GEOGRAPHY

STANDARD TWELVE

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2020

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

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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,

You are welcome to Class XII. You have studied various concepts in Geography under Environmental Studies from Class III to Class V and in Social Studies from Class VI to Class X. Like other subjects, it gives me a great pleasure to present before you a separate textbook of Geography for 100 marks.

Broadly, it is accepted that Geography is the study of structure, processes and interactions between physical and human environment. You have studied Physical Geography in the preceding class. Equally important component of Geography is Human Geography. At the Higher Secondary level, Human Geography has been included in Class XII textbook. We see that human settlements are distributed in different parts on the earth. We see that this distribution is uneven and full of diversity. This happens mainly because of the impact of physical factors. This brings variety in the population, settlements and the economic activities of man. The purpose for which the land has to be used is decided accordingly. Land cover changes as per the change in the land use. All these aspects are studied in Human Geography. It is important to understand the cause –and –effect relationship when you study various components of the chapters.

Changes have been made in Practical Geography too as per the contemporary time. For example, you have to use the Balbharati App for doing surveying. This will help you to get acquainted with the latest technology. Also, you will study how to apply statistical techniques to study human variables. You will understand how to use them in analysis and drawing conclusions.

It is said that Geography is the science that lays stress on observation. Observation, cognition, critical thinking, analysis, etc are the skills required in this subject. Use these skills and develop them. Activities which stimulate your thinking power, imaginative power and creativity have been included in the textbook. You should do all these activities. As you read the chapters, you will realise how they are related to our day-to-day life. Various educational tools have been used in the textbook to facilitate understanding of the concepts in the textbook. Through QR code you can study more relevant information related to the components of the textbook.

The scope and importance of this subject is increasing day-by-day. And so, you will surely like the textbook which associates with your daily life. Please let us know your views about it.

Heartiest Wishes to all of You!

Pune

Date : 21 February 2020

Bharatiya Saur Dinank : 2 Phalguna 1941

(Vivek Gosavi)
Director
Maharashtra State Bureau of Textbook
Production and Curriculum Research, Pune

- Standard XII Geography -

Competencies

- Understanding factors affecting distribution of population.
- Understanding various components of population growth.
- Examining the trends of population change.
- Examining population growth as a problem or an opportunity.
- Explaining the economic and social effects of population structure.
- Explaining variables related to migration.
- Explaining positive and negative effects of migration.
- Explaining the factors affecting location and growth of human settlements.
- Understanding why settlements grow in specific patterns.
- Analysing the patterns of human settlements on a global scale.
- Understanding the nature of primary economic activities.
- Understanding correlation between the geographical factors and various primary economic activities.
- Showing the global distribution of primary economic activities.
- Explaining the changes in the patterns of primary economic activities.
- Understanding the nature of secondary economic activities.
- Explaining the factors affecting location of industries.
- Explaining the distribution of major industries in the world.
- Understanding different types of industries.
- Understanding the nature of tertiary economic activities.
- Understanding the relationship between geographical factors and some of the tertiary economic activities.
- Explaining the relationship between trade, tourism and transport.
- Understanding the changing trends in trade, tourism and transport.
- Understanding the concept of 'region'.
- Understanding various types of regions.
- Examining various factors which affect development of a region.
- Examining regional imbalance and ways to reduce it.
- Reflecting on various geographical concepts studied till now.
- Relating the importance of the study of Geography in day-to-day life.
- Understanding the ever-increasing scope and application of Geography in various fields.
- Examining the nature of Geography as a field of study.

Competencies - Practical

- Conducting household surveys through the use of Apps
- Data collection through the use of Mobile App
- Data organization on the basis of objective behind data collection
- Understanding the use of statistical techniques in geography
- Deciding which statistical technique has to be used according to the data organized
- Drawing suitable diagrams to show the available data
- Analyzing the data and drawing conclusions on the basis of the representation of data
- Correlating two variables in the given data and expressing their relationship numerically
- Interpreting the toposheet with respect to human elements considering the physical factors

- For Teachers -

- ✓ To begin with, get familiar with the textbook yourself.
- ✓ Please understand the characteristics of the textbook carefully for the teaching-learning process.
- ✓ 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.
- ✓ Looking at the constructivism approch of the textbook, it is compulsory to carry the textbook in the class for teachers and students both.
- ✓ The chapters in 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.
- ✓ 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'.
- ✓ Please refer to textbooks of earlier classes before teaching this textbook.
- ✓ 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.
- ✓ Please plan carefully and independently for the activities in each chapter. Please do not teach without planning.
- ✓ Please use the geographical teaching aids in the laboratories as required for the appropriate understanding of the subject. It is necessary to use the globe, the maps, atlases, websites and weblinks.
- ✓ All chapters should be taught by giving appropriate time.
- ✓ Participation of all the students is very necessary in the teaching-learning interactions and processes.
- ✗ **Do not use the boxes titled 'Do you know?' for evaluation**.
- ✓ 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'.They follow the question paper pattern.
- ✓ It is necessary to access the supplementary material wherever specific website or use of Internet is indicated. Use QR Code given in the textbook. 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.
- ✓ It is compulsory to teach one example in a practical and get another one done from the students.
- ✓ Students have to carry out surveying by an App. The teachers will also have to download this App and register themselves too.
- ✓ The data collected through survey has to be analysed on the basis of study of various correlations, deviation, changes and trends in statistical methods and importance in Human Geography.

- CONTENTS -

S.O.I. Note : The following foot notes are applicable : (1) © Government of India, Copyright : 2020. (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 righters (©) 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 Cover and Back Cover : Natural land cover had been shown in Std. XI textbook. We had studied Physical Geography last year. We are going to study Human Geography now in Std. XII. Considering this, the development of human land use on this natural land cover has been shown. Observation of the cover pages will help you while understanding the chapters in the book.

Credits : For land cover and land use maps - MAHARASHTRA REMOTE SENSING APPLICATION CENTRE (MRSAC) Nagpur.

1. Population : Part - 1

Geography studies humans and their interactions with their environments. The study of population is a part of Human Geography under a branch called Population Geography. Population Geography studies human population and its distribution and pattern on the earth's surface. Their qualitative and quantitative composition is also studied in this subject. The way the population influences the economy and the development of a region are also the points of study in Geography. In this chapter, we will study humans as a resource.

Distribution of Population :

Try this.

Observe the pie-charts shown in Fig 1.1 carefully and answer the following questions.
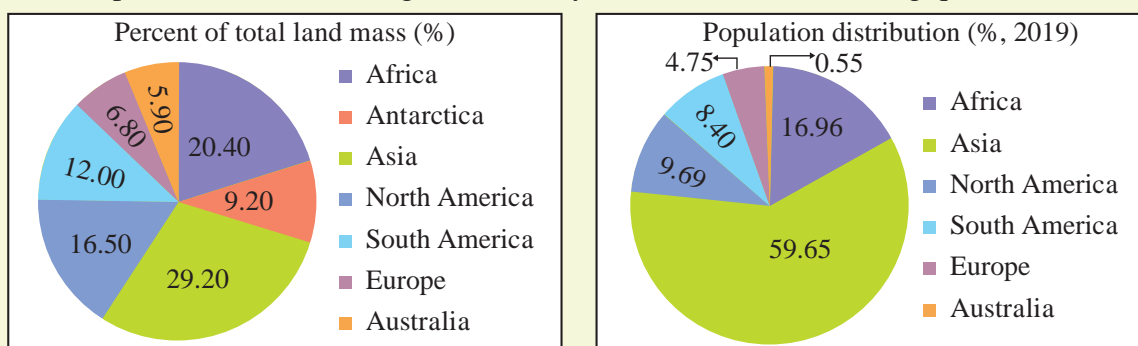
Percent of total land mass (%)

Africa	20.40
Antarctica	9.20
Asia	29.20
North America	16.50
South America	12.00
Europe	6.80
Australia	5.90

Population distribution (%, 2019)

Africa	16.96
Asia	59.65
North America	9.69
South America	8.40
Europe	4.75
Australia	0.55

Source : UN data (https://data.un.org)

Fig 1.1

1) Which continent has the least population?
2) Which continent has the least landmass and also the least population?
3) Which continent has the most landmass as well as most of the population?
4) Which continent is missing in one of the pie charts? Why?

Geographical explanation

Human population is unevenly distributed throughout the world. In the year 2019, the world's population stands to be around 7.7 billion. **Continent wise population distribution is as follows :**

North and South America that account for around 28% of the landmass barely support 18% of the population. Asia occupies about 30% of the land mass and supports around 60% of the population. Europe has around 7% land and supports 5% of the population. Australia has around 6% of the world's land but does not even support 1% of the population. Antarctica occupies around 9% of the landmass but has no permanent human settlements.

This distribution of land and population can be better understood not just in terms of numbers living in a region but also in terms of people living in an unit area. This is called population density.

$$\text{Density of population} = \frac{\text{Total population}}{\text{Total area (in sq. km.)}}$$

Give it a try.

Table 1.1 shows the 10 most populated countries in the world in 2018 with their areas. Calculate their population densities and complete the table.

World : Population

Make friends with maps!

ARCTIC OCEAN

ASIA

EUROPE

AFRICA

ATLANTIC OCEAN

NORTH AMERICA

SOUTH AMERICA

PACIFIC OCEAN

INDIAN OCEAN

PACIFIC OCEAN

AUSTRALIA

SOUTHERN OCEAN

ANTARCTICA

N.

0   5000 Kms

60° N.

30° N

0°

30° S.

60° S.

Each dot represents settlements above 200 persons/ Sq. Kms

Source: Landscan data set, ORNL- 2017

Fig 1.2 World : Population Distribution

Table 1.1

Rank	Country	Population in Crores (2018)	Approx. Area (in lakh sq.km.)	Population Density
1	China	142.8	96.0	
2	India	135.3	32.9	
3	United States of America (USA)	32.7	95.3	
4	Indonesia	26.8	19.1	
5	Pakistan	21.2	8.9	
6	Brazil	20.9	85.2	
7	Nigeria	19.6	9.2	
8	Bangladesh	16.1	1.5	
9	Russia	14.6	171.0	
10	Mexico	12.6	19.7	

Table 1.2

Continent	Physical Factors Responsible for High Population	Physical Factors Responsible for Less or No Population
North America	Coastal areas	Forests, desert, snow-covered land

Geographical explanation

Patterns of Population Distribution in the World :

Looking at the pie-charts given in fig. 1.1 and table 1.1 together, we can conclude the following. We find that population and population densities both are unequally distributed in the world. When you look at the regions with large populations, it is explicitly visible. Patterns of population distribution and density help us to understand the demographic characteristics of any area. The term population distribution refers to the way people are spaced over the earth's surface. (Fig. 1.2.)

Make friends with maps!

Look at the map in Fig. 1.2. Compare it with the physical map of the world given in the book on page 83. Try to understand the impact of physical factors on population distribution. Complete the table accordingly. One has been done for you as an example.

Geographical explanation

When we compare the distribution of the world population with physical factors, we observe the following points :

- Snow-covered regions, around the North and the South Poles, are sparsely populated.
- Even hot deserts have low population.
- The Mountainous and hilly regions are also less populated.
- Coastal regions and plains are highly populated.
- In some river valleys like the Amazon, population is sparsely distributed. It means that there are factors other than physical factors, like forests, that influence population distribution.

Can you tell ?

Can you think of the factors besides physiography which affect the distribution of population? Make a list.

Geographical Factors Affecting Population Distribution :

Here are some physical and human factors affecting the distribution of population. Fill in suitable examples of countries or regions in the table 1.3. Two examples have been solved for your convenience.

Table : 1.3

Physical/ Human Factors	High Density	Low Density
1) Relief	Flat, Lowland e.g. Ganges plains	Mountainous area e.g. Himalayas
2) Climate		
3) Availability of Resources		
4) Economic	Business and financial centre. e.g. Tokyo	Low economic growth. e.g. Louisiania
5) Social		
6) Government Policies		
7) Cultural		

Geographical explanation

Following factors determine population distribution :

Physical Factors :

1) **Relief (Landforms) :** Population is densely distributed on flat plains and gentle slopes. This is because such areas are favourable for the production of crops. In these areas it is easier to build roads and develop industries.

The mountainous and hilly areas tend to be less populated. If means of livelihood are available, population can be concentrated in few such areas. For example, Dehradun, Leh, etc.

Thus, it can be concluded that plateaus or mountainous areas are less populated than plains.

2) **Climate :** Extreme climates such as very hot or cold deserts or regions with very heavy rainfall are uncomfortable for human habitation. They have less population. Areas with an equable climate, where there is not much seasonal variation, attract more people. Mediterranean regions were inhabited due to their pleasant climate.

In cold climates, only people like the Eskimos and Lapps, who are highly adapted to such climates, can live in these regions. Vast equatorial areas of the Amazon lowland and Congo basin are very sparsely populated due to their unfavourable climate.

Find out !

- Are Eskimos still living in their conventional ways?
- What changes can be seen in their lifestyle now?

3) **Availability of water :** It is the most important factor for life for all living beings including man. So, people prefer to live in areas where fresh or potable water is easily available. You will find that easily through the map in fig. 1.2.

It is because of this, that river valleys and coastal areas are among the most densely populated areas of the world. For example, Nile valley and coastal plains of India are one of the most densely populated areas of the world. In deserts too, population is found near oases. For examples, Phalodi from Thar desert and Al-Ahsa from Saudi Arabia have developed around oases.

Use your brain power !

- Can lakes be a factor for concentration of population? Find out examples.
- Which water bodies are surrounded by dense population in Maharashtra?

4) **Soils :** Fertile soils are important for agricultural and allied activities. Therefore, areas which have fertile loamy soils have more people living on them, as these can support intensive agriculture. The flood plains of the river Mississippi, the Ganga,

the Irrawaddy, the Yangtze are examples of areas having high densities of population. Similarly, areas having Regur or black soils are also densely populated. The slopes and foothills of many volcanoes have high densities of population as their slopes are covered with fertile volcanic soil. The slopes and foothills of volcanoes in Java, Japan, Sicily and Central America support many people.

Fig 1.3 : Evacuation

If a dormant volcano erupts someday, these settlements may face disasters. They may face economic losses and loss of life. For example, fig. 1.3 shows people leaving their places after an eruption in Mt. Agung in Bali.

Human Factors :

1) **Agriculture :** Increase in agricultural production due to use of fertilisers and irrigation make it possible to support more population. Type of agriculture, crops grown, method of cultivation and specialisation of particular crops are other characteristics of agriculture that affect the distribution of population. Do map activity related to fig 1.4.

2) **Mining :** Areas with good quality mineral deposits attract industries. Mining and industrial activities generate employment.

Make friends with maps!

Refer to the map showing rice producing regions of the world in Fig. 1.4. Relate it with the population map of the world in Fig. 1.2. Write the conclusions in your own words.
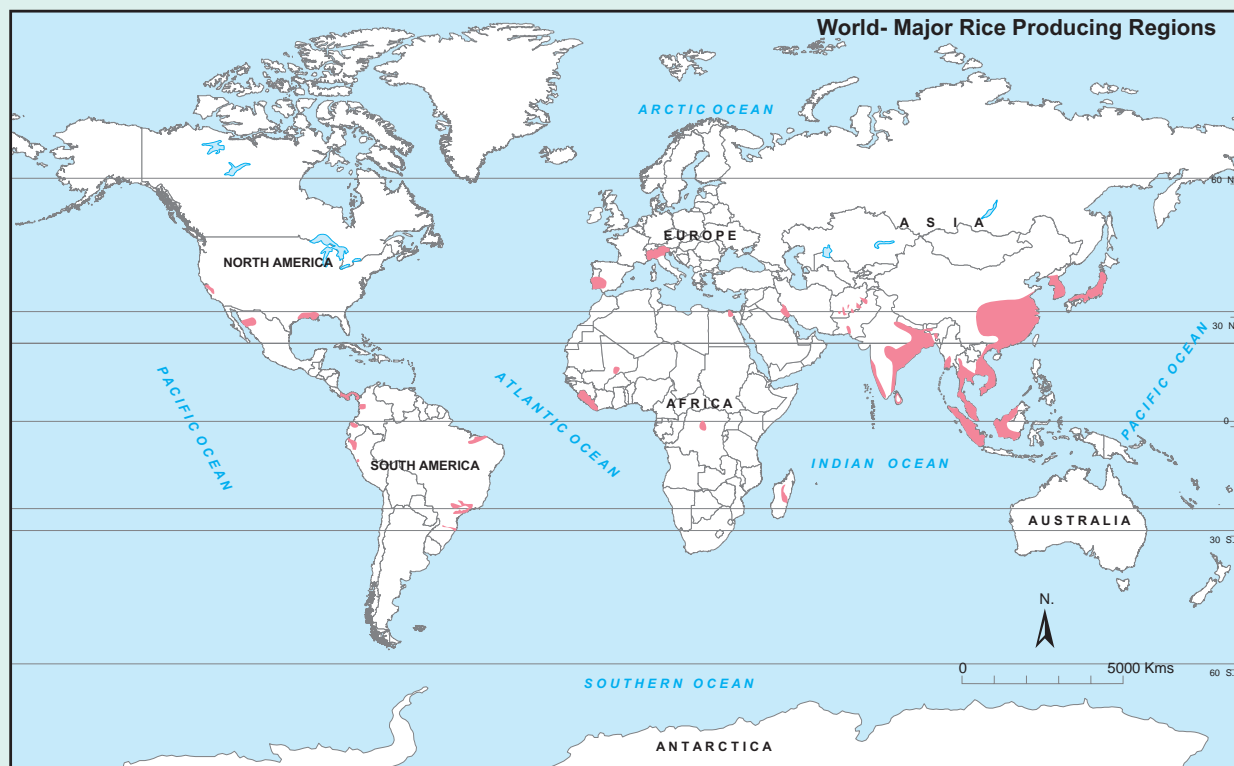

Fig 1.4

So, skilled and semi–skilled workers move to these areas and make them densely populated. Katanga copper belt in Zambia, the Chota Nagpur Plateau in India, coal and iron fields of Western Europe, the Manchurian region of China and the Appalachian mountains of the USA are examples where population is dense due to availability of minerals. Some minerals are highly valuable and they are extracted despite odd physical conditions. In such areas, population may be dense. This is true for precious and rare minerals like gold and mineral oil. For example, gold mines area in the Australian desert, mineral oil in the desert regions of South-West Asian countries.
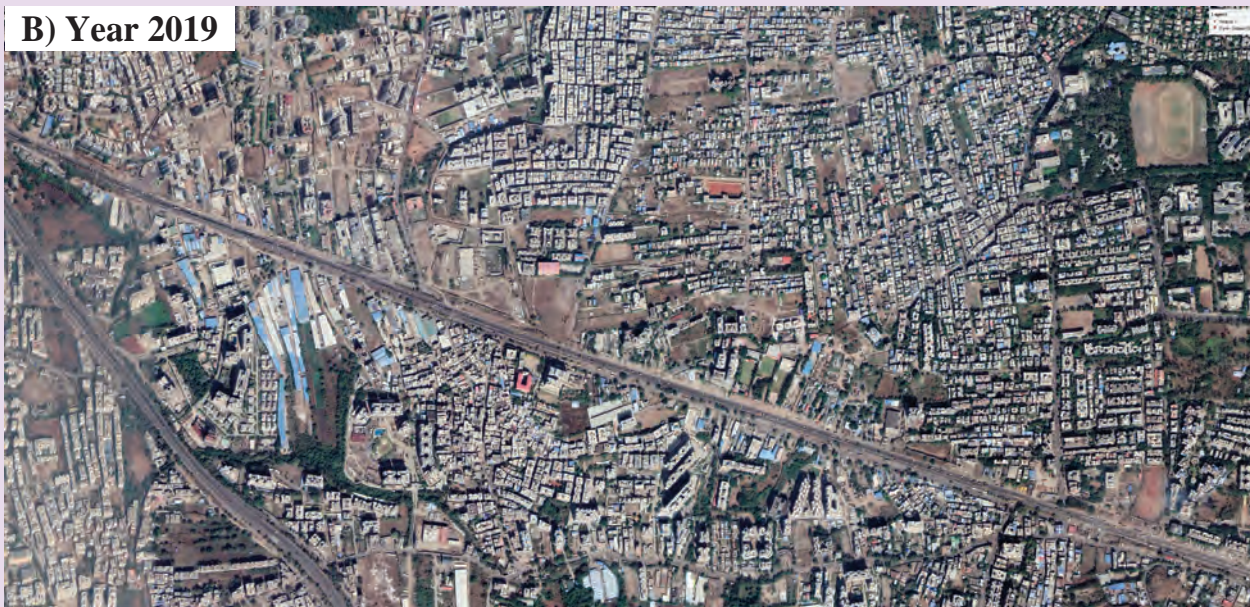
Give it a try.

Look at the satellite images given in Fig. 1.5. They show the same area from two different periods.

• What difference do you see?
• What might have caused these changes? Discuss in class.

A) Year 2005

B) Year 2019

Fig 1.5 : Satellite images showing Ambegaon Budruk, (Pune)

3) **Transportation :** After studying the satellite images in fig. 1.5, you may find that roads or highways may increase the population here. Such regions are easy to access because of roads thus increasing density. On the contrary, if accessibility is difficult, it takes more time and is costlier to reach there, then the region is sparsely populated. Fig. 1.5 clearly shows that the population density has increased as a highway passes through this area.

Sea transport led to the discovery of new places. Port cities got developed. The population grew there due to trade. For example, the construction of the Suez Canal increased the exchange of raw materials and goods. Therefore, the population appears to be concentrated in coastal regions. Western and eastern coastal regions of India, the western and eastern coastal regions of the United States are examples.

4) **Urbanisation :** The growth of industries is responsible for the development of towns and cites. Tertiary activities like transportation, trade and other services also increase in order to cater to the needs of the growing urban population. Cities offer better employment opportunities, educational and medical facilities, better means of transport and communication. In many areas of the world, a continuous urban belt is found. For example, Greater Mumbai.

5) **Political factors and government policies :** Besides all the above factors, the policies of various governments also affect population distribution and density. A government may choose to promote population in an area or depopulate it. For example, the government promoted human settlement in parts of Siberia by giving more opportunities and special incentives. For example, in Japan,

the government is giving incentives to people to leave Tokyo, as about one third of Japan lives in Tokyo.

Let's recall.

Which policy did the Brazilian government promote with respect to decentralisation?

Besides these factors, other factors like, distance from the sea coast, accessibility, natural harbours, sources of energy, navigable rivers or canals, cultural factors, migration, economic activities, technology, etc. affect distribution of population in the world. Adverse physical conditions and lack of sufficient opportunities for means of livelihood are mainly responsible for discouraging inhabitation in certain areas.

Components of population change :

People of one region differ from others. People can be distinguished by their age, sex and their place of residence. Some of the other distinguishing attributes of the population are occupation, education and life expectancy. Let us first understand the various aspects of population.

Population growth :

Try this.

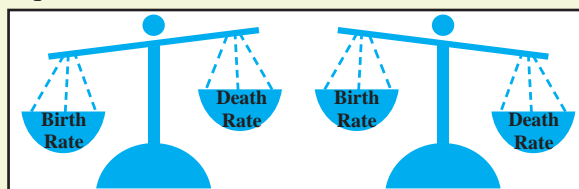Look at the fig. 1.6 and answer the questions that follow :

Fig. 1.6

- What does the image show?
- What happens to the population when deaths are more than births?
- What happens to the population when births are more than deaths?
- What happens when both are same? Is it possible?

The population growth or population change refers to the change in number of inhabitants of a territory during a specific period of time. This change may be positive (growth) or negative (decline). It can be expressed either in terms of absolute numbers or in terms of percentage. Population change in an area is an important indicator of economic development. It can be an indicator of social upliftment. For example, poverty can be reduced if population reduces.

There are three components of population change : births, deaths and migration.

Crude Birth Rate : Crude birth rate (CBR) is expressed as number of live births in a year per thousand of population. For example, in 2019, there were 3,250 births in a city with population of 2,23,000. Therefore :

$$CBR = \frac{3,250}{2,23,000} \times 1,000 = 14.57$$

So, at that time, there were 14.57 live births for every 1,000 people in the city.

Crude Death Rate : Death rate plays an active role in population change. Population growth occurs not only by increasing birth rate but also due to decreasing death rate. Like CBR, CDR is expressed in terms of number of deaths in a particular year per thousand of population, in a particular region.

Give it a try.

- Can you calculate the death rate in the above example, if the total number of deaths in the city was 2,986 in the same year?
- On the basis of the Birth Rate given earlier and Death Rate calculated by you, what change in population do you observe?

Always remember

The crude birth rate or death rate is considered 'crude'. This is because it ignores the age structure of the population. It doesn't take into account that age group in the population that is actually able to give birth. Similarly, actual birth or death rates take into account the population structure of a country. Birth rates and death rates will not be same for all age groups simultaneously.

$$CBR = \frac{\text{Total number of live births in a year}}{\text{Total population in that year}} \times 1000$$

$$CDR = \frac{\text{Total number of deaths in a year}}{\text{Total population in that year}} \times 1000$$

$$\frac{\text{Population}}{\text{growth}} = \frac{\text{Present}}{\text{population}} - \frac{\text{Earlier}}{\text{population}}$$

$$\frac{\text{Population}}{\text{growth rate}} = \frac{\text{Population growth}}{\text{Earlier population}} \times 100$$

Can you tell ?

Observe the table 1.4. Arrange data in ascending order for birth rates and death rates respectively.

Table 1.4

Country	Crude BR (2017)	Crude DR (2017)
Sweden	11.5	9.1
India	18.1	7.2
Greece	8.2	11.6
China	12.4	7.1
USA	11.8	8.5
Niger	46.5	8.5

Population Growth and Explosion :

You know that birth rates and death rates determine the growth or decline in the population. Based on this notion, try to complete the table 1.5, where different combinations of Birth Rates and Death Rates are given. Discuss in the class and complete the table. One has been done for you as an example.

Table 1.5

Sr. No.	Birth Rate	Death Rate	Effect on Population Growth
1	High	High	Stable /Low Increase
2	High	Decreasing	
3	High	Low	
4	Decreasing	Low	
5	Low	Low	

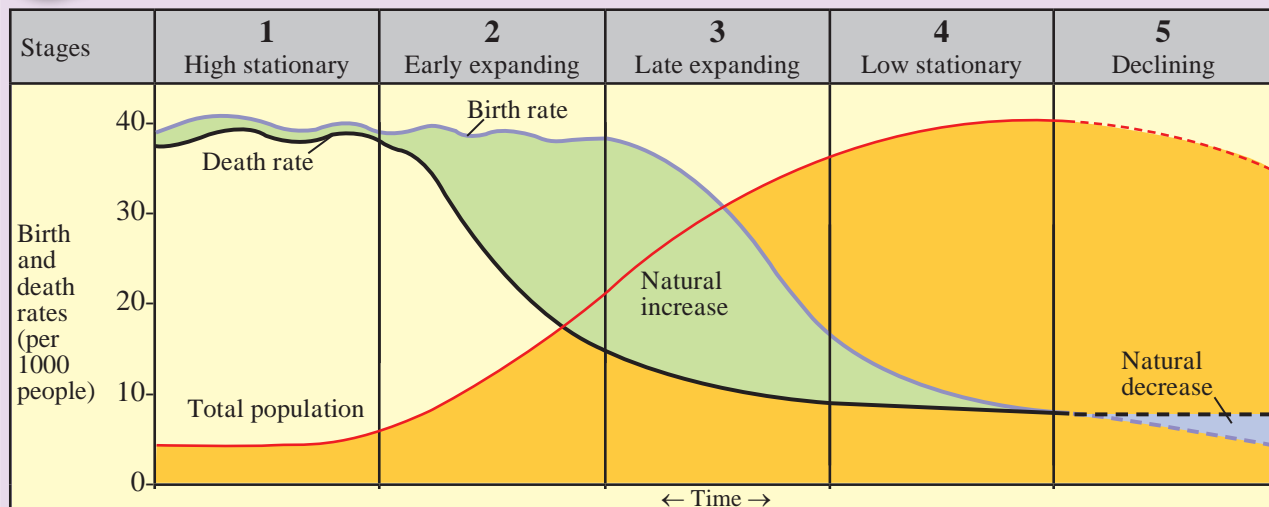| Stages	1 High stationary	2 Early expanding	3 Late expanding	4 Low stationary	5 Declining

Fig . 1.7 Demographic Transition Theory

Look at the graph in Fig 1.7 carefully. Answer the following questions :

1) What do the blue and the black lines show?
2) What does the green part in the graph show?
3) What does the blue part in the graph show?
4) In which stages is the birth rate more than the death rate?
5) In which stages is the birth rate same as the death rate?
6) In which stage is the death rate more than birth rate?

Geographical explanation

Generally, a country experiences various stages in population growth. It never experiences the same rate of growth or decline. Along with the economic development, tendencies of birth rate and death rate are different. Hence, growth rate of population also varies. The theory of demographic transition is based on the population trends of a country with time. According to this theory, a country passes through different stages of population growth. It may take several years to pass through a stage. They are as follows :

Stage 1 : High stationary stage

Both birth rates and death rates are high during this phase, so population growth is stable. Birth rates are high because having lots of children is considered to be a good idea. At this stage, the financial position of the country is not developed. It is dependent on agriculture or similar primary occupations. People engaged in secondary and tertiary activities are negligible. Educational opportunities are limited. Fertility rates are high. Families are big. Science and technology are not developed. Low sanitation, high occurrence of contagious diseases, lack of medical facilities and malnutrition are responsible for high death rates. At present, no country falls in this category.

Stage 2 : Early expanding stage

Technological expansion of science occurs and development starts. Therefore, medical and health care services start expanding. Efforts are underway to control and combat diseases. This leads to a reduction in mortality. But the birth rate is constant. As a result, the population grows rapidly. Production in agriculture and industry increases. Transportation network increases. Efforts to control the population are launched. The developing countries with high populations are currently undergoing this phase. This stage is also known as the 'population explosion' phase,

as it has the highest growth rate as shown in the fig 1.7. For example, Countries like Congo, Bangladesh, Uganda, Niger, etc. are presently in this stage.

Stage 3 : Late expanding stage

The reduced death rate in the second stage is still decreasing in this stage too. Birth rates are also decreasing now. This reduces the rate of population growth. But, the population is still growing because birth rates are higher than death rates. As the progress of the country is accelerating, the income of the people of the country is above the subsistence level. Their standard of living is elevated. Poverty is decreasing. Use of technology is seen to expand. Secondary and tertiary activities expand. Education level of the population also increases. People now know the importance of family planning. Family size reduces. Countries that are moving towards developed stage from developing are going through this stage. For example, China.

Use your brain power !

- In which stage do you think India is passing right now?

Stage 4 : Low stationary stage

The birth rate in the third stage now lowers further. The standard of living is very high. The economic condition of the country and the economic status of the citizens improves a lot. Secondary and tertiary occupations have a higher share than primary. The death rate is also very low as the best medical facilities are available. Epidemics like cholera, plague, etc. have been eliminated. People are health conscious. The birth rate is not less than the death rate but is almost the same. Therefore, population growth is minimal. For example, developed countries like USA are going through this phase.

Stage 5 : Declining stage

The birth rate is very low and almost equals the death rate. Population growth is minimal or in some countries, could be negative. The population may be reduced because of higher mortality. In such countries the number of children is very low and the elderly are very high. Standard of living is very high. The economic condition of the country and the citizens is very good. Tertiary activities contribute the most to the economy. High quality of educational and medical facilities are available. Healthy environment and pleasant life is preferred. E.g. Sweden, Finland, etc.

Can you tell ?

Look at the fig. 1.7 and answer :

1) If the crude birth rate is 7 and the crude death rate is 8 then which stage of demographic transition is the country in?

2) If a country has crude death rate of 20 and crude birth rate of 24, then which stage of demographic transition is the country in?

Always remember

Population Composition :

Composition of population covers all the characteristics of a population that can be measured. For example, rural and urban residence, age, marital status, sex ratio, etc. are the basis on which population can be classified to understand its characteristics.

Population Structure :

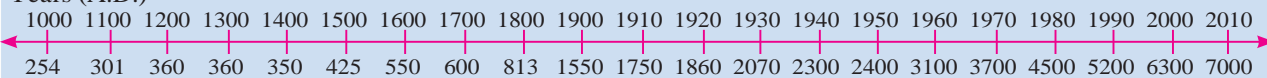Structure of a population is the overall picture or the idea we get by studying the composition of the population. For example, age composition of the population tells us about the percentage of children, young and aged in the country. Population structure will give us an idea about the dependency ratio and the effects this composition will have on the economy of the country. We will study about them in the next chapter.

Find out in what multiples has population increased in the following timeline and write down your findings. For example, in the initial phase, the population took 6 centuries (1000 to 1600 A.D.) to double itself.

Years (A.D.)

1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
254	301	360	360	350	425	550	600	813	1550	1750	1860	2070	2300	2400	3100	3700	4500	5200	6300	7000

Population of the world approx. (in millions)

Exercise

Q. 1) Identify the correct correlation :

A : Assertion; R : Reasoning

1) A : Areas which have fertile soil have dense population.

R : Fertile soils are good for agriculture.
   1) Only A is correct
   2) Only R is correct
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

2) A : Population of a region does not change.

R : Birth rate, death rate and migration affect the population of a region.
   1) Only A is correct
   2) Only R is correct
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

3) A : In stage 2, death rate reduces but birth rate is constant.

R : The population increases rapidly in stage 2.
   1) Only A is correct
   2) Only R is correct
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

Q. 2) Write short notes on :
1) Impact of relief on population distribution.
2) Correlation between birth rates and death rates.

3) Stage 3 of Demographic Transition theory.

Q. 3) Give geographical reasons :
1) India is passing through Stage 3 of demographic transition.
2) Population distribution is uneven.
3) Population increases because of transportation facilities.
4) Secondary and tertiary activities increase in the third stage of demographic transition.
5) Population may increase though birth rates are low.
6) Population density is a function of population and area of a region.

Q. 4) Answer in detail :
1) Explain the physical factors affecting distribution of population.
2) In the first and fifth stage of the demographic transition, population growth is almost nil. What is the difference between the two stages then?
3) Discuss the problems faced by countries in stage 4 and stage 5.

Q. 5) Draw a neat labelled diagram for demographic transition theory and its various stages.

Q. 6) On an outline map of the world, show the following with index :
1) Highly populated region in Australia.
2) Sparsely populated region in India.
3) Any 2 countries in stage 5 of Demographic Transition Theory
4) Any 2 countries in stage 2 of Demographic Transition Theory

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2. Population : Part - 2

Population is also considered as a human resource. The physical and intellectual characteristics of the population affect the development of a region. The development of a region is dependent on how human resources are used like other natural resources. The human economic activities also develop with reference to human resources. In fact, if human resources are not developed efficiently, the use of other resources also gets adversely affected. Considering these issues, the population structure, sex ratio, literacy rate, etc. are studied in Population Geography.

Population Composition :
1) Age Structure :

The age structure of a population refers to the number of people in different age groups-

infants, children, teenagers, young, adults, old people. Each of the age group has a share in the population. Their share in the population varies from country to country. The population in each group changes. Their share in the population also varies. Try the following activity in fig. 2.1 to understand the age structures of different countries.

