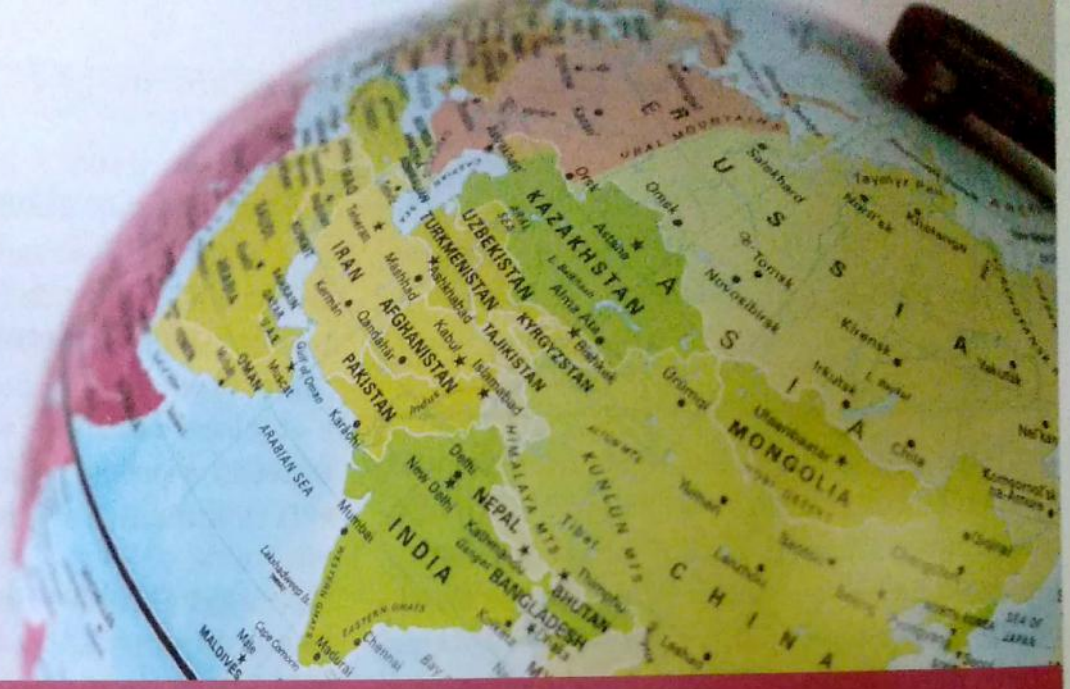


CHAPTER 1

Globes, Maps and Diagrams

We Will Learn • Globe • Map • Plan • Sketch • Importance of Maps • Elements of a Map • Types of Maps • Diagrams – Folding and Faulting Landforms, River Landforms

Introduction

The satellite image of the Earth shows it to be spherical in shape. The upper and the lower points on the sphere are flat. The large size of the Earth makes it difficult to study. So, the geographers made a small model of the Earth called **globe**. However, a globe could not give directions to a traveller. It was also not easy to carry. Geographers, thus, represented the Earth on a flat surface. This is called **map**.

Representation of the Earth's Reality

We understand early life of man on Earth through the cave paintings that depict their life and surroundings. The drawings of neighbouring areas helped to form the first map. These drawings originated as scribbles on clay tablets (see Fig 1.1). Later, maps were produced on cloth,

Fact File Ptolemy is called the Father of Mapping. His first world map was made around AD 2nd century. He coined the term 'Terra Incognita' to identify the regions of the world that were unknown to him.

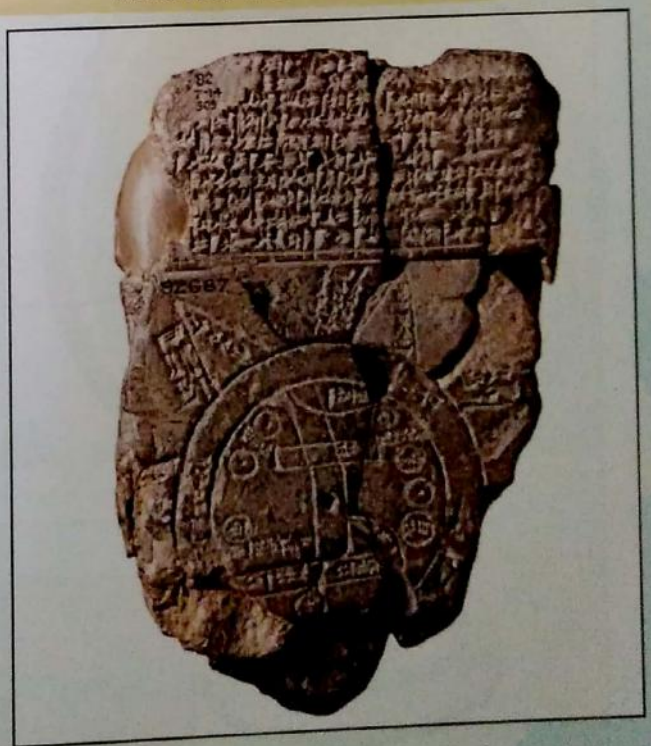


Fig. 1.1 Map on Clay Tablet from Babylonia, 5th century BC

stone, wood and leather. The earliest terrestrial globe that has survived till date was made around AD 1492.

Features of the Earth can be represented through globes, maps, sketches and plans.

Globe

A globe is a small-scale three-dimensional model of the Earth (see Fig. 1.2). It is a true representation of the world. A globe is mounted on an axis and is titled like the Earth on its axis. If you spin a globe, it also rotates freely like the Earth. Major landmasses and waterbodies are also represented on the globe.

Have you seen several vertical and horizontal lines on the globe? These lines form a criss-cross pattern and help to find the exact location of a place on the globe. This is known as a grid.

Fig. 1.2 Globe

There are, however, some limitations of a globe:

- The small size of the globe makes it difficult to read.
- The globe does not have enough space to cover the finer details of every geographical feature.
- A globe occupies considerable space and needs a proper storage area.
- It is difficult to carry around.

Thus, geographers developed various other means to depict the Earth's surface. Let us read about them.

Map

A map is a two-dimensional representation of the Earth or a part of the Earth's surface. It highlights the relationship between elements of that area such as distance, direction and other objects. They are accurately based on scale. A collection of maps in the form of a book is called an **atlas**.

Map drawing is a specialised field. It is the art and science of map making which involves basic surveying and data collection to final map production. A person who develops a map is called a **cartographer**.

Today, accurate maps can be produced very quickly with the help of advanced computers and software. This system of accurate map-making through computer and satellite images is called **Geographical Information Systems** (GIS).

Fact File The word 'map' comes from the Latin word *mappa* which means napkin. The word **cartography** comes from two Greek words – *chartis* meaning map, and *graphein* meaning write.

Plan

A **plan** shows details of a small area based on the actual measurements on the ground. It could be a plan of a house, a classroom, a multistorey building or a city (see plan of New Delhi in Fig. 1.3). The measurement and use of scale is very important while drawing a plan.

A plan is drawn with the help of drawing instruments. To draw a plan of a house or a building in detail, one needs to show the features correctly with reference to scale and direction.

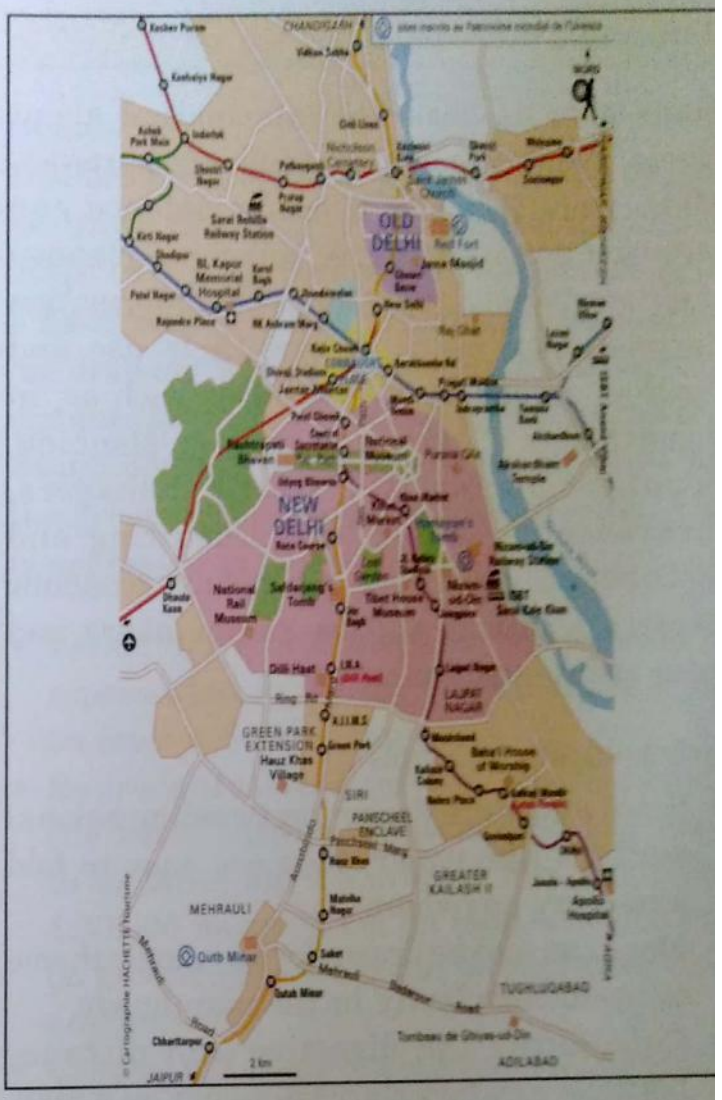


Fig. 1.3 Plan of New Delhi

Sketch

A **sketch** is a freehand drawing of the relative position of a place with respect to other surroundings, buildings or places (see Fig. 1.4). Such a drawing is not based on any scale. A sketch may not have all the features of the area in detail. It is primarily used to help people reach their destination or give them a general idea of a place.

