 2870 km thick. Out of the total mass of the earth, 84% lies in the mantle.
 - **Map scale** : All maps represent the whole earth or part of it like a picture drawn to scale. The scale of a map is expressed as a ratio between the actual distance between two locations and the distance on the map between those two locations. Scales are of three types : verbal, numerical and graphical.
 - **Moisture holding capacity**: The capacity of the air to hold vapour. This capacity changes according to the temperature of the air. Air having lower temperatures cannot hold much moisture. As the temperature of the air increases, its capacity to hold moisture also increases.
 - **Non- agricultural land** : Land used for any other purpose except agriculture. This may include land used for roads, housing units, non-residential purpose, etc.
 - **Ocean Floor**: The ocean bed also consists of undulating landforms like those on the land. There are submerged mountains at the ocean floor. Similarly, there are very deep trenches too. The Mariana trench is

around 11,000m deep. It is so deep that the highest mountain in the world, Mt Everest, will complete submerge in the deep. The age of any ocean floor is not more than 200 million years old. The mid-oceanic ridges and the trenches near the continents are geologically the most active parts of the ocean floor.

- **Ocean sediments:** The sediments deposited in the ocean are of three types: 1. Material formed due to erosion on the continents or material coming out from the volcanic eruptions occurring in the sea. 2. The coverings of the marine organisms (shells/ mollusks) 3. Material formed from the chemical deposition in the ocean water. The material formed on the continents is taken away from the coasts. The accumulation of sediments formed by the Ganga River is seen up to a distance of up to 2000 km.
- **Oceanic oozes:** The deposition of sediments in the deeper parts of the oceans is called oozes. They are made up of very fine clayey particles. At least 30% of this consists of the remains of the floating minute marine organisms. Oceanic oozes are found in deep sea, away from the coast.
- **Outer core :** The layer below the mantle is the core of the earth. This layer is divided into two sub –layers: inner core and outer core. The secondary seismic waves disappear at the boundary between the mantle and the outer core. These waves cannot traverse the core. On this basis, the scientists have inferred that the outer core is in a liquid state.
- **Ownership rights :** Actual and documented legal and theoretical ownership of any immovable or movable property. It means that the owner can decide how to use the given property.
- **Planned city :** Due to some political reasons or because of unprecedented growth of an existing city, a city is newly constructed after planning. Such cities are called planned cities. For example, before independence, Lahore was the capital of the province of United Punjab. After independence, Chandigarh was built as a

planned city for the Punjab state in India. Tremendous growth of Mumbai led to establishing “Navi Mumbai” . At present, Amravathi is being built as a planned city for Andhra Pradesh.

- **Property Card:** Document showing the registration of a property in the urban area. This document is available with the local self governments (Municipal council, municipal corporation, etc)
- **Relative humidity :** The percentage of water vapour present in the air at a specific time and place. It is the ratio between the maximum capacity of the air to hold the moisture at the given temperature and the amount of water vapor actually present in the air.
- **Representative Fraction:** A type of scale. It is also known as numerical scale. The ratio between the distance on the ground and the distance on the map is expressed as fraction. As this fraction represents both the distances, it is called representative fraction. The numerator shows the distance on the map while the denominator shows the actual distance between two points.
- **Revenue department:** The department of the government that handles the taxes obtained from citizens and industries, registers property holdings, Satbara, etc. Each state has its own independent revenue department.
- **Rotation :** the act of moving around one’s own self. All spherical celestial bodies in space have the momentum to rotate around themselves. It can be said that they get the spherical shape because they rotate around themselves.
- **Saturated air:** When the air can hold as much moisture as it can at a given temperature, it is known as saturated air.
- **Sex Ratio :** The proportion of females in comparison with the males is called sex ratio. It is expressed with reference to per thousand males. For example, the sex ratio of Haryana is 879 while it is 1084 for Kerala.
- **Small scale map:** Type of map on the basis of scale. These maps give general

information about large areas. Generally, scales with representative fractions less than 1:10,000 are said to be small scale maps. The maps of states, countries, most maps given in the atlases, etc are examples of small scale maps.