Geographical explanation

Demographers use population pyramids to describe age and genderwise distribution of populations. The Y-axis in the centre of this graph shows age groups while X-axis shows population or percentage of population in specific age groups. The lengths of bars show the numbers or percentage of population. The left side of the graph represents the males while

Try this.
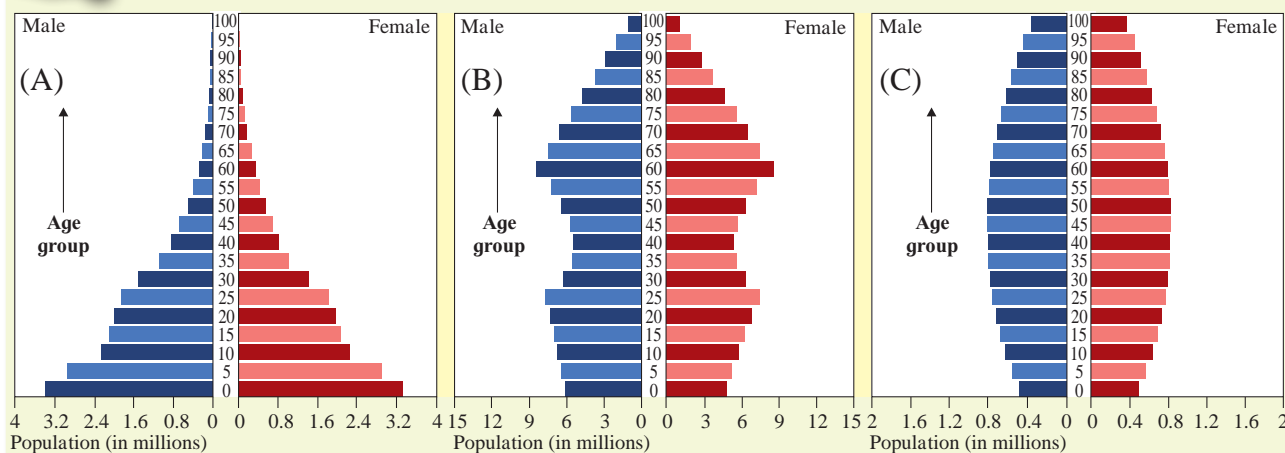
Fig. 2.1 Three types of population pyramids

In fig. 2.1, A, B, C are three population pyramids. Study their shapes and answer the following questions :

1) In which pyramid(s) the number of children will be the least?
2) In which pyramid(s) the number of old people will be the least?
3) Which pyramid(s) represent(s) a 'young country'?
4) Which pyramid(s) represent(s) a country with high medical expenditure?
5) Which pyramid(s) represent(s) a country with a large manpower?
6) Which pyramid(s) represent(s) developing and developed countries respectively?

the right side represents the females. The base of the graph represents the children population while apex represents the old people.

A larger size of the population in the age group of 15-59 years indicates the chances of having a larger independent working population. On the other hand, if the number of children in 0-15 is high, the dependency ratio will be high. Similarly, a growing population in the age group of 60 plus, indicates greater expenditure for medical and health facilities for the aged population.

Three main types of population pyramids :

As per fig.2.1, we will see three main types of population pyramids :

i) Expansive (A) : Broad base with narrowing apex shows that more people die at each higher band. This also shows high birth rate and high death rate.

ii) Constrictive (B) : Base gets narrower while apex is broader. This indicates lower percentages of younger people and more of elderly people. This shows low birth rate and lower death rates.

iii) Stationary (C) : Almost all age groups have same percentages. Very low birth rate and very low death rate. Population hardly grows.

The type of age structure has a direct influence on the future of a nation. Both extremes, i.e., old age dependency as well as young age dependency, prove to be a severe burden on the economy of a country. On the other hand, higher proportion of working population means large number of manpower.

Can you tell ?

Population pyramid of India is given in fig. 2.2. Read the pyramid and answer the following questions :
• Which pyramid type does India belong to?
• Comment upon the age-structure of its population.

Fig. 2.2
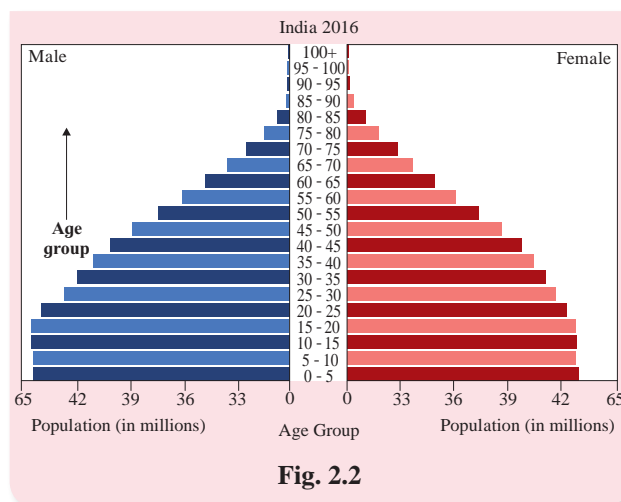
Give it a try.

On the basis of the survey done in practical 1, draw a population pyramid for the people in 15 households. Write your conclusions after studying the structure of the population.

2) Sex composition :

Population pyramids also tell us about the number of women and men in various age groups of the country. The gender distribution in a country is an important demographic characteristic. The ratio between the number of women and men in the population is called the sex ratio. In India, it is calculated by using the formula :

$$\text{Sex ratio} = \frac{\text{Total Female population}}{\text{Total Male population}} \times 1000$$

The sex ratio is an important information about the status of women in a country. On an average, the world population reflects a sex ratio of 990 females per 1000 males. The highest sex ratio in the world has been recorded in countries like Latvia, Estonia, Russia and Ukraine where there are 1162 females per 1000 males. In contrast, in Saudi Arabia there are 667 females per 1000 males. Countries like China, India, Bhutan, Pakistan, Afghanistan have a lower sex ratio. In general, Asia has a low sex ratio.

Demographic Dividend

Can you tell ?

Read the following table and answer the questions that follow :

Table 2.1 : India - Demographic Dividend

Decade	Ratio of working/ non-working population	Percentage of working population
2001-10	1.33 : 1	57.1
2011-20	1.53 : 1	60.5
2021-30 (projected)	1.81 : 1	64.4
2031-40 (projected)	1.72 : 1	63.2

Source : Economic Survey, 2016-17, Pg. 33

1) What does the table show?
2) What is the relationship between second and third column?
3) How will this relationship affect the economy of India?
4) What will happen if the ratio decreases over the years?

Geographical explanation

Demographic dividend refers to the growth in an economy, which is the result of a change in the age structure of a country's population. The change comes because of a decline in birth rates and death rates. As fewer births are registered, the number of young dependents grow smaller, relative to the working independent population.

In simple words, dividend is a type of reward that is distributed among the shareholders. It is the division of profit or surplus received. In a country, there is working population and dependent population. The ratio between working and non-working dependent population determines how productive the country is economically. The higher the ratio, higher will be the contribution of working population in the economy.

When the population of a country goes through demographic transition, fertility rates, birth rates and death rates also change. There is a change in the age structure of the country. As fewer births are registered, the number of dependents become smaller than the working population. With fewer people to support and more people working, economy's resources are invested in other areas to accelerate a country's economic development. As a result of this, per capita income increases over with time. This economic benefit is in the form of dividend which benefits everyone in the economy.

The benefits are not achieved automatically. Demographic dividend depends on whether the government implements the right policies in areas such as education, health, research, etc. It depends on the level of schooling, employment, frequency of childbearing, economic policies on tax incentives, health programs, pension and retirement policies.

Demographic dividend in a country is visible in the following ways :

1) Personal savings can grow and can be used to stimulate the economy.
2) As number of children are less, parents can invest more in their education. Thus, human capital is built.
3) As more women join the labour force and become economically strong, they contribute in the country's economic growth.
4) Per capita GDP increases because dependency ratio is decreased.

Try this.

Answer the questions after studying table 2.2 carefully :

Table 2.2

Country	Retirement Age reforms being implemented or under consideration (in years)
Germany	Retirement age to increase gradually to 66 by 2023 and to 67 by 2029
United States of America	Retirement age to rise gradually to reach 67 for those born in 1960 or later
United Kingdom	Retirement age to increase for both men and women to 66 by October 2020 and further to 67 between 2026-28
Australia	Retirement age scheduled to increase gradually to 67 by 2023
China	By 2045, to increase retirement age for both men and women to 65
Japan	Under consideration to raise the retirement age to 70
India	On an average, 60 years. May vary from 55 years to 65 years according to services

Source: Economic Survey 2018-19 Vol 1, Pg 145

1) What does the table show?

2) Classify these countries into developed and developing.

3) What could be the reasons behind increasing the retirement age in these countries?

4) What will be the impact of increase in the retirement age on the economy of the respective countries?

5) Why is China considering increasing the age later in 2045?

6) Considering these examples from developed countries, will it be good for India to increase its retirement age? Express your views about this.

7) Write a concluding statement about the relationship between age structure, life expectancy and economy of a country.

	Geographical explanation

The table 2.2 shows that many countries have considered or are considering an increase in the retirement age. This is happening because increase in ageing populations puts increasing pressure on pension funding, retirement provisions and medical facilities. Therefore, many countries have begun raising the pensionable retirement age. Increase in ageing population occurs because life expectancy of the population is generally increasing. Thus, people can now work up to higher ages. For example, the life expectancy in Japan is around 84 years. Therefore, they are now considering increasing the retirement age to 70 which is at present 60 years.

Another aspect which needs to be seen in these countries is their age structures. The proportion of children and young adults in these countries is less or decreasing and hence these countries have increased the retirement age. In China, the retirement age will be changed only in 2045 because it is only then that the proportion of children and young adults is going to reduce in the age structure. Given that life expectancy is likely to continue rising in India, the growing proportion of young and child populations should also be considered.

3) Literacy and education :

Proportion of literate population of a country is an indicator of its socio-economic development. It reveals the standard of living, social status of females, availability of educational facilities and policies of the government. The level of economic development is both, a cause and consequence of literacy rate.

Every country has its own definition of literacy. In India – literacy rate denotes the

percentage of population above 7 years of age, which is able to read, write and has the ability to do arithmetic calculations with understanding.

Find out !

Find out the minimum age taken into consideration for calculating literacy.

1) Brazil   2) USA   3) Germany

Can you tell ?

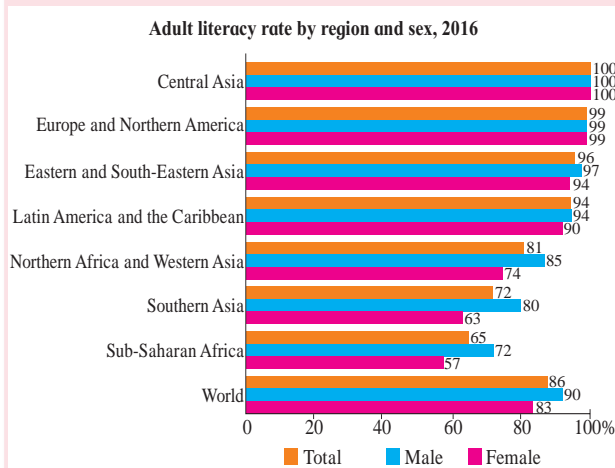Read the following graph in fig. 2.3 and answer the following questions :

Adult literacy rate by region and sex, 2016

Fig. 2.3

1) Which region has the highest literacy rate?

2) Which region has the lowest literacy rate?

3) In which region does women fare better than men in literacy rate?

4) Write a concluding paragraph about the graph.

Geographical explanation

The graph in fig. 2.3 clearly tells us that we find differences in the literacy rate in the same continent. Compared to the global average, the literacy rates in Europe, North America and Eastern and South-East Asian countries are

higher, whereas they are lower in Northern Africa, Western Asia, South Asia and Sub-Saharan Africa. In any continent or sub-continent, the literacy rate of females is not more than men, except where there is full literacy as in Central Asia. It is same in Europe and North America. According to the graph, the lowest literacy rate is in Sub-Saharan Africa.

4) Occupational Structure :

The working population (i.e. women and men of the age group – 15 to 59) take part in various primary, secondary, tertiary and quaternary occupations. The proportion of working population engaged in these sectors is a good indicator of the levels of economic development of a nation. This is because only a developed economy with industries and infrastructure can accommodate more workers in the secondary, tertiary and quaternary sector. If the economy is still agrarian then the proportion of people engaged in primary activities is high.

Give it a try.

Study the table 2.3 carefully and answer the following questions :

1) What does the table show?

2) Which sector has the highest occupation? In which year?

3) Which sector has the lowest occupation? In which year?

4) In which sector is the working population increasing?

5) In which sector is the working population occupation decreasing?

6) Draw a suitable diagram for statistical information showing A, B and C columns from 1901-2011.

7) Compare the data. Write a concluding paragraph on the graph.

Table 2.3 : Occupational Structure of India (1901-2011)

Year	1901	1951	1961	1971	1981	1991	2001	2011
A. Primary Sector (1+2+3+4)	**71.9**	**72.7**	**72.3**	**72.6**	**69.4**	**67.4**	**57.4**	**48.96**
1. Cultivator	50.6	50.0	52.8	43.4	41.6	38.5	29.6	26.4
2. Agricultural Labourers	16.9	19.7	16.7	26.3	24.9	26.4	25.4	20.3
3. Livestock, forestry, fishing etc.	4.3	2.4	2.3	2.4	2.3	1.9	1.7	1.5
4. Mining and quarrying	0.1	0.6	0.5	0.5	0.6	0.6	0.7	0.8
B. Secondary Sector (5+6)	**12.5**	**10.0**	**11.7**	**10.7**	**12.9**	**12.1**	**16.8**	**23.52**
5. Manufacturing	11.7	9.0	10.6	9.5	11.3	10.2	12.4	16.92
6. Construction	0.8	1.0	1.1	1.2	1.6	1.9	4.4	6.6
C. Tertiary Sector (7+8+9)	**15.6**	**17.3**	**16.0**	**16.7**	**17.7**	**20.5**	**25.8**	**27.52**
7. Trade and Commerce	6.0	5.3	4.0	5.6	6.2	7.5	11.1	12.1
8. Transport, Storage and Communications	1.1	1.5	1.6	2.4	2.7	2.8	4.1	4.8
9. Other Services	8.5	10.5	10.4	8.7	8.8	10.2	10.6	10.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

5) Rural-Urban Composition :

The division of population into rural and urban is based on the residence. This division is necessary because rural and urban life styles differ from each other in terms of their livelihood and social conditions. The age-sex-occupational structure, density of population and level of development vary between rural and urban areas. The criteria for differentiating rural and urban population varies from country to country.

In general terms, rural areas are those where people are mainly engaged in primary activities and urban areas are those where majority of the working population is engaged in non-primary activities.

Can you tell ?

On the basis of which other characteristics can you explain the composition of population? Make a list.

Migration -

Read the following events and answer the questions that follow :

1) Ramprasad has grown up in a village in Northern India. His uncle who lives in Mumbai has called him to Mumbai and offered him a job.

2) Ritika has completed her post-graduation from a famous college in Pune. She landed a job in a big company in the USA. It's been 5 years and now she has settled there.

3) Sahmat's country is undergoing a war situation. For security reasons, the people had to leave their country and go somewhere else compulsorily. Sahmat and her family have taken refuge in the neighbouring country.

4) Babanrao is a small farmer from the Marathwada region. He faced losses in agriculture due to drought. Some other family problems also forced him to sell his land and he shifted to the nearby city. Now he is working and earning livelihood for himself and his family.

5) Ritesh from Pimpalwadi completed his school education in his village. He has gone to Nashik for further education.

6) Latika, daughter of Surekha and Sandeep from Satara, went to Solapur after marriage.

Questions :

1) What similarities do you find in these events?

2) Is there a change in the location in these events? Why?

3) Arrange these 6 events according to the difference in the relative distance between the new and the old locations?

4) Make a list of reasons for leaving the original location.

5) Classify the reasons into willing and reluctant.

6) Make a list of reasons behind migration besides the ones given here.

Geographical explanation

When an individual or group of individuals moves from one place to another, from one political boundary to another, for lesser or longer duration or permanently; this movement is called migration. This may happen in a pre-planned manner or may happen suddenly. Also it can be either voluntary or involuntary.

In general, migration brings changes in the population. If people migrate to a region, the population of the region will increase. If people leave a region and migrate to another region, its population will decrease. Population density, patterns and structure of the population of both the original region (donor region) and the region where migration has taken place (recipient region) will be affected.

Migration can be classified into various types on the basis of their region, duration, intention or purpose, distance, etc.

1) On the basis of region :

In this classification, migration can be divided into two types :

A) **Internal migration :** People migrate within the boundaries of their country. They do not leave the country. This is done from one state to another or from one city to another. e.g. moving to Mumbai from other states of India.

B) **External Migration :** In this type of migration, people leave their country and move to another country. e.g. moving abroad for higher education from India.

2) Classification by duration :

1) **Short-term :** This type of migration can be, for limited time or seasonal. Some tribes travel seasonally in search of fodder, this is called seasonal migration. In some places in Maharashtra, more labor is needed during sugarcane harvesting. Then, these labours work in sugar cane fields. When there is no work on the farm, they go to the city and work as labourers. This is an example of seasonal migration.

2) **Long-term :** People leave their place of residence and move to a new place. It is not decided whether they will return soon or not. They may come on holidays for a few days and go back. For example, 1) People from India have migrated to the United States of America, Great Britain etc. 2) Some villagers have come to the city in search of employment and have settled here.

In both the examples, if the migrated person returns to the original place after a very long time, it is called a long term migration. But if the person never returns to his original place, it is called permanent migration.

In addition, migration can be voluntary or involuntary.

Reasons for migration :

There are different reasons for human migration from one region to another. It can be economic reasons in some places and social causes in some places.

1) **Physical :** Natural events like earthquakes, volcanic eruptions, droughts and flooding may be responsible for population to migrate.

2) **Economic :** Migration in which people migrate in search of jobs, businesses, improve their standard of living, etc.

3) **Social :** Often people have to migrate forcefully. People decide to leave the place rather than face social problems. It may involve forcing people of a certain group to migrate. Discrimination, education,
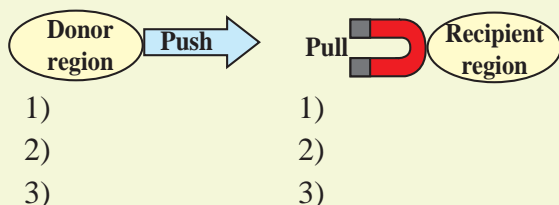
health, medical facilities, marriage, etc. can be reasons behind migration.

4) **Political :** Sometimes war or political problems may arise in a country. In that case, people from that country migrate and seek refuge in another country.

Donor region → Push → Pull → Recipient region

1)
2)
3)

1)
2)
3)

Geographical explanation

As long as the financial, physical, and psychological needs of a human being are fulfilled in a region, he remains in that region. But when these needs become difficult to be fulfilled, he leaves the place. The factors that cause people to move away from their original places are called push factors. For example, reduced employment opportunities, wars, drought, water or air pollution etc.

On the contrary, when people are attracted to a region due to some factors, they are called pull factors. For example, education and availability of employment opportunities are the pull factors.

Impact of migration on population :

We have studied various aspects of population. Migration affects these two factors: distribution and density of population. Migration takes place between two regions. One of them is the donor region while the other is the recipient region.

Population of a region requires housing, water supply, transportation, health facilities, education, recreation, etc. to settle down. In a donor region, migration cause less or no utilisation of these facilities. As a result, expenditure incurred on them becomes unnecessary because population has there reduced.

In such regions, sex ratio and age-structure also change tremendously. For example, majority of men in the working age group of the state of Kerala, go to foreign countries for employment. As a result, Kerala has a higher sex ratio than other states. (1084, Census 2011). When we consider the age structure of the state, we find that the number of children and older people exceeds young age group.

On the contrary, the recipient region may face a pressure on provision of facilities. Housing, water supply, transportation may prove insufficient as compared to the population. One of the most badly affected sectors could be agriculture in the peripheral regions. A large chunk of agricultural land is used for non-agricultural purposes like housing. Also, prices of land increase tremendously. Lack of housing leads to increase in slums. Public facilities get affected very badly. Economic inequality also rises in such cities. Crime rates may also increase.

The recipient regions may also have an unfavourable sex ratio. For example, Mumbai (832), Pune (948) Also working population may be higher than other age groups. There is a great deal of exchange of new ideas and concepts in such regions. These become centres of creation and new researches. Development and use of new technologies is seen. Consequently, development, especially economic development, also takes place on a large scale.

Complete the table 2.4, which shows the impact of migration on the population. One is solved as example.

Table 2.4

Sr. No.	Type of migration	Positive effects	Negative effects
1	International migration	Employment is available to migrants. Improves their financial status.	Resources are affected. Sometimes, they might be sent back to their original country.
2	Internal migration		
a	Rural to urban migration		
b	Urban to rural migration		
c	Rural to rural migration		
d	Urban to urban migration		
3	Seasonal /temporary migration		

Exercise

Q. 1) Identify the correct co-relation :

A : Assertion; R : Reasoning

1) A : Increase in dependency ratio will affect the economy.

   R : Medical costs are high when there are more elderly in the population.
   1) Only A is correct
   2) Only R is correct
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

2) A : In population pyramid, a broad base indicates high number of children in a country.

   R : Broad apex is an indicator of high number of elderly in a country.
   1) Only A is correct
   2) Only R is correct
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

Q. 2) Write short notes on :

1) Population growth and migration.

2) Population pyramid and sex ratio.

3) Occupational structure of a population.

4) Literacy rate.

Q. 3) Give geographical reasons :

1) In developed countries, percentage of population engaged in agriculture is low.

2) Literacy rate of a country is an indicator of its socio-economic development.

3) Demographic dividend increases when proportion of working population increases.

4) Migration is not always permanent.

Q. 4) Differentiate between :

1) Donor region and Recipient region.

2) Expansive pyramid and Constrictive pyramid.

Q. 5) Answer in detail :

1) Outline the importance of population pyramids in the study of populations.

2) Explain the rural and urban population structure.

3) Examine the impact of migration on the population structure of a country.

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Fig. 3.1

Observe Fig. 3.1 and answer the following questions :

1) Where are human settlements likely to develop : A, B, C, D or E? Why?

2) In the above figure in which place human settlement is not likely to develop and why?

3) Looking at figure above, what factors do you think could contribute to the development of human settlements?

4) Can economic factors be important along with physical factors for the development of human settlements?

5) Do physical factors affect the economic activities of human settlements?

6) Make a list of factors which affect development of settlements in an area.

	Geographical explanation

Man being a social animal, likes to live in groups. Further, social bonding and social needs are developed. Due to the social needs, many people come together at a particular place and construct houses in a particular way, which is known as settlement.

Human habitat is in the form of settements. This may range from one house to a city. It shows that a group of people are using some territory to build houses as well as for their economic support. Man stays here, lives and carries out economic activities.

Physical, cultural and economic factors affect the human settlements. Settlements are developed due to the co-relation between man and environment. Physical Factors like relief,

altitude, soils, climate, drainage, groundwater level, etc. influence the type and spacing of settlements. For example, in dry regions, water is a crucial factor and therefore, houses are situated along the water source.

Sometimes, social factors can also lead to fragmentation of settlements. In the past, areas were conquered or attacked frequently by outsiders. For a long time, therefore, security concerns favoured the evolution of nucleated settlements.

Types of Settlement :

Settlements vary in size and type. They range from a hamlet to metropolitan cities. With size, the economic character and social structure of settlements change and so do its ecology and technology. Settlements could be small and sparsely spaced; they may also be large and closely spaced. On the basis of spacing between the houses, settlements can be divided into the following four types :

1) Compact or clustered or nucleated settlement.
2) Semi-clustered or fragmented settlement.
3) Dispersed settlement.
4) Isolated settlement.

Try this.

Observe different images in Fig. 3.2 A to F. They show various patterns of settlements. Try to understand the difference between them. Carefully read their characteristics in second column. According to the applicable characteristics, write the alphabet of the image settlement in the place provided below the characteristics.

Satellite images of the settlements	Characteristics of settlements
A	**Linear pattern :** a) Settlements occur along a road, railway, canal or river. b) They are in a straight line or take the shape of the road or the river.
B	**Rectangular pattern :** a) Settlements are in a straight line. b) Such lines are parallel to each other. c) These days planned cities may take such a shape.

C	**Patternless :** a) With the development of the settlement, the size of the population also increases. b) Increasing population leads to haphazard development of settlements. c) Houses are built as per convenience and space available.
D	**Radial pattern :** a) Settlements grow around a central object or center. b) This central point plays an important role in development of the settlements around it.
E	**Circular pattern :** a) Settlements take shape around a lake. b) Houses are closely spaced because of availability of water.
F	**Triangular pattern :** a) Found at the confluence of two rivers or roads. b) The settlements can grow in all three sides due to physical or social reasons.
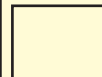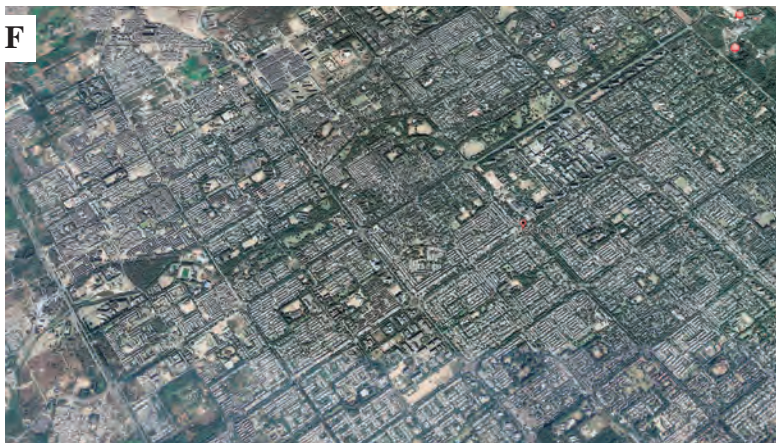
Fig. 3.2

Town		City	
Metropoli-tan cities		Mega Cities	
Urban Agglomer-ation		Outgrowth	

As cities perform various functions, they can be divided on that basis. Some towns and cities specialise in certain functions and they are known for some specific activities, products or services. However, each town performs a number of functions. On the basis of dominant or specialised functions, Indian cities and towns can be broadly classified as follows. Complete the table 3.2 with examples from Maharashtra and India.

Table 3.2

Functions	Name of the cities from Maharashtra	Name of the cities from outside Maharashtra
Administrative		
Industrial		
Transport		
Commercial		
Mining		
Cantonment		
Educational		
Religious		
Tourism		

Think about it.

Can a town have only one function ? Why do the cities become multi-functional?

Geographical explanation

Looking at the cities above, we realise that cities do not carry out only one function. They generally carry out more than one function as they grow. One of these functions may be a major one. As towns become cities and cities

---

Always remember

'Type' refers to a category of things having some common features, where as 'pattern' refers to a regular form or order in which a series of things occur. When we say settlement pattern, the term is strictly applied to the spatial arrangement or distribution of settlements within a given area.

Compact settlement is a type of settlement while linear settlement is a pattern. It can be compact or dispersed.

Let's recall.

Can you differentiate between urban and rural settlements?

Geographical explanation

One can also divide settlements according to their functions. On the basis of their functions, settlements can broadly be divided into two types – rural and urban. Unlike rural settlements, urban settlements are generally compact and larger in size. Based on their functions and types, cities can be classified.

Types of Urban Settlements :

Visit http://censusindia.gov.in/2011-prov-results/paper2/data_files/India2/1.%20Data%20Highlight.pdf to know how cities are divided into various types in India on the basis of their populations. Also look for examples from Maharashtra. Refer to the website and complete the table as given below :

Table 3.1

Classification	Population	Classification	Population
Class I		Class II	
Class III		Class IV	
Class V		Class VI	

become metro cities, with time, complexity in a city increases. Generally, cities become bigger and lots of changes can be seen in them. These changes are in the form of change in land use and structure of a city. These changes also result in the change in skyline of the city. See the image at the end of the Exercise.

Land Use :

Try this.

Do the following activity in class with your teacher.

1) Obtain a map of your city or village. You can also use Google Earth and select an image of your area. Alternatively, you can also make a map of your college and surrounding area.

2) The map should include your school and nearby streets.

3) On a Xerox machine, enlarge the area on the map that surrounds your school/ college.

4) Take a short walk around the area that is represented on the map with your teacher. Mark the areas according to the key with a specific colour given below.

Land use in my city/village	Suggested colour scheme
Parks/ open spaces	Green
Houses/ apartments	Dark Red
Shops/ stores/ commercial establishments/ malls	Light blue
Public buildings/ offices/ schools/ colleges/ bus station/ railway station	Light Red
Agricultural	Yellow
Water bodies/rivers/	Dark blue
Transportation (roads / railways, highways, etc.)	Black

5) You may add more descriptions if required by using more colours.

6) This will help you to get an idea of what type of buildings and land use exists around the neighbourhood.

7) After coming back to the class, discuss which land use occupies more land than the others.

Geographical explanation

You must have observed that the land around you is put to different uses. Some land is occupied by rivers, some may have trees and on some parts roads and buildings have been built. Different types of lands are suited to different uses. Human beings, thus, use land as a resource for economic activities, production, as well as residence and recreation.

Land Use Classification :

You know that the land use in rural areas is different from that in urban areas. Generally, in rural areas, land use revolves around agriculture. In urban areas, it revolves around residential and other economic activities . The classification of land use in rural areas is done according to the Land Record Department. It is as follows :

1) **Forests :** The land under forest.

2) **Non-agricultural Uses :** Land under settlements (rural and urban), infrastructure (roads, canals, etc.), industries, shops, etc. are included in this category. An expansion in the secondary and tertiary activities would lead to an increase in this category of land-use.

3) **Barren and Wastelands :** The land which may be classified as a wasteland such as barren hilly terrains, desert lands, ravines, etc. normally cannot be brought under cultivation with the available technology.

4) **Area under Permanent Pastures and Grazing Lands :** Most of this type land is owned by the village 'Panchayat' or the Government. Only a small proportion

of this land is privately owned. The land owned by the village Panchayat comes under 'Common Property Resources.'

5) **Area under Miscellaneous Tree Crops and Groves (Not included in Net sown Area) :** The land under orchards and fruit trees are included in this category. Much of this land is privately owned.

6) **Culturable Waste-Land :** Any land which is left fallow (uncultivated) for more than five years is included in this category. It can be brought under cultivation after improving it through reclamation practices.

7) **Current Fallow :** This is the land which is left without cultivation for one or less than one agricultural year. Fallowing is a cultural practice adopted for giving the land rest. The land recoups the lost fertility through natural processes.

8) **Fallow other than Current Fallow :** This is also a cultivable land which is left uncultivated for more than a year but less than five years. If the land is left uncultivated for more than five years, it would be categorised as culturable wasteland.

9) **Net Area Sown :** The physical extent of land on which crops are sown and harvested is known as net sown area.

Land use in urban areas :

1) **Residential Areas :** Any of those lands which man uses for his dwelling. He builds up (land cover) and carries out construction.

2) **Industrial Areas :** The land, where any of the manufacturing activity exists (land cover), where people work for their livelihood. (land use.)

3) **Institutional Areas :** The space over which the educational centres, universities, insurance offices, cantonments and similar to these activities exist and are used for the activities associated with all these land uses.

4) **Recreational Areas :** The place (land cover) where people visit to seek entertainment (land use) like parks, playgrounds, open or close theatres, etc.

5) **Transportation :** The space (land cover) used for moving around by man. It includes airports, railway stations, roads, railways, harbours, etc.

6) **Commercial Areas :** These are business centres where selling of finished products is carried out for day-to-day usage in urban areas. These areas are intermixed with residential areas. At few places, commercial areas can aggregate to form definite clusters, especially at the core i.e. CBD (Central Business District).

7) **Plot Layouts :** These are vacant lands mostly developed for construction of buildings. These are usually located on the periphery of the urban areas. These lands encroach the agricultural land due to the pressure of the increasing population.

8) **Mixed Land Use :** It is an area where various types of land uses exist together. These may include residential, commercial and industrial land use in an integrated manner. In such areas, one can find houses, businesses, shops, schools, clinics and open spaces at one place itself.

Always remember

Land use is distinct from land cover. They are sometimes used synonymously but mean different things. Land cover describes the physical surface covering the land such as forest, water, ice, bare rock, sand, etc. Land use describes the use that the land has been put to by people. For example, the land use might be 'recreational' but the land cover might be vegetation or forest.

Understanding both the land use and land cover provides a comprehensive

picture of a particular area. Land cover can be determined by analysing the satellite imagery. Land use cannot be determined from satellite imagery alone.

Rural-Urban Fringe :

Geographical explanation

The area between urban and rural area is called urban- rural fringe. It has characteristics of both urban as well as rural areas. It is not a separate zone as such, but is a transition between the two and merges into both of them. People using automobiles make their daily trips to perform their jobs, from these areas to its central area, where their offices and economic institutions are generally located. When large urban areas develop, the span of urban areas increases. This is called 'urban sprawl'. The term 'rural-urban fringe' has been used to designate such areas, where we have a mixture of rural and urban land use.

The rural-urban fringe has a complex structure. The city and surrounding areas consist essentially of two types of administrative areas- the Municipal Councils and Gram Panchayats. The smaller municipal towns close to the main city tend to lose their identity and are, in reality, a part of the geographical city. The quality of services in these towns is comparable to those of the main city.

The towns away from the main city maintain their distinct identity and have a distinct set of problems relating to urban amenities and transportation. The quality of these services are generally inferior. The areas in the rural areas also exhibit a certain level of diversity— agricultural land may have been converted to residential or industrial areas or the whole area may be entirely rural, the only link with the city being the daily commuters. Beyond the urban fringe lies the rural fringe, consisting of villages only and partly affected by urbanisation.

Suburbs :

Outside the metro city, there may occasionally be a small town or a number of well-established towns or small cities. These are often called suburbs. For example, Bhandup, Kalyan, Virar, etc. are considered to be the suburbs of the main city of Mumbai. They are all cities in themselves but developed as a result of growth in Mumbai. Hence, they are the suburbs of Mumbai. Similarly, Wakad, Hinjawadi, are suburbs of Pune.

See maps of Ichalkaranji city given below and observe how changes have occurred in the city over the years. Answer the questions that follow :

LAND USE LAND COVER MAP- ICHALKARANJI CITY, KOLHAPUR DISTRICT

A) 2007

B) 2017

LEGEND :

Agriculture	Built Up- Rural	Built Up- Public/Semipublic
Forest	Built Up- Residential	Built Up- Recreation
Wasteland-Scrub	Built Up- Residential-Sparse	Built Up- Mining/Quarry
Waterbodies	Built Up- Industrial	Built Up- Open Space

Scale - 1:80,000

0 0.5 1 2 3 4 KM

Generated by:
MAHARASHTRA REMOTE SENSING APPLICATION CENTRE
Department of Planning, Government of Maharashtra
VNIT Campus, South Ambazari Road
MRSAC Nagpur-440010, Maharashtra

1) Enlist the colours used for showing land uses in the index.
2) What do the blue and the black lines show?
3) What is the name of the river in the map?
4) Name any two villages shown on the map.
5) Which city is shown on the map?
6) Which periods do the maps belong to?
7) Which land covers have reduced? What are their colours?
8) Which land covers seen to have increased? What are their colours?
9) Which land covers have been replaced by the increased land covers?
10) Write a conclusive note comparing both the maps.

Geographical explanation

Both the maps show land use land cover from two different periods – 2007 and 2017 – for the city of Ichalakaranji in Kolhapur District. The maps show the main city and the surrounding regions. Various colours shows types of land uses and land covers.

When we see the maps carefully, we find that the area under wasteland scrubs has transformed into industrial areas. Also, few parts in the city which show built-up has increased from sparse to dense. In some parts in rural areas, area under mining has increased. Some quarries have come up. Some areas under recreation have also reduced and denser urban growth is seen in this area. It is also found that areas along the roadways in the fringe of the city have urbanised during this period.

Exercise

Q. 1) Identify the correct correlation :

A : Assertion; R : Reasoning

1) A : Settlements can be of various types.

   R : Various physical factors affect the growth of settlements.

   1) Only A is correct.
   2) Only R is correct.
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

2) A : When cities grow, their functions also grow.

   R : Cities can have only one function.

   1) Only A is correct.
   2) Only R is correct.
   3) Both A and R are correct and R is the correct explanation of A.
   4) Both A and R are correct but R is not the correct explanation of A.

Q. 2) Give geographical reasons :

1) Not all rural settlements change into urban settlements.
2) In rural settlements, land use is related to agriculture.
3) Rural-urban fringes have the characteristics of both urban and rural settlements.
4) Growth of urban areas is linked to land use.

Q. 3) Write short notes on :

1) Interrelationship between rural and urban settlements.
2) Problems of urban settlements.
3) Suburbs.
4) Mixed land use.

Q. 4) Answer the following questions :

1) Explain the characteristics of rural settlements.
2) What factors are responsible for development of various patterns in a settlement? Give examples.