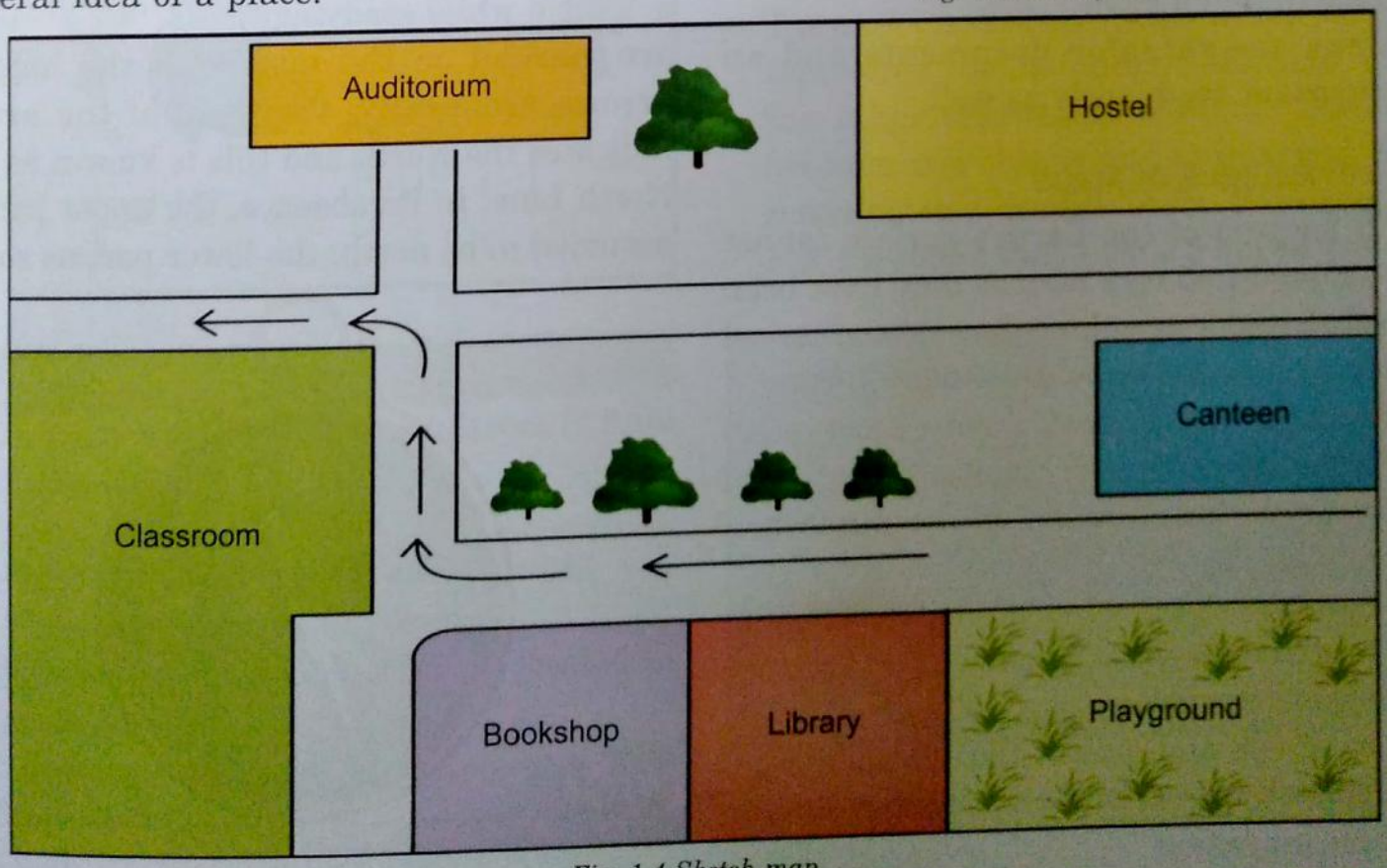


Fig. 1.4 Sketch map

Importance of Maps

Maps give us accurate information about places. People use maps for different purposes. Maps were initially used for defence and strategic purposes. Army personnel planned their strategies according to the information derived from maps. Later, their use and function spread to diverse fields such as, in departments of town and country planning, population scientists, traffic managers, insurance personnel, manufacturing and distribution industries, historians, economic experts, political parties, newsmakers and even the common man.

Advantages of Maps

- Since maps are drawn on two-dimensional surfaces like paper, they are easy to fold and carry anywhere.
- Maps can also be drawn for any single theme to avoid complexity in the map image.
- Calculating the direction and distance between any two places is easier on a map, compared to a globe.
- Maps are valuable documents and an important study tools as well.

Disadvantages of Maps

- All features of the Earth's surface cannot be reproduced on a map as they have been transferred from a three-dimensional curved surface to a flat two-dimensional surface.
- Being two-dimensional, a map cannot retain all the properties of a globe. Selection of the properties depends on the purpose of the map.
- Maps are most accurate around the equator. Their distortion increases as they move towards the poles.
- The shape and size of the continents get distorted on various maps, depending on their projection.

Elements of a Map

There are a few basic elements on each map and their knowledge is a must for reading and interpreting a map. These elements are:

- Title
- Direction
- Scale
- Grid system
- Legend or Key

Title

The main title of the map gives the name of the country, continent, state, district, village, country or specific region. The secondary title tells us about the theme, topic or content of the map. Political map, physical map, road map, crop map, mineral map and so on are some examples of the titles shown on maps.

Direction

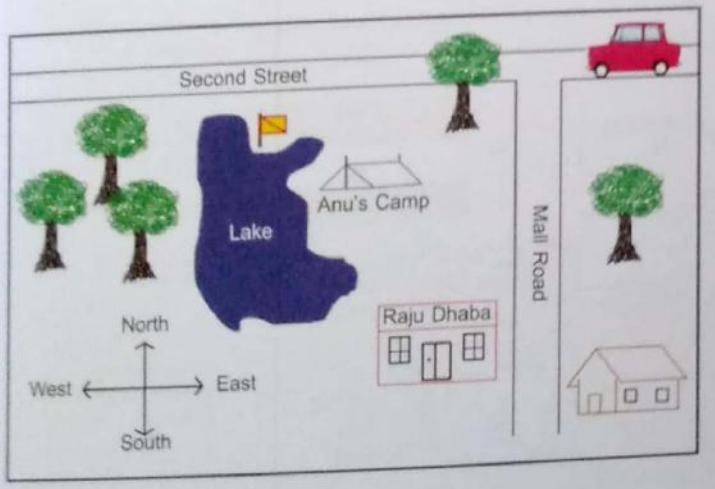
A compass (see Fig. 1.5) gives us an idea of directions. But a compass is not always available while studying maps. So directions are marked on the map with the help of arrows. Generally, the head of the arrow indicates the North and this is known as the North Line. In its absence, the upper part is assumed to be north, the lower part as south

Fig. 1.5 A Compass

and the right and left indicate east and west respectively. North, south, east and west are the four cardinal directions as indicated on the compass. Knowing about these cardinal points is essential to locate a place or feature on a map and its direction with reference to another object.

A compass also shows intermediate directions. If a position lies halfway between north and east, it will have a north east (NE) direction. If a position lies halfway between south and west, it will have a south west (SW) direction. So the intermediary points are – NE (northeast), SE (southeast), NW (northwest) and SW (southwest). Thus, these directions are known as the intermediate directions.

Study the plan given below carefully and answer the questions that follow.



In-text Questions

1. On what side of the Second Street is Raju Dhaba located?
   ..... side.
2. Which street runs from east to west?
   .....
3. What side of the lake is the not located in image on?
   ..... side.
4. Anu's camp is on the.....side of the lake
5. What is on the east side of Mall Road?
   .....

Scale

Distances on the Earth are vast. A map cannot be drawn as per the original size of the Earth. Maps have to be reduced in size, according to a fixed ratio. So, a cartographer uses a scale for drawing a map. The scale indicates the distance between two points on a map and the actual distance between the same points on the ground. The scale of a map (see Fig. 1.6) is expressed in three different ways.

- Verbal Scale or Statement where scale is represented in words. For example, 1 cm on scale = 50 km on ground
- Representative Fraction which shows the ratio between distance on the map to distance on the ground. For example, 1:30,000 means 1 cm on map = 30,000 cm on ground. The scale can be converted into any unit.
- Graphic or Linear Scale shows the distance on the map to the actual distance on Earth. They are marked on a scale where one side represents the distance on the map while the other represents the true distance between two objects on the map and then referring to a graphic scale. For example, Fig. 1.6 shows that 1 cm = 5 km on ground.

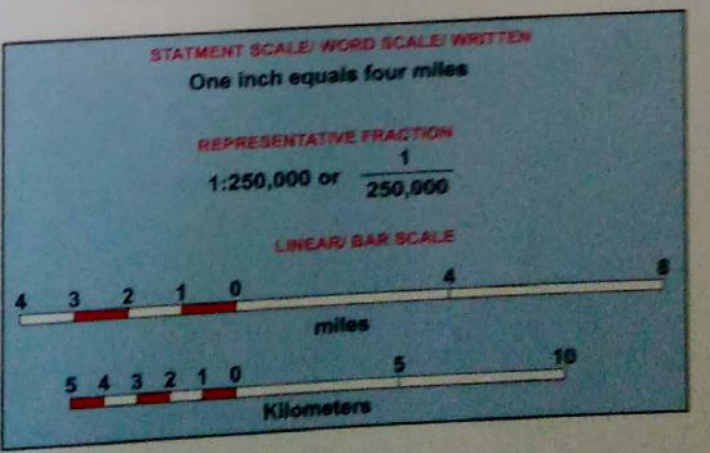


Fig. 1.6 Statement Scale, Representative Fraction Scale, Linear Scale

Grid System

To measure the exact location of any place on the surface of the Earth, a grid system has been developed (see Fig. 1.7). It gives us the exact location of any place by using two coordinates—latitudes and longitudes (see Fig. 1.8). These are imaginary lines drawn on the Earth. With the longitudes and latitudes, a network or grid pattern has been developed that is known as **graticule**. We can locate a place easily by finding the point at which the two lines meet.

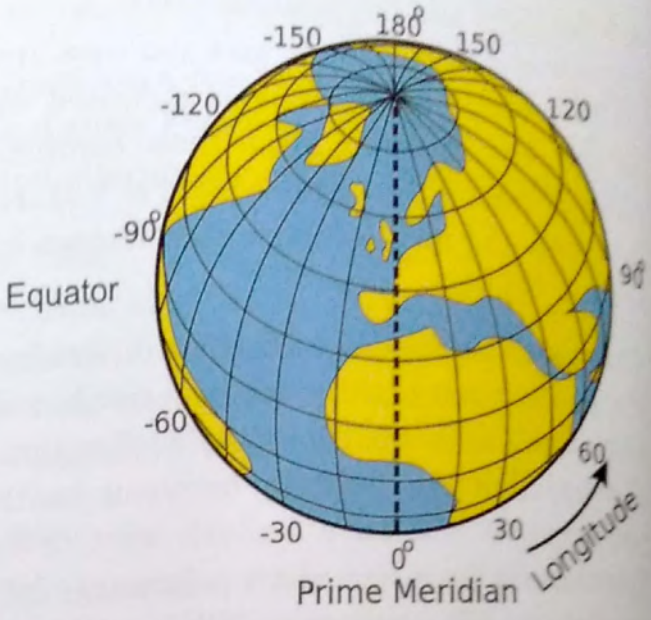


Fig. 1.7 Spherical Diagram Showing the Grid of Latitude and Longitude Lines

Legend

Maps have wordings on them explaining certain symbols. These symbols are graphical signs that are used on maps. They can be

Fig. 1.8 Locating a Place with the help of Latitudinal and Longitudinal Lines

various shapes, lines of different patterns, thickness and directions, dots of various colours and sizes, different textures, grey tones and different colours. Along with these, alphabetical symbols are also used.

A **legend**, therefore, is a collection of various signs, symbols, colours and alphabetical abbreviations used on the map for representing natural and man-made features. The key or legend is usually printed close to the map. (see Fig. 1.9).

Types of Maps

Maps Based on Purpose

There are several types of maps. For different purposes, a new and different map is designed, depicting different information. Some maps focus on the physical features, whereas others represent the political units along with their specifications. Some maps focus only on the man-made features or cultural environment.