- **Smog:** In heavily industrialized cities, the air becomes polluted and this leads to mixing of smoke and fog. In large cities too, smog is formed by smoke from vehicles. Smog is an amalgamation of Smoke+Fog = smog.
- **Solar Winds :** The flow of charged particles coming out of the higher part of the sun's atmosphere. This consists of mainly electrical atoms, very fine particles and alpha particles. Interplanetary magnetic field is a part of the solar winds. There is a change in their density, temperature and velocity with time. Because of extreme energy in its particles, they are free from the gravitational force of the sun. At a little distance away from the sun (expressed in multiples of radius), the velocity of the solar winds is more than the velocity of sound waves. It can be somewhere between 250 to 750 km/ sec.
- **Standard Time :** The time assumed according to the central meridian of a country. This time is determined on the basis of the longitude passing through the centre of the country and all the places in a country use this time.
- **Submerged Mountain:** There are many submerged mountain ranges on the ocean floor. Out of these, the Mid Atlantic Ridge is the longest and continuous range extending upto 65000km.
- **Suburbs :** In large cities, there exists a space crunch when the population and transactions in the cities increase on a large scale. The land prices also are not affordable to common people. Also, one starts getting a feeling of avoiding the city life. In such cases, the residents of city start settling away from the city. With time, such settlements expand and become suburbs of the large cities.
- **Transition :** The concept of transition is related to space/ region, time and various circumstances. When changes occur spontaneously, the boundaries are clear in the region or time where changes are occurring. But when the changes are slow, the boundaries are not very clear and take up a larger space and time.
- **Units of measurement:** Values used to measure the characteristics of objects or materials. Centimeter is a unit of measurement for length; gram is for weight while year, month, hour or minutes are units of measurement for time.
- **Working population:** The active component of a population. Out of the total population of a region, people belonging to the age group of 15 to 59 are engaged in some form of employment or business and are earning. Therefore, this age group is considered to be the working population. People belonging to the age group of less than 15 years and more than 59 years are considered to be the dependent population.

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Do it!

A world map is given on the next page. Cut it along the dotted lines. Paste the cut map on a hard cardboard. Now make a cylinder out of this map. While making a cylinder, make sure the 180° longitudes on the left and the right sides are superimposed on each other. Keep in mind that the longitudinal interval is 15° each in this map.

On the same page, a strip showing hours is also given. On this strip, 24 hours have been shown with one hour markings. The 0 and 24 hour markings show midnight while the 12 hour marking shows noon. Cut this strip too and make a cylinder out of it. Make sure the 0 and 24 hour markings are superimposed on each other while doing so.

To do the above mentioned activity, understand the steps along with the pictures given alongside.

When you match the marking of any time with any longitude on the map, you will know the time at the other longitudes. With this moving strip and the cylinder, you can play the game of 'local times'.



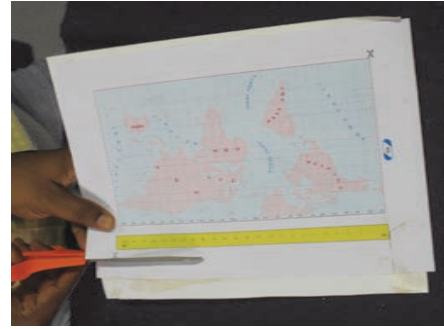
1



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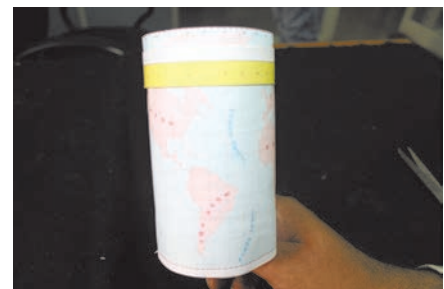
7