Q. 5) Differentiate between :

1) Land use and Land cover

2) Barren and Non-agricultural land

3) Radial pattern and Circular pattern

4) Nucleated and Dispersed settlement

Q. 6) Draw a neat and well-labelled diagram for :

1) Linear settlement   2) Radial settlement

3) Compact settlement   4) Dispersed settlement

Q. 7) Write a note in your own words about how land use in Lonar city has evolved over time.
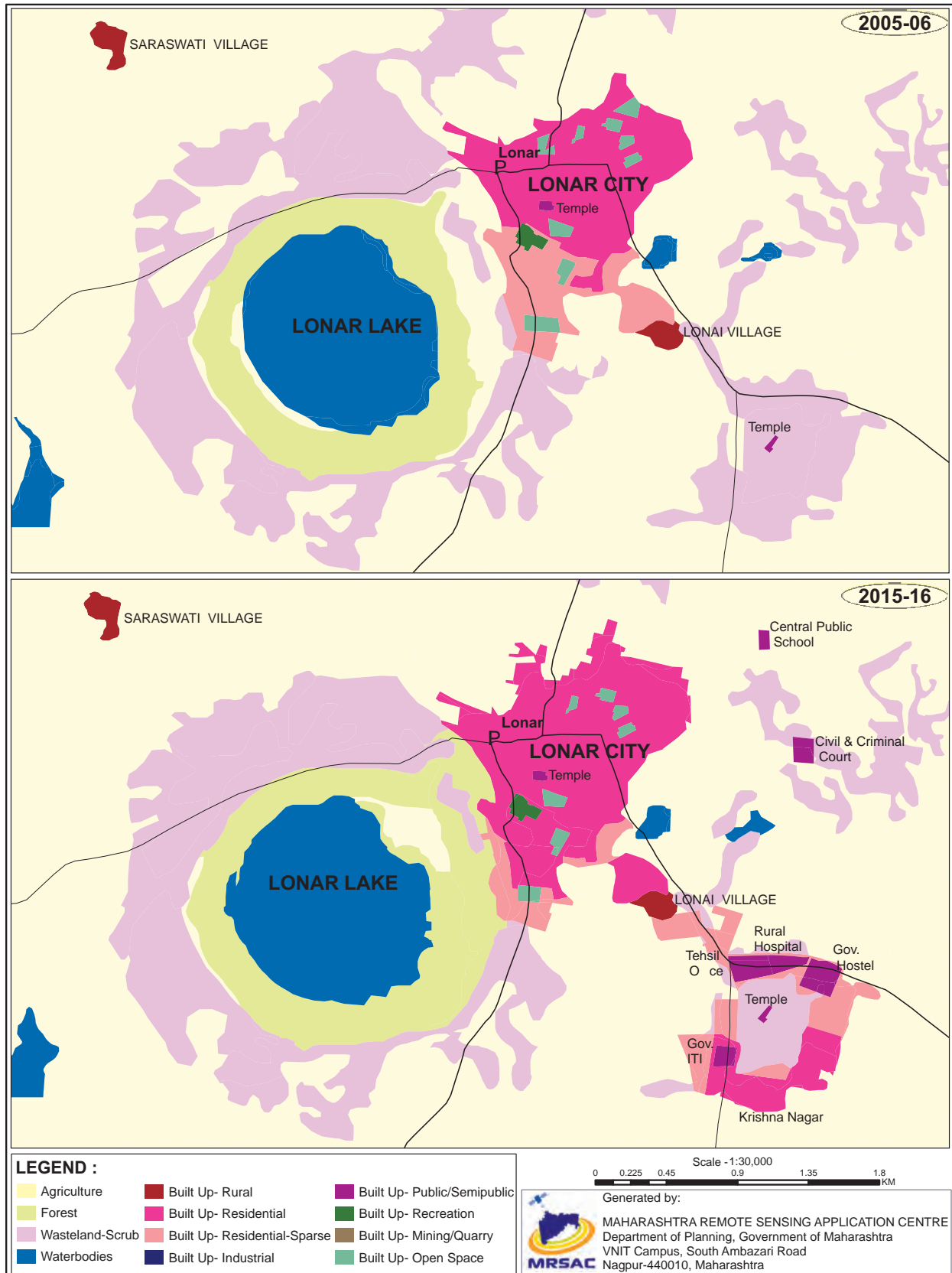
Q. 8) Read the given passage and answer the following questions :

Different types of human settlements include hamlets, villages, small towns, large towns, isolated places, cities and conurbations. In some systems, types of human settlements are broken up into urban, suburban and rural; for example, the U.S. Census Bureau divides settlements into urban or rural categories based on precise definitions. Small settlements, such as hamlets and villages, have low populations and restricted access to services. Larger types of settlements, such as cities, have higher populations, higher densities and greater access to services. For example, a village may have only one or two general stores, while a large metropolis may have many specialized stores and chain stores. These differences are known as low-order service settlements and high-order service settlements. Larger settlements also have a sphere of influence affecting surrounding settlements. Settlements may also be divided by the site chosen, such as sites selected based on resources, trading points, defensive sites, shelter and relationship to water resources. The functions of human settlements also differ, as settlements may be established as ports, market towns and resorts. Types of rural settlements may also be classified by function, such as proximity to farming, fishing and mining. Settlements that focus on one economic activity are called single functional settlements. Human settlements may be permanent or temporary. For example, a refugee camp is a temporary settlement, while a city is a permanent settlement .

1) Which human settlements are mentioned in the passage above?

2) On what basis are urban and rural areas classified?

3) What are the functions carried out in rural settlements?

4) Explain the difference between low-order service and high-order service settlements.

✳✳✳

1932

1988

2013

How skyline of a city changes with time

Make friends with maps!

World- Major Regions of Primary activities

Fig . 4.1

Index

Agriculture
Animal husbandry
Fishing
Mining
Lumbering
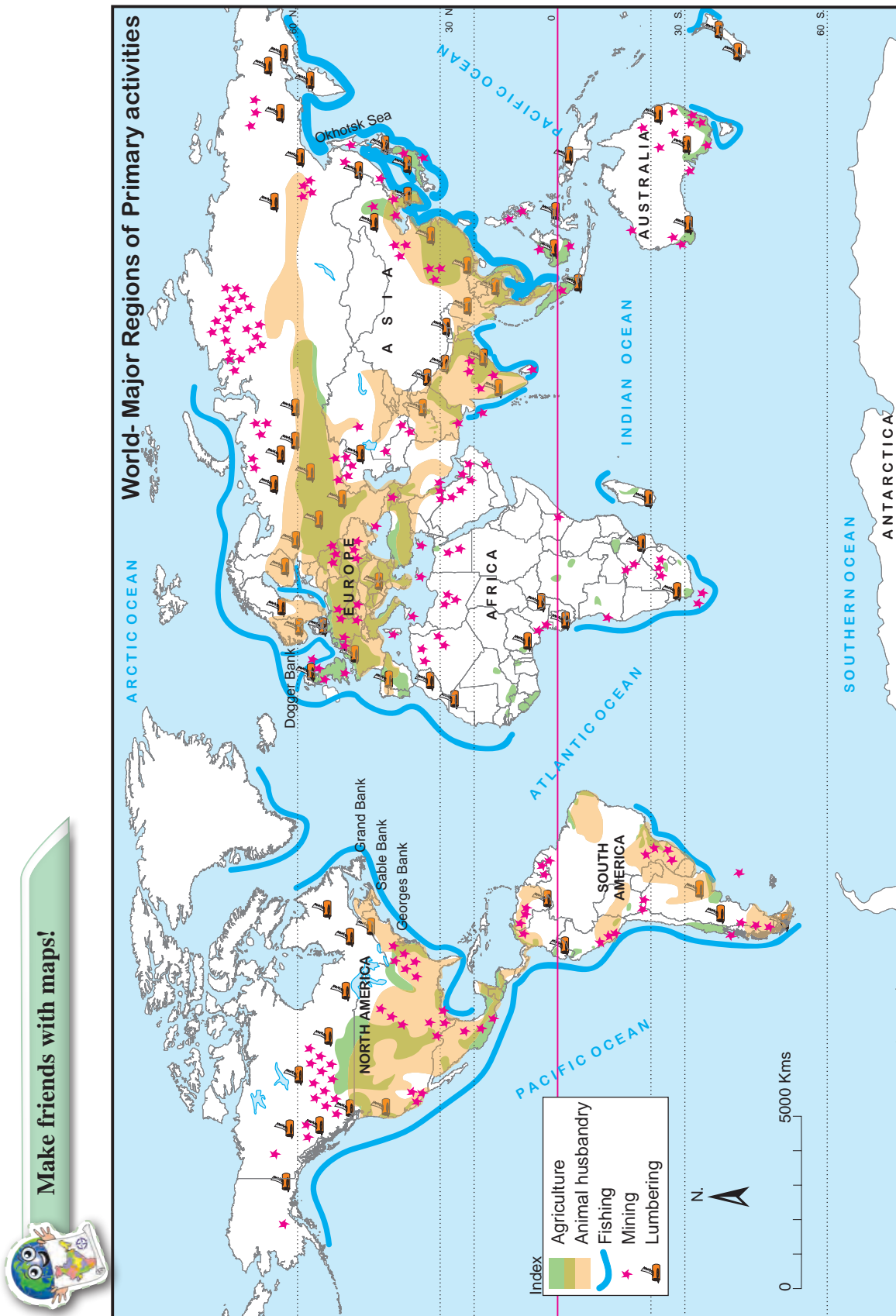
5000 Kms

Observe the given in fig. 4.1 map and answer the following questions :

1) Which economic activities are shown on the map?
2) In which regions do you don't find any activity? What could be the reason?
3) In which latitudes do you primarily find the distribution of lumbering activity?
4) Why is fishing occupation only found in certain areas in the oceans?
5) Which primary economic activities are mostly found in Europe?
6) What production does the symbol of mining shown in seas and oceans depict?
7) In which continent is mining not found?
8) In which ocean is the world's fishing mostly carried out?
9) Which primary economic activities are found to the south of Tropic of Capricorn?
10) Which primary activity is found in the islands of South East Asia?
11) Considering all the four continents, in which continent do you find less agriculture being practised?
12) Write a paragraph on relationship between latitudinal extent of agriculture and climate in your own words.

Geographical explanation

You must have understood the difference in the distribution of various activities from the given observation. All these activities are dependent on nature. Hunting, gathering, animal husbandry, agriculture, fishing, lumbering, mining etc. are primary economic activities.

Natural resources exploited in primary activities, factors affecting these activities and effect of natural calamities affect these primary activities.

To fulfil the needs of growing population, to provide technical help to manpower etc. mechanization was started in primary activities.

Try this.

Complete the following table in your notebook. One has been done for you as an example.

Table 4.1

Primary economic activity	Natural resources required for the activity	Factors affecting activities	
		Natural	Man-made
Agriculture	Land, soil, water, air	Slope of land, Quality of soil, favourable climate, rainfall	Fertilizers, insecticides, farm machines
Animal husbandry			
Fishing			
Mining			
Lumbering			
Gathering			

Primary Occupations :

1) **Hunting :** Hunting was a primitive activity of man to obtain food. A large number of animal species have become extinct or are on the verge of extinction because of large-scale hunting. Commercial hunting is banned all over the world. Also many laws are being passed to conserve and protect the animals. Some tribes practice hunting for their subsistence.

Distribution :

Bushmen of Kalahari desert (South Africa), Pygmies of Equatorial Selvas, Boras, Eskimos of Tundra, Sentinels in Andaman, Jarawahs, Onges, etc. hunt for livelihood.

Find out !

With the help of the internet, find about the Wild Life (Conservation) Act.

2) Gathering :

Fig. 4.2

1) Identify the images given above.
2) What are these products made from?
3) Where do you find the raw materials that are required to make these products?
4) What is the occupation of obtaining these raw materials called?

Geographical explanation

Many people in the world practice this activity which is dependent on the forest products. They collect fruits, roots and tubers, leaves, flowers, medicinal plants for their livelihood. They also collect products like gum, lac, honey, wax, rubber, etc. Different types of forest products are collected. e.g. kath is collected from monsoon forests from Khair trees. Some of these products have a high demand in the market. This activity is carried out on a large commercial scale. This occupation is carried out in all the forest covered regions of the world.

The equatorial forests are dense and evergreen. The climate is humid and unhealthy. Due to the disturbance of reptiles and insects, collection of forest products is not done on a large scale.

3) **Lumbering :** Observe the given map in Fig. 4.1 and answer the following questions :
1) Which countries in the monsoon region practise lumbering on a larger scale?
2) In which part of Australia is lumbering carried on?
3) Why do you think lumbering is not carried out in the Northern part of Africa?
4) Write a note on the relationship between latitudes and lumbering.
5) Lumbering is not developed on a commercial level in equatorial regions?

Complete Table 4.2 in your notebook. One has been done for you as an example.

Table 4.2 : Lumbering practised in different parts of the world

Type of forest	Regions	Characteristics of forests	Characteristics of lumbering activity
Equatorial Evergreen forests	Amazon river basin in South America, Congo river basin of Africa, West coast of Africa, South East Asia, Papua New Guinea.	• Dense forests • Many species in a small area • Hard Wood trees • Accessibility is difficult • Inhospitable climate	• Dense forests increase inaccessibility and transportation issues • Traditional methods of lumbering • Insects, reptiles cause problems • Hard wood is comparatively less in demand than softwood • Presence of many species in one region unprofitable.

Type of forest	Regions	Characteristics of forests	Characteristics of lumbering activity
Tropical Deciduous forest (Monsoon)			
Temperate deciduous forest			
Temperate Coniferous forest			

Geographical explanation

Amongst all other activities going on in the forest, lumbering is one of the most important activities. According to the nature of vegetation, we divided earth into various natural regions.

The trees in the tropical forest have hardwood. Also, these forests are evergreen and hence commercial lumbering cannot be done in these forests. Tropical deciduous or monsoon forests are not dense. Many bushes grow at the base of these forests. Since these forests are near agricultural lands and densely populated regions, they have been deforested for agricultural purpose on a large scale.

In the coniferous forests, only one species of trees is found in an area. These trees grow tall. That's why in the world, the lumbering activity is mostly practised in the coniferous regions.

Today, wood is used on a very large scale for various purposes, hence the percentage of forest in the world is decreasing drastically. As a result, hazards related to the environment are occurring.

Can you tell ?

List out the effects of deforestation on the environment, animals, birds and humans.

4) **Fishing :** Observe the map in Fig. 4.1 and answer the questions given below :

1) Along which coast of North America is the Grand Bank located?

2) Along which coast of South America is the fishing mostly practised?

3) In which part of the Australian continent has fishing activity developed?

4) Fishing is carried out on large scale on the Western coast of Africa than on the Eastern coast. Give reasons.

5) Commercial fishing is practised on the Southern coast of Greenland. Give reasons.

Geographical explanation

There are many physical and human factors that impact development of fishing as a primary activity in certain areas of the world. Though it started as a subsistence level activity, fishing is now one of the major primary economic activities especially in coastal areas.

Some of the factors are as follows :

(a) Wide expanse of the continental shelf with presence of shallow water. For example, North-West Pacific which is below 200 metres of depth near Okhotsk Sea near China.

(b) Confluence of warm and cold currents and subsequent growth of abundant plankton. As a result, development of fishing grounds or banks takes place. For example, meeting of warm Kuroshio current with cold Oyashio

current favours coastal area near Japan for fishing.

Other factors which are favourable for development of fishing are :

1) The traditional skills of some people who are naturally good at fishing, for example, Japanese and Chinese. The fishing activity has further developed over here.

2) Large population of the country, lack of land and absence of other protein food makes island countries especially dependent on fish as a staple food. For example, Japan, Philippines.

3) Absence of alternative occupation makes fishing a major occupation.

4) Use of technology has increased fishing activity.

5) Broken coast line provides excellent portal facilities.

6) Cold climate in temperate regions facilitates preservation of fish. In tropical countries, artificial refrigeration facilities have to be developed.

7) Nearby forest provides wood for ship building.

Think about it.

What is the difference between fishing and pisciculture?

5) **Animal husbandry :** Look at the map in Figure 4.1 and answer the following questions :

1) Do you think there is a correlation between animal husbandry and grasslands?

2) In which continent is animal husbandry not practised on a large scale?

3) In which regions of the world do animal husbandry and agriculture coincide?

4) Animal husbandry is found in between which latitudes of the world?

5) In which zone between 30°North and 30°South latitudes, is animal husbandry not found on a large scale? What could be the reason behind?

6) What could be the reason of concentration of animal husbandry in the Eastern part of Australia?

7) Why is animal husbandry developed more in the arid regions of the interior of the continents?

Geographical explanation

Considering the latitudinal distribution of animal husbandry in the world, it is located between 30°N to 60°N and 30°S to 55°S latitudes. Climate is one of the most influencing factors in the development of animal husbandry. It is more developed in the Northern Hemisphere. Presence of grasslands in all the continents has led to distribution of this occupation. But, this occupation is influenced by advanced technology, market and availability of large estates. It has developed on a commercial basis in North America, South America and Australia. The animal husbandry in North and South America is carried out with the help of advanced technology on a commercial scale. Dense forests inhospitable climate, low-quality fodder in equatorial region has discouraged the development of animal husbandry in these regions. Looking at fig. 4.1, we realise that agriculture and animal husbandry is done together in man's areas. Hence, they are considered as allied activities.

Find out !

Find out how overexploitation of all kinds of animal resources affects human lives and enviroment.

6) **Mining :** Look at the fig. 4.1 and answer the following question :

1) In which part of North American continent is mining mainly found?

2) Mining activity is located along which coastal side of the continent of South America?

3) Comparing other primary economic activities, do you think the extent of mining is related to latitudes? Why?

4) Looking at the concentration of mining in the world, can you relate it with the economic development of the country?

Geographical explanation

Man has been using minerals since ancient times. Minerals have been used for making weapons, tools, jewellery, medicines, utensils, etc. The various stages of cultural evolution of man are also related to the use of minerals. At the end of the Stone Age, man developed skills of using minerals. Various periods like the Copper Age, Bronze Age, Iron Age, Atomic Age, respectively were delineated accordingly. Man's progressive development can be attributed to the exploitation of minerals. He has even started exploiting the mineral oil and natural gas reserves from the sea and ocean beds too.

Man cannot manufacture the minerals that are found naturally in the earth's crust. The distribution of minerals is highly uneven in the world. This activity depends solely on the presence of minerals and not related to latitude directly. Even though the minerals may be present, actual mining depends on several factors. These factors may be the geology of the region, the value of the minerals, climate, capital investment, technology, skilled labour, etc. Due to mechanisation, this occupation has developed on a large scale. Many industries related to minerals locate near mining areas. Improved transportation facilities are very important for development of mining occupation. This, in turn, increases industries which in turn leads to economic development of the country.

Find out !

Mining causes air, water, land and noise pollution on a large scale. Look for one example of each.

7) Agriculture :

Try this.

Complete the chain by observing the columns A , B and C. Write the number of the relevant characteristics and type of agriculture in column A:

A) Image	B) Characteristics	C) Type of Agriculture
Characteristics no. .... Type of Agriculture no. 	1) • Small land holding. • Maximum yield from small land. • Food crops are dominant. • Manual labour and use of animals. • China, India, Japan, Korea, Sri Lanka and East Asian countries. • Rice is the major crop.	A) Shifting Agriculture

Characteristics no. .... Type of Agriculture no. 	2) • Large size of farm. • Capital intensive, more use of modern machinery. • Monoculture • Use of machinery from sowing to harvesting. • Cultivation and commercial animal husbandry is done together • Per hectare low but per capita income is high, • Temperate grassland, Steppes, Praries, Downs, Pampas, Velds. • Wheat and maize are the major crops.	B) Horticulture
Characteristics no. .... Type of Agriculture no. 	3) • Large farm size. • Capital intensive. • Monoculture. • Local labour is employed. • Crop is well managed for quality and processing. • Per hectare yield low but total production is high. • Once plantation is done, it gives production for 10 to 15 years. • Tea, coffee, rubber, cocoa etc., spice plantations in Kerala, cashewnut plantation in Konkan region. • Malaysia, India, Sri Lanka, Brazil, Indonesia, Caribbean Islands, Philippines, Thailand, Vietnam.	C) Market Gardening
Characteristics no. .... Type of Agriculture no. 	4) • Forest land is burnt and used for agriculture. • Very small farm size. • Production is very less. • Production can be taken for only 2 – 3 years. • Land left fallow and move ahead looking for another land. • Forest resources decline and soil erosion occurs. • Mainly practiced in forested tropical regions of Asia, South – East Asia, South and Central America and Africa.	D) Intensive Subsistence Agriculture

| Characteristics no. .... Type of Agriculture no. .... | 5) • Modern type of agriculture.
• Fulfill the demands of urban people it is developed in fringe areas.
• Maximum production from limited agriculture area.
• Use of capital is high.
• Along with use of manual labour, use of scientific technology, knowledge and capital.
• Organic and chemical manures or fertilizers and irrigation.
• Practised in areas lying at distance of an overnight journey by trucks.
• Vegetables, fruits, milk, eggs, meat, fish etc.
• Developed mainly in highly industrialised and densely populated urban areas. e.g., fruits, vegetables and flowers from Khedshivapur, Saswad are brought to Pune. | E) Plantation Agriculture |
| Characteristics no. .... Type of Agriculture no. .... | 6) • Fruits, flowers, medicinal plants, ornamental plants etc. are produced for commercial use.
• Use of manual labour and mechanization.
• Practiced in tropical, Mediterranean and temperate regions where climate is supportive. | F) Extensive Commercial Agriculture |

Fig. 4.3 : Types of agriculture and characteristics

Try this.

On the basis of the information given and pictures shown above, classify the factors affecting agriculture into physical and human factors.

Geographical explanation

When we look at the distribution of agriculture as an occupation in the world, we see that the proportion of people engaged in agriculture is maximum in Africa and then in Asia. Though the area under agriculture is more

extensive in Europe, the Americas and Australia; the percentage of population engaged in this activity is very less. Generally, the developed countries of the world have less population engaged in agriculture while the share of population engaged in agriculture is higher in developing countries.

Various crops are produced in the different parts of the world. Various physical and socio-economic factors influence the development of agriculture. Major physical factors that influence agriculture are climate, topography, soils and biotic factors. The economic and social factors include labour, market, capital, transportation facilities, storage facilities, government policies, population, ownership of

land etc. We saw various types of agriculture and their characteristics through the images given earlier. Greenhouses, polyhouses are also used for agriculture. Similarly, high-yielding seeds, fertilizers and insecticides are also used for increasing production.

Think about it.

• Greenhouses and poly-houses are used for growing vegetation from specific regions in other regions. Similarly, can they be used in snow-capped regions and polar areas?
• Besides these activities, can you think of other primary activities carried in the world? Make a list.

Exercise

Q1) Choose the correct option and complete the sentence :

1) Gathering of various products from the forests for livelihood is mainly carried in
   a) Temperate coniferous forests
   b) Temperate Deciduous forests
   c) Tropical deciduous forests
   d) Equatorial evergreen forests

2) Ideal location for fishing
   a) rugged coasts, shallow seas, hot climate, growth of planktons
   b) shallow seas, confluence of warm and cold ocean currents, growth of planktons, cold climate
   c) continental shelf, growth of planktons, good fishing skills, cold climate
   d) continental shelf, rugged coasts, growth of planktons, cold climate

3) Primary Economic activity not related directly to latitudinal locations
   a) lumbering   b) fishing
   c) mining   d) agriculture

4) Characteristics of extensive commercial agriculture
   a) monoculture, use of water, tropical, cereal production
   b) monoculture, use of machinery, tropical, cereal production
   c) monoculture, use of manual labour, equator, Thailand, horticulture
   d) monoculture, use of scientific know how, sub-tropical, production of pulses

Q. 2) Complete the chain :

A	B	C
1) Intensive Subsistence agriculture	1) Dogger Bank	1) Small size of farm
2) Pampas Grassland region	2) Off shore oil and gas production	2) Unfavorable
3) Fishing	3) Rice	3) Bombay High
4) Gathering	4) Dense forest	4) NE Atlantic Ocean
5) Mining	5) Commercial animal husbandry	5) South America

Q3) Write short notes on :

1) Plantation agriculture
2) Physical factors and fishing
3) Lumbering on a commercial scale
4) Hunting and loss of ecosystem

Q. 4) Give geographical reasons :

1) Agriculture is done on a large scale in India.
2) Mining is developed in the Chhota Nagpur plateau of India.
3) Lumbering is developed on a large scale in Canada.
4) Extensive agriculture is a commercial type of agriculture.
5) Lumbering is practised more in coniferous region than in tropical region.
6) Hunting has been banned.

Q. 5) Differentiate between :

1) Lumbering in equatorial forests and Temperate forests.
2) Plantation agriculture and extensive commercial agriculture.
3) Mining and Fishing.

Q. 6) Answer the following questions :

1) What are the factors affecting commercial fishing?
2) Write a note on Intensive Subsistence agriculture.
3) Give the characteristics of Market Gardening.
4) Write a note on the areas in the world practicing commercial animal husbandry.
5) Mining is dependent on the extraction of naturally occurring minerals. Explain.

6) Write in detail about the characteristics of primary economic activities.

Q. 7) On an outline map of the world, show the following with appropriate symbols and prepare an index :

1) Dogger Bank fishing area.
2) Area of lumbering in Asia.
3) Area of animal husbandry in Australia
4) An area of agriculture in Europe.
5) Mining area in Arabian Sea.
6) Fishing area in South-West Atlantic Ocean.

Q. 8) Given below is the data about the continent-wise employment engaged in primary economic activities in the year 2018. Draw a suitable diagram to represent the data and answer the questions that follow :

Continent	% of population engaged in primary economic activities
Europe	7.91
Asia	24.49
North America	14.93
South America	14.94
Africa	47.28
Australia	27.79

Source: FAO data, 2018

1) In which continents is less than 10% of the population engaged in agriculture?
2) In which continent is more than 40% population engaged in agriculture?
3) Looking at the given data, can you arrange these continents in an ascending order on the basis of level of economic development?

✱✱✱

Observe the pictures given in figure 5.1. Identify the activities with which these figures are associated and complete the table 5.1

A)

B)

C)

D)

E)

F)

G)

H)

Fig. 5.1

• **Table. 5.1**

Figure	Name of the activity	Raw materials required	Finished products obtained	Characteristics of raw material (weight, durability, procurement, cost price)	Characteristics of finished products (weight, durability, production, selling price)
A					
B					
C					
D					
E					
F					
G					
H					

Geographical explanation

In the previous chapter, we have learnt about the primary activities, where the product is directly obtained from the nature. Some products obtained through primary activities are utilised directly, while some are processed and made into a more durable product. The products obtained from the primary economic activities are used as raw material in secondary economic activities. Further, processing of these materials takes place and a manufactured finished product is prepared to sell it to the consumers. Secondary activities add value to natural resources by transforming raw materials into valuable products.

Secondary activities, therefore include manufacturing, processing and construction (infrastructure) industries. The place where conversion of products obtained from primary activities into final products takes place, is called 'factory'.

Try this.

1) Look at the map of Solapur district in fig. 5.2. It shows the location of some sugar industries. Shamrao is a farmer at location A. He has just harvested his sugarcane crop. Study the map and tell where should he send his crop? What factors will Shamrao consider for this?
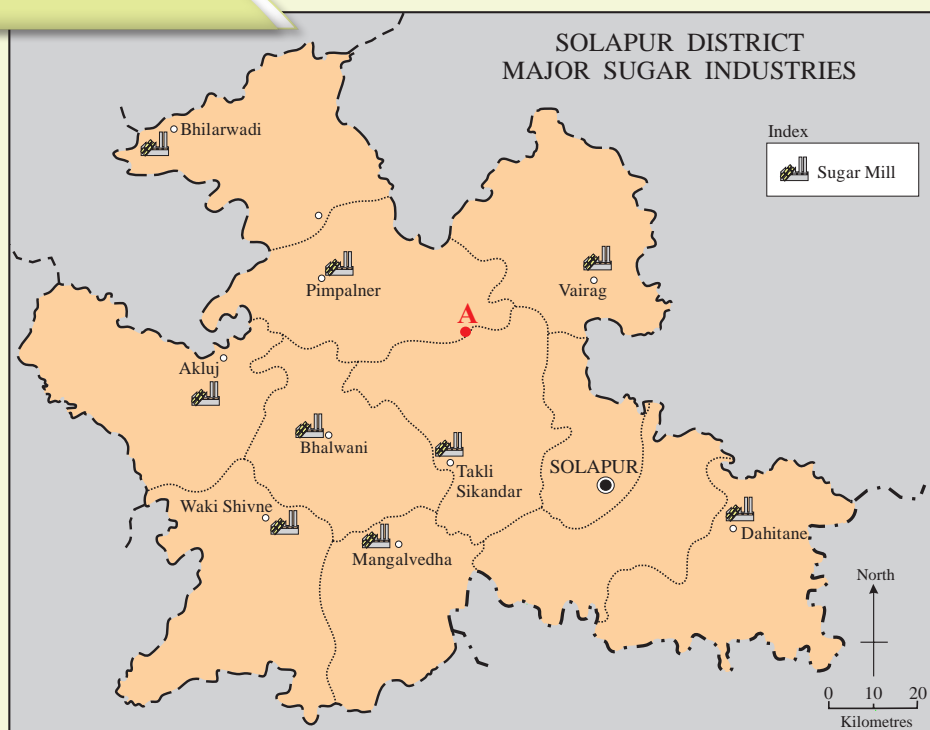
Fig. 5.2 : Map of Solapur

2) Firoz's son has done an advanced course in Bakery Management from the nearby city. He wants his son to start a bakery in their village but his son says it should be in the city, which is around 20 kms from their village. Who is correct? Firoz or his son? Why?

3) Shantaram is a young boy from a tribal area in Maharashtra. He wants to start a honey processing unit as he has access to good honeycombs in the forest. The city is around 35 kms away. He has his own land in the village and is also getting land in the city. Where should he establish the honey factory? In the village or in the city? Why?

| Geographical explanation |

While studying all these examples, you will understand that location of an industry is dependent on many factors.

To set up an industry, one needs raw material and that has to be transported from somewhere. We know that the raw material for industry is the final product of the primary activities. The characteristics of the raw material and also the finished product affect the location of industries. For example, sugar industries need sugarcane. Sugarcane loses weight and amount of sugar after harvesting as time after harvest increases. This affects their effective use for producing sugar. Thus, sugarcane needs to be sent to nearby factories as soon as possible. Sugar industries are, therefore, located near the production of raw material. On the other hand, in bakery industries, the final output, say cake, has higher weight than raw materials. This will be costlier to transport, as transport cost will increase with weight. Therefore, bakery industries are located near the markets. Let us, look at the factors which affect the location of industries.

Always remember

Weight-losing industries are industries where the raw materials are relatively bulky, but the resulting product is relatively lighter.

On the other hand, weight-gaining industries are industries whose raw materials are lighter but finished products are heavier and bulky. Weight-losing industries will be located near the raw material while weight-gaining will be located near the market. In earlier times, transportation costs increased with distance and weight.

Physical Factors :

1) **Climate :** Harsh climate is not much suitable for the establishment of industries. There may not be any industrial development in extremely hot, humid, dry or cold climate. For example, the extreme type of climate of North-West India or extreme North India hinders the development of industries there. Change in climatic conditions, for example, may also affect industries. For example, chronic droughts.

In contrast to this, the moderate climate of western coastal area is quite congenial to the development of industries. Earlier, when artificial threads and mechanization were not used for making textiles, cotton thread-making required humid climate because thread breaks in dry climate. Consequently, majority of cotton textile mills were concentrated in coastal parts of Maharashtra and Gujarat. Artificial humidifiers are used in dry areas these days, but it increases the cost of production.

2) **Availability of raw material :** Raw materials used in industries mainly come from farms, mines, forests, fisheries etc. Thus, location of industries is dependent on the nature of raw material. Industries dependent on perishable, heavy, bulky

and weight-losing raw materials, such as sugarcane, are located near the raw material area. (as in example 1 in Try this). The jute mills, sugar mills, are mostly concentrated close to the sources of raw materials for this very reason. Similarly, industries processing local fruits are found near Mahabaleshwar and Nagpur. Perishable fruits need to be processed soon and hence, they are located near these cities.

3) **Water and power supply :** Almost all the industries require plenty of water for various processes like cooling, smelting, washing etc. Thus, such industries are located near the banks of rivers or near lakes. Coal, oil, electricity are indispensable energy resources in running any type of industry. Coal is heavy and bulky. Thus, industries dependent on coal as energy resource are located near the mining area. Electricity and oil can be supplied through wires and pipelines easily over long distances. Hence, industries dependent on it, need not be located near their source region.

4) **Labour :** Different types of industries require different types of labour. For example, construction, mining industries or textile industries require semi-skilled labourers, where as food-processing industries, ornament-making industries require skilled labourers. In spite of increasing mechanisation, some industries still require a large number of workers. Hence, we find that labour colonies are found near large industries.

5) **Transportation :** The cost of transportation and time required to carry goods is known as economic distance. Low cost of transportation is the key factor in the location of industries. Cost of transportation will be more for heavy, bulky, perishable raw materials and for longer distances. For example, transportation of coal. On the other hand, light-weight and non-perishable items can be brought from far distances through cheaper transportation like waterways. Such industries may be located near the ports or rivers. For example, cotton textiles or pulpwood.

6) **Site or availability of land :** Site requirements for industrial development are of considerable significance. Location should be generally flat and well served by adequate transport facilities. Large areas are required to build factories. Earlier, industries were concentrated near urban areas but now because of non-availability of land and high prices, there is a tendency to set up industries in rural areas. For example, Lote Parshuram industrial area in Chiplun and Chakan in Pune.

Economic Factors :

1) **Proximity to Market :** The entire process of manufacturing is futile until the finished goods reach the market. Nearness to market is essential for quick disposal of manufactured goods. It helps in reducing the transport cost and enables the consumer to get things at cheaper rates. Ready market is most essential for perishable and heavy commodities. Sometimes, during the process of production, products become bulky and delicate. For such final products, industries are located towards markets. For example, cake as a final product is heavier than raw materials. That is why, such industries are located near markets i.e. cities.

Can you tell ?

Find examples of market-oriented industries.

2) **Capital :** Capital or huge investment is needed for the establishment of industries. Industries are located in those areas where banking and financial facilities are easily available. As a matter of fact, capital is attracted to those areas where industries

are localised which, in turn, attract more industries. Mumbai, Kolkata, Chennai and Delhi being the centres of industry have better banking and financial facilities than other cities. Now, with an expansion of better banking facilities in rural areas, industries can also be located there.

Political Factors :

1) **Government policies :** The government may give boost to industries producing certain goods by giving several incentives. It may provide finance, land, water, transport and communication facilities at subsidised rates. It may promote industrialisation in economically backward regions with a view of developing these regions. It also provides tax concession, marketing consultancy, export and import facilities to industrialists and entrepreneurs, who establish industries in such regions. For example, the 'D and beyond' categories of Government of Maharashtra's industrial policy.

   At the same time, government may also discourage location of industries in a particular area like coastal zones or eco-sensitive areas.

2) **Setting up of SEZs :** Many governments support establishing such zones or regions which are specially developed for industrial production. In India, they are called Special Economic Zones (SEZs). They are specially earmarked geographical zones, which can be developed by private sector or public sector or in a public-private-partnership (PPP) model. These are mainly developed to boost export–quality production in the country. Such SEZs attract many industries to be set up there. For example, SEEPZ near Santa Cruz.

Other Factors :

1) **Split location :** Sometimes, the different stages of production are decentralized and production is organized at different places for reducing transport costs. In mobile industries and automobile industries, various parts of a commodity are made in different areas and assembled at one place. Splitting of the production of a commodity at different places reduces costs.

2) **Economies of scale or agglomeration :** Availability of various facilities lead to establishment of industries in a region. By using the available opportunities according to 'economies of scale', the region attracts more industries with time. Consequently, concentration or agglomeration of industries occurs in this region. As a result of this, the above-mentioned physical and economic factors have no influence on location. A special characteristic of such a region is that industries that are mutually complementary to each other are established here. For example, all over the world, places where iron and steel industries were located, saw the development of industries which use steel as raw material, viz. utensils, automobile accessories, locomotives, etc. This in turn led to establishment of car-manufacturing units, packaging industries, railway engine manufacturing industries, etc.