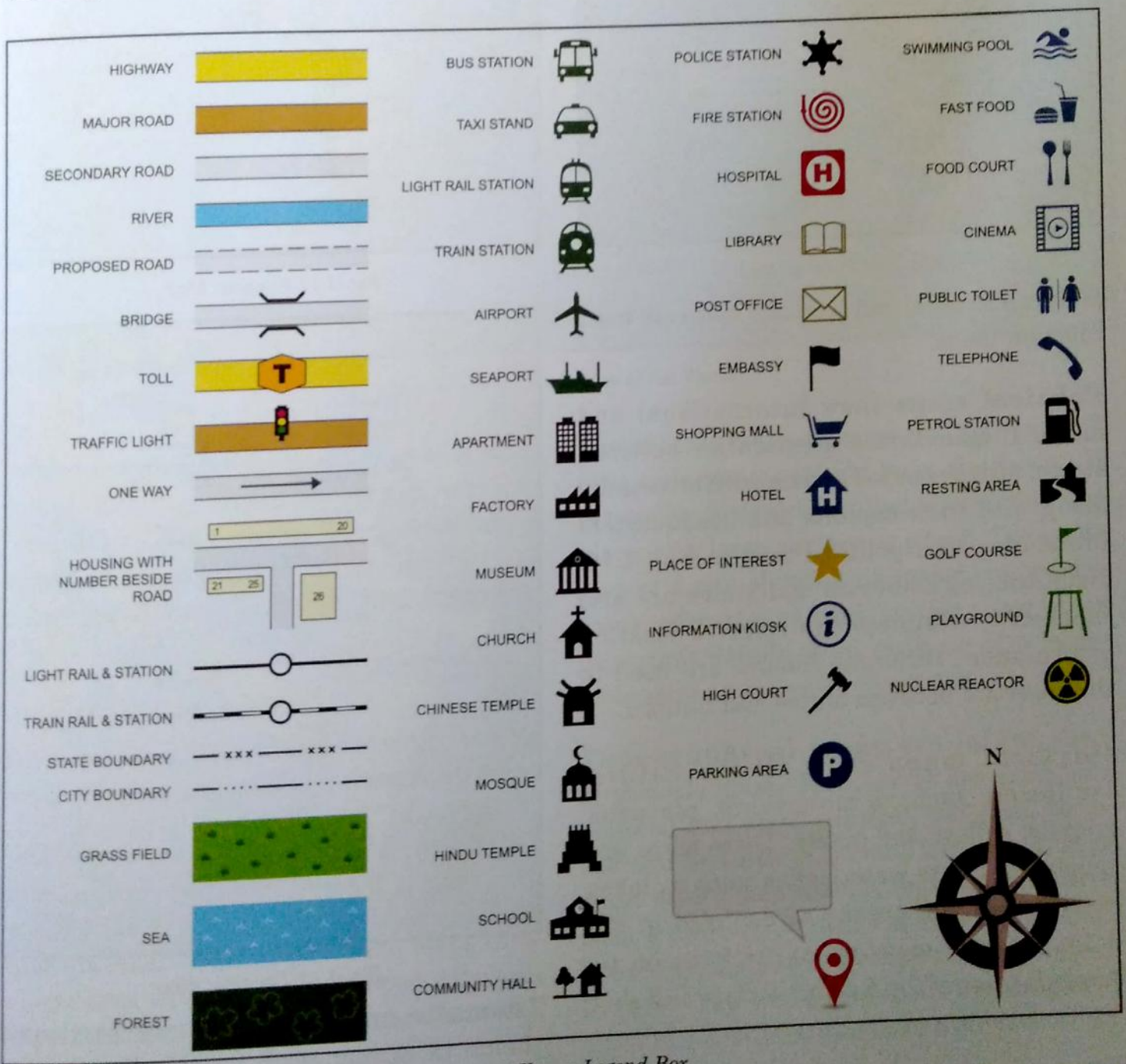


Fig. 1.9 Key or Legend Box

Fig. 1.10 Political Map

Fig. 1.11 Physical Map

Political, physical and thematic maps are most common maps.

Political maps show international and national boundaries. Boundaries between states, districts or lower administrative units along with their capitals and headquarters are shown on a political map in Fig. 1.10. Neighbouring countries and states are also marked to complete the relative location information. Different colours are used to differentiate between states and nations.

Physical maps show all the natural landforms such as mountains, plateaus, islands, valleys and plains. These maps also help us to locate waterbodies, such as lakes, rivers, seas and oceans as depicted in Fig. 1.11. Physical maps primarily focus on the irregularities of the Earth's surface and show its variations and depth.

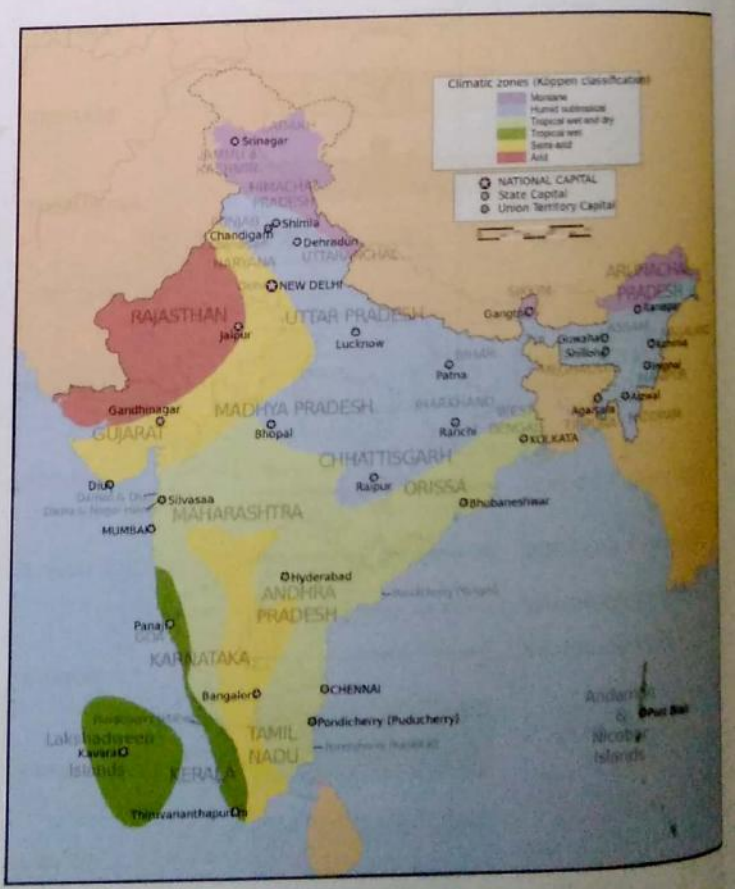


Fig. 1.12 Thematic Map

Thematic maps show any one particular theme in a map, such as the distribution

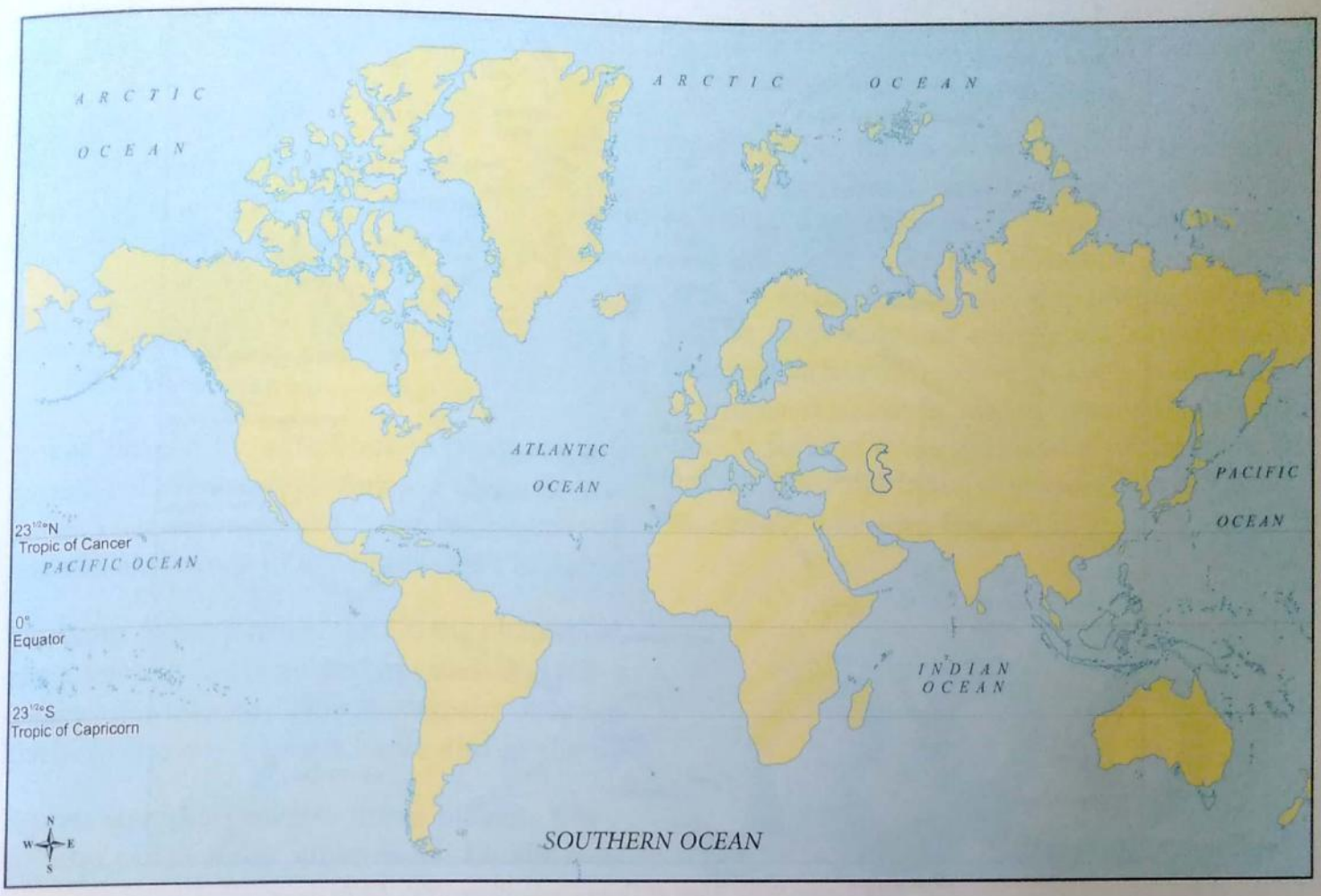


Fig. 1.13 Small-Scale Map of the World

patterns of population density; types of soils; wildlife and vegetation; network of railways, roadways, seaways and airways; availability of minerals and location of industries. Fig. 1.12 shows the climatic pattern of India and is a thematic map.

Maps Based on Scale

There are three types of maps based on scale—small scale, large scale and topographical.

Small-scale maps are maps that present a large area of the Earth on a small-scale map as shown in Fig. 1.13. The maps given in an atlas are small-scale maps. These maps show a large area on a small sized paper. All world maps, continent maps, country maps and even state maps are small-scale maps.

Large-scale maps are maps that show a small area on a comparatively large-sized map. It is possible to depict detailed information of a place on a large surface or paper. The guide map of a city showing its major landmarks, roads, airports, railway stations and other important details is an example of a large-scale map as shown in Fig. 1.14.

Topographical maps are larger than large-scale maps. These maps are extremely detailed and show political, physical, socio-cultural features of a small area on a large scale. Such a map actually represents the area from a bird's eye view as shown in Fig. 1.15. It uses symbols to represent a wide range of features. You will learn about topographical maps in more detail in Class 7.