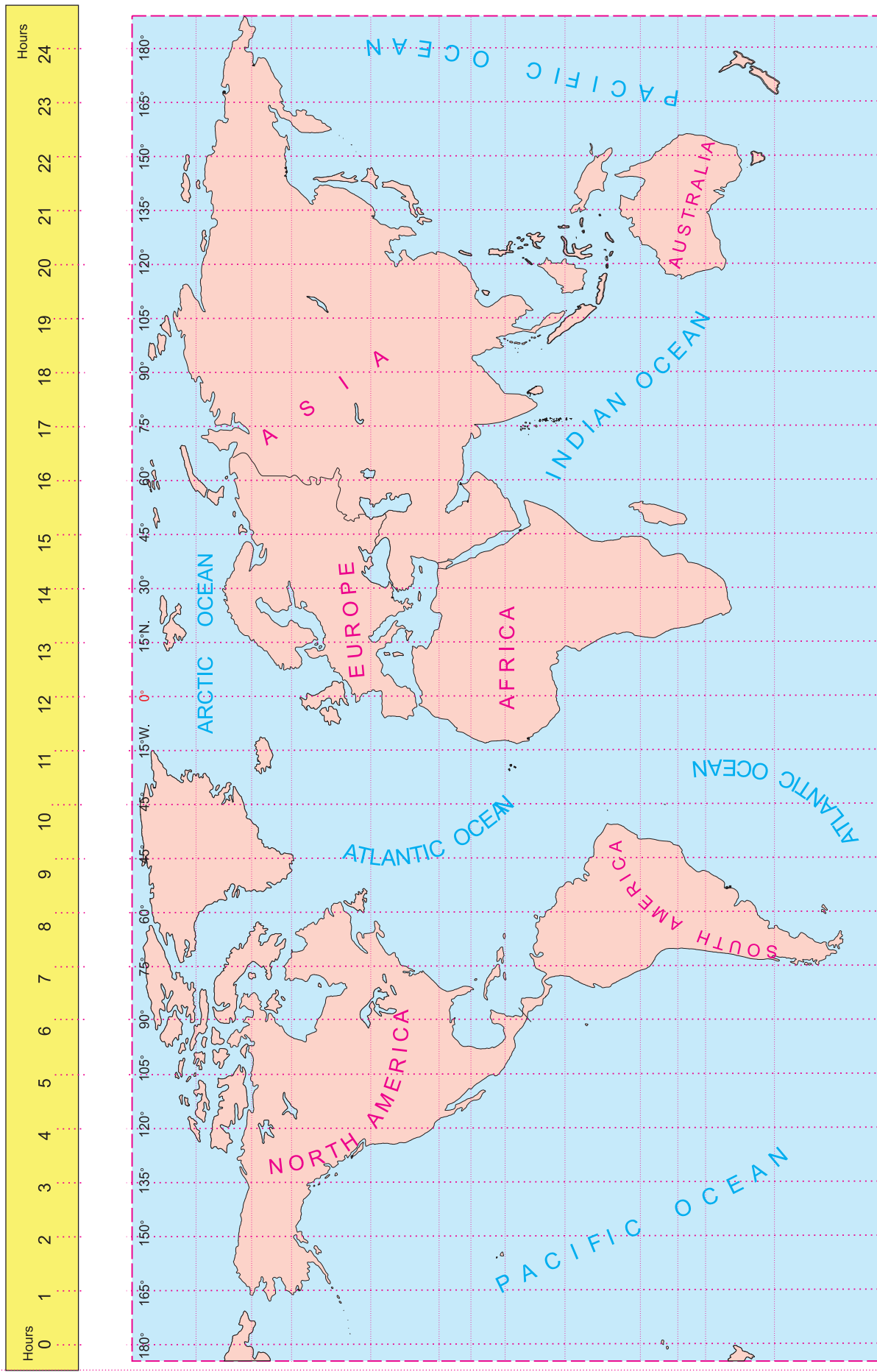
8

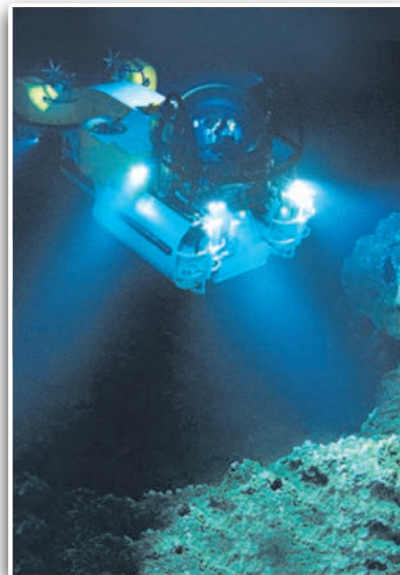


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