   Due to such agglomerations, new industries get more profit as compared to low investment due to 'economies of scale'.

Footloose industries :

A footloose industry does not have a strong locational preference because the resources, production skills, and consumers on which it depends can be found in numerous places. Such a company may relocate anytime, hence the term footloose. The Internet and other forms of advanced communication technology have made location completely detached from both resource and market considerations. Some prominent examples of footloose industry are watch-making, diamond cutting, etc. Like the inputs, the output is

lightweight and can be easily transported to the markets. Most of the footloose industries produce low volume and high-value outputs.

In example 3, in 'Try this', honey industry is a footloose industry as its location is not related to weight of raw material or finished product.

Following is a list of few industries. Think about the factors of location of these industries and tell whether they are footloose industries or not. Complete the table accordingly in your notebook.

1) Cotton textile industries
2) Cement industries
3) Diamond industries
4) Mobile manufacturing units
5) Paper industry
6) Sugar industry
7) Food processing industry
8) IT (Hardware) industry
9) Oil refinery
10) Hairpins industry

Name of Industry	Raw materials required	Finished products	Factor affecting location

Industrial Regions :

Industries are unevenly distributed because the factors affecting industrial location are not the same everywhere. Industries tend to concentrate in a few pockets because of earlier mentioned favourable factors. The pockets having high concentration of industries are known as 'industrial regions'.

Study the given map in Fig. 5.3 and answer the following questions :

1) In which hemisphere do you find more concentration of industries?
2) In which part of North America has the industrial region been mainly developed?
3) In which parts of Europe is concentration of industries mainly found?
4) Why is less industrial development found in the other parts of African continent except coastal areas?
5) In which part of India do you find concentration of industries?
6) Why do you think coastal areas have higher concentration of industries?
7) Write a concluding paragraph on latitudinal distribution of industries in the world.

Geographical explanation

Major Industrial regions of the world :

Industrial regions are those areas, where concentration of industries has occurred due to favourable geo–economic conditions. These are the areas within which manufacturing industry is carried out on a relatively large scale employing large proportion of working population.

Some of the characteristic features of industrial regions are :

1) Agglomeration of industries.
2) Dense population growth, large labour force.
3) Employment to large working populations.
4) Large banking and credit facilities.
5) A large network of transportation.
6) Excellent communication facilities.

World- Major Industrial Regions

Fig. 5.3

Make friends with maps!
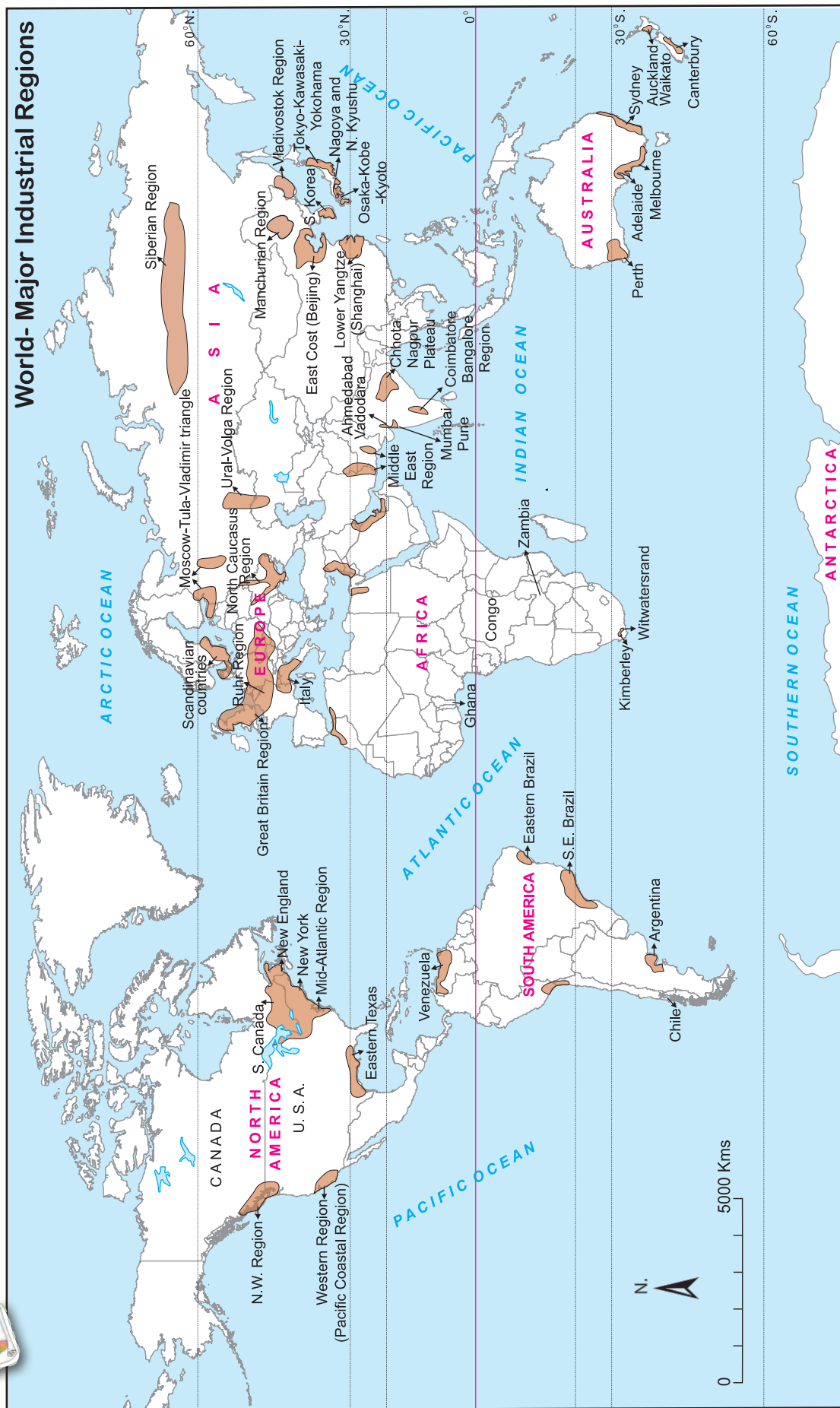
Continent-wise distribution of industrial regions is as follows :

Major industrial regions in the continent	Physical factors affecting localisation	Human factors affecting localisation	Major industries
North America : United States of America and region adjoining Canada. The New England Region, New York, Mid-Atlantic Region, Mid-Western Region, North-Eastern Region, Southern Region, Western Region.	• Varied range of relief and climate • Location of North America just across Europe • Rich reserves of mineral resources • Agricultural products used as raw materials • Large rivers and the Great Lakes • Broken coastline	• Availability of huge capital • Good communication • Export facilities • Cheap and skilled labour • Vast market • Development of inland water, rail transport and ports.	Food and beverages, automobiles, aircraft, metal fabrication, petrochemical, steel, telecommunications, chemicals, electronics, consumer goods, wooden industry and heavy chemicals etc.
Europe : **i) Western European :** • Ruhr region in Germany and France, parts of Great Britain and Italy.	• River Rhine • Climate supporting fishing and dairy products • Large coal and iron reserves • Pastures and meadows	• Skilled labour • Large market • Port facilities • Huge demand • Development of rail and road transport • Mechanisation	Ferrous and non-ferrous metal production and processing, petroleum, coal, cement, chemicals, pharmaceuticals, aerospace, rail transportation equipment, passenger and commercial vehicles, construction equipment, industrial equipment, shipbuilding, electrical power equipment, machine tools, electronics and telecommunications equipment, fishing, food and beverages, furniture, paper, textiles.
ii) European Russia : • Moscow-Tula-Vladimir triangle • Ural and Volga regions	• Location near oilfields • Location near coalfields and iron ore mines • Climate • Volga river	• Large population • Good communication system • Railroads	Machine tools, refineries, textile, electrical, automobile etc. Agricultural machinery, chemicals
iii) Other regions : • Scandinavian countries, Switzerland and Poland.	• Climate • Broken coastlines and rivers flowing into it. • Low temperatures • Coniferous forests	• Limitations in agriculture • Advanced technology • Low population	Iron and steel, chemicals, textiles and zinc/lead refining, dairy, watches and other electronics
Asia : **i) China :** • Manchuria • Northern end of the North China Plain, along the east coast and extending Westward beyond Beijing. • Lower Yangtze industrial region including Shanghai	• Rich in iron and coal • Near to coalfields • Broken coastline	• Development of ports. • Availability of labour • Government policies • Large markets	Cotton textile mills, shipyards, oil refineries, flour mills, steel plants, metal works and a great variety of light industrial products, lubricating oil, machinery and tools, chemicals, etc.

Major industrial regions in the continent	Physical factors affecting localisation	Human factors affecting localisation	Major industries
ii) Japan : • Tokyo, Kawasaki and Yokohama • Osaka, Kobe and Kyoto region • Nagoya and the Northern Kyushu region	• Coastal plains • Rich natural resources regions • Availability of hydro power • Broken coastline • Fast-flowing rivers.	• Abundant supply of cheap labour • Relatively developed infrastructure • Market availability • Efficient transportation system • Availability of port facilities • Port city of Yokohama facilitates trade	Electrical engineering such as transistors, radio television sets, washing machines, refrigerators and computers, steel mills, machines and tools, chemicals, refineries, shipbuilding, airplane, factories of consumer goods, electrical machinery, textile and canning industries, Cotton industry, Shipbuilding, oil refining, and petrochemical industries including synthetic textile and rubber manufacture
iii) India : • Chhota Nagpur Plateau, Mumbai-Pune corridor, Delhi region, Coimbatore-Bengaluru, Ahmedabad-Vadodara region, etc.	• Rich mineral resources • Port facilities available • Hot climate	• Large market • Huge supply of labour • Excellent rail network • Port facility	Textiles, chemicals, food processing, steel, transportation equipment, cement, mining, petroleum, machinery, software, pharmaceutical
iv) Russia : • Siberia and the North Caucasus Industrial Region • Vladivostok (Far East) Industrial Region	• Nearness to coal fields • Large forest reserve	• Government support • Despite inhospitable climate • Port facilities developed • Railway transport system	Production and transmission (by means of pipelines) of oil and gas, Chemicals, food processing, petrochemicals, iron ore, and machinery, Gold, diamonds, tin, and mercury, wood and wood products
v) Other • South Korea, Singapore, Hong Kong, Malaysia, Taiwan	• Broken coastline • Coastal areas • Climate • Agricultural base	• Huge population base • Vast Market • Port facilities • Cheap labour availability	Textile, electronic, Oil and petrochemicals
South America : • Argentina, Brazil, Venezuela and Chile	• Fertile plain • Coastal region • Grazing grounds • Favourable climate • Availability of mineral oil	• Availability of low cost labour • Government promotions • Port and dockyard facilities	Foodstuffs and beverages, metallurgy and mechanical industries, chemicals and petroleum refining, textiles, footwear and apparel, pig iron, automobiles and household appliances, Textile industry
Africa : • Witwatersrand • Kimberley, Congo, Ghana, Zambia	• A variety of minerals • 75% of the gold in the world is found in this continent • Vast land available • Forests	• Market oriented production • Demand • Large investments	• Diamonds, gold, forest products
Australia : • Eastern part • Perth in the West	• Climate favourable • Coastal area	• Availability of labour • Port facilities, good connectivity • Market	• Food, beverages, Textile and footwear, Wood and paper products, Petroleum, coal and chemical products, metallic industries, Machinery and equipment,
New Zealand : • Auckland and Waikato • Canterbury	• Climate favourable for agricuture • Coastal area • Large coniferous forests	• Mechanisation • Port facilities, good connectivity	•Meat and meat products, Dairy products, Woollen products, beverages, canned fruits, timber.

- Refer to the lumbering map of the world in fig. 4.1 and 5.1, tell which industries will be located in Northernmost island of Japan?
- How have the Great Lakes been instrumental in development of industrial region in the USA?
- How has the Trans-Siberian Railway contributed to development of industries in Russia?

Do you know ?

Industrial/Economic corridors are special areas along the main transport routes which have been selected to give thrust to industrial/economic development in the country. The corridors involve multiple development projects including development in transport, urban development, environmental management, etc. This has been done to increase exports, growth in employment opportunities and revolutionise the industrial growth.

Currently, the following four industrial/ economic corridors are proposed to be developed :

1) Delhi – Mumbai Industrial Corridor (DMIC)
2) Amritsar – Delhi – Kolkata Industrial Corridor (ADKIC)
3) Chennai – Bengaluru Industrial Corridor (CBIC)
4) Bengaluru – Mumbai Industrial Corridor (BMIC)

Classification of industries :

Manufacturing industries are broadly classified on the basis of size, source of raw materials, nature of products and ownership.

Classification based on the source of raw materials :

- **Agro - based industries :** Agricultural produce is processed in this sector. For example, sugar mills, cotton textile mills, food processing units.

- **Marine-based industries :** These refer to all units involved in the processing and canning of fish, fish products and other marine produces. For example, fish oil, ornamental objects, sea-shells, etc.

- **Forest-based industries :** Products from the forests are processed in this sector. Wood is made into paper or provides timber for various uses. The manufacturing of resins, gums, colours, dyes, fragrant oils and turpentine is forest – based.

- **Mineral-based industries :** They involve industries where manufacturing is based on mineral wealth, obtained through mining. Examples are petrochemicals, iron and steel, aluminium units, etc.

- **Pastoral-based industries :** These indusries depend upon animals for their raw material. Hide, bone, horn, shoes, dairy, etc. are some of the pastoral-based industries. For example, leather bags, chappals, shoes, etc. are made from leather while cheese, curd, sweets are made from milk. Silk clothes, woollen clothes, jackets, etc. are produced in these industries.

On the basis of capital investment :

In India, classification of industries on the basis of amount of capital investment, can be done as follows :

- **Large-scale industries :** They require huge amount of capital, equipment and other infrastructure.

In India, the industries requiring an investment of more than ₹10 crores are large-scale. Iron and steel, power, cotton

textiles, etc. are large-scale industries. (fig.5.4)

Fig. 5.4 : Large scale industry

- **Micro, Small and Medium Industries :** In India, the definition of MSME industries is as follows : (fig. 5.5)

Industries	Investment in plant and machinery	Investment in equipments	Examples
Micro	Does not exceed ₹ 25 lakh	Does not exceed ₹ 10 lakh	Pens, dairy products etc.
Small	More than ₹ 25 lakhs but does not exceed ₹ 5 crores	More than ₹ 10 lakhs but does not exceed ₹ 2 crores	Bottles, small toys, papers, etc.
Medium	More than ₹ 5 crores but does not exceed ₹10 crore	More than ₹ 2 crores but ₹ 5 crores	Cycle, T.V., Radio, etc.

Fig. 5.5 : Small scale industry

- **Cottage or Household industry :** It is the most basic type of manufacturing characterised by manual production, using locally available raw materials at a very small scale or at home. The goods are generally produced for consumption and for sale in the local markets. Little capital and transport cost is involved. Potters, weavers, blacksmiths, carpenters and craftspersons are some of the major groups engaged in a cottage industry. These industries require good skills. Their importance has increased in the present times. Some of these products have great demand abroad. Hence, they are exported. For example, Paithani Sarees, Indian quilts, etc.

Fig. 5.6 Cottage or household (cane work)

Classification based on nature of output :

The nature of the product determines the type of industry.

- **Basic industries or Heavy industries :** These are industries that produce material, which is in turn used for other industries. The iron and steel industry, for example, makes steel for further use in the automobile, heavy machinery and other industries.

- **Consumer goods or Light industries :** These industries manufacture goods that are ready for direct consumption. Watch-making, electronic goods, textile mills and pharmaceutical plants are examples.

- **Ancillary industries :** The industries which manufacture parts and components to be used by other industries for manufacturing heavy articles like trucks, buses, railway engines, tractors, etc. The final product of these industries is the raw material for other industries. For example, nails, tyres, iron sills, iron sheets, etc.

Classification based on ownership :

This classification is based on who owns the means of production.

- **Public sector :** Public sector industries are owned by the State. The government makes all investments and the marketing of the goods produced is through government agencies. Bharat Heavy Electrical Limited (BHEL) is an example.

- **Private sector :** Private sector enterprise is owned by a private individual or a partnership of private individuals. Profits derived from the sale of output belong to the individual, who owns the manufacturing unit and who makes all the capital investments in it. The Tata Iron and Steel Company (TISCO) is the example of private sector.

- **Joint sector :** This involves an industry owned and managed jointly by the government and an individual or individuals or between two and more governments. The amount of investment and share of the profits depends on the level of involvement of both sides example. For example, MNGL (Maharashtra Natural Gas Limited).

- **Cooperative sector :** A group of individuals pool resources to set up and manage an industrial venture on a cooperative basis. All profits and losses are shared among the members of the cooperative unit. Many textile, sugar and milk units function as cooperatives. Example, AMUL.

- **MNCs :** When operations of a privately owned industry or public-owned industry extend to more than one country, such industries are called multi-national corporation (MNCs). They have headquarters in the main country where they are registered. For example, Hindustan Lever in private-sector has it's headquarters in London. Oil and Natural Gas Corporation (ONGC) in public-sector has headquarters in Dehradun. Factors like cheap labour, technical skills, lower cost of production, availability of market in other countries lead to establishment of such industries.

Give it a try.

#startupindia

Digital India
Power To Empower

MAKE IN INDIA

- Look at the given logo. Find out more information about it and write a short note on it.
- Find at least 2 examples of each of the types of industries from India and write in your notebook.

Try this.

Now you know the factors affecting location of industries. You also know the classification of industries. Assume you want to set up an industry in future. Think about what will be the product produced in your industry? Which geographical region will you choose to set up your industry? Why? Discuss in class and share your ideas.

TYPES OF INDUSTRIES

| Capital Investment | Ownership | Source of Raw Material | Nature of Output |

Cottage | Large Scale | Medium and Small Scale Micro Scale

Agro-based | Mineral-based | Pastoral-based | Forest-based | Marine-based

Consumer/ Light | Ancillary | Basic/ Heavy

Private Sector | Public Sector | Joint Sector | Co-operative Sector | Multi- National
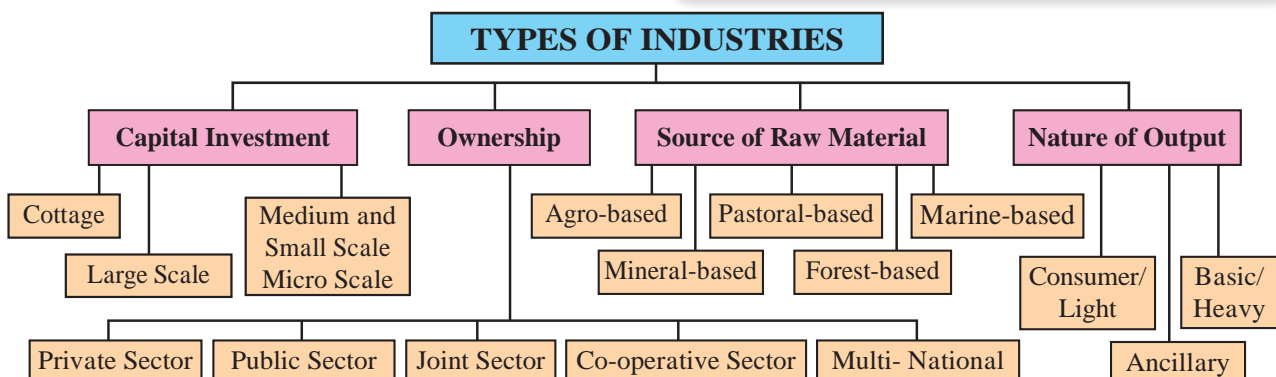
Fig. 5.7

Q. 1) Complete the chain :

A	B	C
1) Small-scale industries	1) Manual manufacturing	1) Ceramics
2) Cottage industries	2) Skilled crafts person	2) Tata Iron and Steel company
3) Consumer goods	3) Individual	3) Potters
4) Private	4) Ready for direct consumption	4) Pharmaceutical

Q. 2) Identify the correct correlation :

A : Assertion; R : Reasoning

1) A : The humid climate of Mumbai offered great scope for the development of cotton textile industries.

R : Industries require ample amount of water.

1) Only A is correct
2) Only R is correct
3) Both A and R are correct and R is the correct explanation of A
4) Both A and R are correct but R is not the correct explanation of A

2) A : In India, industries are found concentrated in few areas are available.

R : India is predominantly agrarian country.

1) Only A is correct
2) Only R is correct
3) Both A and R are correct and R is the correct explanation of A
4) Both A and R are correct but R is not the correct explanation of A

Q. 3) Give geographical reasons :

1) Distribution of industries is uneven.
2) Iron and steel industries are found in mineral rich area of Dhanbad.
3) Fruit-processing industries are found in Ratnagiri and Sindhudurg districts of Konkan region.
4) What are the major factors which have hindered the growth of industries in South America?
5) What factors are responsible for non-development of industries in Central Australia?

Q. 4) Short notes :

1) Footloose industries.
2) Public sector industries.
3) Economies of scale.
4) Role of transportation in industries.

Q. 5) Differentiate between :

1) Weight-losing and Weight-gaining industries.
2) Primary and Secondary activities.
3) Basic industries and Consumer industries.

Q. 6) Answer the following :

1) Explain the physical factors affecting location of industries.
2) Explain the factors affecting location of sugar industries.

Q. 7) Show the following on a map of the world with suitable index :

1) Ruhr industrial region
2) An industrial region in Japan
3) An industrial region in South Africa
4) An industrial region in Australia
5) Industrial region near Great Lakes

✳✳✳

6. Tertiary Economic Activities

Read the following comprehension and answer the questions that follow :

There are three friends from different backgrounds. They decided to become entrepreneurs after graduating from the same college.

Rohit is a farmer's son. He pursued his bachelor degree in the Arts faculty. He was thinking of continuing his father's profession but at a different level. He wanted to grow export-quality agricultural products in his two acres of farmland.

Sejal is the daughter of a businessman. They produce and sell bakery products on wholesale basis. She has passed her degree in Science. She wants to become an entrepreneur in Fast Moving Consumer Goods (FMCG) products.

Asif is a son of a small hotel owner. He has passed his graduation in Event Management. He wants to start his own company of Event Management.

After graduating with good grades, they decided to help each other and begin their careers. Rohit, Sejal and Asif tried to find out information about how to start their businesses. They tried to get maximum information regarding their businesses. They wanted to plan, organise and then establish their start-ups. During this period, they found information regarding their businesses.

Rohit found out that he will have to do major changes in his farmland to grow export-quality products like lily, orchid flowers and fruits like kiwis, dragon fruits, etc. He will have to maintain moisture and temperature in the air. He will also need to use special fertilizers to maintain the soil's Ph value. He also came to know that he has to take help of the Agricultural officer from the same Taluka. More importantly, he has to take out a licence to establish a business. He also got to know that he will need an account which can be used for foreign transactions. He also got information from where he would get saplings for the export-quality products. He came to know that, these flowers are in great demand in Gulf countries and they give high returns too. As these countries are within the reach of an hour or two by air, the flowers can remain fresh and retain their quality. He also decided to visit few vendors from these countries to directly setup his business.

Sejal realised that toothpaste is a product which is required daily by the people. Since her background was from Science, she decided to derive an advanced formula which will be good for dental health. She also took help from a cousin brother from the Pharmaceutical industry.

She came to know that she needed the following things to set up the industrial unit :
- Machinery and labour force to work in the plant.
- Land for setting up the plant.
- NOC from competent authorities before taking the product to the market.
- Other licenses like NOC from fire service department.
- Industries that will give tubes to fill ready toothpaste and cartons to wrap the product.
- Appoint an advertising agency to promote the product.

She was reluctant for this start-up since it required land and a large capital investment. But she felt relieved that due to the Government's Start-up schemes, she can get subsidised loan. Her father helped her solve her land problem. He had a small piece of land near her town which was sufficient for this purpose. He arranged for other basic amenities like water, electricity, etc. which are required for an industry. He leased out that plot to Sejal.

Asif realised that he mainly needed services and labour for his start-up, which he can arrange by hiring them from various agencies like caterers, florists, hall owners, band players, sound systems etc. He also understood how to take permission from various competent authorities to arrange various events. He realised that it will be good if he opens up an office to start his business in the market. To advertise his start up, he got a brochure designed and printed visiting cards for marketing his services.

After planning for a year, all the friends started their entrepreneurship in their respective businesses. As their businesses have been established as per their likings, they are enjoying their work. Their businesses are now their passions.

1) What do you understand by the term 'competent authorities'?

2) In which types of economic activities are the children in the story engaged?

3) While being occupied in their type of economic activity, which other activities they interact with?

4) Classify all the economic activities you come across in the passage.

Geographical explanation

While reading the passage, you would have come across many human occupations. These are the economic activities carried out by humans. Out of them, some of the activities are completely dependent on nature. We obtain natural resources out of such activities. These activities are primary activities.

Man cannot use some of the products received from these activities directly. These products can be used again by increasing their values or making them more durable. In that case, these products are processed. This creates new and different products. These are usable, more durable and can be sold at higher prices. Through processing, these activities become a part of secondary activities. Secondary activities are mainly dependent on products obtained from primary activities.

There are activities which act as the link between the primary and secondary activities and are complementary to both of them. These are mostly in the form of services. If you want a particular service you will have to pay for it. These include buying and selling of goods, means of transportation and communication, loading and unloading of goods, credit facilities, marketing, import and export, etc. Providing public services are also a part of it. Other services like knife grinders, vegetable sellers, shopkeepers, passenger's carriers, postal services, etc. are also included in tertiary activities. All these services are called tertiary economic activities. (Fig.6.1)

Use your brain power !

- Do tertiary activities involve only services?
- Can there be products in tertiary activities? Discuss in class and make a list of such products.

Can you tell ?

In figure 6.1, many economic activities included in tertiary occupations are enlisted. Classify the following economic activities in the following two categories :
- Activities dependent on geographical factors
- Activities not dependent on geographical factors
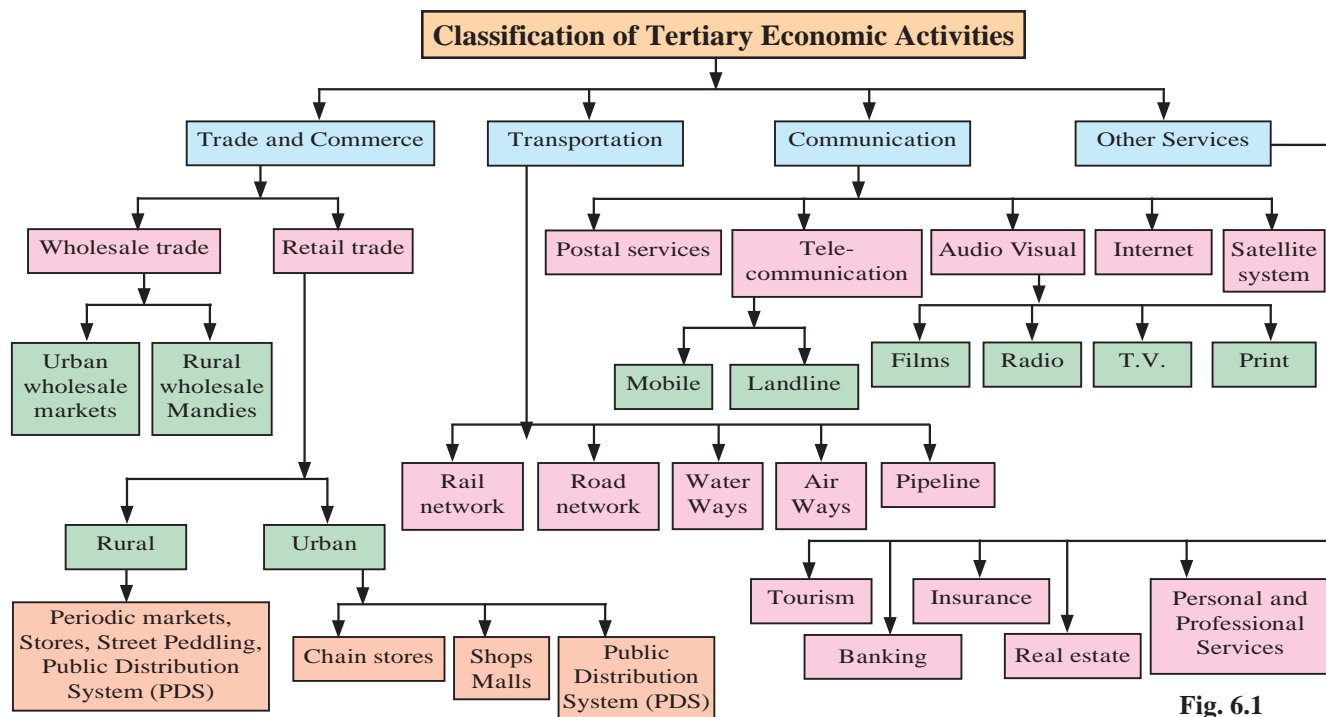
Classification of Tertiary Economic Activities

Fig. 6.1

Geographical explanation

In tertiary occupations, there is no derivation from the nature as it is in primary activities. There may be some products manufactured like secondary activities but they are in the form of services offered. As these activities are mainly of the service category, these occupations are also known as the 'service sector'.

The distribution of many of these services is dependent on many geographical factors. You will realize from the activity above that there are very few such services which are not dependent on natural factors completely. Climate, topography, nearness to the sea or continental location are some of the geographical factors, which may affect tertiary activities.

The secondary activities are not only dependent on how long the perishable raw material will last but also the mode of transport through which the raw material is to be delivered. For example, for international export of a product like grape obtained through agriculture, using airways will be a better option, while sending cotton through water transport will be more profitable.

The human settlements all over the world have developed as an effect of various favourable geographical factors. Markets, be it retail or wholesale, always occur near these settlements. A secondary activity can occur away from the settlements but markets will not. They are always found near the settlements.

Loading and unloading of goods takes place at ports and dockyards. Try searching the names of these places with the help of internet. (For example, Ghodbunder, Kochi Port trust, Mumbai Port Trust, Delhi International Cargo Terminal). You will find that these places are either located near a water transport or airways.

It is clear from the examples above that tertiary activities are also controlled by geographical factors. Transportation is also an example of this. Now, it is being operated by advanced technology.

Transportation :

Transportation is a service or facility through which passengers, freight and industrial products are carried from one place to another. Transportation plays a very important role in development of any country. It is one of the basic tertiary activities. Development of all economic activities is dependent on transportation system.

World- Major transportation routes

Fig. 6.2

Make friends with maps!

Geographical explanation

Means of transportation are essential components of transport systems. They are the means to carry passengers or freight or a combination of both, from one place to another.

Means of transportation can be grouped into three broad categories based on the medium they use : land, water and air. Each mode has its own requirements and features and is adapted to serve the specific demands of freight and passenger traffic. This gives rise to marked differences in the ways the these means are deployed and utilized in different parts of the world.

Various geographical factors govern the development of transport. Relief, location and climate are the three major physical factors. Generally, it is easier to build rails, roads and pipelines where relief is not rugged. Dense forests, hilly and mountainous regions affect construction of long route rails and roads. For example, in dense forest and arid regions of Africa and South America, construction of long distance roads and rails is difficult.

Coastal area locations are favourable for development of ports and harbours, especially broken coastlines. Therefore, not all coastal areas can be good ports.

With development of technology, air transport is now used more. But still, major trade happens through ocean routes. Two canals which changed the course of transport, Suez Canal and Panama Canal, were constructed to avoid long ocean routes. They changed the use of ocean routes radically. Suez canal connected Asia with Europe and Africa. Panama Canal joined Pacific and Atlantic Oceans.

For airways to develop, one needs favourable climate, advanced technology and plain regions for airports. Constant fog or smogs, area with high peaks, become an obstacle for air transportation.

Trade :

Try this.

Consider the following conditions a, b and c and answer the questions that follow :
a) There are two countries 'A' and 'B'. 'A' produces 500 tonnes of wheat by employing 200 labourers. 'B' produces 1,000 tonnes of wheat by employing 300 labourers.
b) Country 'C' produces 300 kg of tea and 'D' produces 500 kg of coffee. 'C' does not produce coffee and 'D' does not produce tea.
c) Country 'E' has expertise in water engineering and agriculture. Country 'F' has expertise in metro-making.
1) Will trade take place between A and B in condition (a)?
2) Will trade take place between C and D in condition (b)?
3) If trade occurs between A and B in condition (a), what does it tell you about the conditions of the countries in terms of their economy?
4) If trade occurs between C and D in (b), what does it tell you about the climate of the countries?
5) Considering that trade occurs between two countries in condition (c), what does it tell you about the human resources of the countries?
6) Make a list of factors which affect the trade between any two countries.

Geographical explanation

Trade means the voluntary exchange of goods and services, where two or more parties are involved. Barter system was an initial form of trade practised by the primitive societies. There was only an exchange of goods. Today, trade occurs in goods and services. Bilateral or multilateral trades are major types of international trade. Trades can be carried out within a country too. Trades can be affected by many factors.

International trade is a result of specialisation in production and human resources.

International trade occurs when it is mutually beneficial to trading partners and when it is a comparative advantage for both, rather than producing in their own countries. It may occur to you that this is an economic concept, then why are we discussing this in geography? But, actually, the foundation of this activity lies in geography. You will relate to it when you read the explanation further.

The various geographical factors which affect the trade are as follows :

- **Difference in natural resources :** We have studied many concepts in geography till now. Out of them, the concept of natural region specifies that each region is different from another. The natural resources available in one country will be different from the ones available in a different region. They may not be the same. Also, it may happen, that in one region they may be in abundance, while in another in much less quantity.

  Soil, minerals, forests, land, water and human resources are unevenly distributed. A country rich in soil will be good in agriculture. Thus, it may be a good exporter of grains and other crops. On the other hand, a country which does not practise agriculture on a large scale will have to import grains. Example can be given from the Gulf countries. These countries are rich in mineral oil. Hence, they export oil but they import grains.

- **Climate :** Climate affects the plants and animals in a region. It also ensures how different types of products can be grown or produced in a country. For example, countries which are snow covered for a major part of the year, export meat and woollen products. On the other hand, tropical countries produce and export bananas, rice, cocoa, tea and coffee. For example, Sri Lanka is a major tea exporter country. Cheap labour, favourable climate, undulating land, soil which can drain water, etc. are geographical factors, which make tea plantations on a large scale possible here. The production of tea is more than what their population requires. The United Kingdom does not have tea plantations. But the demand for tea is high in this country. So countries like India, Sri Lanka export tea to UK.

- **Population factors :** The size, distribution and diversity of people is found in various countries. This leads to different products and hence trade occur. Also, size of trade is affected. Densely populated countries have to worry about feeding their own populations. Standard of living can also determine the demand for various goods and services. The country with less population will depend more on trade because less human resource is engaged in production of goods. The population of the Asian continent along with India is known for their expertise in Information Technology. The education system in these countries, mathematical knowledge, skills of using technology has made this possible. Though it appears that geographical factors have no direct influence, it is important to note that, this labour force belongs to the same geographical region.

- **Culture :** Some parts of the world are known for their products and specific art and craft. They are valued all over the world. For example, there is great demand for Chinese porcelain, Iranian carpets and Batik print of Indonesia and Kashmiri shawl, silk from various parts of India around the world. This promotes the trade.

- **Economic cost :** Cost is a major factor in production. If it is cheaper to import than to produce certain goods in a country, then trade will occur. For example, a country may not have the climatic and physical conditions to grow tea, hence they will find it easier to import it from tea producing countries.

- **Specialisation :** Some countries have specialised goods and services. e.g. Israel has specialised itself in dry farming or agricultural engineering. In such a case, it exports its services to countries who wish to carry out agriculture in desert-like conditions. Similarly, specialised goods and services have an international demand and therefore trade may occur between countries.

Can you tell ?

- Can intelligence or physical efforts be imported and exported?
- If possible, discuss some examples in class.

- **Government policies :** Government policies may cause or stop international trade. A free trade government policy will not restrict the citizens from buying or selling to another country. To maintain good relations with another country, a country may carry out trade with it.

Importance of Transport in Trade :

Transportation is a very important tertiary activity for trading. The importance of ports, sea transport and air transport has been very obvious in the trade.

Try this.