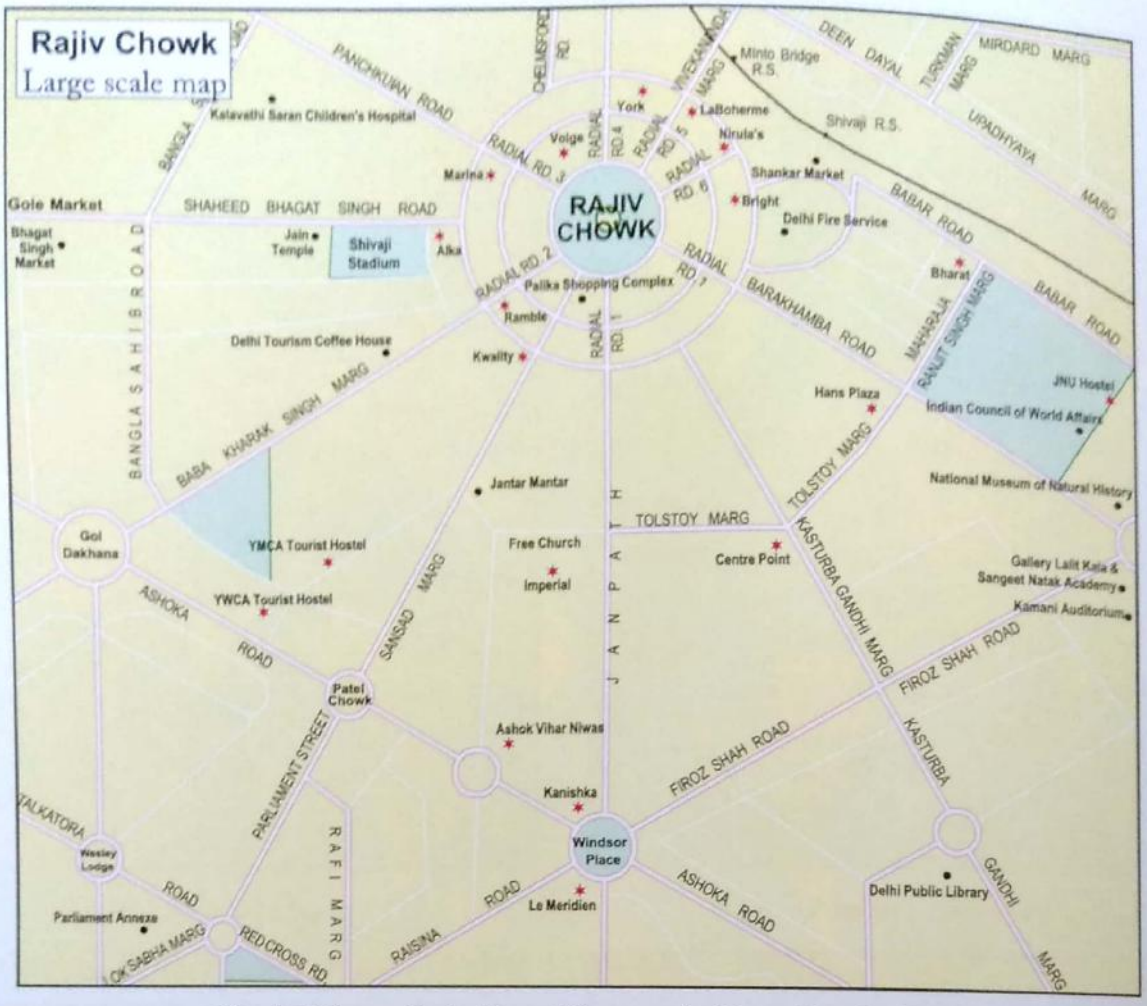


Fig. 1.14 Large-Scale Map of Connaught Place, New Delhi

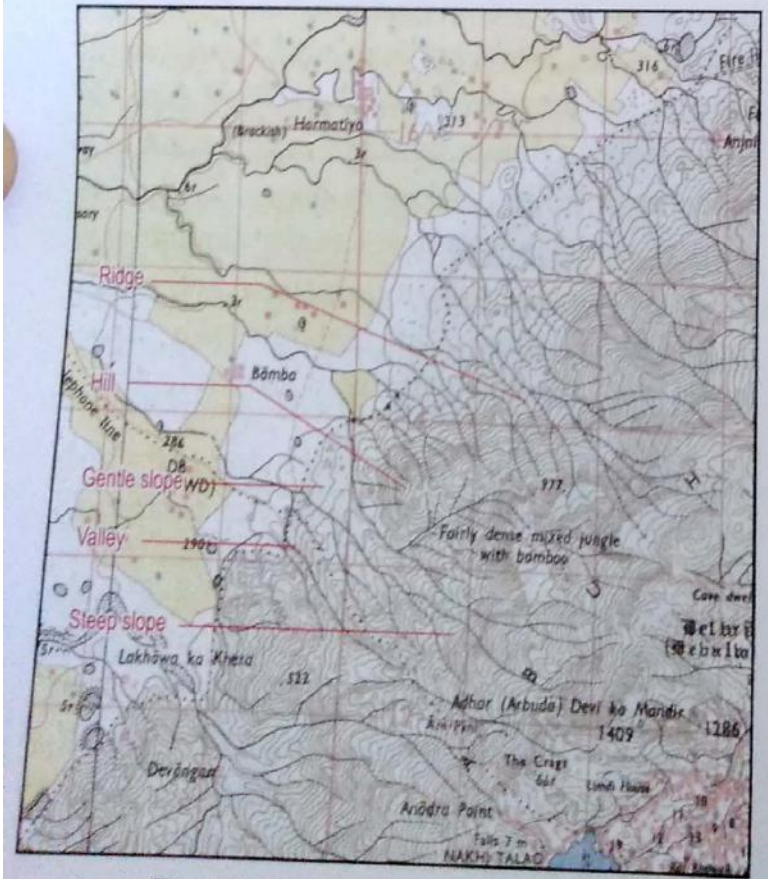


Fig. 1.15 Topographical Map of Delhi

Diagrams

Geographical features of the Earth can be represented through simple diagrams. They are effective tools to illustrate particular geographical processes.

Representation of Folded and Faulted Turnover forms

Folding: During the process of folding, folds and bends are formed on the Earth's surface. Some parts of the Earth's surface fold downwards while other parts fold upwards. The two terms associated with this folding movement of the Earth are anticline and syncline.

Anticlines are upward arches formed away from the Earth. The top of the arch on the anticline is called a crest. Mountains are

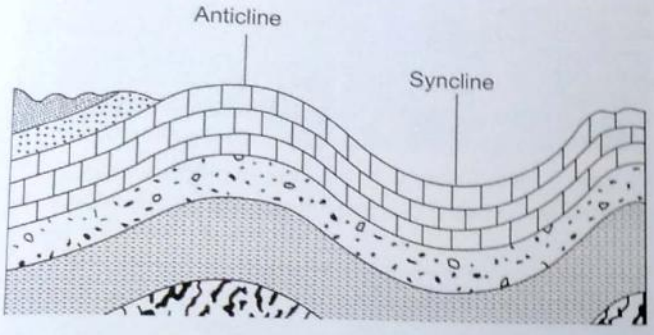


Fig. 1.16 Anticline and Syncline

arches formed by anticlines. **Synclines** are downward depressions formed towards the Earth. These are similar to troughs. Basins are depressions formed by synclines (see Fig. 1.16).

Faulting: When forces of the Earth pull its crust apart, some parts are pushed upwards and some collapse downwards. This movement of large blocks of the crust forms horst and graben.

Horsts are the upward lifted blocks. They are also called block mountains. **Graben** is the downward collapsed part. They are a low rift valley in the Earth's crust surrounded by higher block faults (see Fig. 1.17). So, graben is also called Rift Valley. The Vindhyas and Satpuras are block mountains and the Narmada Valley, where River Narmada flows, is a rift valley between these two block mountains.

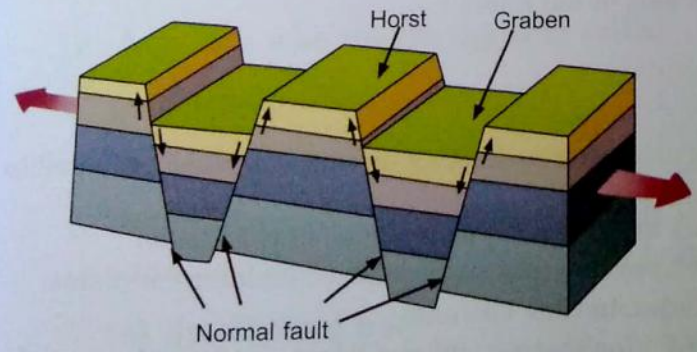


Fig. 1.17 Horst and Graben

Representation of River Landforms

River meanders: A meander is a bend in the river course. A snake-like pattern is formed as the river swings and sways in a zigzag manner through the plain. This is formed in the middle course of a river.

Meandering happens when there is erosion in the outer banks and there is deposition of silt in the opposite inner banks. Meandering widens a river's valley. However, sometimes due to this erosion and deposition, a part of the river may get completely cut-off from the main river. The river in such a situation changes its course and a crescent-shaped lake is formed when a meander of the river is cut off from the main channel. This is called an oxbow lake (see Fig. 1.18).

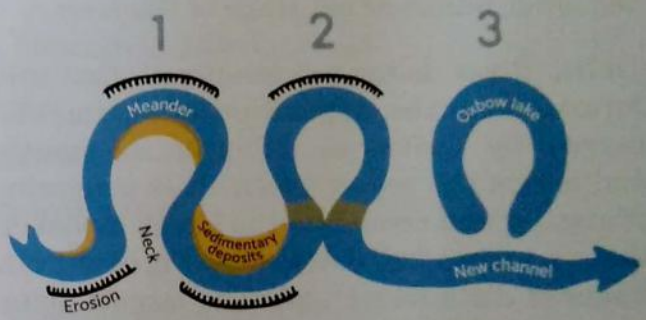


Fig. 1.18 Meanders and Oxbow Lake Formation

Tributaries: Tributaries are the streams or rivers that flow into a larger main stream of a river. The main river receives a large number of such streams that drain a large part of the drainage basin. The point where a tributary meet or joins the main river is called the **confluence**.

Tributaries do not drain directly into the ocean or sea. The side of the river, through which a tributary joins the river, is accordingly indicated as the left bank tributary or the right bank tributary. For example, River Kosi is a left bank tributary while River Yamuna is a right bank tributary of the River Ganga.

Distributaries: Distributaries are streams that branch off and flow away from the main stream. These tiny streams are the most

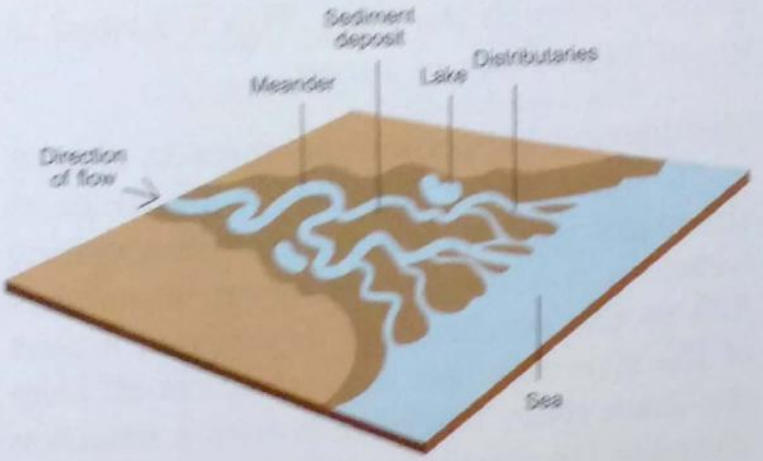


Fig. 1.19 Distributaries and Formation of Delta

common feature of the river delta as depicted in Fig. 1.19. They are formed before the river drains into the sea or ocean or sometimes, in the lower course or old stage of the river.

Delta: River deltas are landforms that are formed from the deposition of sediments carried by a river as it leaves its mouth and enters the sea or ocean. It is generally triangular and resembles the Greek alphabet that is known as 'delta' (see Fig. 1.20 for stages of delta formation). The largest delta in the world is that of the River Ganga and River Brahmaputra. Some other famous river deltas are of Mississippi and Nile.