The graph in fig 6.3 shows trade carried from 1980 to 2010 through sea transport. Interpret the graph in your own words.
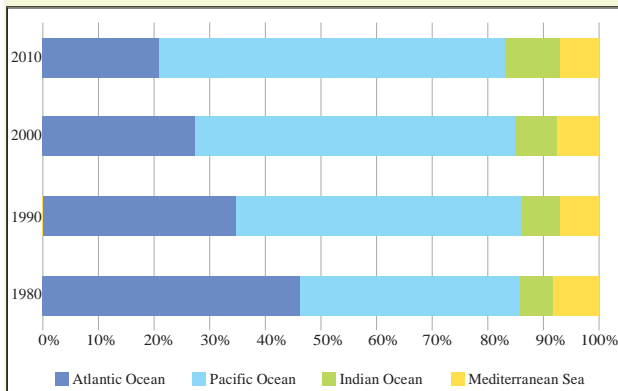
Fig. 6.3

Find out !

Find out, what are these places famous for : Coorg, Yusmarg, Saputara, Ladghar, Marina beach, Istanbul, Milan. What is the main economic activity carried here? Is there any relationship between their location (geographical) and their economic activities? Find out!

Tourism :

Try this.

See the following two tables and answer the questions that follow :

TABLE 1 : Direct Contribution of Travel and Tourism to GDP of some regions (%) (2018)	
Maldives	38.92
British Virgin Islands	32.96
Macao	28.01
Aruba	27.64
Seychelles	25.73

TABLE 2 : People engaged in tourism in some regions (%) (2018)	
Aruba	29.91
St. Lucia	27.29
The Bahamas	26.49
Macao	26.48
Seychelles	25.35

Source: World Bank data

1) What do the tables show ?
2) Are the countries shown in the tables same?
3) Locate them on a map of the world.
4) Can you tell, why contribution of tourism is high in these countries in terms of GDP and employment?
5) Write a concluding paragraph on factors affecting tourism as an occupation in a country.

Geographical explanation

Tourism is an important tertiary economic activity. The tourism sector has grown tremendously in the last few decades. At present, this growth is seen due to the availability of

advanced means of transport and the basic infrastructure facilities for tourism. Looking at the countries given in the table, you will notice that most of these regions are island countries. Therefore, the climate, natural beauty of the region, availability of land and sea adventure sports, tourism is a major contributor to the country's GDP. Also, the population employed in tourism is higher.

The following geographical factors play an important role in the growth of tourism in a region : the site and situation of a place, climate, relief, altitude, biodiversity, accessibility, availability of water are important physical factors, while transportation facilities, lodging and boarding facilities, cultural diversity, government policies and political conditions in a country are important human factors affecting the development of tourism.

Use your brain power !

Given below are the countries which are least dependent on tourism. Locate these countries on a map. Explain the geographical factors which are responsible for non-development of tourism in these countries.

Country	Contribution of Tourism to GDP (%) (2018)
Democratic Republic of Congo	0.66
Papua New Guinea	0.66
Uzbekistan	0.93
Moldova	0.96
Gabon	1.02

Communication :

Can you tell ?

1) What are the list of items mentioned in timeline related to?
2) Which of these means are you aware of ?
3) Which of these means do you actually use?
4) Which of these are now outdated?
5) What could be the reasons for them getting outdated?
6) Can you add more to the list?

Geographical explanation

Man uses different means of communication to express what he wants to say and makes it reach other humans. For example, depiction through pictures, symbols, verbal communication using signs, body language, postures, etc. In earlier times, the tribal people used coloured smoke to communicate. Now, in recent times, we use telephones, mobiles, internet, etc. to communicate.

This is the era of information. One who has information is considered to be the pioneer in many things. Each country is trying to stay up-to-date with such information. Use of technology in communication has increased manifold. For example, use of satellites.

The satellites in space work for communications day and night. They give us a lot of information regarding various physical and human factors on the earth. For example, daily atmospheric conditions, cyclones, movements of the earth, looking for mineral reserves, obtaining the latitudes and longitudes of a place, etc.

All these means of communication are used for regional development on a large scale. The extent and scope of this tertiary activity and these means of communication is increasing day by day.

Fig. 6.4 : Timeline - Means of communication

Draw a suitable graph for the following information given in table 6.1 and write a paragraph interpreting the data.

Table 6.4 : Contribution of various sectors in the national income. (%)

Countries	Primary 2018	Secondary 2018	Tertiary 2018
Denmark	1.0	34.0	65.0
India	14.0	30.0	56.0
Kenya	34.0	23.3	42.7
New Zealand	7.0	27.4	65.6
Russia Federation	3.0	43.0	54.0
Tajikistan	21.0	37.2	41.8
Tanzania	29.0	33.1	37.9
Uganda	24.0	28.4	47.6
United Kingdom	1.0	28.5	70.5
U.S.A	1.0	21.6	77.4

Quaternary and Quinary Activities

Considering tertiary economic activities, the services included in this sector are varied in nature and have a very vast coverage. Therefore, some specialised services are now categorised into quaternary (fourth and quinary (fifth) activities. Quaternary

activities refer to those activities where task is to think, research and develop ideas. Thus, this sector involves activities related to education, information, research and development. For example, financial planners, tax consultants, software developers, statisticians, persons working in offices, hospitals, theatres, schools teachers and university professors, accountants etc. belong to this category of services.

Quinary economic activities involve work related to administrative character. Senior business executives, government officials, scientists, judges, etc. belong to quinary activities. The main difference between the two types is that the people involved in quinary activities are involved in highest level decision-making or policy-making.
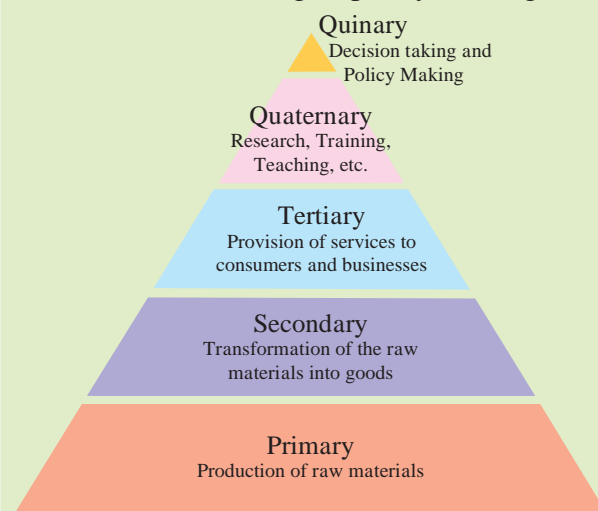
Fig. 6.5

In fig. 6.6, five hypothetical countries and some information about their conditions is given. Study them carefully and answer the following questions :

- Considering the natural resources available in these countries, which activities will flourish here?
- Between which countries will export-import of goods occur?

- Which tertiary activities will take place here?
- Considering the location of country 'E', how will it carry out the trade with other

countries?
- Write in your own words, the effect of geographical factors on human economic activities in these countries.
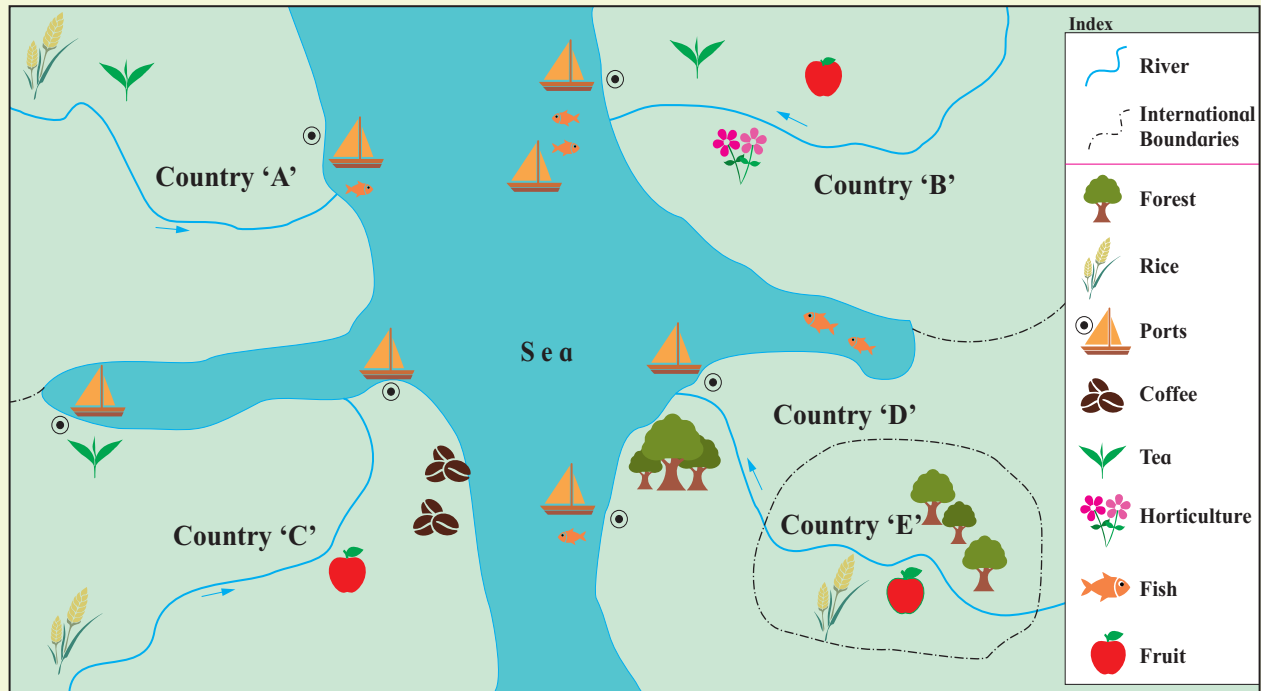
Fig. 6.6

Exercise

Q. 1) Complete the chain :

A	B	C
1) Matheran	Tea	Communication
2) GPS	Atlantic Ocean	Tertiary Activity
3) Sri Lanka	Satellite	Export
4) Panama Canal	Tourism	Pacific Ocean

Q. 2) Choose the correct option :
1) Tertiary activities include :
   a) Use of natural resources
   b) Finished product
   c) Raw material
   d) Transportation
2) Natural Ports :
   a) Kochi
   b) JNPT
   c) Dehi International Cargo Terminal

   d) Nagpur Cargo Hub (MIHAAN)

3) Trans-Australian Railway connects
   a) Perth - Sydney
   b) Perth - Vladivostok
   c) Sydney - Vancouver
   d) Vancouver - Vladivostok

Q. 3) Give geographical reasons :
1) Tertiary activities include both services and exchange.
2) The proportion of airways as means of transportation is increasing.
3) Geographical diversity is responsible for trade to occur.

Q. 4) Short notes :
1) Importance of satellites as means of communication.

2) Role of transportation in trade.

3) Tourism and GDP.

Q. 5) Differentiate between :

1) Secondary economic activities and Tertiary economic activities.

2) Quaternary and Quinary activities

3) Waterways and Airways

Q. 6) Answer in detail :

1) Explain the factors affecting trade between two countries.

2) Development of transportation is dependent on geographical factors. Explain.

3) Why is transportation system important in the development of any nation?

4) Tertiary activities are expanding day-by-day. Explain the statement.

Q. 7) On an outline map of the world, show the following with the help of suitable index :

1) A canal bringing radical change in sea transport.

2) Railway connecting two continents.

3) An international airport in India.

4) An important port in India.

Q. 8) Read the given passage and answer the following questions :

Careful planning and implementation is necessary for economic development of any country. In the tourism sector the need for planned development is of great importance. It involves many industries working together in a complex way and needs special attention. Planning basically tries to allot limited resources between various competitors with a view to maximize output, income and employment and to make sure different sectors have fair growth. Tourism planning is a process through which the set goals can be achieved and the various choices linked to tourism development can be addressed. It is a long term and constant process of preparing, upgrading and improving a destination for tourist. Communities are the basic elements of tourism. It mainly depends upon the level of acceptance shown by local communities. In the process of planning their involvement is essential .The development of tourism creates impact on mainly environment, socio-culture and economy of the host community at any destination. These impacts produce both negative as well as positive impacts. Planning is necessary to reduce the negative impact and boost the positive impact for sustainable development of a destination.

1) Why does the tourism sector need planning?

2) What is the importance of communities in planning?

3) Explain any two benefits of planning.

4) What factors affect the economy of the host community?

5) Why is planning a long term task?

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Try this.

Given below are some geographical areas given to you. Complete the table in your notebook thinking about similarities between them and their types. One has been done for you as an example. Answer the questions that follow :

Table 7.1

Geographical areas	Common factors / characteristics	Type (political/ physical)
Ganga river basin, Amazon river basin, Mississippi river basin, Nile river basin	River	Physical
The Himalayan region, The Alps, The Western Ghats, The Rockies, The Caucasus		
Marathwada, Vidarbha, Khandesh, Konkan, Western Maharahstra		
The Thar desert, The Arabian desert, The Gobi desert, The Sahara desert		
Rajasthan, Madhya Pradesh, West Bengal, Kerala, Manipur		
Pune, Bhopal, New York, Manchester, Munich, Shanghai		
Parbhani, Nagpur, Palghar, Kolhapur, Solapur		
Hindi-speaking belt, Bengali-speaking belt, Marathi-speaking belt, Kannada-speaking belt, Urdu-speaking belt		
Delhi University campus, Punjab University campus, Mumbai University campus, Vanasthali University campus		

1) While completing the above table, how did you decide the common factor between these areas?
2) How did you differentiate one area from another?
3) Is the common factor the only basis of differentiation?
4) Make a list of characteristics which can be the basis of different areas separately.

Geographical explanation

You must have realized that small or large areas of land having common features help us to identify them separately. These features can be natural (physical) or man-made (administrative boundaries, political or linguistic). Generally, there is a boundary which demarcates one area from another. A geographical area that distinguishes itself from another area is called a region.

These regions can be very small or very large. Natural features which form the basis of a region are physiography, climate, vegetation, soil or wildlife. For example, we differentiate between the Himalayan ranges and the Northern Plains of India on the basis of their altitude and topography. Thus, they are considered as two

different regions. Socio-cultural factors like, language, ethnicity, etc., political factors like administrative boundaries and economic factors like GDP, are some man-made factors which define a region. For example, Madhya Pradesh and Maharashtra are two different regions because they have their own boundaries and governments. Similarly, Pune and Ahmednagar are two different districts. So they are two different regions. In a region, there can be two or more sub-regions. For example, within the Northern Plains of India, there are various sub-regions of different plains : the Indus and its tributaries, the Ganga-Yamuna plains and the Brahmaputra-Hooghly plains. Similarly, within a district, there can be talukas. Each of the taluka is a region in itself. Each city and village in the Taluka is also considered a region.

The classification of regions is thus based on common characteristics. The area which has common characteristics and is homogeneous in nature, constitutes a region. In geographical studies, a region is the basic unit. This helps us to differentiate one area from another. Every region has various attributes :

i) **Location :** A region must have a geographical location. It can be expressed in latitudes and longitudes.

ii) **Spatial extent :** Based on homogeneity, the extent of a region can be decided.

iii) **Boundary :** A region must have a boundary. Beyond a boundary, there is another region.

iv) **Hierarchical arrangement :** A region can be arranged into various orders or sub-regions on the basis of the common characteristics. For example, Northern plains and its subregions.

Do you know ?

The States Reorganization Act of 1956 made the state boundaries according to languages after independence. Thus, Maharashtra became the State of Marathi-speaking people, Tamilnadu became the land of Tamil-speaking people, etc.

Use your brain power !

Can you tell what is the identifying characteristic in the following regions?
1) Pune Metropolitan Region
2) Nagpur hub
3) Dal Lake in Srinagar
4) Alleppey tourism centre

Types of regions :

Geographical explanation

On the basis of characteristics, a region can be divided into physical or political regions. For example, river basins are physical regions while districts are political regions. Both of these are formal regions. A formal region is an area inhabited by people who have one or more characteristics in common. Shared characteristics may be a common language, economic activities, such as a particular crop production, or physical characteristics, such as the climate of an area. Some formal regions have distinct boundaries which make them easy to identify, such as countries or states. Examples of formal regions are Europe, Africa, United States and Canada or Assam and West Bengal, etc.

On the other hand, functional regions are not bound by any formal characteristic but by a function. A functional region may not be heterogeneous in nature. It may involve more than one type of physical or political regions but still it can be one functional region because that function binds these regions together. For example, Pune Metropolitan Region has various physical regions, many political regions, various villages, talukas and cities in its area. But, the
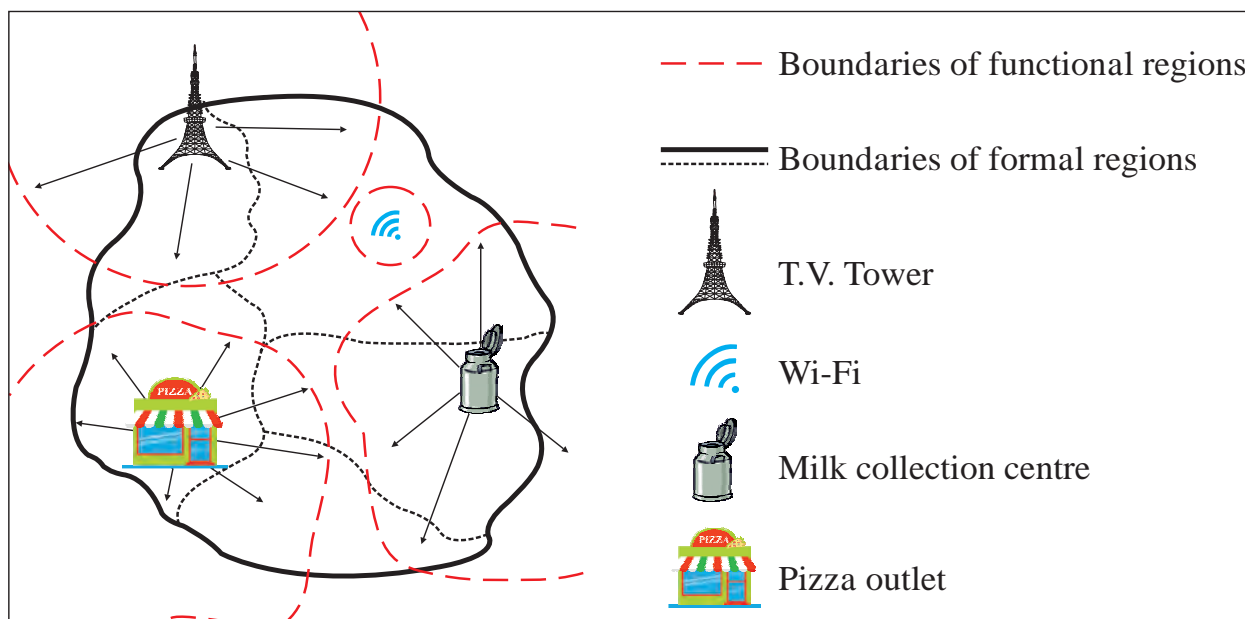
Fig. 7.1 : Difference between formal and functional region

- - -	Boundaries of functional regions
....	Boundaries of formal regions
🗼	T.V. Tower
📶	Wi-Fi
🥛	Milk collection centre
🍕	Pizza outlet

area which comes under Pune Metropolitan Region is bound by the economic activities. The regions in the periphery serve the core region with vegetables, flowers and other perishable items. The core area pays the surrounding region value for their products. A functional region is an area organized to function socially and economically as a single unit. Functional regions are centred on a focal point that connects other areas by various systems, such as transportation, communication or economic activities. Cities can be considered functional regions because highways, railroads, subways and buses move people from the suburbs to the central areas of the city. Other examples of functional regions are television signal areas of a TV tower, Wireless, Wi-Fi hotspots or pizza delivery areas served by a pizza outlet or milk served by a milk centre. (See fig. 7.1)

Try this.

Here is a list of regions. Classify them into Formal or Functional regions :

Ujani Dam catchment area, area served by Pune Municipal Transport (PMT), area served by Citi Cable Service, Uttar Pradesh, District Kolhapur, Taluka Haveli, rice – producing region of Konkan, Black cotton soil region of India, areas served by Local trains of Mumbai, area served by a Primary Health Centre.

Formal Regions	Functional Regions

Use your brain power !

- Identify your formal region.
- Can you identify and demarcate your own functional region?
- Which one is larger?

Regional Development :

We have seen that not all regions are the same in size and population and also in resources. Some regions like the desert regions might have

fewer resources while forested regions have huge resources.

Read the table 7.2 and answer the questions that follow :

Table 7.2

Region	Per Capita Income (₹)	Population Below Poverty Line (%)	Urbanization (%)	Net irrigated area to Total sown area (%)	Per capita consumption of electricity per year (in units)
A	15466	14	45	64	557
B	10432	32	31	42	332
C	5000	48	16	28	145

1) In which region do you think there are more resources available?
2) In which region do you think people are richer?
3) In which region do you think people may be more happier? Why?
4) Do you think the given indicators or factors are enough to decide the standard of living of people in the region?
5) In which region would you like to stay and why ?

Geographical explanation

In the above table, three regions with their performance in few indicators are shown. On the basis of the given data, we can say that region A performs better in the given indicators than region B or C. Per capita income suggests that region A's income is high and production is high. It also indicates that population is lower than the other regions. Lower per capita income could mean that either the population is high or the total income is also less. In general, this indicates the presence of fewer resources and lesser utilisation of these resources. In region A, urbanisation is more than regions B and C. At the

same time, net irrigated area to total sown area is also higher. This indicates that the region has good irrigation facilities. Also, consumption of electricity is higher than in the other two regions. These indicators point to the fact that life in this region may be better than in the other two.

At the same time, these indicators are not enough to give a complete picture of the region. Indicators like literacy rate, enrolment ratio/ dropout ratio, sex ratio, crime rate against women/children, etc. will give a better picture. There are a number of indicators based on various social, economic, political, cultural and environmental conditions of a region.

Thus, development of a region is a function of its resources and its population. There are many factors which affect the development of a region. For the holistic development of a region, skilled human resources and optimum utilisation of natural resources is necessary. Thus, regional development is the development of all the regions simultaneously, raising their per capita income and living standards by exploiting their natural and human resources fully.

Think about it.

- Does development mean maximum utilisation of resources?
- Does development consider environment as an indicator?
- Can a region be called developed if it has sparse population or no population?
- Discuss this in your class.

Try this.

In the following table, regions are given. At the same time, some geographical factors and effects are also given. Complete the table 7.3 accordingly, with the help of solved examples.

Table 7.3

Region	Geographical Factors	Effects on the region
Nile River basin		Agricultural Development, Development of Industries, Hydro-electricity project, Irrigation etc.
	Coniferous forest area	
Japan	Island location, low mineral resources, narrow geographical extent	
Indonesia, Malaysia		Agriculture Development, Trade, Tourism

Factors affecting regional development :

In geographical studies, we consider many factors when we talk about the development of a region. Development itself is a very relative term. There are many indicators of development. Income of the region through various activities, quality and quantity of population, education, life expectancy, poverty, etc. are some indicators of development, but no one indicator can be the only factor to decide the development of a region. Considering only one or few factors will never give a holistic view of the region. Generally, development is considered when it takes into account the physical, economic, social, environmental, etc. aspects of a region.

Till now, we have studied various aspects of geographical studies like population, land use, various economic activities, etc. Let us now see how each of these will affect the regional development of a region.

Physical factors and regional development :

The physical factors like climate and relief of a region affects its development. Areas where land is less fertile, water is scarce, diseases flourish will be less developed. For example, the regions located in the tropical rainforests. On the other hand, fertile land, favourable climate and good rainfall promote the development. For example, Mediterranean region.

The physical setting of a region is also very important. If regions are landlocked or located in high mountain ranges or if there is a lack of navigable rivers, long coastlines or good natural harbors, then even in presence of other natural resources, the region may not develop well. Sometimes, there is presence of large resources but climate may not be favourable or population may not be present to exploit the same. For example, Antarctica

Population and regional development :

Can you tell ?

- Looking at the five stages of Demographic Transition Theory, countries in which stage do you think, will be called developed?
- Having looked at the various shapes of pyramids, which pyramid will represent a developed country? (fig. 2.1)
- After having answered both the questions above, what can you comment upon the role of population in regional development?

Geographical explanation

Population and development are closely interrelated. In fact, all the parameters of development are measured, keeping in mind the population of a region. Population influences development and in turn, is also influenced by development. Quality and quantity of the

population are important for development of a region.

Population density, age, sex, fertility, mortality, occupational structure, literacy rate, life expectancy, etc. determine the pressure on resources in the region. At the same time, they can also determine how efficiently the resources in a region will be used by the population.

In the five stages of Demographic Transition, the later stages have low birth rates and death rates. This will imply that the regions with such low growth will have greater development because there will less population to spend on. At the same time, the quality of the population will be equally important.

Population pyramids help to explain employment and consumption patterns, social needs and perhaps the psychological characteristics of population. The high dependency ratio may force huge amount of capital resources to be consumed in supporting the dependents. The existence of a relatively large population of working age is associated with higher economic development and high living standards. If migration is high in a region, the region will face problems of using the population for various activities. Regions, where people are migrating in large numbers, shows that it has a good employment opportunities or better living conditions, which is a pull factor. Similarly, the migrated population can bring pressure on resources and facilities in the recipient region.

You know that higher the population, lower will be the per capita income. Per capita income is an important indicator of development. On the other hand, if the population is very low in a region, it may hamper further development, as there will be lack of human capital to exploit the resources.

Give it a try.

Table 7.4

Region	Percentage of malnourished children about to enter school Year 2016	Government expenditure on education (% of total budget) Year 2016
A	29.3	4.70
B	19.2	4.17
C	3.4	7.10
D	12.8	5.40
E	31.7	4.09
F	27	4.45
G	3.1	3.82
H	5.9	5.95

Draw a conclusion on the basis of the data given in table 7.4. Use Spearman's Rank Correlation, find the correlation between the two variables. What can you comment about the development in this region?

Land use and regional development :

When we analyse the existing patterns of land-use in regions which are developed and regions which are not developed, we find a difference in the percentages of land use. The demand for land changes due to the changing needs of the society. As socio-economic conditions change, land use keeps on changing. Rural as well as urban areas have land under different uses. In rural areas, much of the land is used for agricultural purposes and other uses have less land. On the other hand, in urban areas much of the land remains under residential, commercial, industrial and other uses. The way the people of a region use their land will help the region develop faster.

As population and human aspirations increase, land becomes an increasingly scarce resource. Deciding how to use land is important to reduce the negative effects of land use and to increase the efficient use of resources in a region with minimal effect on future generations.

With faster economic development and changes in land use, the transition of rural area to urban area also increases at a faster rate.

Try this.

Look at the land use of the following regions and answer the questions that follow :

Table 7.5

Region	Arable land (%)	Land under permanent crops (%)	Land under permanent meadows and pastures (%)	Land under Forests (%)	Other land (%)	GDP in billion dollars (2017)
A	11.8	0.3	46.0	2.1	39.9	76.48
B	4.0	0.04	44.0	20.1	32.1	1364.83
C	52.0	16.0	4.1	9.7	17.9	837.58
D	27.4	0.8	15.3	22.4	32.6	567.48
E	6.5	1.0	16.7	57.0	19.2	3456.35
F	57.8	0.6	5.5	14.3	21.8	312.84
G	2.8	1.0	0.0	0.1	95.6	1391.25
H	33.6	1.8	16.8	31.0	16.4	3061.14
I	50.1	4.1	3.1	21.8	20.8	11325.66
J	13.7	13.0	5.7	48.5	19.0	3737.48
K	11.0	0.8	2.6	66.0	19.7	5747.49
L	2.5	0.5	37.5	37.7	21.8	206.22

1) What does the table show?
2) Which region has the highest land use under agriculture ?
3) Which region has the highest GDP?
4) Which country has more land use under forests?
5) Which region has highest land use under the category 'other land'? What is its GDP?
6) Write your conclusion in few sentences.

Primary, secondary and tertiary economic activities and regional development :

Look at the following data and answer the questions that follow :

Table 7.6

Regions	Contribution of Primary Sector to GDP (%)	Contribution of Secondary Sector to GDP (%)	Contribution of Tertiary Sector to GDP (%)	Human Development Index (HDI)
	2018	2018	2018	2018
A	1	34	65	0.93
B	2	32	66	0.85
C	2	37	61	0.71
D	6	33.2	60.8	0.81
E	14	30	56	0.65

1) In which region is contribution of primary activities the least?
2) In which region is contribution of primary activities the most?
3) In which region is contribution of tertiary activities the most?
4) Which region has the highest HDI?
5) Can you draw a conclusion on the basis of the answers from Q1 to Q4?

Geographical explanation

These three types of activities that are carried out in any region, give an idea about the regional development in that region. It is generally seen that the regions are developed if they contribute more in tertiary sector and depend less on primary activities. There are various indices like the Human Development Index (HDI) which are used to assess various aspects of development in a region. Generally, tertiary activities contribute more to the income of the region and hence more development is seen.

Regional imbalance :

Balanced regional development as a policy is considered both on economic, social and political grounds. The policy is considered in order to redress inequalities between different

regions of a country and also for raising the standard of living to a higher level at a uniform rate.

Causes of Regional Imbalances in India :

You have already studied how various factors affect the development of a region. Considering India as a region, we know that there is regional imbalance as levels of development are not similar in all sub-regions. Physical factors like location, relief, altitude, availability of resources, accessibility have been responsible for imbalanced regional development.

While some regions have a better position in terms of geographical location, mineral and other natural resources, the others are lagging behind in these. For example, the states located in difficult terrains surrounded by hills and dense forests like the states of Himachal Pradesh, Uttarakhand, several north-eastern states are behind the other regions having more mineral and other resources. Regions which have ports and airports have an advantage over others. For example, you know that while determining the location of iron and steel industries, nearness to raw material is a criteria.

Thus, regional imbalances arise due to such locational advantages attached to regions which are rich in resources and locational disadvantages attached to regions which don't have. Adverse climate and vulnerability to disasters like floods and cyclones are also responsible factors for poor rate of development. This is turn may result in low agricultural productivity and lack of industrialisation.

Moreover, human factors like skilled labour, technology, transportation, access to markets, communication facilities, power, technology, banking and insurance etc. have played a dominant role in disparity in development. Due to adequacy of such factors, some regions fare better than others. For example, North-Eastern Region, Himachal Pradesh, etc. are less developed as compared to other regions.

Moreover, investments made by the private sector are generally concentrated in those regions having basic infrastructural facilities. This has an impact on the government's decision of locating industries and projects which contribute by increasing employment and other advantages for the residents there.

Strategies to reduce Regional Imbalance :

In India, many policies have been considered and implemented to reduce this regional imbalance. Regions which were not developed were initially identified. The reasons behind non-development are also identified. These can be physical, social or economic reasons. Different types of criteria are considered for identifying such areas. Funds are allocated to those regions which need them in particular sectors or fields. Sectorwise investments are then done to improve the conditions in these areas. Such funds are given in the form of subsidies, and investments in roads, schools, agriculture, irrigation, industries, housing, medical and health facilities, etc. Special care is taken for regions which have been identified as drought-prone, deserts, hilly and tribal-dominated areas. Decentralisation of industries is also a strategy to reduce regional imbalance.

Give it a try.

Go through the fig. 7.2 and write two sentences on each factor. Tell how they will help in reducing regional imbalance. Also add some more to the list, if necessary.

Fig. 7.2

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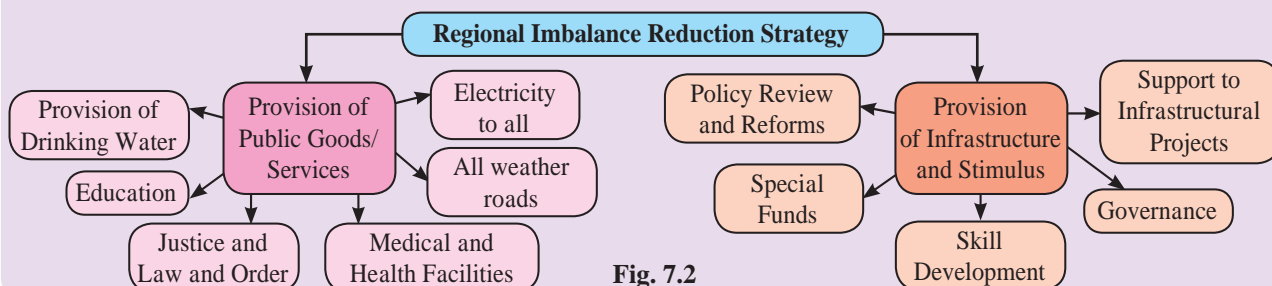
Find out !

Find out information about 'Human Happiness Index'. Relate its correlation with regional development and discuss in the class.

Exercise

Q. 1) Identify the correct group :

1.A) 1) Satpuda
2) Deccan
3) Alps
4) Rockies

B) 1) Yavatmal
2) Amravati
3) Solapur
4) Greater Mumbai

C) 1) Thar
2) Sahara
3) Himalaya
4) Gobi

D) 1) Marathwada
2) Khandesh
3) Vidarbha
4) Konkan

2.A) 1) Plain
2) Lakes
3) Mountain
4) Plateaus

B) 1) Pressure
2) Rivers
3) Temperatures
4) Humidity

C) 1) Tropical forest
2) Thorny forest
3) Mangrove forest
4) Deciduous forest

D) 1) Fishing
2) Lumbering
3) Agriculture
4) Bakery

Q. 2) Differentiate between :

1) Functional region and formal region.
2) Physical region and political region.

Q. 3) Write short notes on :

1) Factors affecting regional development.
2) Measures to reduce regional imbalance.

Q. 4) Give geographical reasons :

1) Regional development is dependent on physical setting.
2) Factors like illiteracy, poverty affect the regional development.
3) Development is not seen in the Himalayan region.

Q. 5) Answer in details :

1) What is a region?
2) On what factors are the regions differentiated? Give examples.
3) Per capita income is not the real indicator of regional development. Explain.

Q. 6) Find the correlation between land under permanent crops and GDP given in Table 7.5 using Spearman's Rank Correlation. Write the conclusion in your own words :

✶✶✶

8. Geography : Nature and Scope

Dear students, you have been studying geography either as a part of Environmental Studies since Standard III or as Social Studies since Standard VI and as an independent subject since Standard XI. Your journey to understand our homeland earth began with the study of the cardinal directions in Standard III. In the consecutive academic years, you learnt various geographical concepts. Now just recall the various concepts that you have learnt till now and make a list of them. Also classify them under different categories given below in the table. One in each category has been done for you as an example.

Table 8.1

Related to Lithosphere	Related to Hydrosphere	Related to Atmosphere	Related to Biosphere	Related to man and his activities	Other Concepts
Mountain	Oceans	Climate	Vegetation	Agriculture	Maps

Geographical explanation

While studying geography, you have learnt about the physical environment of the earth as well as the human activities and their interactive relationship with each other. The nature of the earth's surface is full of variations. There are various features with variations such as mountains, hills, plains, plateaus, oceans, rivers, lakes, deserts and many more. Climatic patterns on the global and local level, its impact on vegetation and wildlife, wind patterns, soils and its types, etc. are also studied in Geography. Types of landforms, submarine relief, ocean currents, salinity, etc. are also studied by a geographer. All these physical aspects affect human populations. These factors bring about variations in social and cultural features too, which changes from place to place and time to time.

This variation is observed in the forms of settlements, transportation networks, ports, markets and many other elements created by man, across the entire period of their cultural development. Thus, the subject matter of Geography can be divided into two major themes : physical factors and human factors. This has given rise to two branches in Geography- Physical and Human Geography.

Thus, Physical Geography includes the study of landforms, drainage, relief, slope (lithosphere), composition, structure, weather and climate, winds, precipitation, climate types (atmosphere), oceans, seas, lakes, rivers (hydrosphere) and life forms including human being and macro-organism, ecosystem, food chain, ecological balance (biosphere). Human Geography studies relationship between man and his environment and distribution of various attributes related to humans social and environmental phenomena around the world.