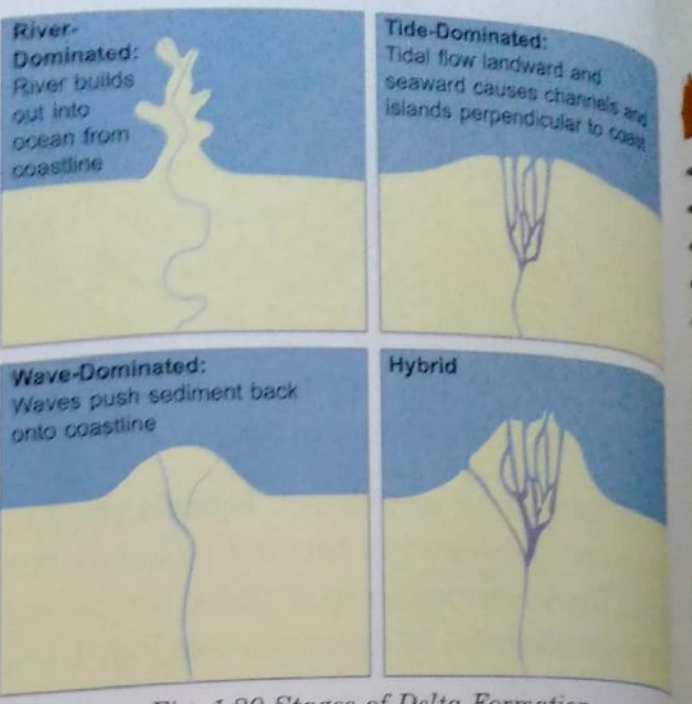
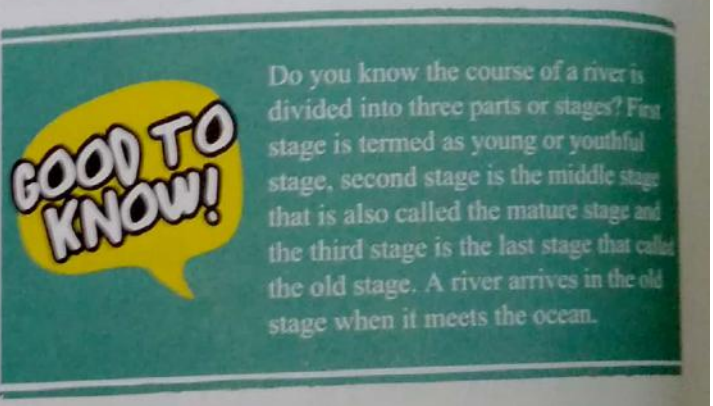


Fig. 1.20 Stages of Delta Formation



Glossary

globe: a three-dimensional model of the Earth
map: a two-dimensional representation of the Earth or a part of the Earth
atlas: collection of maps presented as a book
cartography: the art and science of map-making
cartographer: a person who develops a map
Geographical Information System (GIS): the system of accurate map-making through computer and satellite images
plan: drawing that shows details of a small area based on the actual measurements on the ground
sketch: drawing of the relative position of a place with respect to other surroundings, buildings or places
graticule: network of grid patterns formed by the longitudes and the latitudes
legend: collection of various signs, symbols, colours and alphabetical abbreviations used on the map for representing natural and man-made features
anticlines: upward arches formed away from the Earth
syncline: downward depressions formed towards the Earth
horst: upward lifted blocks of the Earth's crust when natural forces pull the crust apart
graben: downward collapsed blocks of the Earth's crust when natural forces pull the crust apart
confluence: point where a tributary meets or joins the main river

Summary

- The geographical features of the Earth can be represented by a globe, map, sketch and plans.
- Globe is a three-dimensional representation of the Earth. However, it is difficult to carry it physically.
- Maps are two-dimensional representations of the Earth. They are easy to carry.
- A plan shows the details of a small area based on the actual measurements on the ground.
- A sketch is a freehand drawing of the relative position of a place with respect to other surroundings, buildings or places.
- Elements of a map are: title, direction, scale, grid system and legend.
- Political, physical and thematic maps are maps based on purpose.
- Small-scale, large-scale and topographical maps are maps based on scale.
- Geographical features of the Earth can be depicted through simple diagrams as well.

Exercise

A. Fill in the blanks.

1. The ratio between map distance and real distance is called ..... .
2. The direction to the left of the north line is ..... .
3. A map with a smaller scale is able to represent a ..... area.
4. A map that shows relief and human settlements is a ..... map.
5. To locate a place on the Earth, we use latitudes and longitudes called ..... .
6. The ..... explains the signs and symbols given on a map.

B. Tick (✓) the correct answer.

1. The measurement or use of a scale is very important while drawing a
   - (a) Plan ☐
   - (b) Sketch ☐
   - (c) Globe ☐
   - (d) Map ☐
2. A person who makes maps is called
   - (a) Cartographer ☐
   - (b) Map-maker ☐
   - (c) Geographer ☐
   - (d) Geologist ☐
3. A topographical map showing both physical features like hills, streams, depressions, sand dunes as well as man-made features like wells, huts, temples is a
   - (a) Small-scale map ☐
   - (b) Large-scale map ☐
   - (c) Physical map ☐
   - (d) Political map ☐
4. Grid system helps us
   - (a) To locate places ☐
   - (b) To find direction ☐
   - (c) To find the height of a place ☐
   - (d) To find the climatic condition of a place ☐

5. A drawing that shows the detailed layout of a small area is called

(a) Sketch ☐ (b) Plan

(c) Grid ☐ (d) Scale

C. Give one word for the following.

1. An arrow with its head pointing to the North.

.....

2. The relative position of a place with reference to north.

.....

3. The ratio between map distance and ground distance.

.....

4. A small three-dimensional model of the Earth.

.....

5. A collection of maps in the form of a book.

.....

D. Write short answers for the following questions.

1. Why do we use maps?
2. Why does a map have a north line?
3. Mention two advantages and disadvantages of maps.
4. Why are legends and symbols important parts of a map?
5. Why are directions shown on a map?
6. What are folding and faulting?

E. Write the answers in detail for the following.

1. Differentiate between large-scale and small-scale maps.
2. What are the three type of maps based on purpose?
3. Explain the formation of an oxbow lake.
4. What are anticlines and synclines?
5. Discuss the three ways in which we can express the three scales of a map.
6. How are mountains useful?

Do It Yourself

Draw a plan of your school auditorium, showing clearly the position of the doors, windows, the stage and the rows of seats.

CHAPTER 2

Major Landforms

We Will Learn

- Formation of Landforms
- Types of Landforms
- Mountains
- Plateaus
- Plains
- Valleys
- Other Landforms

Introduction

The surface of the Earth is not even. The Earth has land, water and air that are essential for life to exist. In fact, Earth is covered with 71 per cent water and 29 per cent land that is why it is also called 'the blue planet'.

The surface of the Earth is uneven and irregular. There are places where the land surface is high and steep, at some places it is low and depressed, while some land surfaces look like tabletops.

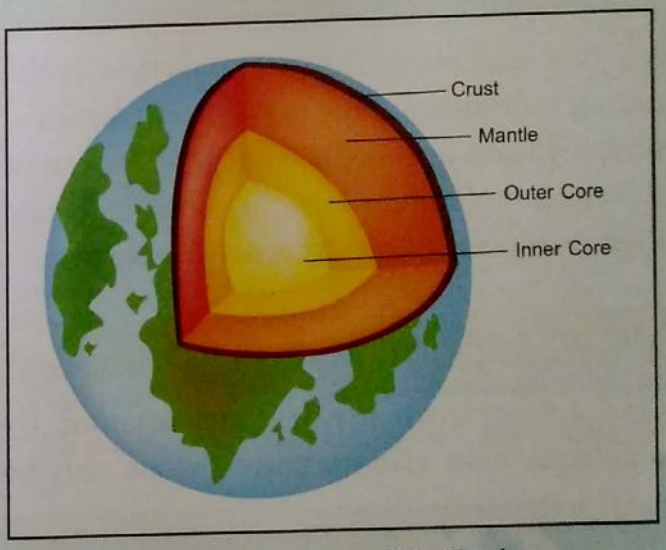


Fig. 2.1 Structure of the Earth

GOOD TO KNOW!

The inner core of the Earth lies in the centre of the Earth and is the hottest part of the Earth. The surrounding layers of mantle and outer core are in a molten form, but the inner core is a solid ball. This innermost layer is made up of iron and nickel. It has an extreme temperature of up to 5,500°C. (see Fig. 2.1)

Formation of Landforms

Landforms created on the Earth are the result of a long-term exposure to by internal and external forces of nature.

The Earth's crust is made up of several

large plates on which both the continents and oceans stand. These plates are not placed on any hard surface, but lie on the molten layer of the Earth called the mantle. So, these plates are not static, and slowly but constantly move due to the movement and heat of the mantle.

Endogenous Processes

The movement of the plates at the crust below the Earth's surface is called **endogenous** or **internal processes**. Folding, faulting and volcanic activities are the major endogenous (internal) processes.

Exogenous Processes

Water and air that are the flowing agents of nature on the Earth's surface erode and have a weathering effect on the landforms over a period of time. Due to their constant flow they break down rocks to form soil, and also deposit rocks, soil and sand. These actions modify the existing landforms. This weathering, erosion, transportation and deposition that form new landforms or change existing landforms are called **exogenous** or **external processes**.

Types of Landforms

Some important landforms formed by exogenous and endogenous forces can be broadly categorised as:

- Mountains
- Plateaus
- Plains
- Valleys

Mountains

Mountains are the natural elevation of the Earth's surface rising from its surrounding area as base. They are normally above 600 metres in height. Highlands less than 600 metres are called **hills**. The top or summit or crest of a mountain is called a peak. Mount Everest (8,850 metres) is the highest peak in the world (see Fig. 2.2).

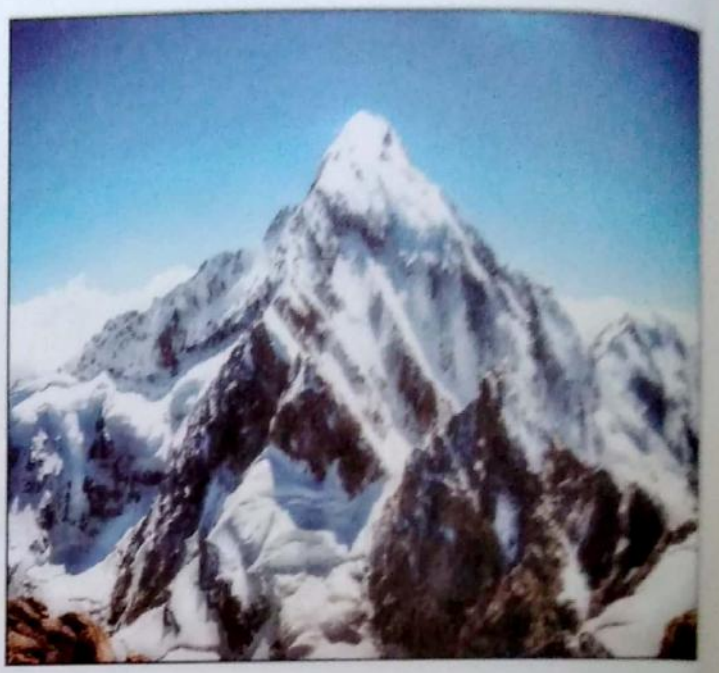


Fig. 2.2 A View of Mt. Everest

Mountains are found on all continents. Some mountains are a single, stand-alone landmass such as Mount Kilimanjaro in Africa, while others are long, continuous chains called ranges, such as the Himalayas in India and the Andes in South America (see Fig. 2.3).

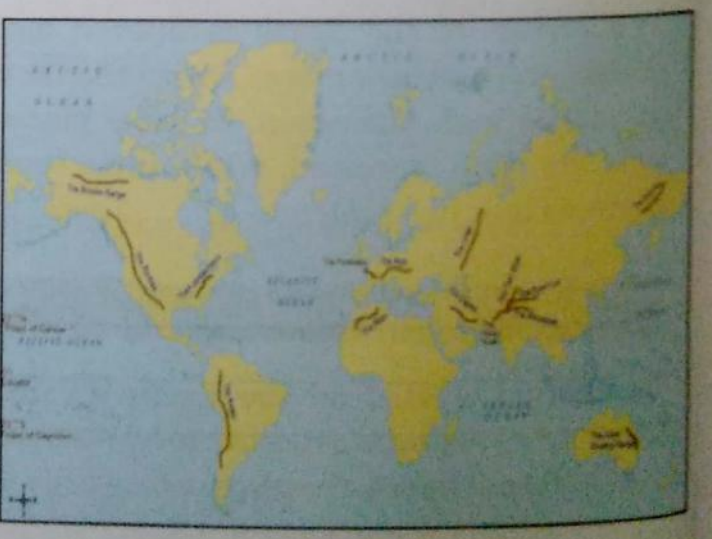


Fig. 2.3 Mountains of the world

GOOD TO KNOW!