Nature of Geography as a discipline :

Geography is a study of the earth and phenomena related to it. The earth is dynamic. We find there are variations in its physical and cultural environments. Geographers study these distributions, their patterns and these variations. In addition, geographers also study the causes behind these phenomena. Thus, a geographer is interested in knowing the cause and effect relationship between these distributions and patterns. For example, a geographer studies various crops in different regions. He understands that this is a result of different climates, soils, demand in the market and application of technologies, etc. By studying a region, he can tell what type of economic activities are most suitable for a region.

Also, a geographer studies 'space' or 'area' or a 'geographical location'. Moreover, these geographical phenomena, whether physical or human, are not static but highly dynamic. They change over time. For example, we study weather over a period of time (roughly 30 years) and decide the climate of a place.

The population of India or world over a period of time, development of a landform or the age of the earth are various phenomena which are of interest to a geographer as they are concerned with 'time'. Thus, Geography is a study of 'space' and 'time'. This makes Geography *dynamic* in nature. In short, a geographer tries to answer the questions : *Where, 'When, What and Why.'*

Geographical explanation

The skills required to study Geography and the methods and techniques used in Geography make it empirical and practical in nature. See fig. 8.1. The study is very scientific and is always supplemented with experiments, data, observation patterns, data analysis and research findings. It is not just based on theory but supported by evidence based on data collection and analysis through various tools and techniques.

Initially, Geography has developed through observations. When we look back at the history of the subject, we find that earlier scholars of the subject have written a lot about the description of the earth. Notable among them is the work of a Greek scholar called Hecataeus. His book Ges-Periodus (description of the earth), which was published most probably before the end of the 6th century BC. It is the first systemic description of the world. It also gives a detailed account of the Mediterranean Sea, islands, straits and describes the general outline of all the countries of the world. (Fig. 8.2) Ptolemy's 'Geography' was another book on general description and also

- Data collection using surveys, photographs, satellite images
- Observation
- Make maps
- Data interpretation
- Land Surveying with the help of instruments and advanced technology
- **SKILLS OF A GEOGRAPHER**
- Data organisation
- Data representation with the help of graphs and maps
- Analysis with the help of statistical techniques
- Write reports and present the findings

Fig.8.1

included an atlas. Another book by a Roman scholar called Strabo was 'Geographica', which is an encyclopaedia of geographical knowledge, consisting of 17 'volumes'. (fig. 8.3)

Thus, the skills acquired by a geographer enables him to make observations and describe the various elements he sees on the earth. These skills of the geographer have enriched the subject as newer branches of geography keep developing with time.

Can you tell?

Discuss the following points in class with reference to its importance in the subject matter of Geography.

1) Environment Vs. Man

2) Complete study of India Vs. Study of only agriculture in India
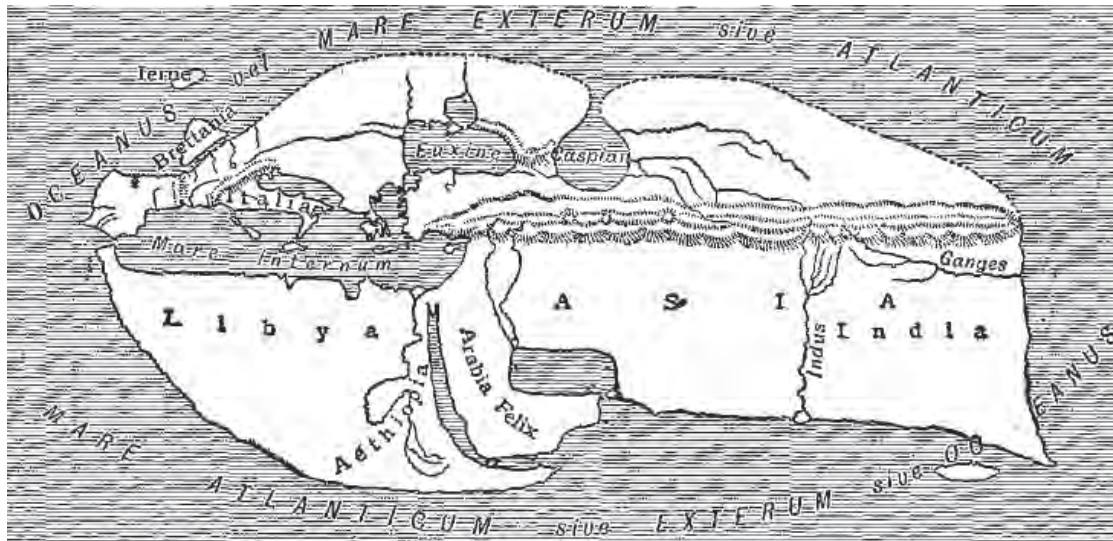
Fig. 8.2 Map of the world by Hecataeus

Fig. 8.3 Map drawn by Strabo, a Roman geographer

Geographical explanation

When you discuss these points you realise that they are two contrasting approaches to study Geography. For example, does nature rule us or does man rule the nature? When we study Geography, shall we study various regions in which a sector is distributed or study various sectors in a region? These are some of the questions, a geographer faces while studying. This contrast is known as Dualism in Geography. It refers to existence of two contrasting or separate approaches in Geography. For example, some geographers are of the view that nature is more dominant than man. This is called environmental determinism. While others think that man dominates the nature, they believe in possibilism. There are many other such dualistic approaches in Geography. This makes Geography dualistic in nature.

Scope :

Try this.

Given here are some of the concepts or subject matter we study in Geography. Write the name of subjects or disciplines you think they are also studied in. One has been done for you as an example. Complete the table after discussing in the class in pairs.

Table 8.2

Concepts	Subject in which the concept is also studied
Calculations involved in projections, shapes of projections	
Means of livelihood : agriculture, industry, trade, etc.	Economics
Cost of production, GDP, incomes, resources, scarcity, etc.	
Social relations and inequalities	
Racial structure of humans, evolution of humans, etc.	

Rocks and minerals	
Behaviour of humans in different climates and topography	
Electoral divisions, voting patterns, types of governments	
Biomes, food chain, forests, etc.	
Chemical weathering, erosion, acid rain, etc.	
Mean, variance, correlation, regression, etc.	
Past of different places, their development before attaining the present day status, etc.	

Note : You can add some more if you want!

Geographical explanation

We find that almost every discipline, under natural and social sciences, is linked with Geography. (See Fig. 8.4) Geology, Meteorology, Hydrology and Pedology are linked with the fields of Physical Geography such as Geomorphology, Climatology, Oceanography and Geography of Soils, respectively. Similarly, knowledge of Mathematics is essential for cartographic techniques. Drawing of maps and diagrams requires understanding of Mathematics. To do data analysis, geographers use various statistical techniques and hypotheses testing.

In case of Human Geography, every social science studied separately has interface with branch of Human Geography because of their spatial attributes. Social sciences such as Sociology, Political science, Economics, History and Demography are closely linked with the branches of Human Geography like Social, Political, Economic, Population and Historical Geography, respectively.

It can be concluded that Geography has strong interface with natural as well as social sciences. At the same time, every sub-discipline
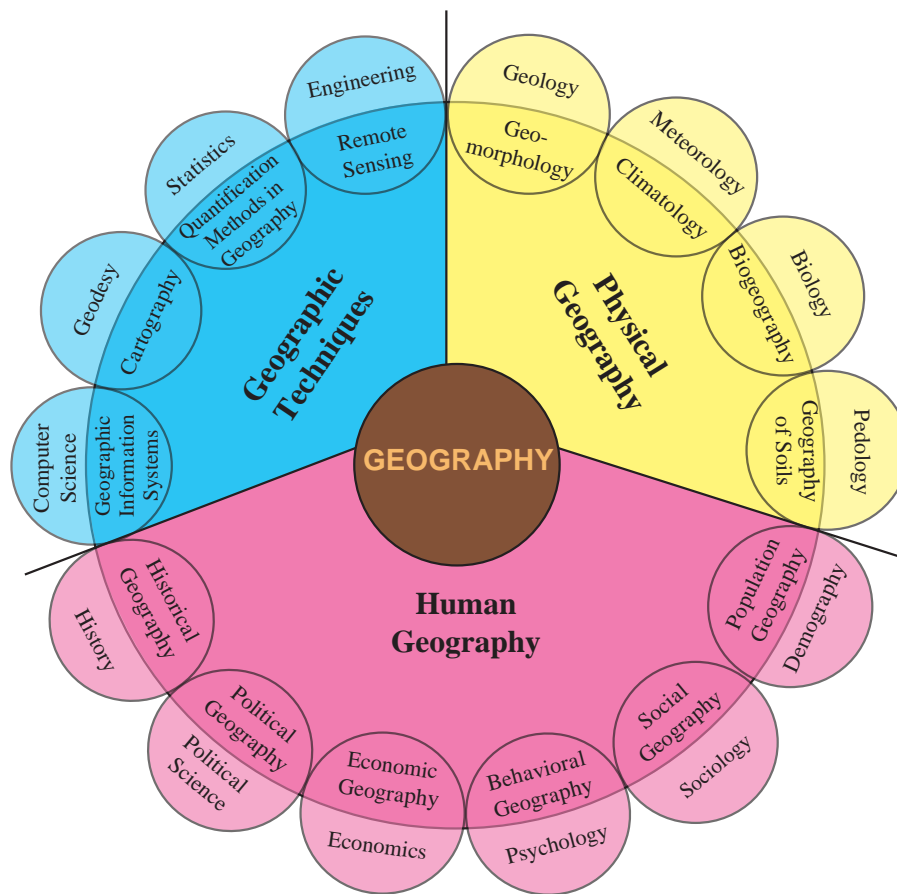
Fig. 8.4 : Relationship of Geography with other subjects

in Geography has its own scope. This is because their subject matter varies over space and time. Geography has adopted and developed a lot from different disciplines within its own boundaries. Many branches of Geography have developed from mainstream disciplines. This makes geography an *integrating* and *interdisciplinary* discipline.

Latest Trends in Geography :

A geographer explains the phenomena in a frame of cause and effect relationship. It helps in analysis but also predicts the future through data collection and modelling. This opens up intra and inter-disciplinary avenues and widens the scope of Geography. The dynamic nature of Geography keeps adding new things in the subject. The audio-visual media and Information Technology have enriched the database. Technology, use of computers and softwares, has offered better opportunities in data collection, interpretation, analysis and presentation. Use of GPS and GIS

has become a mandatory aspect of geographical studies. Mapping is now mostly done using GIS softwares. Thus, knowledge of computers is now an added skill that a geographer requires. Use of Apps has also further enhanced its applications in daily life. Mathematical modelling and computer models are now increasingly being used in Applied Geography. The future growth and density of population, use of land, intensity of cropping and migration, pattern of population, industrialization, urbanization and growth of cities and slums are being predicted with the help of such models. These are increasingly being used in the forecast of weather, change of climate, change in sea level, environmental pollution, soil erosion, forests depletion and evolution of landforms. Advanced statistical techniques and computer programmes are being used in studying and explaining geographical phenomena depending on the collection of reliable data about earth surface phenomena. The use of computer

helps in measurement of numerous elements in the geographic environment.

With such a vast scope and dynamic developments occurring in the subject, it has become a lucrative option as a career. Besides being a popular and lucrative subject and providing a good base of knowledge in competitive examinations, Geography offers great careers with a combination of various hard and soft skills. Here is a list of major career possibilities in Geography. (Table 8.3) In some cases, knowledge of disciplines in combination with Geography also becomes imperative.

Table 8.3

Career Opportunities	Specialisation in Branch of Geography
Cartographer	Cartography, G.I.S.
Climate Change Analyst, Climatologist	Climatology
Demographer/Census officer	Population Geography
Geospatial analyst	G.I.S.
Journalism	Any field of Geography
Surveyor	Cartography /Human Geography
Urban Planner	Urban geography
Researcher	Any branch of Geography
Freelancer /blogger / report writer / travel blogger	Any branch of Geography

Disaster management specialist	Geomorphology / Disaster Management
Tour operator / tourist guide	Human Geography, Tourism Management, Historical Geography
Data Scientist and Analyst / Census / Defence	Statistical Geography, Computer knowledge, Artificial Intelligence , Machine learning, G.I.S.
Consultant	Various fields like mapping, report-writing

Many careers in Geography may also be such that they encourage entrepreneurship and freelancing. Journalism, tourism, teaching, book writing, blog writing, content writing, map-making services, etc. are the fields which need people from background in Geography. Geographers are also increasingly working in the field of environmental conservation, water pollution and monitoring, water conservation, environmental education, sustainability, health, urban governance, transport planning, etc.

Try this.

In Fig 8.5, a newspaper item is given. A list of job opportunities is given. Go through all the entries and see which ones are suitable for a geographer as a career.

Employment News

- Union Public Service Commission (UPSC) – Class -1 Officer 2020 (Notice for Interviews) National Atlas of Thematic Mapping organisation of India, Deputy Director General (Map)
Vacant Seats- 2 (1 for UR, 1 Reserved)
Educational Qualifications – M.A./ M.Sc. Geography, Cartographer, Masters in Urban Planning
Experience – Minimum 5 years
- Mumbai Mahanagar Palika, Department of Urban Planning, Mumbai

Post – Urban planner Class-1 (open)
Work of place- Mumbai
Qualification- MA Geography /M.Arch./M.Planning
Experience: 5 years experience in urban planning or similar work.
- Post- Assistant professor Subjects: Geology, Geography, History, Rural Development
Posts : 4 (2 UR, 2 Reserved)
Educational Qualifications - Graduation and Post Graduation in the subjects mentioned above NET/SET compulsory
Desirable: M.Phil. / PhD

- UN internship - Required consultant to support UNCT Gender Equality Marker implementation.Location: New York
Language : English and French, Starting data : 16th Mar 2021.
Initial Contract Period : 10 months.
Educational Qualifications Masters Degree in Development Studies/Gender Studies/ Social Sciences.
- UPSC Engineering services Examination (Exam notice 2021) (IES) Eligibility : Any Engineering graduate

Total Posts : 495
Apply Online through website. See website for details.
- Bank PO exam :
Eligibility : Any graduate
Total Posts : 50
Apply Online through website
- UPSC Combined Defence Services (CDS)
Eligibility : Any graduate
Total Posts : 123
Apply Online through website.

Fig. 8.5 : Sample Advertisement

Geographical explanation

Use of technology has also made it possible for more and more start-ups coming in this field.

The study of Geography is emerging as a discipline of evaluating and managing natural resources. In order to achieve this objective, it is essential to understand the intricate relationship between physical environment and human beings. Physical environment provides resources, and human beings utilise these resources and ensure their economic and cultural development. Accelerated pace of resource utilisation with the help of modern technology has created ecological imbalance in the world. The Sustainable Development Goals (SDGs) given by United Nations are related to various aspects of Geography. Hence, a better understanding of Geography is absolutely essential for sustainable development and avoiding clashes between man and nature.

Exercise

Q. 1) Identify the correct group :

A)
1) Geomorphology
2) Climatology
3) Biogeography
4) Historical geography

B)
1) Cartography
2) Survey
3) Data collection
4) GIS/GPS

C)
1) Tourism
2) Forest conservation
3) Wildlife conservation
4) Culture conservation

D)
1) Political Geography
2) Physical Geography
3) Population Geography
4) Economic Geography

Q. 2) Give geographical reasons :
1) Human Geography is multidisciplinary in nature.
2) Geography is dynamic in nature.
3) Geography is dualistic in nature.

Q. 3) Write short notes on :
1) Physical Geography is related to various branches of Science.
2) Branches of Geography
3) Latest trends in Geography
4) Skills required for studying geography.

Q. 4) Answer in detail :
1) Explain how the knowledge of Geography is important in our day-to-day life. Give examples.
2) Discuss the relationship between Geography and other subjects.
3) Explain the nature of Geography in detail.

Q. 5) Differentiate between :
1) Physical Geography and Human Geography.
2) Possibilism and Determinism.

Q. 6) Draw a neat and well-labeled diagram :
1) Relationship between Geography and other subjects.
2) Skills required to study Geography.

***

World - Political (Major Countries)

PACIFIC OCEAN

ARCTIC OCEAN

ATLANTIC OCEAN

INDIAN OCEAN

SOUTHERN OCEAN

PACIFIC OCEAN

GREENLAND

ICELAND

CANADA

ALASKA (USA)

UNITED STATES OF AMERICA

MEXICO

CUBA

COSTA RICA
PANAMA
ECUADOR
COLOMBIA
PERU
VENEZUELA
GUYANA
BRAZIL
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY

RUSSIA
MONGOLIA
CHINA
JAPAN
NORTH KOREA
SOUTH KOREA
TAIWAN
PHILIPPINES
VIETNAM
THAILAND
MYANMAR
MALAYSIA
INDONESIA
PAPUA NEW GUINEA
FIJI
NEW ZEALAND
AUSTRALIA

KAZAKHSTAN
KYRGYZSTAN
TAJIKISTAN
UZBEKISTAN
TURKMENISTAN
AFGHANISTAN
PAKISTAN
NEPAL
BHUTAN
INDIA
SRI LANKA
MALDIVES
BANGLADESH

IRAN
IRAQ
KUWAIT
SAUDI ARABIA
U.A.E.
OMAN
YEMEN
SYRIA
TURKEY
GREECE

FINLAND
SWEDEN
NORWAY
DENMARK
UNITED KINGDOM
IRELAND
GERMANY
POLAND
BELARUS
UKRAINE
ROMANIA
FRANCE
SPAIN
PORTUGAL

MAURITANIA
WESTERN SAHARA
MOROCCO
ALGERIA
TUNISIA
LIBYA
EGYPT
MALI
NIGER
CHAD
SUDAN
ETHIOPIA
SOMALIA
SENEGAL
GUINEA
SIERRA LEONE
LIBERIA
IVORY COAST
GHANA
TOGO
NIGERIA
CAMEROON
GABON
CONGO
ZAIRE
ANGOLA
ZAMBIA
ZIMBABWE
NAMIBIA
BOTSWANA
SOUTH AFRICA
MOZAMBIQUE
TANZANIA
KENYA
MADAGASCAR
MAURITIUS

ANTARCTICA

Parallel True to Scale: 0°

5000 km

N

60°N
30°N
0°
30°S
60°S

150° 120° 90° 60° 30°W 0° 30°E 60° 90° 120° 150°

World - Physiography

PRACTICALS

CONTENTS

PRACTICALS

Practical No. 1 - Data Collection : Surveying Through App

Introduction :

The study of geographic phenomena often requires the application of statistical methods to produce new insights into the study. If geographical studies make use of statistical analysis to arrive at their conclusions, then study of geographic problems becomes easier. In Geography, data of various types is used such as data related to climate, relief, population, land use, migration, distance between cities, length of roads, health, etc. Geographers often work on many issues related to these aspects. They need to collect information regarding the same. Data collection can be done by selecting some people from the whole population. Few selected ones represent the sample.

Use your brain power !

You're interested in knowing what percent of all households in a large city, have women working as teachers or professors. To estimate this percentage, you conduct a survey with 200 households and determine how many of these 200 are teachers or professors. In this example, what is the population? In this example, what is the sample?

Collecting information and analysing the data and drawing conclusions from it is a systematic process. It has the following steps :

DATA COLLECTION :

Collecting data regarding the identified geographical problem is known as surveying. For example, if you are studying the migration patterns in various talukas of your district, you need to collect data about the migrants. For that, you need to go and survey them through questionnaires. Surveys are one of the most common means of data collection. Data collection process involves planning a survey, selecting a representative sample of individuals to survey and carrying out the survey properly.

Aim : To design a questionnaire for a survey and conduct the survey

Objectives :

1) To decide the aim and scope of a survey
2) To understand the characteristics of a well-designed questionnaire
3) To design a good questionnaire for the survey

Surveys are one of the key ways to gather quantitative data for analysis. Surveys rely on asking the same question in the same way to a large number of people and obtaining a lot of responses. These responses are then analysed using statistical techniques to obtain information that can be generalised about the whole population. To obtain this information, a good questionnaire is very necessary. The design of a questionnaire will depend on whether the researcher wishes to collect qualitative information for the purpose of better understanding or quantitative information for data representation. **Following are the steps to make a good questionnaire :**

STEP 1 : Decide the information required. Each question or item should express only one idea. Make your questions to make sure that they only cover one idea. If necessary, split one question into two. Avoid difficult words and abbreviations. Use simple language and expressions.

STEP 2 : Define the target respondents.

STEP 3 : Choose the mode of reaching your target respondents.

STEP 4 : Decide on question content.

STEP 5 : Develop the question wording.

STEP 6 : Put questions into a meaningful order and format.

STEP 7 : Check the length of the questionnaire.

STEP 8 : Pre-test the questionnaire.

STEP 9 : Develop the final survey form.

<p style="text-align:center">Sample Questionnaire</p>

1) Name of the Head of the Family _____

2) Gender of the Head of the family: Male [   ]   Female [   ]   Other [   ]

3) Age of the Head of the family :

    a) 0-14 years [   ]

    b) 14-39 years [   ]

    c) 39-60 years [   ]

    d) More than 60 years [   ]

4) Educational level of the head of the family

    a) Illiterate [ ]   b) Primary [ ]   c) High School [ ]

    d) Higher Secondary [ ]   e) Graduate [ ]   f) Post Graduate [ ]

    g) Higher than PG (PhD, etc.) [ ]

5) Occupation of the head of the family _____

6) Annual Income of the family : (in ₹)

    a) 0-50,000

    b) 50,001-2,00,000

    c) 2,00,001-5,00,000

    d) 5,00,001-10,00,000

    e) More than 10,00,000

7) Information about the family

    a) Number of family members – [   ]

    b) Fill the table :

Sr. No.	Name of the family member	Relation with the head of the family	Age	Gender	Education level	Occupation

8) Type of House

a) Clay Tiles/ Hut type ☐   b) Bungalow ☐

c) Apartment /Flat ☐   d) Other ☐

9) What all do you own in the house : (tick all that are applicable) (enter the number also)

a) Cycle ☐   b) Two wheeler ☐

c) Four wheeler ☐   d) Auto rickshaw ☐

e) Refrigerator ☐   f) TV ☐

g) Radio ☐   h) A.C ☐

i) Microwave /Oven ☐   j) Water filter ☐

k) Washing Machine ☐   l) Mixer/Grinder/Food processor ☐

m) High Speed internet ☐   n) Home theatre /DVD player/Music System ☐

o) Agricultural Land ☐   p) Landline phone ☐

q) Mobile phone ☐

10) What is your means of transport commonly?

a) Two wheeler ☐   b) Four wheeler ☐

c) Auto ☐   d) Cycle ☐

e) Walk ☐   f) Public transport ☐

g) Animals ☐   h) Ola/uber/taxi/privately hired vehicle ☐

Note : Students may add more questions.

Carrying out Socio-economic surveys with the help of an App :

Aim : With help of mobile app, survey the household/families and analyse the data and draw conclusions.

Objectives :

1) To survey 15 household families and collect information with the help of mobile app.

2) To analyse collected data with the help of graphs and diagrams and to draw conclusions.

This practical consists of 3 stages :

STEP 1 : The students should first download the app and register themselves. They can start surveying as per the screen shots given on page 89. (only few have been given for reference).

STEP 2 : You have to survey minimum 15 households/ families. They should be residing in the same city/ village but their houses should be at least 20 m away from each other. In urban areas, do not take households in the same building. Take only one household in one building. You have to collect all their information through questions in the app. You can also add some more questions. After data of all the 15 families have been collected, download the file from the app.

STEP 3 : You have to analyse the data after you download the file. For analysis, you have to use the diagrams you have learnt till now in earlier classes and also to be taught in the practicals in this class. Population pyramid, types of graphs, etc., have to be used and submitted to your teachers before Diwali vacation. This analysis has to be in hard copy (on paper).

Please refer to the screenshots of the App for your easy reference as given hereafter :
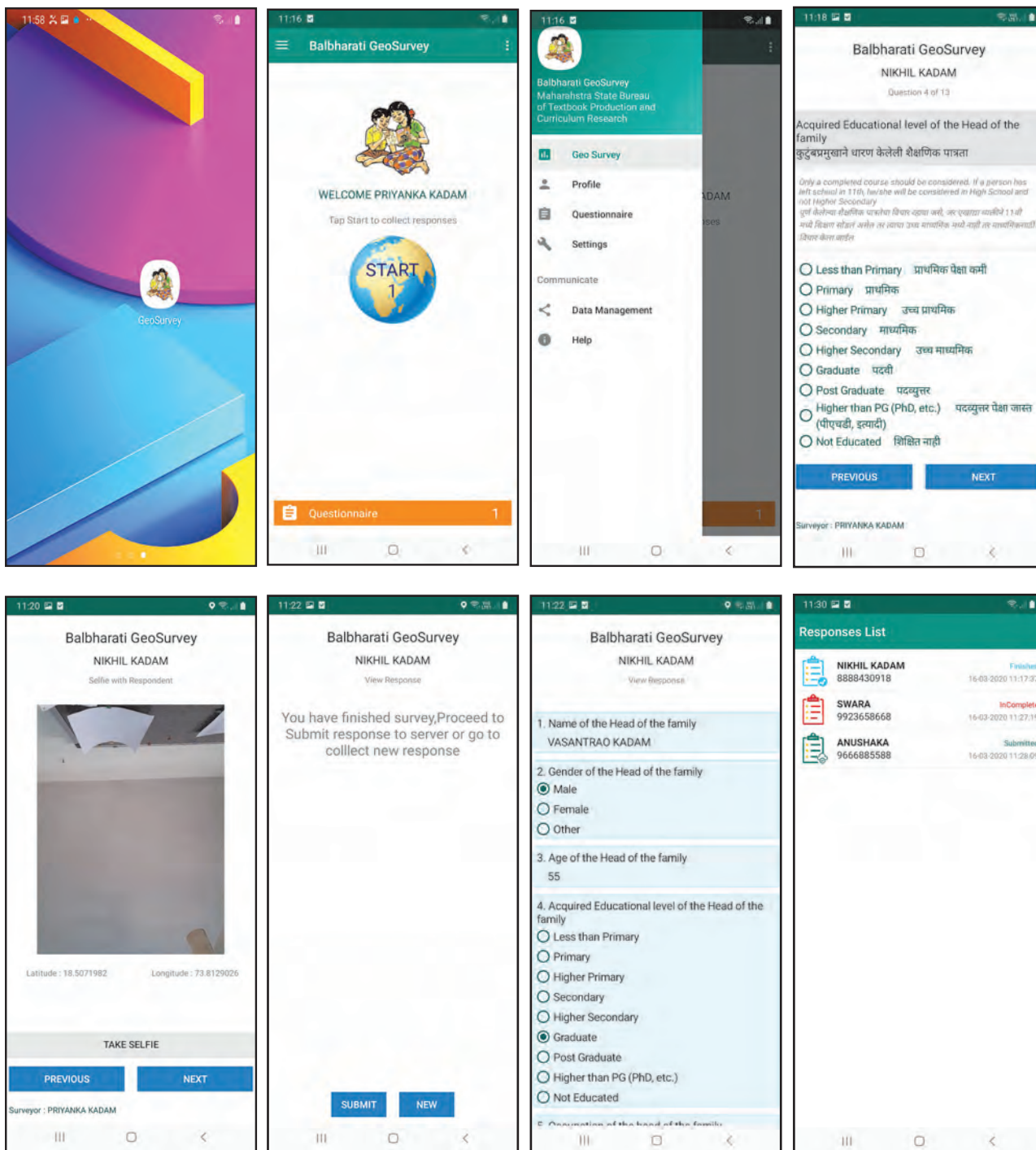
After you complete these three stages, your work will be considered as complete.

Sample analysis :

STEP 1 : Get registered after downloading the App from Google Playstore. You will have to enter all details. You will get access to your surveys only after you enter Teacher's code. Verify your school/college, and start the surveys. Please keep your GPS location 'on' to get the geo-points of your households.

STEP 2 : You can choose one language out of English and Marathi for your convenience though the questions are bilingual. Hints are also given so that you can understand the question better before asking. When you click submit, you cannot edit it. You can save and move ahead with all your surveys. You can submit at the end when you finish all your surveys. Before that

make sure you take a selfie with the respondent.

STEP 3 : After you complete 15 surveys and submit them, you can download the data in two formats:

Excel (xml) and 'kml ' formats. Excel format will be used for data analysis for the collected data . The 'kml' file which you download will help you to make a map of the households you surveyed.

STEP 4 : Open the downloaded xml file in Microsoft Excel. You will see the collected data in a table format. It will look as shown in Fig .P 1.1. There will be two sheets in Excel. One sheet will have details of 15 families and data related to the questions asked to the Respondent. The other sheet will contain data of family members as shown in Fig P 1.2

Fig. P 1.1

You can take printouts of both the tables so that handling the data will be easier for you.

Fig. P 1.2

The data of family members will be connected with the respondent's number on the first sheet and second sheet. This will help you to identify the respective family's data.

Now you will have to carefully analyse and represent it using suitable graphs. Look at the data carefully.. Now you will have to organize the data into various categories according to different questions asked.

Following are some of the basic suggestive points for the analysis. You can also add more points according to the questions you have added.

1) **Start with the basic calculations :** Calculate the total number of males and females in your sample. Also, calculate the total number of people you have surveyed in the 15 families. Make a table like this.

No. of males	No. of females	Others	Total
26	27	0	53

You can also calculate the sex ratio for your sample.

Sex ratio for the sample = No of females / No of males × 1000 = 27 /26 × 1000 = 1038

Conclusion : Thus, 1038 is the sex ratio for this given sample. This suggests that sex ratio is good. (You will calculate the same for your own collected data.)

2) **Age and Sex of the samples :** You have the data of 15 families. You know the ages and gender of all the family members. Make the age groups according to their ages and show them in a population pyramid. Sample analysis is as follows:

Table : Table showing distribution of age and sex in the sample

Age groups (in years)	Females	Males	Total
0-10	4	0	4
10-15	2	0	2
15-20	3	6	9
20-30	8	3	11
30-40	0	2	2
40-50	4	4	8
50-60	1	6	7
60+	5	5	10

This is how we will make age-sex table and then make the pyramid accordingly as shown in the figure P 1.3.

Age group

Number of persons

☐ Males ☐ Females
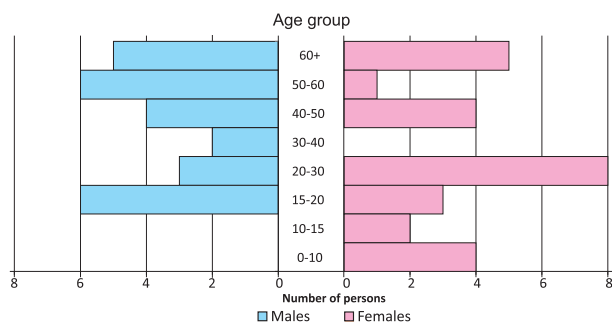
Fig. P 1.3

Conclusions : After drawing the pyramid you can analyse what the pyramid shows about your collected data. Comment upon the age-structure of the collected data as you have learnt in Chapter 2. Here, for this data, we can see that the working population is more than the dependent population. Hence, dependency ratio is less. But, we can see that there are a lot of old people in this sample. This will mean that the medical costs will be high in these families.

(You can write your conclusions accordingly for your dataset.)

3) **Educational level of family members :**
From the excel sheet or the print out, you can organise the data according to their

acquired education level. You can make a table first and then show the data with the help of a suitable diagram as follows:

Acquired Educational Level	No of Males	No of Females	Total
Illiterate	1	1	2
Less than Primary	0	3	3
Primary	2	7	9
Higher Primary	1	3	4
Secondary	1	1	2
Higher Secondary	12	4	16
Graduate	6	6	12
Post Graduate	3	2	5
Higher than PG (PhD, etc.)	0	0	0
Total	26	27	53

You can show this through a graph but calculating percentages will give a better idea than just showing actual numbers.

Calculate the percentage of acquired educational level for males and females. as given in the following table.

Acquired Educational Level	Males	Percentage of educated males in that level out of total males	Females	Percentage of educated females in that level out of total females	Total	Percentage of educated persons in that level out of total persons
Illiterate	1	$1/26 \times 100 = 3.85$	1	$1/27 \times 100 = 3.71$	2	$2/53 \times 100 = 3.78$
Less than Primary	0	0	3	$3/27 \times 100 = 11.11$	3	$3/53 \times 100 = 5.67$
Primary	2	$2/26 \times 100 = 7.70$	7	$7/27 \times 100 = 25.93$	9	$9/53 \times 100 = 16.98$
Higher Primary	1	$1/26 \times 100 = 3.85$	3	$3/27 \times 100 = 11.11$	4	$4/53 \times 100 = 7.54717$
Secondary	1	$1/26 \times 100 = 3.85$	1	$1/27 \times 100 = 3.71$	2	$2/53 \times 100 = 3.78$
Higher Secondary	12	$12/26 \times 100 = 46.16$	4	$4/27 \times 100 = 14.82$	16	$16/53 \times 100 = 30.19$
Graduate	6	$6/26 \times 100 = 23.08$	6	$6/27 \times 100 = 22.22$	12	$12/53 \times 100 = 22.65$
Post Graduate	3	$3/26 \times 100 = 11.54$	2	$2/27 \times 100 = 7.41$	5	$5/53 \times 100 = 9.44$
Higher than PG (PhD, etc.)	0	0	0	0	0	0
Total	26	100	27	100	53	100

Now you can show with a compound bar graph or any other suitable diagram :
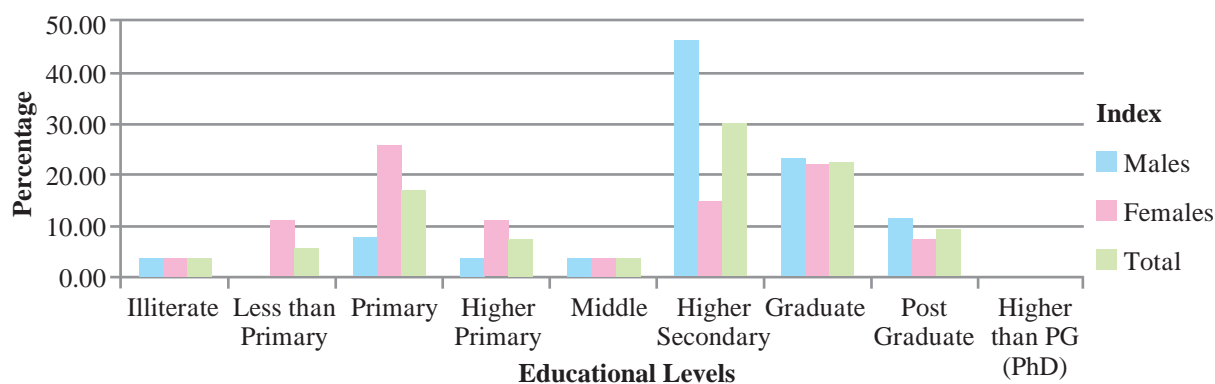
Fig. P 1.4

Conclusions : Here, we can see that only 3.9% of the population is illiterate. Illiteracy is more in males than in females. After Higher Secondary level, the Primary level has been acquired by around 16% of the population. Here too, more females have completed their primary education than males. Most of the males have completed education upto Higher Secondary level. There was no one in the sample who has completed education beyond Post Graduation.

(Similarly, analyse and draw conclusions for your collected data.)

4) **Occupation followed by the Head of the Family :** You have collected data about what occupation is the Head of the family engaged in. Classify these occupations into primary, secondary and tertiary as you have learnt in the textbook. If there are retired persons or home-makers who are heads of the families, then take them as non –working . Following analysis has been done for the collected sample.

Acivities	Number of head of the families	Percentage
People engaged in Primary Activities	6	40
People engaged in Secondary Activities	2	13.33
People Engaged in Tertiary Activities	6	40
Not working	1	6.67
Total	15	100

Conclusions : This shows that 40% of the heads of the families are engaged in Primary and Tertiary activities while only 13.3% of the families are engaged in secondary activities. Around 6% of the heads were not working anywhere. This means that 93.3% of the head of the family are under working population.

5) **Income of the families :** You have collected the data about annual incomes of the families. Organise the data as shown in the table :

Income groups	No of families	Percentage of families in that income group (%)
Less than ₹ 50000	0	0
₹ 50001- 200000	3	$3/15 \times 100 = 20$
₹ 2,00,001- 500000	6	$6/15 \times 100 = 40$
₹ 500001- 10,00,000	4	$4/15 \times 100 = 26.6$
More than ₹ 10,00,000	2	$2/15 \times 100 = 13.3$
Total	15	100

You can show this with the help of a suitable diagram, say, a pie chart, as follows (fig. P 1.5) :

Percentage of families in that income group (%)
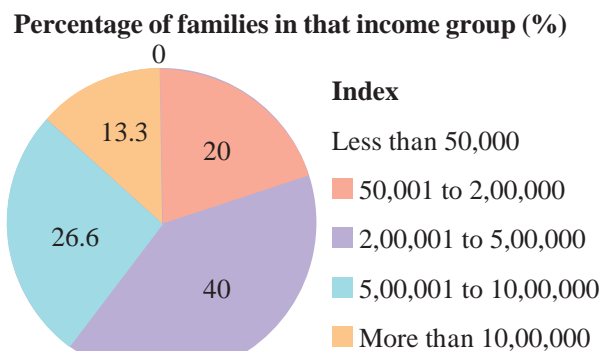
Fig. P 1.5

Conclusions : The pie chart shows that there is no family in the age group of less than ₹ 50000. Around 40% of the families fall into the income group of ₹ 2 lakh to ₹ 5 lakhs. Around 26.6% of the surveyed families fall into the category of ₹ 5 lakh to 10 lakhs. Around 13.3% of the families fall into the category of more than ₹10,00,000.

Similarly, you can organize data for the following :

5) Percentage of people living in own house or rented house

6) Percentage of people using various means of transport

7) Percentage of people having various items in their households

8) Percentage of people having access to toilet within their households

These are just hints and you can analyse the data using various indicators based on the data that you have collected.

You can also calculate mean of your data- For e.g mean income, mean age, mean education, etc. You can also calculate Standard Deviation using mean. You can also calculate correlation using Rank Correlation for the transport data. You can find out if there is any correlation between distance travelled and cost incurred for distance travelled.

Rank Correlation has been derived for the sample data.

Distance travelled daily for work (X) Kms	Cost of travelling (Y) ₹	R_1	R_2	R_1-R_2	$(R_1-R_2)^2$
40	250	1	2	-1	1
10	35	14	11	3	9
15	15	10	14	-4	16
25	65	5	9	-4	16
20	150	7	6	-1	1
24	180	6	5	1	1
12	60	12	10	2	4
11	25	13	12	1	1
2	0	15	15	0	0
18	30	8	13	-5	25
28	220	3	3	0	0
14	100	11	7	6	36
16	75	9	8	1	1
30	280	2	1	1	1
26	200	4	4	0	0
					$\Sigma = 112$

Thus, R= 1- {6 (Σ (R_1- R_2)^2 /n (n^2- 1)}

= 1- {6×112) / 15 (15^2 -1)}

= 1- {672/ 15(225-1)}

= 1- {672/ 15×224}

= 1- {672/3360}

= 1- {0.2}= 0.8

Conclusions : This implies that there is a high positive correlation between distance travelled daily and cost incurred for travelling. It means if distance increases, cost of travelling also increases.

STEP 5 : Now after you finish the analysis See the location where your 'kml' file has been downloaded. From there, copy the file on to a computer. It is easier to use this format on a computer than a mobile phone.

STEP 6 : There are two ways to make a map with the help of computer.

a) Using Google Earth:

STEP 6.a1 : Go to Google and put Google Earth in Search. Download Google Earth onto your computer. After you download it, open it. You will get the following screen:
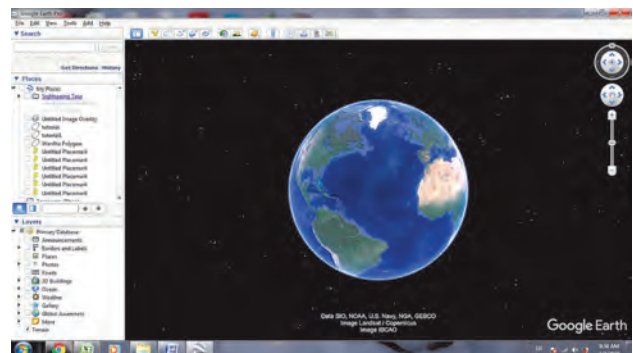
Fig. P 1.6

STEP 6.a2 : Now go to File Tab and click open. Open the 'kml' file location and this will add your file to Google Earth.
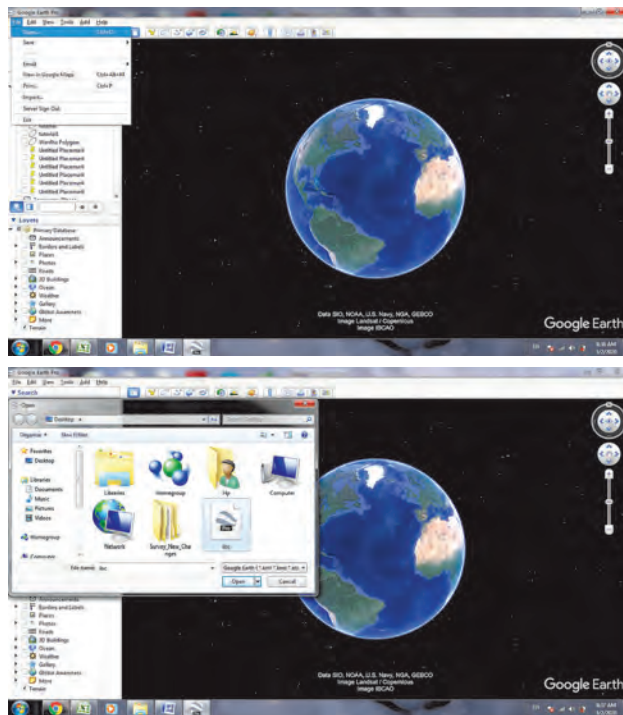
Fig. P 1.7

STEP 6.a3 : As you select the file and open it, you will see all the houses you surveyed with pinpointed locations.
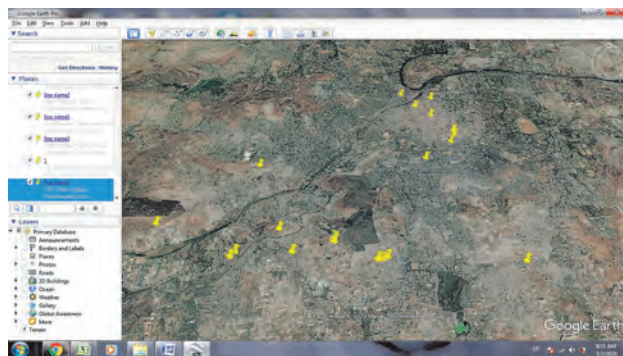
Fig P 1.8

STEP 6.a4 : Take a screenshot (using prt sc on your keyboard) and paste it in a word file or make a jpeg image. Make sure your area is clearly visible when you take a screenshot. Take a print of this screenshot. Use Powerpoint, Photoshop, Paintbrush to make JPEG or you can click a photo of the screen with your mobile. Take a print of the JPEG or Tiff image and submit it with your submission of the analysis.

b) Using Bhuvan Website :

STEP 6.b1 : Go to Bhuvan portal : https://bhuvan.nrsc.gov.in/bhuvan_links.php

STEP 6.b2 : Click on Bhuvan 3D or Bhuvan 2D

STEP 6.b3 : On the left side of the page, you can see the icon "Tool". Click on the icon Tool and then choose "Add Layer" and then add the file from the saved location. Then click Upload.
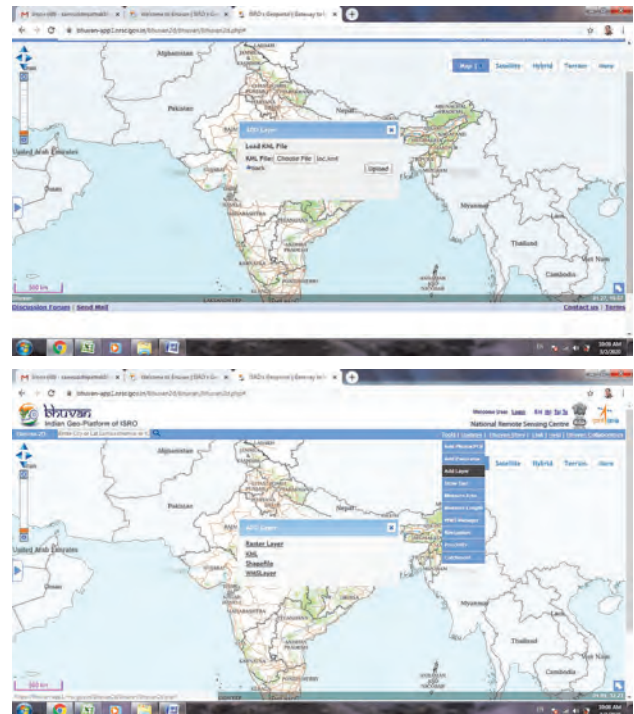
Fig P 1.9

STEP 6.b4 : When you click upload, wait for some time and then you will see you points on that map. Zoom in more if needed.
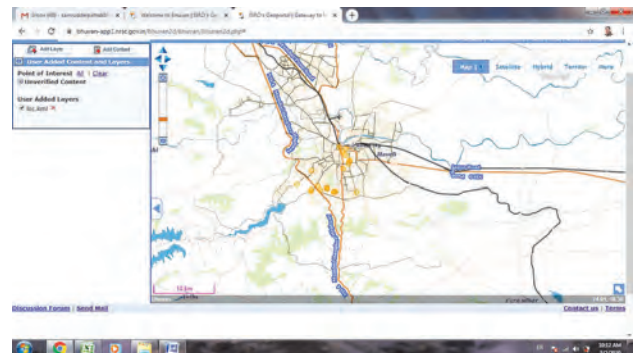
Fig P 1.10

STEP 6.b5 : Take a screenshot using prt sc on your kepbaord. Save the file and take a print of the screenshot. Then submit this hard copy of your map with your main submission.

***

Practical No. 2 - Data Organisation

DATA ORGANISATION :

After you collect and review data, you should check whether it really makes sense. You need to check how much of the collected data is really useful. This step is known as data organisation. The way to do that is two-fold : (1) Organize the data in a visual manner, so that you can see it clearly and (2) think, how by using some statistical techniques, you can draw conclusions. To do this, you can organise the collected data into tables according to various variables or items as per your needs. For example, if you have collected data about age of few 100 people, then you can classify the ages into various age-groups like 0-15, 16-30, 31-45, 46-60 and 60+ or if you have collected data about their incomes , then you can count how many people have their incomes in that class or range. This can be done manually or one can also use softwares like Excel or SPSS for doing so and draw the condusion.

Types of data for data organisation :

After collecting data, it needs to be organized. Hence, data organisation can be done as per requirment from your collected sample. Thus, the need to separate grouped data from ungrouped data. Both are useful forms of data but the difference between them is that ungrouped data is raw data. This means that it has just been collected but not sorted into any group or classes. On the other hand, grouped data is data that has been organized into groups from the raw data.

If there are some values in the data which are recurring and the amount of collected data is large, then data can be grouped into classes with ranges. If the data is small, then it can be kept ungrouped. For example, if we survey 100 people and ask them their monthly incomes, it will be difficult to keep a track of all 100. You will instead divide the incomes into various

class intervals and see how many people have the income in a particular range. This is how your grouped data will look :

Income Categories	No of people who have incomes in these categories
0-10000	20
10000-20000	25
20000-30000	28
30001-40000	20
40000 and more	7
Total	100

Thus, this will be grouped data. On the other hand , the following example shows ungrouped data where only 10 people have been surveyed and incomes have not been classified.

Person	Income (in ₹)
A	2500
B	3000
C	4000
D	12000
E	8000
F	7400
G	6500
H	8780
I	9000
J	4500

When we analyse data given in grouped or ungrouped data, calculation of mean, standard deviation or any other statistical measure may differ by few steps.

Practice more : Your mother has given you the following list of items to be brought from the market. Organise the given data :

Dataset - 1	
Items	**Quantity**
Kolam Rice	1 kg
Split Black gram	1/2 kg
Beans	1/4 kg
Coriander Seeds	100 gms
Chillies	200 gms
Soap Nut	100 gms
Coconut Oil	1/2 liters
Soaps	5

Dataset - 2	
Items	**Quantity**
Basmati Rice	1 kg
Kolam Rice	5 kg
Indrayani Rice	10 kg
Lokvan Wheat	10 kg
Sihor Wheat	10 kg
Pearl Millet	5 kg
Sorghum	5 kg
Pigeon Pea	2 kg
Bengal Gram	2 kg
Split Black Gram	1 kg
Red Lentils Dal	1 kg
Soap	10
Washing Powder	1/2 kg
Liquid Soap	1 kg
Coriander Seeds	100 gms
Pepper	100 gms
Clove	100 gms
Coconut Oil	1/4 liters
Groundnut Oil	2 liters
Soybean Oil	2 liters
Sesame Oil	1 liters
Beans	1/4 kg
Black-eyed Peas	1/4 kg
Red Lentils Pulse	1/4 kg
White Gram	1/4 kg
Green Pea	1/4 kg
Black Peas	1/4 kg

Q. 2. Given the following set of data, we want to organize the data into groups. We have decided that we want to have an interval of 5.

26 18 21 34 18 38 22 27 22 30 25 25 38 29 20 24 28 32 33 18

Q. 3. Given data is about Time taken (in seconds) by a group of students to answer a simple geography question. Group the data in an interval of 10.

20 25 24 33 13 26 8 19 31 11 16 21 17 11 34 14 15 21 18 17

Q. 4. Read the given paragraph and complete the table. Following data is given about the size of holdings in a village. (in hectares). There are 2000 households in the village who own these holdings. Half of the households own the holdings between 1 to 3 hectares. Out of the remaining, 200 households hold land in the category of 3 to 5 hectares. Out of the remaining, 50% of the households own in the category 5 -10 hectares and 50 % hold 10 -20 hectares. No one holds land in the category of 20 and above.

Holdings (in hectores)	No of households holding the land
1-3	
3-5	
5-10	
10-20	
20 and above	
Total	2000

***

Practical No. 3 - Data Analysis : Measures of Dispersion

DATA ANALYSIS :

After you organise, you have to analyse the data. For that you can use various variables in the data and see how you can explore relationships between them. You can do that by looking at and comparing percentages, calculating mean or by using correlation and use them to make predictions (one variable predicting the other) by using regression. Studying relationships helps you get at the essence of how statistics is applied in Geography. For example, you can say, out of the data collected, 60% of the people were in the age-group of 20-40 years or 20% had income of more than Rs.10,000 per month. You can also say that there is a high correlation between income and ownership of the house and so on. All these analysis depends on the data you have collected and the parameters you select for the analysis.

Introduction :

In class X, you have already studied about the measures of central tendency, i.e. averages such as the mean, median and mode. These are all 'central' or 'middle' values. Mean is the average of all values while median is the midpoint of an arrangement of all values in increasing or decreasing manner. Mode is the maximum times a value is recurring (frequency) in the data.

Thus, we see that the data may consist of extreme values on both sides, but these central values or averages often misinterpret the data. These values are insufficient to examine the nature of the data. There must be some value which will associate the variation in each value with the central value. This phenomenon of varying from central value is known as dispersion. The various values which tell us dispersion, are called measures of dispersion.

We will study two measures of dispersion : range and standard deviation.

Range :

It is the simplest measure of variation. It is simply the difference of maximum and minimum values of the given data. You have already studied range of temperature in class XI, where you subtracted the lowest value from highest value for calculating the diurnal or annual range of temperature. It is the difference of two extreme values, hence, it does not take into consideration the mid-values. Other examples of calculating the range would be difference in relief features, fluctuation in water table of a city or a village, etc.

Solved example :

Calculate the range of the population densities of the given data. Also calculate the mean of the data.

Solution :

Range = Maximum value – Minimum value

States	Population Density (2011)
Uttar Pradesh	829
Madhya Pradesh	308
Himachal Pradesh	123
Jharkhand	414
Tamil Nadu	555
Gujarat	308
Punjab	551
Uttarakhand	189
Arunachal Pradesh	17

Maximum value = 829

Minimum value = 17

Range = Maximum value – Minimum value = 829 – 17 = 812

(Mean = 366)

Calculate the range of literacy rates of various countries :

Country	Literacy Rate (%) (2018)
Argentina	98.1
Bangladesh	73.9
Bhutan	64.9
Brazil	91.7
China	96.4
India	74.4
Kenya	78
Malaysia	94.6
Zimbabwe	86.5

Highest value = 98.1%

Lowest value = 64.9%

Range = 98.1 – 64.9 = 33.2

Discuss the merits and demerits of using range.

2) Standard Deviation : The main idea behind the measures of dispersion is to get to know, how the data values are spread. It shows how much the data vary from its average value. There are various such measures used and we will learn now about standard deviation (S. D.).

S. D. is the average distance between each value and the mean value. This value tells you, if the data is clustered around the mean or scattered. It can also, therefore, assess the mean and tell if it really represents the data well. Sometimes, we have different sets of data, whose means are of the same value, though data values are very different. In such a case, standard deviation gives us the real picture.

The significance of the S. D. is assessed by comparing it to the mean :

Low S. D. value : Values are tightly clustered and the mean is a reliable representation of the entire sample.

High S. D. value : Values are scattered apart and mean is not a reliable representation of the entire sample.

Solved example :

Calculate the standard deviation for the given data.

Cities	Distance of rural-urban fringe from city center (in kms.)
A	4
B	9
C	11
D	12
E	15
F	5
G	8
H	12
I	14

First we will calculate the mean (x).

$$x = \frac{\text{Sum of all values } (x_1 + x_2 + x_3 + x_i)}{\text{No. of Values}}$$

$$= \frac{(4 + 9 + 11 + 12 + 15 + 5 + 8 + 12 + 14)}{9}$$

$$= \frac{90}{9} = 10$$

Now subtract the mean from each value ($x_i - x$), then square the result. Follow the table :

Cities	Dist (x_i)	($x_i - x$)	($x_i - x$)²
A	4	4 – 10 = – 6	36
B	9	9 – 10 = – 1	1
C	11	11 – 10 = – 1	1
D	12	12 – 10 = 2	4
E	15	15 – 10 = 5	25
F	5	5 – 10 = – 5	25
G	8	8 – 10 = – 2	4
H	12	12 – 10 = 2	4
I	14	14 – 10 = 2	4
			Σ = 104

Now, Calculate the sum of all squares. Divide it by the number of values (x) = 9 Then, find the square root.

Thus, S. D. $= \sqrt{\left(\frac{104}{9}\right)}$

$= \sqrt{11.5}$

$\cong 3.39$

This is more than half away from mean. Thus, it shows high dispersion or scattering of data.

Practice more :

Q. 1. Suppose you have surveyed few youngsters in your village/city. They have all migrated to other places. These are the distances of their migration. Find out the average distance of migration and the standard deviation. Interpret your data.

Youth	Distance migrated (kms.)
A	9
B	2
C	5
D	4
E	12
F	7
G	8
H	11
I	9
J	3
K	7
L	4
M	12

N	5
O	4
P	10
Q	9
R	6
S	9
T	4

Q. 2. Following data shows the percentage of land use under residential category in different cities.

Find the standard derivation.

Cities	A	B	C	D	E	F	G	H	I	J
% of land use under residential category	57	64	63	67	49	59	44	47	61	59

Interpret your data.

Q. 3. Use standard deviation for your data collected through App.

Coefficient of Variance :

To know how much dispersion is there in the data, we use coefficient of variance (C. V.).

$$C. V. = \frac{S.D.}{Mean} \times 100$$

In the above example, S.D. = 3.39, Mean = 10,

$$\therefore C. V. = \frac{3.39}{10} \times 100 = 33.9\%$$

Thus, C. V. expresses the S. D. as a percentage mean and shows dispersion in the data in a better way.

Q. 4. Calculate Standard Deviation for the following data. Interpret your results

Wards in a city	% of people who are graduates
A	3.4
B	2.3
C	5.6
D	7.8
E	10.0
F	12.2
G	8.4
H	5.6

Do you know ?

Finding the square root :

We will learn how to find the square root using log tables. You can easily calculate the square root of certain numbers like 36, 49, etc. which are perfect squares. You may even know their square roots. But when it comes to decimal figures, it becomes difficult estimating or calculating square roots. One way of finding square roots is using log tables which have tables showing square roots ready for using. (see page 111 and 112)

Solved example :

Calculate the square root of 18..

STEP 1 : Take a log table and take out the page which shows square roots. Generally, log tables show square roots from 1 to 100. We have to use them to find out the square roots of any number within or outside this range.

STEP 2 : Now see the table and check the column on the leftmost side which has numbers from 1 to 100. Now we consider 18 to be 18.0 and hence when we check the row which contains 18 and the column showing 0, we get the answer as 4.243.

STEP 3 : Now suppose we have to find the square root of 18.3. Then we will take the row which shows 18 and take the column which shows values under 3. Then the square root of 18.3 will be 4.278. Similarly for 18.8, it will be 4.336.

STEP 4 : Suppose we want to find out the square root of 180. Now, 180 is not given in the table. Then we follow the followings steps.

We write 180 as 180 = 18 *10

therefore √180 = √18 * √10

You find the square root of 18 from the table = 4.243

Q.5. Find the standard deviation. Interpret your result.

Name the village	Population
A	500
B	200
C	300
D	400
E	250
F	350
G	500

Q. 6. Following data shows dates of the first snowfall in Shimla, for 10 years. The dates are given in year days, i.e., January 1st is day 1, January 2nd is day 2, and so on throughout the year. Calculate the range. Further , calculate the mean and standard deviation. Interpret your data.

Day of First Snow * (Xi)
291
299
279
302
280
303
299
304
307
314

Q. 7. Following data shows the number of days of precipitation in Chennai in the month of December. Find the standard deviation. Interpret your result.

Year	No of rainy days in December
1967	10
1968	12
1969	9
1970	7
1971	10
1972	11
1973	9
1974	10
1975	9
1976	13
1977	8
1978	9
1979	10
1980	8
1981	9

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Practical No. 4 - Data Analysis : Rank Correlation

Introduction :

We discussed till now about a single variable. But sometimes, in Geography, we need to understand the relationship between 2 variables. For example, high temperature and low pressure, population density and availability of water, literacy rate and per capita GDP, etc. We will now see how these relationships between two variables can be explained numerically. We need to understand that with data for 2 variables, change in one set will affect the other. To know this, correlation is useful to us. Correlation refers to the strength and nature of relationship between two variables.

Three types of relationships can be seen :
  i) Increase in one variable, leads to increase in the other.
  ii) Increase in one variable, leads to decrease in the other.
  iii) Change in one variable, does not change the other.

In first case, the direction of the relationship between the first and the second is the same.

Both are positively correlated. In second case, the direction of relation is opposite. Both are negatively correlated. In third case, there is no correlation between the two. For example, Increase in distance from market increases transportation cost, is an example of first case. Higher the temperature, lower is the pressure is example of second case.

Increase in education investment has no relationship with number of clothes each one wears is an example of third kind.

Degree of correlation can go to 1 in mathematical terms. This is perfect positive correlation. The other extreme is -1, perfect negative correlation. Between the two points, lies zero correlation or point of no correlation. At other times, correlation values can be between -1 and 1.

There are various methods by which correlation can be calculated. Now we will disuses the Spearman's Rank correlation method. This is used for variables for whom data is in the form of ranks or preferences.

Method : Calculate the Spearman's Rank correlation with the help of following data :

Wards in a city	A	B	C	D	E	F	G	H	I	J
No. of people BPL	20	80	00	200	120	160	60	180	90	100
No. of people unemployed	40	120	60	240	160	180	80	200	90	100

Here we have to see if there is any correlation between the two variables.

STEP 1 : Copy the data in a table and put them in another column with ranks.

Ward	X_i	R_1	Y_i	R_2	R_1 - R_2	$(R_1 - R_2)^2$
A	20	9	40	10	-1	1
B	80	7	120	5	2	4
C	00	10	60	9	1	1
D	200	1	240	1	0	0
E	120	4	160	4	0	0
F	160	3	180	3	0	0
G	60	8	80	8	0	0
H	180	2	200	2	0	0
I	90	6	90	7	-1	1
J	100	5	100	6	-1	1
						$\Sigma = 8$

STEP 2 : Arrange the data according to ranks and put 1, 2, 3, 4 accordingly. Highest value gets Rank 1.

STEP 3 : Find the difference between the two ranks. (R_1 - R_2).

STEP 4 : Square the values. (R_1 - R_2)^2.

STEP 5 : Find the sum of all squares.

STEP 6 : Now find the correlation with the following formula :

$$R = 1 - \frac{6\Sigma(R_1 - R_2)^2}{n(n^2-1)}$$

Where, R = Rank correlation

$\Sigma(R_1 - R_2)^2$ = Sum of squares of differences between two ranks

n = Number of data values

$$R = 1 - \frac{(6 \times 8)}{10(10^2 - 1)}$$

$$= 1 - \frac{48}{10(100 - 1)}$$

$$= 1 - \frac{48}{10 \times 99}$$

$$= 1 - \frac{48}{990}$$

$$= \frac{990 - 48}{990} = \frac{942}{990} = 0.95$$

Thus, there is a positive high correlation between population BPL and unemployment in the 10 Wards of a city. This means that if BPL population increases, unemployment also increases.

Practice more :

Urban population and literacy ratio of 10 areas is given in these two data. Interpret your results.

Areas	1	2	3	4	5	6	7	8	9	10
Urban population (%)	60	35	15	22	18	38	47	5	12	9
Literacy rate (%)	73	29	36	14	20	48	45	12	13	10

Do you know ?

How to divide easily?

Suppose we have to divide 890 by 920. How can we do that easily?

Here the number of digits in both the dividend and the divisor are same. Consider their first digits. As dividend is smaller than the divisor, we know that 8 will not be divided by 9. In that case, we get 0 in our quotient. Now 8 becomes 80. As we have added a zero we can now put a decimal point in quotient (0.). Now, in the table of 9, the number closest to 80 is 9*9= 81 which is larger than 80 so we take 9*8 = 72. Thus, our quotient becomes 0.8. Thus, 890/ 920 = 0.8 (approximately).

Thus, by choosing only first digits of both the numbers you can divide easily. Another example, 726 by 878. In this case too, the dividend is smaller than the divisor. Let's take the first digits. As 7 cannot be divided by 8, we put a 0 in the quotient and assume it to be 70. Now, quotient becomes 0. As we put a decimal. Multiple of 8 nearest to 70 is 8*8 = 64 or 8*9= 72. Since 72 is larger than 70, we take 8. Therefore, quotient becomes 0.8. Thus, 726/ 878 = 0.8 (approx.)

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Practical No. 5 - Data Representation : Divided Circles

DATA REPRESENTATION :

An old saying goes, " A picture is worth a thousand words". The analyses that you have done need to be presented well. You can use line graphs, bar graphs , scatter plots and various other ways to present yiour analysis which will be eay to understand at one go. For example, you can use a population pyramid to show the age and sex distribution of the sample you have collected. You can show incomes by line graphs and use compound bar graphs to show how many people are engaged in primary, secondary and tertiary activities.

Aim : To represent the given data using a pie-chart.

Objectives :

1) To understand that pie charts can be used to show various types of data and its components.

2) To understand how they can be shown on a map and used for data interpretation.

3) Analyse the data represented by pie diagrams.

Introduction :

In a divided circle, a specific circle is created, showing the statistics of different geographical constituents in a numerical way. For example, land use, agricultural products, irrigation areas under different sources, financial products etc. The statistics of the geographical factors can be shown in a split circle manner.

Materials required : Data (given), pencil, scale, compass, protractor, paper.

STEPS :

Represent the given statistical information with the help of a pie chart following these steps :

Q.1. Area under various crops in Satara district

Crops	Area (in 000 hectares)
Grains	42698.3
Pulses	5629.9
Sugarcane	2746.8
Oilseeds	6685.4
Other crops	14716.1
Total	72476.5

STEP 1 : Calculate the total of all the given sub-components of the data for all the years.

STEP 2 : Calculate the value of sub-components of the data in degrees using the following formula:

$$\text{Value of sub-component in degrees} = \frac{\text{Data of the sub-component value}}{\text{Sum total of all the components}} \times 360°$$

For example,

$$\text{Value of Grains in Degrees} = \frac{42698.3}{72476.5} \times 360° = 212.0°$$

Sr. No.	Crops	Area (in 000 hectares)	Value in degrees
1	Grains	42698.3	212.0
2	Pulses	5629.9	28.0
3	Sugarcane	2746.8	14.0
4	Oilseeds	6685.4	33.0
5	Other crops	14716.1	73.0
6	Total	72476.5	360.0

STEP 3 : Decide the radius of the circle depending on the paper size given to you or space available.

STEP 4 : With the help of a protractor, mark the respective angles and divide the circle accordingly showing all the sub-components.

STEP 5 : Shade or colour every sub-component so that they appear distinctively.

STEP 6 : Give the title and prepare an index for the shades or colours.

Area under various crops in Satara district

Index
- Grains
- Pulses
- Sugarcane
- Oil seeds
- Other crops
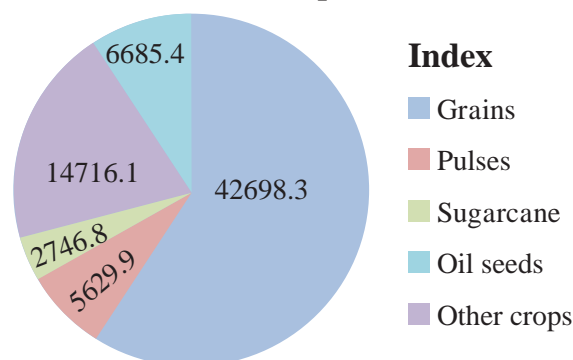
Write the conclusions in your own words.

Observations and learnings :

Complete the table below in your journal. Here is an example.

Sr. No.	Merits of pie-chart	Demerits of pie-chart	Uses of pie-chart
1	Useful for comparing information	Looking at the diagram, it only gives a comparative picture but the exact value cannot be drawn from the figure	Useful for classification of components
2			
3			
4			

Practice :

Show the following data with the help of pie chart.

Q. 2. Length of Roads Built in the State (in kms.)

Sr. No.	Type of Roads	Length of roads (in kms.)
1	National Highways	2970
2	State Highways	30548
3	Major District Roads	37234
4	Other District Roads	36403
5.	Rural Roads	76602

Q. 3. Draw a pie chart to show the following data. Write your conclusions at the end.

India's exports to various countries / regions of the world (%)

Region /Country	Percentage of exports
European Union	22.3
USA and Canada	20.1
OPEC	15
African countries	4.5
South East Asian countries	28.9
Caribbean countries	2.2
Others	7

Q. 4. Following data shows distribution of visitors to various destinations in a region in a year. Draw a pie chart to show the data. Interpret your results.

Places of Interest	Number of visitors
Wildlife Parks and Zoos	300
Historic Monuments	200
Theme Parks	350

Museums and Art Galleries	150
Riverfronts and beaches	250

Q. 5. The following data shows land use division in a city. Represent the data using pie charts. Interpret your results.

Land Use category	Total Land under (%)
Residential	52
Commercial	15
Industrial	8
Agricultural	2
Green spaces	5
Mixed Land Use	18

Q. 6. In a region, data about the land under various physical features is given. Show the data with the help of a divided circle and interpret your result.

Physical Features	Land (%)
Hills	10
Plains	40
Plateaus	30
Very High Mountains	20

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Practical No. 6 - Data Representation : Divided Bar Graphs

Aim : To represent the given data using divided bar graph.

Objectives :

1) To understand that, information regarding more than two sub-components can be represented using divided bar graph.

2) Analyse the data represented by divided bar graphs.

Introduction :

A divided bar graph is used to represent geographical sub-components in different time periods. Land use pattern, types of occupation, cropping pattern or production of various crops, information about means of irrigation, etc. are shown through this graph.

Materials required : Data (given), pencil, scale, paper.

Represent the given statistical information with the help of a divided bar graph following these steps :

Q. 1. Estimated Production of various crops (in million tonnes)

Crops	Production (Million tonnes)
Cereals	95.98
Pulses	43.68
Oilseeds	18.24
Cotton	32.48
Other crops	33.00
Total	223.38

STEP 1 : Convert the components given in the data into percentage. Use the following formula

Formula :

Percentage of the sub-component = data of the component/ total of all components × 100

For example,

$$\text{value of cereals in percentage} = \frac{95.98}{223.38} \times 100 = 42.97\%$$

Crops	Production (Million tonnes)	Percentage
Cereals	95.98	42.97
Pulses	43.68	19.55
Oilseeds	18.24	8.17
Cotton	32.48	14.54
Other crops	33.00	14.77
Total	223.38	100

STEP 2 : Decide the length of the graph to be drawn according to the size of the paper.

STEP 3 : Decide the scale as per percentage. For example, if the total bar graph is 10 cm then 10cm = 100%. Accordingly, calculate the lengths of all sub components.

STEP 4 : After you finish drawing   the graph with all its components, show them with proper shades or colours.

STEP 5 : Complete the graph by marking the axes, giving title and preparing the legend.

STEP 6 : Shade or colour every sub-component so that they appear distinctively.

STEP 7 : Give the title and prepare an index for the shades or colours.

STEP 8 : Interpret the graph and write conclusions in your own words.

Observations and learnings :

| 42.97 | 19.55 | 8.17 | 14.54 | 14.77 |

Index
- Cereals
- Pulses
- Oilseeds
- Cotton
- Other crops

Complete the table in your journals :

Sr. No.	Merits	Demerits	Uses

Practice more :

Represent the following data with the help of divided bar graph :

Area under different fruits crop in the State

Sr. No.	Fruits	Area (in hectares)
1	Mango	527147
2	Jackfruit	1451
3	Coconut	26325
4	Orange	168979
5	Pomegranate	33280
	Total	757182

Q. 2. Given below is the data showing number of people in different age groups who visited a Zoo in the month of April 2019. Draw a bar graph to represent the data and interpret the data at the end.

0-5	150
5-10	200
10-15	150
15-20	125

20-40	100
40-50	50
50-60	50
60+	50

Q. 3. Draw a divided bar graph to show the following data. A traffic surveyor stood at a major square in a city. He surveyed the number of vehicles that passed at various timings. Given is the data. Draw divided bar graphs to show the data. Interpret your results.

Time of survey	Vehicles surveyed			
	Cars	Buses	Heavy Vehicles	Bikes
8.30 a.m. to 9.30 a.m.	20	5	2	60
9.30 a.m. to 10.30 a.m.	30	8	1	100
10.30 a.m. to 11.30 a.m.	40	10	1	120

Q. 4. In a region X, the following table shows data about breakup of the population engaged in various tertiary services practised there. Show the data with the help of divided circles. Interpret your result.

Type of Tertiary Services	Population engaged (%)
Banking	20
Transport	25
Tourism	10
Retail Trade	22
Wholesale trade	15
Communication	8

★★★

Practical No. 7 - Data Representation : Construction of a Population Pyramid

Aim : To represent age-sex data of population data through population pyramid.

Objectives :

1) Understand that age and sex data of a given population can be presented through population pyramid.

2) Interpretation of data shown in such diagrams.

Introduction :

The Pyramid diagram is virtually a variant of a bar graph, where columns, constructed to represent specific qualitative population data and are arranged in a tier structure simultaneously. It is called a pyramid because in many cases, it has a triangular shape, although it is not always true. The length of the bar represents a proportion of the total. A vertical line divided the males from the females in the population. It is customary to represent males on the left and the females on the right side.

Only one pyramid will represent data of one year of one region or country. To represent the data of another year, another pyramid has to be drawn.

Materials Required : dataset (given), scale, pencil, graph paper.

Methodology :

Question : Represent the following data with the help of population pyramid.

Age Group	% of male	% of female
0-9	14.6	13.3
10-19	10.6	10.0
20-29	7.8	7.6
30-39	6.8	6.5
40-49	5.2	5.0
50-59	3.7	3.2
60-69	2.1	2.2
70+	0.2	0.2

STEP 1 : If the data is given in actual numbers, then convert them into percentage out of total population for the sake of convenience. Write the percentages in the respective columns.

STEP 2 : Select a suitable scale to mark these percentages on the horizontal plane. Convert these percentages into a suitable scale. For example, if the scale is 1cm = 10 % , then each percentage should be converted accordingly in cm. This scale is for X-axis.