Mount Everest is the highest mountain from the sea level; however, Mauna Kea in Hawaii is the highest when measured from its base under the sea to its summit. The base of Mauna Kea is about 6,000 metres below the sea level, and the summit is about 4,000 metres above the sea level. The distance between the foot of the mountain and the summit is about 10,000 metres. This makes Mauna Kea the 'tallest' mountain in the world.

Based on their origin and form, mountains can be categorised as: 1. Fold mountains, 2. Block mountains and 3. Volcanic mountains.

Fold Mountains

When two plates collide against each other, then both the edges of the plates start to rise, and the surface of the Earth gets a crease. This uplifts the surface from both sides to form mountains. This process is called folding (see Fig. 2.4). The Andes, the Rockies and the Himalayas are examples of fold mountains.

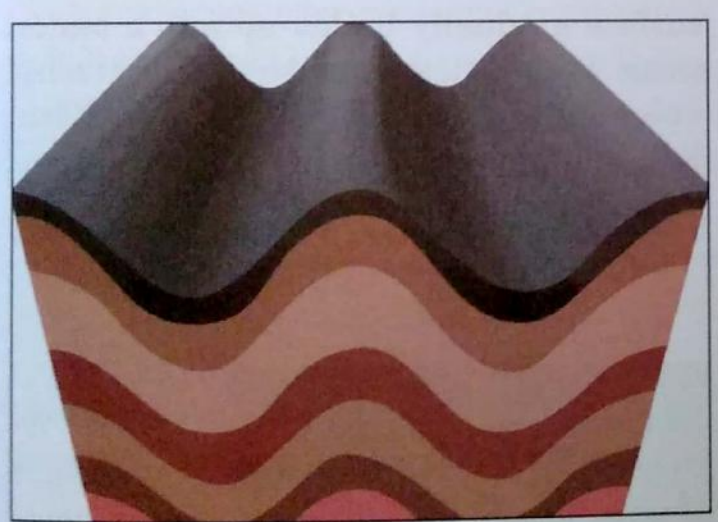


Fig. 2.4 Creasing of the Earth's Crust Forms Fold Mountains

Fold mountains are of two types:

Young fold mountains: Fold mountains that formed a few million years ago are called **young fold mountains**. These mountains have unstable crustal plates that are still gradually moving towards each other and the crest is still growing in height. Young fold mountains are characterised by high conical peaks, steep slopes and narrow deep valleys [see Fig. 2.5(a)]. The Himalayas and the Alps are examples of young fold mountains.

Old fold mountains: Fold mountains that formed several hundred million years ago and have now stopped growing any further are called **old fold mountains**. They once did have moving or creasing crustal plates. However, now their crustal plates are stagnant and have stopped moving towards each other. Old fold mountains have been exposed to forces of erosion and denudation. Therefore, these mountains have gentle slopes and low rounded peaks [see Fig. 2.5(b)]. The Aravali ranges and the Urals are examples of old fold mountains.

Fig. 2.5 (a) Young Fold Mountains – The Himalayas

Fig. 2.5 (b) Old Fold Mountains – The Aravali Ranges

Block Mountains

Sometimes the plates of the Earth's crust draw away from each other. This pulling apart causes cracks or faults. Due to the movement of large crustal blocks, extreme force (tensional forces) is created that pulls apart the Earth's crust. During this movement, some parts of the Earth are pushed upwards, and others collapse. The blocks that are pushed up are called **horsts**. The blocks that are pushed down are called **graben**.

The blocks of land that rise or push up form mountains called **block mountains**. The valley between two block mountains is called a rift valley.

The block mountains are characterised by steep slopes and flat summits. The Vosges and Black Forest Mountains are examples of block mountains.

The rift valleys are not formed due to erosional action of a river, but due to subsided blocks along the fault lines of the crustal planes. So these valleys are bound by the steep sides of the block mountains and have a flat floor. The Rhine Valley and the Narmada Valley are examples of rift valleys.

Volcanic Mountains

Beneath the Earth's surface, there is magma, a mixture of molten and semi-molten rock. When the heat in the molten layers of the Earth becomes too extreme and creates a lot of pressure on the crust, cracks develop on the surface and the magma erupts from the interior and at times reaches the outer surface of the Earth. This gushing out of molten magma with extreme pressure through cracks on the Earth's surface is called a volcanic eruption. The crack through the molten magma erupts onto the Earth's surface is called a **vent**. On reaching the surface, the magma cools and solidifies. This cool and solidified magma is called **lava**. Along with the magma, small particles of rocks, cinders and ash with hot steam also gush out from these cracks.

The continuous flow of magma and its accumulation as lava and volcanic residue such as ash, cinders and rocks on the Earth's surface gradually builds up into a conical shape. Such conical-shaped highlands is called **volcanic mountains** (see Fig. 2.6). Mount Fuji and Mount Vesuvius are examples of volcanic mountains.

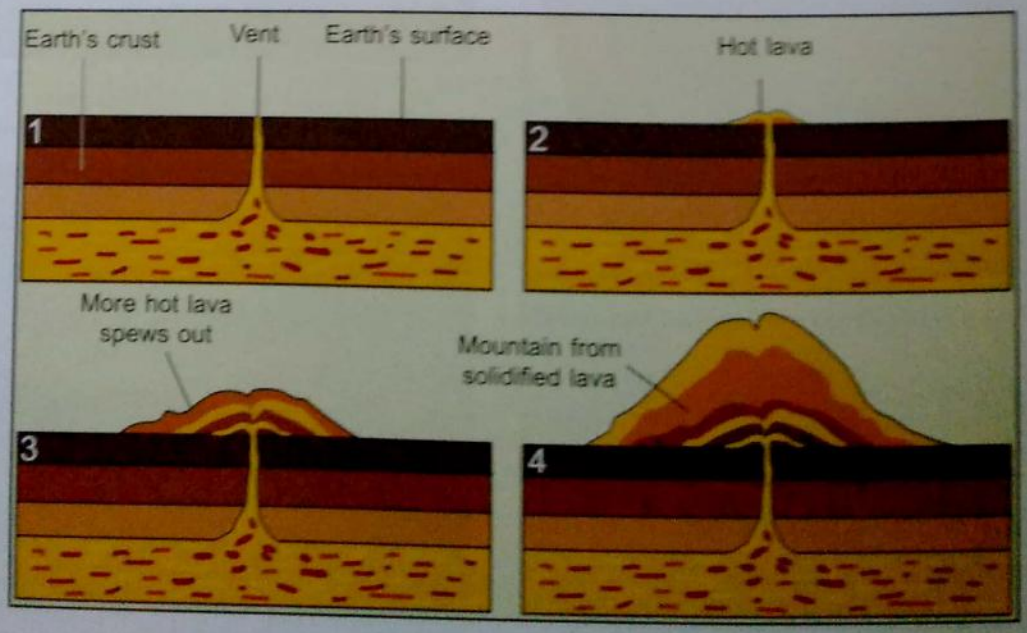


Fig. 2.6 Formation of Volcanic Mountains

In-text Question

Do you know that mountaineers and climbers who climb the Mount Everest leave behind carbon footprints and garbage? This is one of the major reasons for global warming at the summit of Mount Everest.

Study the picture carefully and answer the questions.

1. What do you see in the picture?

   .....

2. Will this help or cause harm to the slopes of Mount Everest?

   .....

3. Do you think this increase or reduce global warming?

   .....

Usefulness of Mountains

- Mountains help bring rainfall by blocking moisture-laden winds and forcing them to precipitate.
- High peaks in the mountains are snow-capped and are a major source of glaciers that melt to form rivers and streams.
- Glaciers and rivers flow down the slopes of mountains with great speed and this force is harnessed to generate electricity.
- Glaciers and rivers while flowing down the steep sides and slopes of mountains breakdown rocks and minerals and deposit this fertile silt in the plains thereby making it rich for agriculture. Water is also stored in dams and reservoirs for irrigation purposes.
- Mountains are the main storehouse of freshwater locked in the snow-capped peaks and glaciers.
- The vast grass covers in the mountains serve as ideal pasture grounds for sheep, goats and cattle. This helps herders to graze their sheep, goats and cattle whom they rear for wool, milk, butter and meat.
- The forests in the mountains provide many natural products, such as timber, honey, medicines and rubber.
- Mountains are great tourist spots due to their green surroundings, picturesque locations and cool climate.
- Snow-capped slopes of the mountains are a great attraction for adventure sports, such as skiing, hang gliding and paragliding.

Fact File

Mountain building process operates slowly over a long period of time. The endogenic or internal process is not visible but its effect may be visible on the surface of the land. The endogenic movement may be slow or sudden.

Plateaus

Have you ever seen mountain-like landforms that have tops like tables? These extensive highlands with flat tops, instead of conical peaks, are called **plateaus** (see Fig. 2.11). They are also called tablelands because of their table-like shape. Plateaus are also formed due to the folding and faulting forces, but they are often lower than mountains in height. Plateaus may also form when mountain tops get eroded and weathered. There are young and old plateaus. The Tibetan Plateau is an

example of a young plateau as it is still rising in height and has unstable crustal plates. However, the Deccan Plateau is an old plateau that is now stable and is no longer rising in height (see Fig. 2.7).

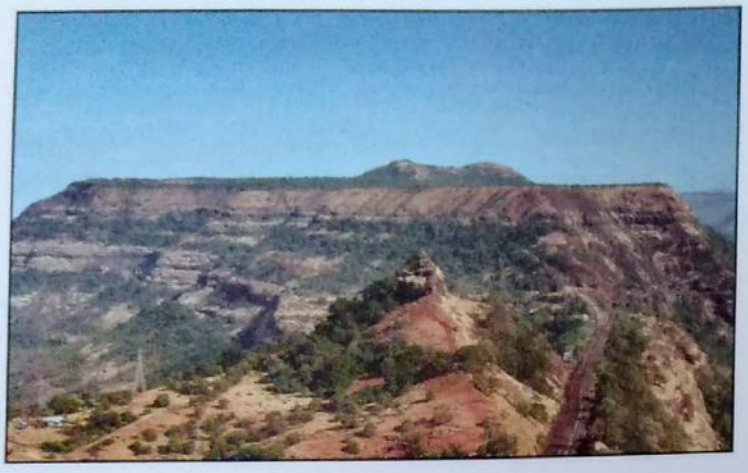


Fig. 2.7 Deccan Plateau in India

Plateaus can be categorised on the basis of their formation. There are four main kinds of plateaus.

1. Intermontane
2. Dissected
3. Piedmont
4. Volcanic

Intermontane Plateaus

When there is a tableland surrounded by high mountains, it is called an intermontane plateau. The Tibetan Plateau is a good example of an intermontane plateau (see Fig. 2.8). It is one of the highest plateaus of the world and is called the 'roof of the world'.

Fig. 2.8 The Tibetan Plateau

Dissected Plateaus

When several rivers flow through a plateau, they cut through its surface. Due to the continuous erosion of the flowing water, many deep valleys are formed. This makes the plateau region look like many raised sections with flat tops. This type of plateau is called a dissected plateau. Colorado Plateau is an example of a dissected plateau (see Fig. 2.9).

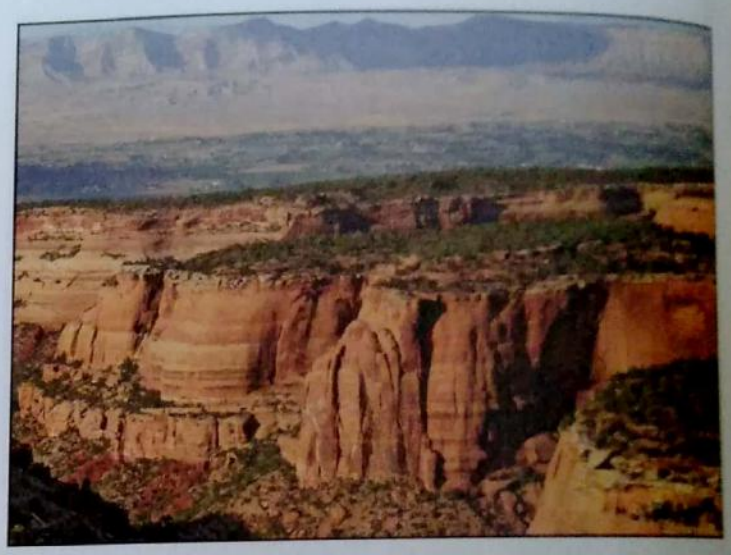


Fig. 2.9 The Colorado Plateau

Piedmont Plateaus

When the crustal plates lying in the borders of an ocean coast or a plain rise upwards, making it higher than its surrounding land, it is called a piedmont plateau (see Fig. 2.10). It is also called a border plateau. The Malwa Plateau in India and the Appalachian Plateau in the USA are examples of piedmont plateaus.

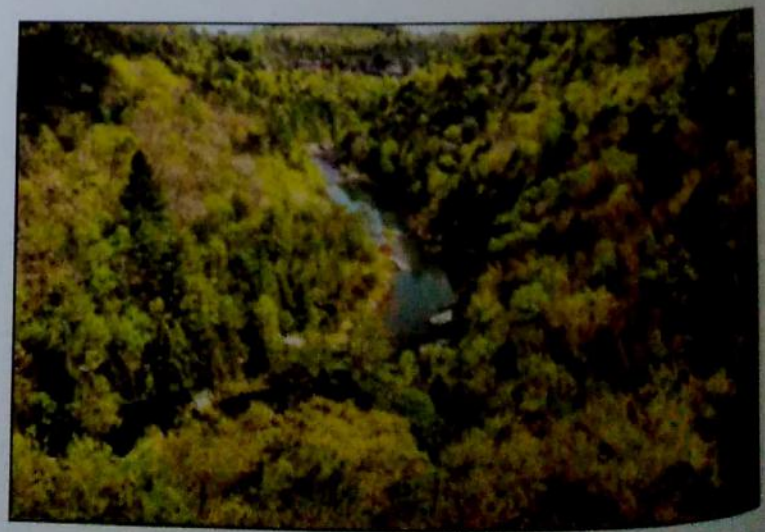


Fig. 2.10 The Appalachian Plateau

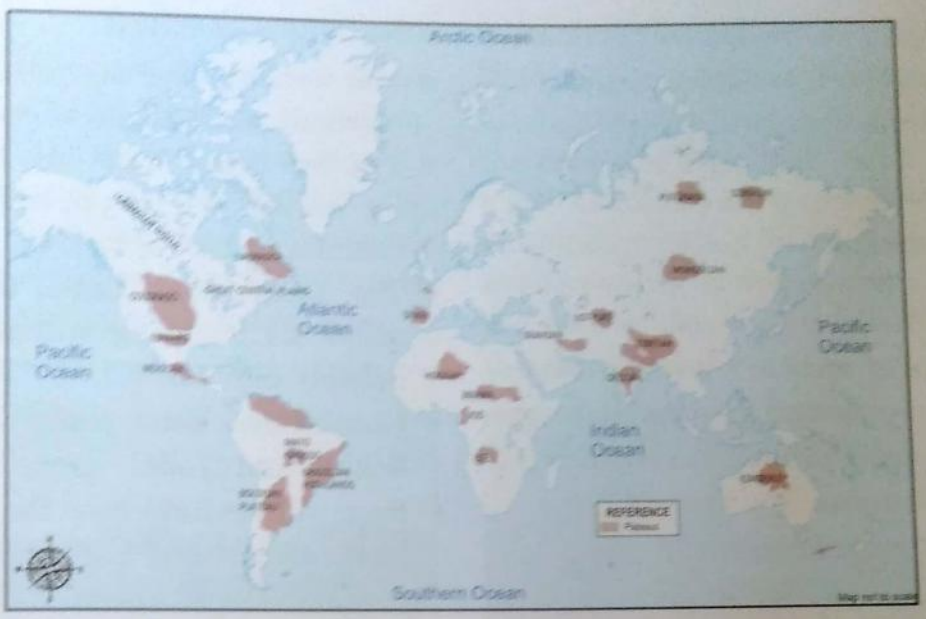


Fig. 2.11 Plateaus of the World

Volcanic Plateaus

You have already learnt how when molten magma comes out from a single vent on the Earth's surface, it forms volcanic mountains. But sometimes instead of a single vent, molten magma comes out through many fissures or cracks. This magma spreads over a large area and solidifies as lava sheets. When this process continues over a long period of time, many lava sheets accumulate over one another to form a lava plateau. It is also known as a volcanic plateau. The Deccan Plateau and the Columbia Plateau see (Fig. 2.12) are examples of volcanic plateaus.

Fig. 2.12 Columbia Plateau

Advantages of Plateaus

- Plateaus are rich in minerals resources. They are mined for various minerals like gold, diamonds, iron, coal and manganese. The African Plateau and the Chota Nagpur Plateau are such examples.
- The black soil in the lava plateaus is fertile and suitable for farming, especially for growing cotton, sugarcane and wheat.
- The grasslands covering some of these plateaus are crucial for livestock farming.
- The steep, jagged edges of the plateaus form waterfalls that are useful for generation of hydroelectricity.
- The picturesque landscape make plateaus attractive tourist spots.

Plains

When a large extent of land is eroded and weathered by various forces of nature, such as wind and river, it forms broad flatland, nearly with no or less elevation. These extensive low-lying lands are called **plains**. More than half of the Earth's surface is covered by plains.

Types of plains can be divided on the basis of their origin as the well as agents responsible for their formation.

1. Erosional plains
2. Depositional plains

Erosional Plains

When the agents of erosion work constantly, they erode away rocks and soil and make the land flat, reducing its elevation. Such plains are called **erosional plains**. The Central Swedish lowland is an example of erosional plain.

Depositional Plains

The rocks, soil and silt carried by rivers and wind are deposited to form large stretches of plains. These plains are called **depositional plains**. Depositional plains are further categorised as river plains, delta plains, coastal plains and loess plains. The depositional plains are intensively cultivated for their fertile soil and abundant water supply. The Northern Plains of India (see Fig 2.13), the Amazon Basin in South America and the Great Mississippi Plains in North America are examples of depositional plains.

Advantages of Plains

- The fertile soil of the plains is suitable for cultivating a variety of crops.
- The low-lying lands are ideal for setting up industries, roads and railways and communication networks.
- The flat levelled land of the plains is also ideal for building settlements and are densely populated.
- Coastal and delta plains are essential for fishing and trade.
- River valleys have been the cradle of earliest civilisations and have contributed to the development of villages, towns and cities.

Valleys

When mountains or hills are formed due to tectonic movements, the two plates either collide or drift away and move upwards. However, there are low-lying areas between the two mountains or hills that are formed due to the two rising parts. Sometimes, they are also formed by the action of agents of denudation. These are called valleys (see Fig. 2.14).

Valleys may be gently sloping or steep with vertical walls. These are V-shaped or U-shaped valleys or rift valleys.

Fig. 2.13 View of the Brahmaputra Plains

Fig. 2.14 Valley

V-shaped Valleys

The V-shaped valleys are formed by rivers (see Figs. 2.15 and 2.16). They are also called **alluvial valleys**. Their exact shape depends on the characteristics of the land and the stream flowing through them. These are narrow and steep-sided, and are formed when a river flows fast through the mountains.

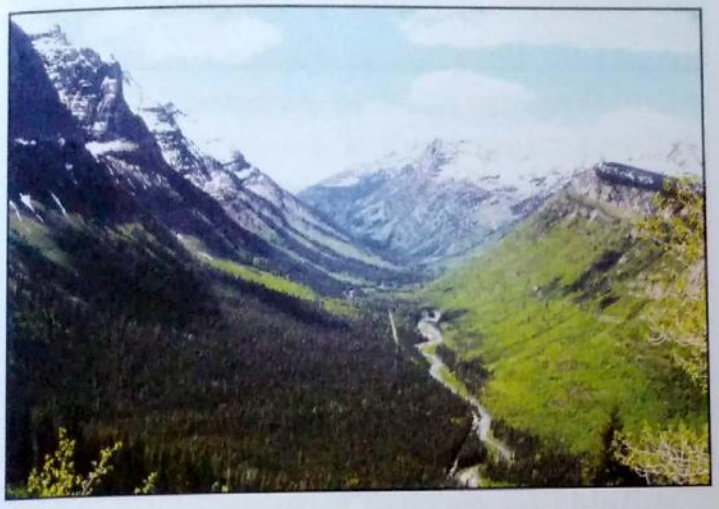


Fig. 2.15 A Glacier Valley in Colorado, USA

Narrow, steep-sided valleys in the mountains are called **gorges**. The Indus Gorge and the Dihang Gorge along the River Brahmaputra are examples of spectacular valleys in the Himalayas.

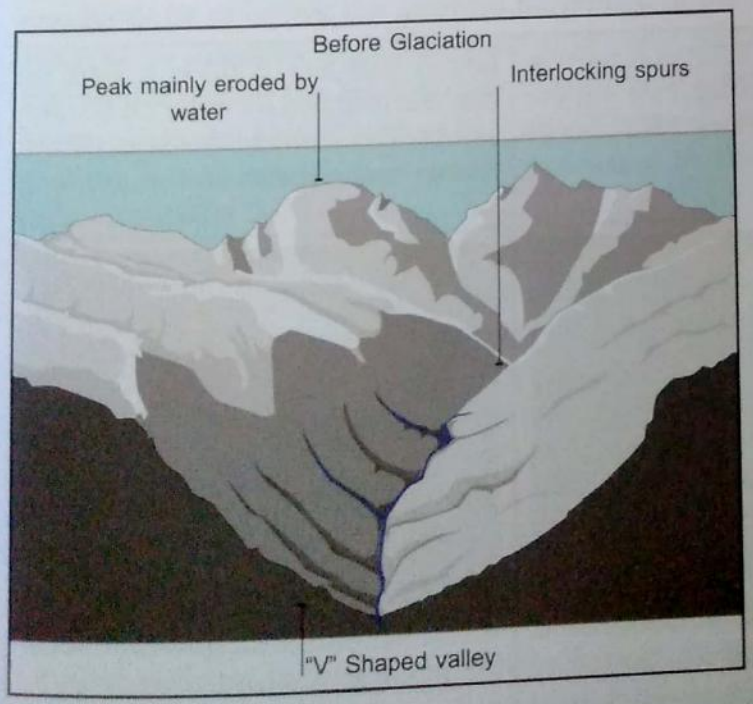


Fig. 2.16 Formation of a V-Shaped Valley

U-shaped Valleys

The U-shaped valleys are formed by glaciers as they move through the valleys scouring the floor (see Figs. 2.17 and 2.18). They have wide, flat floors with typically vertical sides. A hanging valley in glaciated regions is a shallow valley carved by a small glacier. Thus, the floor of this valley is left hanging above the main valley.