STEP 3 : On a graph paper, draw a vertical bar showing age-groups in the centre such that on both the sides, the male and the female percentages can be represented. For this, select a scale. Suppose 1 cm = 1 age group. This will depend on number of age groups given. This scale is for the Y-axis. Keep in mind that the lower age groups will be below at the base of the pyramid, the higher age groups will be at the apex.

STEP 4 : On X-axis, mark percentages from 0-100 according to the scale from the centre to the left and similarly from centre to the right. The left markings will represent male percentages and right ones will show female percentages.

STEP 5 : Mark the respective percentages of each group on the respective points and then complete the bar graphs, as we do in constructing bar graphs.

Population pyramid
□ % of Male   □ % of Female
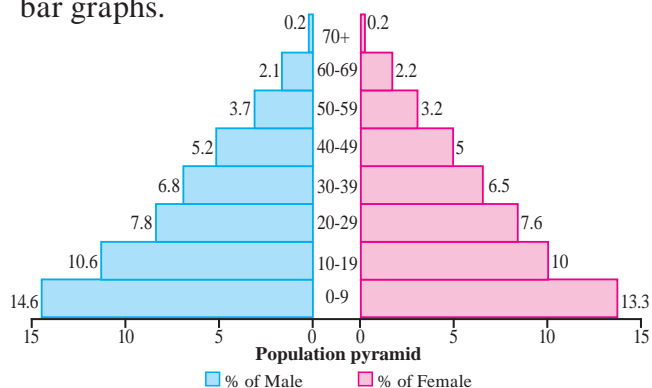
Practice more :

Q. 1. Represent the following data of India through population pyramids.

Age Group	No. of males	No. of females
0-14	186,087,665	164,398,204
15-24	121,879,786	107,583,437
25-54	271,744,709	254,834,569
55-64	47,846,122	47,632,532
65+	37,837,801	42,091,086

Q. 2. Draw a population pyramid to show the following data. Interpret your results at the end.

Age groups	Male (%)	Female (%)
0-15	24	22.3
15-25	21.4	19.2
25-35	18.2	16.3
35-45	14.6	13.4
45-55	11.3	13.7
55-65	7.1	8.9
65+	3.4	6.2

Q. 3. Draw a population pyramid for the following data. Interpret your results.

Age groups	Men (%)	Women (%)
0-14	30	29
14-25	22	21
25-45	21	20
45-65	20	19
65+	7	11

Q. 4. Represent the following data through population pyramids.

Age Group	No. of males	No. of females
0-14	37,847,801	42,091,086
15-24	47,846,122	47,832,532
25-54	271,700,709	254,854,569
55-64	180,087,665	174,398,204
65+	121,879,786	107,593,437

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Practical No. 8 - Interpretation of Toposheet : Human Settlements

We have studied and interpreted toposheet with reference to physical factors in previous standard. In this standard, we will study toposheets with respect to human elements. We will know how distribution of human elements can be done, symbols and signs that can be used and how do we interprets them and draw conclusions.

Aim :

To analyse toposheet according to human elements.

Objective :

1) To understand the types and patterns of human settlements in the area.

2) To identify the relationship between physical factors and human settlements.

Introduction :

You know that toposheets contain a lot of information. After giving the preliminary information, one starts with interpreting the toposheet. To interpret a toposheet, one needs to see the following items :

1) Relief
2) Drainage
3) Vegetation
4) Human Settlements
5) Occupations
6) Transport and Communication

Materials required :

Any toposheet   preferably 1:50000 scale. Teachers can download the toposheets of respective districts from https://soinakshe.uk.gov.in/ and print them for use in the class. We have taken one as example (63K/12).

Procedure :

STEP 1 : After looking at the marginal information, relief, drainage and natural vegetation, we turn to the human aspect to be interpreted in the toposheet. We look for the natural vegetation in the area. Make use of conventional signs and symbols given in marginal information, which are important in interpreting the human settlements. Settlements are generally shown in red.

STEP 2 : Identify major settlements and clusters, if any. See whether they are nucleated or dispersed. What could be the reason behind their being nucleated or sparse?

STEP 3 : Identify the types of settlements -

urban and rural. Identify major cities and towns.

STEP 4 : Identify patterns of settlements which have been already taught to you in earlier classes. Comment upon the reason behind their shapes - Star-shaped, circular, linear, etc.

STEP 5 : Relate relief, drainage, vegetation with human settlements.

The teachers should ask questions in such a way that students will interpret the vegetation aspects. Some sample questions are given here for toposheet number 63 K /12.

1) Which major city is found on the toposheet?
2) Is the area largely rural or urban?
3) What type of settlements is mainly found on the plateau region? Why?
4) What type of settlements is mainly found in the plain region? Why?
5) In which direction does the Mirzapur town extend?
6) Which major town is located to the West of Mirzapur?
7) Name two market towns located to the North of Ganga.
8) Name the town located in the North-West corner of the map.
9) Why are there hardly no settlements in forested areas of the plateau?
10) Which part of the toposheet shows dense population distribution?
11) Comment upon the nature of population distribution in the plateaus.

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Practical No. 9 - Interpretation of Toposheet : Land Use and Occupations

Aim :

1) To understand the land use and occupations in the area.
2) To identify the relationship between physical factors and land use and occupations.

Introduction :

You know that toposheets contain a lot of information. After giving the preliminary information, one starts with interpreting the toposheet. To interpret a toposheet, one needs to see the following items :

1) Relief
2) Drainage
3) Vegetation
4) Human Settlements
5) Land use and Occupations
6) Transport and Communication

Materials required : Any toposheet preferably 1:50000 scale. Teachers can download the toposheets of respective districts from https://soinakshe.uk.gov.in/ and print them for use in the class. We have taken one as example.

Procedure :

STEP 1 : After looking at human settlements and physical aspects in a region, we can now talk upon the occupations. Make use of the conventional signs and the symbols given in marginal information, which are important in interpreting the occupations followed by the people living in the region. Occupations are a function of relief, drainage, vegetation and land use in the area.

STEP 2 : Identify the major land uses in the area - agricultural, forest, commercial, industrial, pastures, meadows, etc.

STEP 3 : Identify the major types of occupations - primary, secondary and tertiary. Ponder upon the reason behind people following these occupations at the place.

The teachers should ask questions in such a way that students will interpret the land use aspects. Some sample questions are given here for toposheet number 63 K /12.

1) What could be the major occupation of the people living in the plain region?
2) What occupations are followed in the plateau region?

3) What occupations are followed by the people living in the Mirzapur town?

4) Identify the fallow land patches along the Nalas.

5) Which industries are found in Jaunpur?

6) In which part are quarries found in the map? Why ?

7) Which colour shows agricultural land in the map?

8) Where are cotton textiles found?

9) Is ferrying an occupation? What type of occupation is it?

10) In which part can tourism be developed in this region ?

11) Identify the major market areas in the region. What type of activities happen in such areas?

12) What type of facilities do you find in Vindhyachal town?

13) Comment upon the nature of occupations followed by the people looking at the relief.

14) Identify the tertiary activities carried in the area.

15) Name the major primary activities in the region.

✻✻✻

Practical No. 10 - Interpretation of Toposheet : Transport and Communication

Aim :

1) To identify the different means of transport and communication available in the region.

2) To identify the relationship between physical factors and transport.

3) To understand the role of transport and communication in the region.

Introduction :

You know that toposheets contain a lot of information. After giving the preliminary information, one starts with interpreting the toposheet. To interpret a toposheet, one needs to see the following items :

1) Relief
2) Drainage
3) Vegetation
4) Human Settlements
5) Land use and Occupations
6) Transport and Communication

Materials required :

Any toposheet preferably 1:50000 scale. Teachers can download the toposheets of respective districts from https://soinakshe. uk.gov.in/ and print them for use in the class. We have taken one as example.

Procedure :

STEP 1 : After looking at human settlements and physical aspects in a region, we can now talk upon the transport and communication facilities available in the region. Make use of conventional signs and symbols given in marginal information which are important in interpreting the various means of transportation and communication.

STEP 2 : Identify the major railway lines. Identify the towns or cities which they connect. Identify their directions. In case of railways, identify the types of gauge as per the marginal information.

STEP 3 : Identify the types of roads shown on the map. Identify the major National and State highways and the cities they connect.

STEP 4 : Identify the major airports if any.

STEP 5 : If there are rivers, lakes, dams or creeks or other water bodies in the region, look for various means of water transportation in the region.

STEP 6 : Look for major facilities available in the region. Post office, Telegraph office, Dak Bungalow, Rest House, Police station, power supply, dispensaries, Hospitals, burial ground, graveyard, etc. are generally found. There can be temples, mosques, forts, churches, etc.

too. Some places have annual fairs or weekly markets. In such cases, months or weekdays are mentioned near that village or city.

The teachers should ask questions in such a way that students will interpret the transportational aspects. Some sample questions are given here for toposheet number 63 K /12.

1) Identify the two main railway lines in the toposheet.

2) Name the main four railway stations on the map.

3) Which area has metalled roads?

4) Which cities does National Highway 7 connect?

5) Name the only road crossing the plateau region of the map.

6) Which road runs parallel to the railways connecting the towns of Mirazapur and Vindhyachal?

7) Name a major unmetalled road on the Hirrai river.

8) When can ferries be used?

9) Which cities are connected by ferries?

10) Name the place with bridges.

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Square Roots (continued)

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
5.5	2.345	2.347	2.350	2.352	2.354	2.356	2.358	2.360	2.362	2.364	0	0	1	1	1	1	1	2	2
5.6	2.366	2.369	2.371	2.373	2.375	2.377	2.379	2.381	2.383	2.385	0	0	1	1	1	1	1	2	2
5.7	2.387	2.390	2.392	2.394	2.396	2.398	2.400	2.402	2.404	2.406	0	0	1	1	1	1	1	2	2
5.8	2.408	2.410	2.412	2.415	2.417	2.419	2.421	2.423	2.425	2.427	0	0	1	1	1	1	1	2	2
5.9	2.429	2.431	2.433	2.435	2.437	2.439	2.441	2.443	2.445	2.447	0	0	1	1	1	1	1	2	2
6.0	2.450	2.452	2.454	2.456	2.458	2.460	2.462	2.464	2.466	2.468	0	0	1	1	1	1	1	2	2
6.1	2.470	2.472	2.474	2.476	2.478	2.480	2.482	2.484	2.486	2.488	0	0	1	1	1	1	1	2	2
6.2	2.490	2.492	2.494	2.496	2.498	2.500	2.502	2.504	2.506	2.508	0	0	1	1	1	1	1	2	2
6.3	2.510	2.512	2.514	2.516	2.518	2.520	2.522	2.524	2.526	2.528	0	0	1	1	1	1	1	2	2
6.4	2.530	2.532	2.534	2.536	2.538	2.540	2.542	2.544	2.546	2.548	0	0	1	1	1	1	1	2	2
6.5	2.550	2.551	2.553	2.555	2.557	2.559	2.561	2.563	2.565	2.567	0	0	1	1	1	1	1	2	2
6.6	2.569	2.571	2.573	2.575	2.577	2.579	2.581	2.583	2.585	2.587	0	0	1	1	1	1	1	2	2
6.7	2.588	2.590	2.592	2.594	2.596	2.598	2.600	2.602	2.604	2.606	0	0	1	1	1	1	1	2	2
6.8	2.608	2.610	2.612	2.613	2.615	2.617	2.619	2.621	2.623	2.625	0	0	1	1	1	1	1	2	2
6.9	2.627	2.629	2.631	2.632	2.634	2.636	2.638	2.640	2.642	2.644	0	0	1	1	1	1	1	2	2
7.0	2.646	2.648	2.650	2.651	2.653	2.655	2.657	2.659	2.661	2.663	0	0	1	1	1	1	1	2	2
7.1	2.665	2.667	2.668	2.670	2.672	2.674	2.676	2.678	2.680	2.681	0	0	1	1	1	1	1	2	2
7.2	2.683	2.685	2.687	2.689	2.691	2.693	2.694	2.696	2.698	2.700	0	0	1	1	1	1	1	2	2
7.3	2.702	2.704	2.706	2.707	2.709	2.711	2.713	2.715	2.717	2.718	0	0	1	1	1	1	1	2	2
7.4	2.720	2.722	2.724	2.726	2.728	2.729	2.731	2.733	2.735	2.737	0	0	1	1	1	1	1	2	2
7.5	2.739	2.740	2.742	2.744	2.746	2.748	2.750	2.751	2.753	2.755	0	0	1	1	1	1	1	2	2
7.6	2.757	2.759	2.760	2.762	2.764	2.766	2.768	2.769	2.771	2.773	0	0	1	1	1	1	1	2	2
7.7	2.775	2.777	2.778	2.780	2.782	2.784	2.786	2.787	2.789	2.791	0	0	1	1	1	1	1	2	2
7.8	2.793	2.795	2.796	2.798	2.800	2.802	2.804	2.805	2.807	2.809	0	0	1	1	1	1	1	2	2
7.9	2.811	2.812	2.814	2.816	2.818	2.820	2.821	2.823	2.825	2.827	0	0	1	1	1	1	1	2	2
8.0	2.828	2.830	2.832	2.834	2.835	2.837	2.839	2.841	2.843	2.844	0	0	1	1	1	1	1	1	2
8.1	2.846	2.848	2.850	2.851	2.853	2.855	2.857	2.858	2.860	2.862	0	0	1	1	1	1	1	1	2
8.2	2.864	2.865	2.867	2.869	2.871	2.872	2.874	2.876	2.877	2.879	0	0	1	1	1	1	1	1	2
8.3	2.881	2.883	2.884	2.886	2.888	2.890	2.891	2.893	2.895	2.897	0	0	1	1	1	1	1	1	2
8.4	2.898	2.900	2.902	2.903	2.905	2.907	2.909	2.910	2.912	2.914	0	0	1	1	1	1	1	1	2
8.5	2.915	2.917	2.919	2.921	2.922	2.924	2.926	2.927	2.929	2.931	0	0	1	1	1	1	1	1	2
8.6	2.933	2.934	2.936	2.938	2.939	2.941	2.943	2.944	2.946	2.948	0	0	1	1	1	1	1	1	2
8.7	2.950	2.951	2.953	2.955	2.956	2.958	2.960	2.961	2.963	2.965	0	0	1	1	1	1	1	1	2
8.8	2.966	2.968	2.970	2.972	2.973	2.975	2.977	2.978	2.980	2.982	0	0	1	1	1	1	1	1	2
8.9	2.983	2.985	2.987	2.988	2.990	2.992	2.993	2.995	2.997	2.998	0	0	1	1	1	1	1	1	2
9.0	3.000	3.002	3.003	3.005	3.007	3.008	3.010	3.012	3.013	3.015	0	0	0	1	1	1	1	1	1
9.1	3.017	3.018	3.020	3.022	3.023	3.025	3.027	3.028	3.030	3.032	0	0	0	1	1	1	1	1	1
9.2	3.033	3.035	3.036	3.038	3.040	3.041	3.043	3.045	3.046	3.048	0	0	0	1	1	1	1	1	1
9.3	3.050	3.051	3.053	3.055	3.056	3.058	3.059	3.061	3.063	3.064	0	0	0	1	1	1	1	1	1
9.4	3.066	3.068	3.069	3.071	3.072	3.074	3.076	3.077	3.079	3.081	0	0	0	1	1	1	1	1	1
9.5	3.082	3.084	3.085	3.087	3.089	3.090	3.092	3.094	3.095	3.097	0	0	0	1	1	1	1	1	1
9.6	3.098	3.100	3.102	3.103	3.105	3.106	3.108	3.110	3.111	3.113	0	0	0	1	1	1	1	1	1
9.7	3.115	3.116	3.118	3.119	3.121	3.123	3.124	3.126	3.127	3.129	0	0	0	1	1	1	1	1	1
9.8	3.131	3.132	3.134	3.135	3.137	3.139	3.140	3.142	3.143	3.145	0	0	0	1	1	1	1	1	1
9.9	3.146	3.148	3.150	3.151	3.153	3.154	3.156	3.158	3.159	3.161	0	0	0	1	1	1	1	1	1

LOG TABLES

Square Roots (from 1 to 100)

	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1.0	1.000	1.005	1.010	1.015	1.020	1.025	1.030	1.034	1.039	1.044	0	1	1	2	2	3	3	4	4
1.1	1.049	1.054	1.058	1.063	1.068	1.072	1.077	1.082	1.086	1.091	0	1	1	2	2	3	3	4	4
1.2	1.095	1.100	1.105	1.109	1.114	1.118	1.123	1.127	1.131	1.136	0	1	1	2	2	3	3	4	4
1.3	1.140	1.145	1.149	1.153	1.158	1.162	1.166	1.171	1.175	1.179	0	1	1	2	2	3	3	4	4
1.4	1.183	1.187	1.192	1.196	1.200	1.204	1.208	1.212	1.217	1.221	0	1	1	2	2	2	3	3	4
1.5	1.225	1.229	1.233	1.237	1.241	1.245	1.249	1.253	1.257	1.261	0	1	1	2	2	2	3	3	4
1.6	1.265	1.269	1.273	1.277	1.281	1.285	1.288	1.292	1.296	1.300	0	1	1	2	2	2	3	3	3
1.7	1.304	1.308	1.312	1.315	1.319	1.323	1.327	1.330	1.334	1.338	0	1	1	2	2	2	3	3	3
1.8	1.342	1.345	1.349	1.353	1.357	1.360	1.364	1.368	1.371	1.375	0	1	1	2	2	2	3	3	3
1.9	1.378	1.382	1.386	1.389	1.393	1.396	1.400	1.404	1.407	1.411	0	1	1	1	2	2	3	3	3
2.0	1.414	1.418	1.421	1.425	1.428	1.432	1.435	1.439	1.442	1.446	0	1	1	1	2	2	2	3	3
2.1	1.449	1.453	1.456	1.459	1.463	1.466	1.470	1.473	1.477	1.480	0	1	1	1	2	2	2	3	3
2.2	1.483	1.487	1.490	1.493	1.497	1.500	1.503	1.507	1.510	1.513	0	1	1	1	2	2	2	3	3
2.3	1.517	1.520	1.523	1.526	1.530	1.533	1.536	1.539	1.543	1.546	0	1	1	1	2	2	2	3	3
2.4	1.549	1.552	1.556	1.559	1.562	1.565	1.568	1.572	1.575	1.578	0	1	1	1	2	2	2	2	3
2.5	1.581	1.584	1.587	1.591	1.594	1.597	1.600	1.603	1.606	1.609	0	1	1	1	2	2	2	2	3
2.6	1.612	1.616	1.619	1.622	1.625	1.628	1.631	1.634	1.637	1.640	0	1	1	1	2	2	2	2	3
2.7	1.643	1.646	1.649	1.652	1.655	1.658	1.661	1.664	1.667	1.670	0	1	1	1	2	2	2	2	3
2.8	1.673	1.676	1.679	1.682	1.685	1.688	1.691	1.694	1.697	1.700	0	1	1	1	1	2	2	2	3
2.9	1.703	1.706	1.709	1.712	1.715	1.718	1.720	1.723	1.726	1.729	0	1	1	1	1	2	2	2	3
3.0	1.732	1.735	1.738	1.741	1.744	1.746	1.749	1.752	1.755	1.758	0	1	1	1	1	2	2	2	3
3.1	1.761	1.764	1.766	1.769	1.772	1.775	1.778	1.780	1.783	1.786	0	1	1	1	1	2	2	2	2
3.2	1.789	1.792	1.794	1.797	1.800	1.803	1.806	1.808	1.811	1.814	0	1	1	1	1	2	2	2	2
3.3	1.817	1.819	1.822	1.825	1.828	1.830	1.833	1.836	1.839	1.841	0	1	1	1	1	2	2	2	2
3.4	1.844	1.847	1.849	1.852	1.855	1.857	1.860	1.863	1.865	1.868	0	1	1	1	1	2	2	2	2
3.5	1.871	1.873	1.876	1.879	1.882	1.884	1.887	1.889	1.892	1.895	0	1	1	1	1	2	2	2	2
3.6	1.897	1.900	1.903	1.905	1.908	1.911	1.913	1.916	1.918	1.921	0	1	1	1	1	1	2	2	2
3.7	1.924	1.926	1.929	1.931	1.934	1.937	1.939	1.942	1.944	1.947	0	1	1	1	1	1	2	2	2
3.8	1.949	1.952	1.955	1.957	1.960	1.962	1.965	1.967	1.970	1.972	0	1	1	1	1	1	2	2	2
3.9	1.975	1.977	1.980	1.982	1.985	1.988	1.990	1.993	1.995	1.998	0	1	1	1	1	1	2	2	2
4.0	2.000	2.003	2.005	2.007	2.010	2.013	2.015	2.017	2.020	2.022	0	0	1	1	1	1	2	2	2
4.1	2.025	2.027	2.030	2.032	2.035	2.037	2.040	2.042	2.045	2.047	0	0	1	1	1	1	2	2	2
4.2	2.049	2.052	2.054	2.057	2.059	2.062	2.064	2.066	2.069	2.071	0	0	1	1	1	1	2	2	2
4.3	2.074	2.076	2.078	2.081	2.083	2.086	2.088	2.091	2.093	2.095	0	0	1	1	1	1	2	2	2
4.4	2.098	2.100	2.102	2.105	2.107	2.110	2.112	2.114	2.117	2.119	0	0	1	1	1	1	2	2	2
4.5	2.121	2.124	2.126	2.128	2.131	2.133	2.135	2.138	2.140	2.142	0	0	1	1	1	1	2	2	2
4.6	2.145	2.147	2.149	2.152	2.154	2.156	2.159	2.161	2.163	2.166	0	0	1	1	1	1	2	2	2
4.7	2.168	2.170	2.173	2.175	2.177	2.179	2.182	2.184	2.186	2.189	0	0	1	1	1	1	2	2	2
4.8	2.191	2.193	2.195	2.198	2.200	2.202	2.205	2.207	2.209	2.211	0	0	1	1	1	1	1	2	2
4.9	2.214	2.216	2.218	2.220	2.223	2.225	2.227	2.229	2.232	2.234	0	0	1	1	1	1	1	2	2
5.0	2.236	2.238	2.241	2.243	2.245	2.247	2.249	2.252	2.254	2.256	0	0	1	1	1	1	1	2	2
5.1	2.258	2.261	2.263	2.265	2.267	2.269	2.272	2.274	2.276	2.278	0	0	1	1	1	1	1	2	2
5.2	2.280	2.283	2.285	2.287	2.289	2.291	2.293	2.296	2.298	2.300	0	0	1	1	1	1	1	2	2
5.3	2.302	2.304	2.307	2.309	2.311	2.313	2.315	2.317	2.320	2.322	0	0	1	1	1	1	1	2	2
5.4	2.324	2.326	2.328	2.330	2.332	2.335	2.337	2.339	2.341	2.343	0	0	1	1	1	1	1	2	2

Table — columns 0–9, with Mean Differences 1–9.

	0	1	2	3	4	5	6	7	8	9	Mean Differences								
											1	2	3	4	5	6	7	8	9
55	7.416	7.423	7.430	7.436	7.443	7.450	7.457	7.463	7.470	7.477	1	1	2	3	3	4	5	5	6
56	7.483	7.490	7.497	7.503	7.510	7.517	7.523	7.530	7.537	7.543	1	1	2	3	3	4	5	5	6
57	7.550	7.556	7.563	7.570	7.576	7.583	7.589	7.596	7.603	7.609	1	1	2	3	3	4	5	5	6
58	7.616	7.622	7.629	7.635	7.642	7.649	7.655	7.662	7.668	7.675	1	1	2	3	3	4	5	5	6
59	7.681	7.688	7.694	7.701	7.707	7.714	7.720	7.727	7.733	7.740	1	1	2	3	3	4	5	5	6
60	7.746	7.752	7.759	7.765	7.772	7.778	7.785	7.791	7.797	7.804	1	1	2	3	3	4	5	5	6
61	7.810	7.817	7.823	7.829	7.836	7.842	7.849	7.855	7.861	7.868	1	1	2	3	3	4	4	5	6
62	7.874	7.880	7.887	7.893	7.899	7.906	7.912	7.918	7.925	7.931	1	1	2	3	3	4	4	5	6
63	7.937	7.944	7.950	7.956	7.962	7.969	7.975	7.981	7.987	7.994	1	1	2	3	3	4	4	5	6
64	8.000	8.006	8.012	8.019	8.025	8.031	8.037	8.044	8.050	8.056	1	1	2	3	3	4	4	5	6
65	8.062	8.068	8.075	8.081	8.087	8.093	8.099	8.106	8.112	8.118	1	1	2	2	3	4	4	5	6
66	8.124	8.130	8.136	8.142	8.149	8.155	8.161	8.167	8.173	8.179	1	1	2	2	3	4	4	5	5
67	8.185	8.191	8.198	8.204	8.210	8.216	8.222	8.228	8.234	8.240	1	1	2	2	3	4	4	5	5
68	8.246	8.252	8.258	8.264	8.270	8.276	8.283	8.289	8.295	8.301	1	1	2	2	3	4	4	5	5
69	8.307	8.313	8.319	8.325	8.331	8.337	8.343	8.349	8.355	8.361	1	1	2	2	3	4	4	5	5
70	8.367	8.373	8.379	8.385	8.390	8.396	8.402	8.408	8.414	8.420	1	1	2	2	3	4	4	5	5
71	8.426	8.432	8.438	8.444	8.450	8.456	8.462	8.468	8.473	8.479	1	1	2	2	3	4	4	5	5
72	8.485	8.491	8.497	8.503	8.509	8.515	8.521	8.526	8.532	8.538	1	1	2	2	3	4	4	5	5
73	8.544	8.550	8.556	8.562	8.567	8.573	8.579	8.585	8.591	8.597	1	1	2	2	3	3	4	5	5
74	8.602	8.608	8.614	8.620	8.626	8.631	8.637	8.643	8.649	8.654	1	1	2	2	3	3	4	5	5
75	8.660	8.666	8.672	8.678	8.683	8.689	8.695	8.701	8.706	8.712	1	1	2	2	3	3	4	5	5
76	8.718	8.724	8.729	8.735	8.741	8.746	8.752	8.758	8.764	8.769	1	1	2	2	3	3	4	4	5
77	8.775	8.781	8.786	8.792	8.798	8.803	8.809	8.815	8.820	8.826	1	1	2	2	3	3	4	4	5
78	8.832	8.837	8.843	8.849	8.854	8.860	8.866	8.871	8.877	8.883	1	1	2	2	3	3	4	4	5
79	8.888	8.894	8.899	8.905	8.911	8.916	8.922	8.927	8.933	8.939	1	1	2	2	3	3	4	4	5
80	8.944	8.950	8.955	8.961	8.967	8.972	8.978	8.983	8.989	8.994	1	1	2	2	3	3	4	4	5
81	9.000	9.006	9.011	9.017	9.022	9.028	9.033	9.039	9.044	9.050	1	1	2	2	3	3	4	4	5
82	9.055	9.061	9.066	9.072	9.077	9.083	9.088	9.094	9.099	9.105	1	1	2	2	3	3	4	4	5
83	9.110	9.116	9.121	9.127	9.132	9.138	9.143	9.149	9.154	9.160	1	1	2	2	3	3	4	4	5
84	9.165	9.171	9.176	9.182	9.187	9.192	9.198	9.203	9.209	9.214	1	1	2	2	3	3	4	4	5
85	9.220	9.225	9.230	9.236	9.241	9.247	9.252	9.257	9.263	9.268	1	1	2	2	3	3	4	4	5
86	9.274	9.279	9.284	9.290	9.295	9.301	9.306	9.311	9.317	9.322	1	1	2	2	3	3	4	4	5
87	9.327	9.333	9.338	9.343	9.349	9.354	9.359	9.365	9.370	9.375	1	1	2	2	3	3	4	4	5
88	9.381	9.386	9.391	9.397	9.402	9.407	9.413	9.418	9.423	9.429	1	1	2	2	3	3	4	4	5
89	9.434	9.439	9.445	9.450	9.455	9.460	9.466	9.471	9.476	9.482	1	1	2	2	3	3	4	4	5
90	9.487	9.492	9.497	9.503	9.508	9.513	9.518	9.524	9.529	9.534	1	1	2	2	3	3	4	4	5
91	9.539	9.545	9.550	9.555	9.560	9.566	9.571	9.576	9.581	9.586	1	1	2	2	3	3	4	4	5
92	9.592	9.597	9.602	9.607	9.613	9.618	9.623	9.628	9.633	9.638	1	1	2	2	3	3	4	4	5
93	9.644	9.649	9.654	9.659	9.664	9.670	9.675	9.680	9.685	9.690	1	1	2	2	3	3	4	4	5
94	9.695	9.701	9.706	9.711	9.716	9.721	9.726	9.731	9.737	9.742	1	1	2	2	3	3	4	4	5
95	9.747	9.752	9.757	9.762	9.767	9.772	9.778	9.783	9.788	9.793	1	1	2	2	3	3	4	4	5
96	9.798	9.803	9.808	9.813	9.818	9.823	9.829	9.834	9.839	9.844	1	1	2	2	3	3	4	4	5
97	9.849	9.854	9.859	9.864	9.869	9.874	9.879	9.884	9.889	9.894	1	1	2	2	3	3	4	4	5
98	9.900	9.905	9.910	9.915	9.920	9.925	9.930	9.935	9.940	9.945	0	1	1	2	2	3	3	4	4
99	9.950	9.955	9.960	9.965	9.970	9.975	9.980	9.985	9.990	9.995	0	1	1	2	2	3	3	4	4

Table — columns 0–9, with Mean Differences 1–9.

	0	1	2	3	4	5	6	7	8	9	Mean Differences								
											1	2	3	4	5	6	7	8	9
10	3.162	3.178	3.194	3.209	3.225	3.240	3.256	3.271	3.286	3.302	2	3	5	6	8	9	11	12	14
11	3.317	3.332	3.347	3.362	3.376	3.391	3.406	3.421	3.435	3.450	1	3	4	6	7	9	10	12	13
12	3.464	3.479	3.493	3.507	3.521	3.536	3.550	3.564	3.578	3.592	1	3	4	6	7	8	10	11	13
13	3.606	3.619	3.633	3.647	3.661	3.674	3.688	3.701	3.715	3.728	1	3	4	5	7	8	10	11	12
14	3.742	3.755	3.768	3.782	3.795	3.808	3.821	3.834	3.847	3.860	1	3	4	5	7	8	9	11	12
15	3.873	3.886	3.899	3.912	3.924	3.937	3.950	3.962	3.975	3.988	1	3	4	5	6	8	9	10	11
16	4.000	4.012	4.025	4.037	4.050	4.062	4.074	4.087	4.099	4.111	1	2	4	5	6	7	9	10	11
17	4.123	4.135	4.147	4.159	4.171	4.183	4.195	4.207	4.219	4.231	1	2	4	5	6	7	8	10	11
18	4.243	4.254	4.266	4.278	4.290	4.301	4.313	4.324	4.336	4.347	1	2	3	5	6	7	8	9	10
19	4.359	4.370	4.382	4.393	4.405	4.416	4.427	4.438	4.450	4.461	1	2	3	4	6	7	8	9	10
20	4.472	4.483	4.494	4.506	4.517	4.528	4.539	4.550	4.561	4.572	1	2	3	4	5	7	8	9	10
21	4.583	4.594	4.604	4.615	4.626	4.637	4.648	4.658	4.669	4.680	1	2	3	4	5	6	7	9	10
22	4.690	4.701	4.712	4.722	4.733	4.743	4.754	4.765	4.775	4.785	1	2	3	4	5	6	7	8	9
23	4.796	4.806	4.817	4.827	4.837	4.848	4.858	4.868	4.879	4.889	1	2	3	4	5	6	7	8	9
24	4.899	4.909	4.919	4.930	4.940	4.950	4.960	4.970	4.980	4.990	1	2	3	4	5	6	7	8	9
25	5.000	5.010	5.020	5.030	5.040	5.050	5.060	5.070	5.079	5.089	1	2	3	4	5	6	7	8	9
26	5.099	5.109	5.119	5.128	5.138	5.148	5.158	5.167	5.177	5.187	1	2	3	4	5	6	7	8	9
27	5.196	5.206	5.215	5.225	5.235	5.244	5.254	5.263	5.273	5.282	1	2	3	4	5	6	7	8	9
28	5.292	5.301	5.310	5.320	5.329	5.339	5.348	5.357	5.367	5.376	1	2	3	4	5	5	6	7	8
29	5.385	5.394	5.404	5.413	5.422	5.431	5.441	5.450	5.459	5.468	1	2	3	4	4	5	6	7	8
30	5.477	5.486	5.495	5.505	5.514	5.523	5.532	5.541	5.550	5.559	1	2	3	4	4	5	6	7	8
31	5.568	5.577	5.586	5.595	5.604	5.612	5.621	5.630	5.639	5.648	1	2	3	4	4	5	6	7	8
32	5.657	5.666	5.675	5.683	5.692	5.701	5.710	5.718	5.727	5.736	1	2	3	3	4	5	6	7	8
33	5.745	5.753	5.762	5.771	5.779	5.788	5.797	5.805	5.814	5.822	1	2	3	3	4	5	6	6	7
34	5.831	5.840	5.848	5.857	5.865	5.874	5.882	5.891	5.899	5.908	1	2	3	3	4	5	6	6	7
35	5.916	5.925	5.933	5.941	5.950	5.958	5.967	5.975	5.983	5.992	1	2	2	3	4	5	5	6	7
36	6.000	6.008	6.017	6.025	6.033	6.042	6.050	6.058	6.066	6.075	1	2	2	3	4	5	5	6	7
37	6.083	6.091	6.099	6.107	6.116	6.124	6.132	6.140	6.148	6.156	1	2	2	3	4	5	5	6	7
38	6.164	6.173	6.181	6.189	6.197	6.205	6.213	6.221	6.229	6.237	1	2	2	3	4	5	5	6	7
39	6.245	6.253	6.261	6.269	6.277	6.285	6.293	6.301	6.309	6.317	1	2	2	3	4	5	5	6	7
40	6.325	6.332	6.340	6.348	6.356	6.364	6.372	6.380	6.387	6.395	1	2	2	3	4	4	5	6	7
41	6.403	6.411	6.419	6.427	6.434	6.442	6.450	6.458	6.465	6.473	1	2	2	3	4	4	5	6	7
42	6.481	6.488	6.496	6.504	6.512	6.519	6.527	6.535	6.542	6.550	1	2	2	3	4	4	5	6	7
43	6.557	6.565	6.573	6.580	6.588	6.595	6.603	6.611	6.618	6.626	1	2	2	3	4	4	5	6	7
44	6.633	6.641	6.648	6.656	6.663	6.671	6.678	6.686	6.693	6.701	1	2	2	3	4	4	5	6	7
45	6.708	6.716	6.723	6.731	6.738	6.745	6.753	6.760	6.768	6.775	1	1	2	3	4	4	5	6	6
46	6.782	6.790	6.797	6.804	6.812	6.819	6.826	6.834	6.841	6.848	1	1	2	3	4	4	5	6	6
47	6.856	6.863	6.870	6.878	6.885	6.892	6.899	6.907	6.914	6.921	1	1	2	3	4	4	5	6	6
48	6.928	6.935	6.943	6.950	6.957	6.964	6.971	6.979	6.986	6.993	1	1	2	3	3	4	5	5	6
49	7.000	7.007	7.014	7.021	7.029	7.036	7.043	7.050	7.057	7.064	1	1	2	3	3	4	5	5	6
50	7.071	7.078	7.085	7.092	7.099	7.106	7.113	7.120	7.127	7.134	1	1	2	3	3	4	5	6	6
51	7.141	7.148	7.155	7.162	7.169	7.176	7.183	7.190	7.197	7.204	1	1	2	3	3	4	5	6	6
52	7.211	7.218	7.225	7.232	7.239	7.246	7.253	7.259	7.266	7.273	1	1	2	3	3	4	5	6	6
53	7.280	7.287	7.294	7.301	7.308	7.314	7.321	7.328	7.335	7.342	1	1	2	3	3	4	5	5	6
54	7.349	7.355	7.362	7.369	7.376	7.382	7.389	7.396	7.403	7.410	1	1	2	3	3	4	5	5	6

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