Fig. 2.17 The Yumthang Valley in Sikkim, a V-shaped River Valley

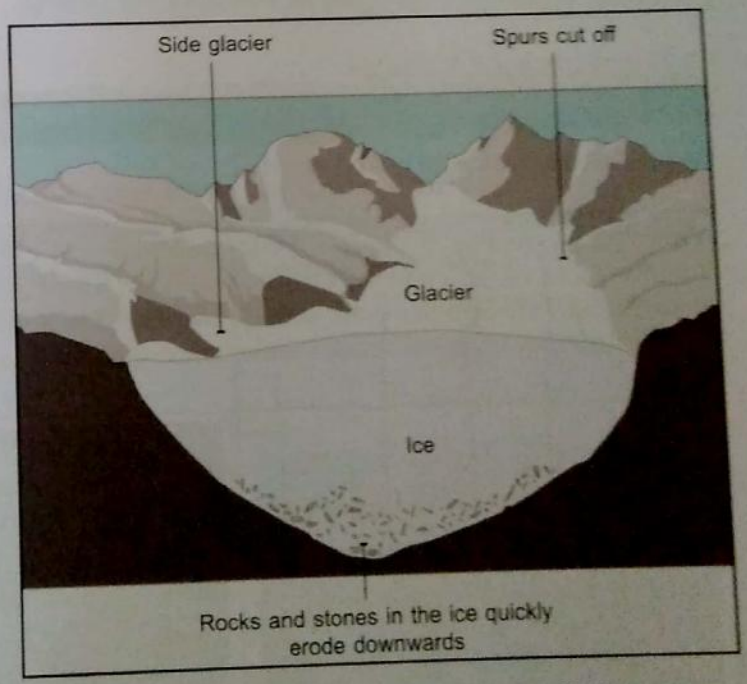


Fig 2.18 Formation of a U-shaped Valley

Rift Valleys

Valleys are also formed by endogenous or internal processes, such as faulting. Here the

land between the two fault lines or fractures in the Earth's crust, slips down to form a **rift valley** or a **graben**. These valleys have steep and nearby vertical sides, with wide flat floors (see Fig. 2.20). In many cases, these valleys are drained by rivers. The Rhine Valley between the Black Forest and the Vosges Ranges, and the Narmada Valley between the Satpura and Vindhya Ranges are examples of a rift valley. The River Nile flows through the longest rift valley in the world (4,800 metres long).

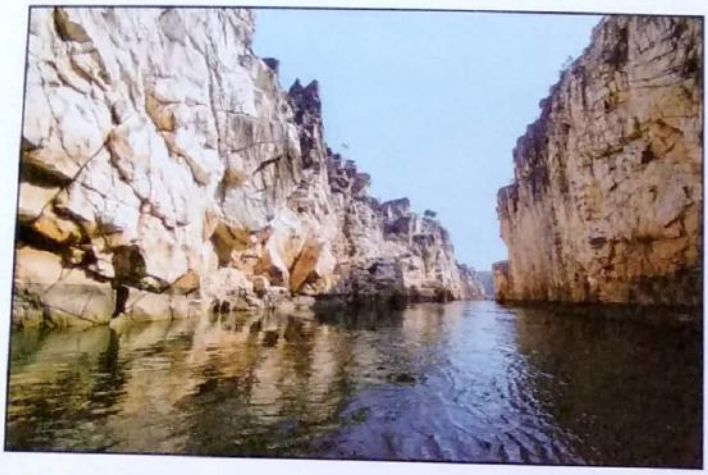


Fig. 2.19 River Narmada Flowing through a Rift Valley

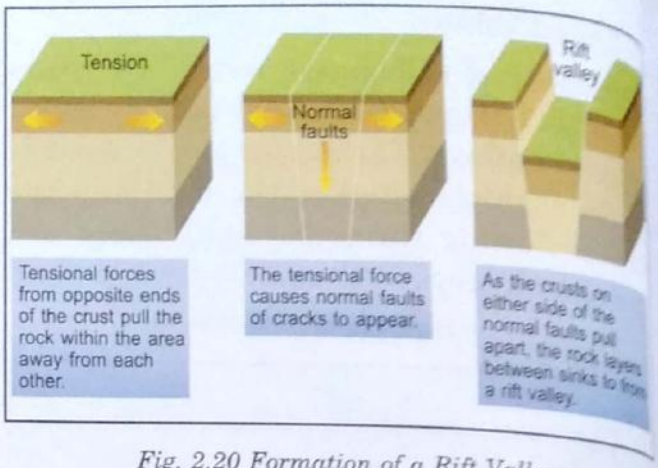


Fig. 2.20 Formation of a Rift Valley

Advantages of Valleys

Though valleys are simply gaps between high mountains, yet they are useful.

- Valleys allow rail routes and roadways to pass through high mountains, such as Uspalata Pass through which the Trans-Andean railways run.
- The grasslands in the valley slopes are excellent grazing land for cattle and herds.
- The rich deposits in the valley slopes are suitable for orchard farming.
- The slopes are cut into steps for terrace farming, mainly for cultivating tea.

Other Landforms

There are many other landforms such as peninsula, isthmus and island.

Peninsula (see Fig. 2.21) is a long narrow piece of land surrounded by water on all three sides and joined to a larger landmass on the fourth side.	Isthmus (see Fig. 2.22) is a narrow neck of land joining two larger landmasses across two large waterbodies.	Island (see Fig. 2.23) is a piece of land surrounded by water on all four sides without any immediate contact to any main landmass.

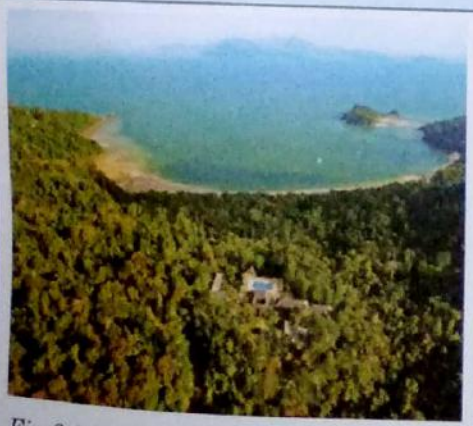



Fig 2.21 An Aerial View of the Malay Peninsula	*Fig. 2.22 An Aerial View of the Isthmus of Panama*	*Fig. 2.23 A Satellite Picture of Sri Lanka*

Case Study: Life in the Mountains and Plains

The varied topography and landforms affect human life in different ways. People living in these landforms adapt accordingly.

Life in the mountains is hazardous and people lead a simple yet harsh life in these regions. The severe cold, extreme climate and continuous rainfall or snowfall makes life difficult. There are poor transport facilities as construction work have many hurdles, for example, rail transport is sparse, making resources unavailable or expensive. Road transport is the main form of transportation and some places are not accessible at all. There are other issues such as lack of cultivable land, drinking water, mineral resources, dispersed population, low technological accessibility and non-availability of skilled labour.

However, mountains provide resources that are unique to the region. Ice-capped mountains are the source of perennial rivers on which dams are built that help in the generation of hydroelectricity, and thick vegetation cover provides a rich diversity in flora and fauna. Lumbering, cattle rearing, handicraft, tourism are some major economic activities in the mountainous regions. Some of the best mountainous regions are Kashmir valley, Himachal Pradesh and Uttarakhand in India, Switzerland and Arizona in Europe.

Plains as a geographical region have fertile soil, better connectivity, high density of population and developed infrastructure. These factors make them thickly populated. Due to interconnected and well-developed roads, plains witness high industrial development. It becomes easier to set up industries and manufacturing units in these areas. Plains provide an ideal ground for agriculture with a wide variety of crops which can be grown easily in these regions. However, due to excessive human activities in the plains, there is a lot of pollution and damage to the environment.

Glossary

endogenous process: the internal movement of the Earth's crust below the Earth's surface
exogenous process: changing of existing landforms due to weathering, erosion, transportation etc.
mountain: part of the land surface that rises to a great height above the surrounding area
horst: when the part of a crust is uplifted between two adjoining faults it forms a Block mountain or a Horst
graben: a linear depression or trough created by the sinking of the intermediate crustal rocks between two or more parallel faults
block mountains: blocks of land that rise or push up to form mountains
vent: crack through which molten magma erupts onto the Earth's surface
lava: solidified magma that comes out of the Earth through volcanoes or fissures in the Earth
hills: highlands less than 600 metres
fold mountains: mountains that are formed due to the Earth's movement
plateaus: these are relatively flat land that is raised above the surrounding area
plains: these plains are formed as a result of the emergence of sea bottom near the coast
erosional plains: these plains are formed as a result of erosion and weathering
depositional plains: large river systems bring silts and deposition them in depression forming plains called depositional plains, like North Indian Plains
alluvial valleys: the V-shaped valleys formed by rivers
gorges: Narrow, steep-sided valleys in the mountains formed by rivers

Summary

- Landforms created on the Earth are the result of long-term exposure to processes by internal and external forces of nature.
- Mountains are a natural elevation of the Earth's surface rising from its surrounding areas as a base.
- Plateaus are highlands with flat tops. There are different types of plateaus.
- Extensive low-lying lands are called plains.
- More than half of the Earth's surface is covered by plains.
- The low-lying areas between the two mountains or hills that are formed due to the two rising parts are called valleys.
- Gorges are narrow, steep-sided valleys in the mountains.
- The varied topography and landforms affect human life in different ways.

Exercise

A. Write T for True and F for False.

1. Old fold mountains have steep slopes and high conical peaks. .....
2. Block mountains are formed due to the deposition of lava over an extensive area. .....
3. Black soil is very fertile and is good for cultivating crops like cotton. .....
4. Wind and river are two forces of denudation that erode and weather highlands and forms plains. .....
5. A plateau is a land with high elevation but a flat-top that looks like a table. .....
6. Rivers are a rich source of minerals. .....
7. Sri Lanka is a peninsula. .....

B. Tick (✓) the correct answer.

1. ..... is an example of young fold mountains.
   - (a) Vesuvius
   - (b) Vosges ☐
   - (c) Aravali
   - (d) Alps ☐
2. Plains formed due to the deposition of silt by rivers flowing from mountains to the low-lying areas are called ..... .
   - (a) Depositional plains
   - (b) Erosional plains ☐
   - (c) Rift valley
   - (d) Glacial plains ☐
3. The ..... plateau has rich deposits of black soil and grows large amounts of cotton.
   - (a) Chhota Nagpur
   - (b) African ☐
   - (c) Malwa
   - (d) Deccan ☐

4. The Narmada Valley between the Satpura and the Vindhya Ranges is a ..... .

(a) V-shaped valley ☐ (b) U-shaped valley ☐

(c) Rift valley ☐ (d) Peninsula ☐

5. The Tibetan Plateau is called the ..... .

(a) Wheat Bowl of India ☐ (b) Roof of the World ☐

(c) Great Wall of China ☐ (d) Ring of Fire ☐

6. The Tibetan Plateau is a ..... .

(a) Tabletop plateau ☐ (b) young plateau ☐

(c) Old plateau ☐ (d) Volcanic plateau ☐

C. Read the clues and guess who am I.

1. I am a landmass surrounded by water on three sides, but connected to the mainland on the fourth side.

.....

2. I am a narrow stretch of land joining two larger landmasses and separating two large waterbodies.

.....

3. I am a highland, but not a hill or a mountain. The top of me looks like a table.

.....

4. I was once growing in height, but today I am old and not that tall anymore.

.....

5. I am a large low-lying landform formed by the settling silt brought down from the mountains by fast-flowing rivers.

.....

6. I am a valley formed due to erosional action of a river, but due to subsided blocks along the fault lines of the crustal planes.

.....

7. The valley that allows rail routes and roadways to pass through high mountains.

.....

D. Write short answers for the following questions.

1. What are plains?
2. Define an isthmus.

3. Write two advantages of mountains.
4. Name the three types of plateaus with examples for each.
5. List three examples of fold mountains and block mountains.
6. What are the advantages of plains?

E. Write the answers in detail for the following.

1. Differentiate between life in mountains and plains.
2. What are the advantages of plateaus?
3. Explain the formation of a U-shaped valley.
4. What are young fold and old fold mountains?
5. How are depositional plains different from erosional plains?
6. How are mountains useful?

Do It Yourself

1. Draw a neatly labelled diagram to show the following:
   - The formation of fold mountains
   - The formation of block mountains
2. What are tabletop plateaus? Find out and paste a picture of the same. Write a few lines about it.
3. Write names of five valleys of India.

Map Practice Time

On a world map, mark the following:

(a) Mountains – Alps, Andes, Rockies, Himalayas, Aravalli, Urals

(b) Plateaus – Deccan, Tibetan, Columbian, Bolivian, Mexican, Yuan, Siberian

(c) Plains – Hwang Ho, Great Central Plains of USA, Indo-Gangetic Plains, Indus Basin, Sundarbans