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Revised and Updated

ICSE GEOGRAPHY

Based on the latest ICSE syllabus

R K JAIN

Includes latest toposheets G43S7 and G43S10 issued by the Survey of India

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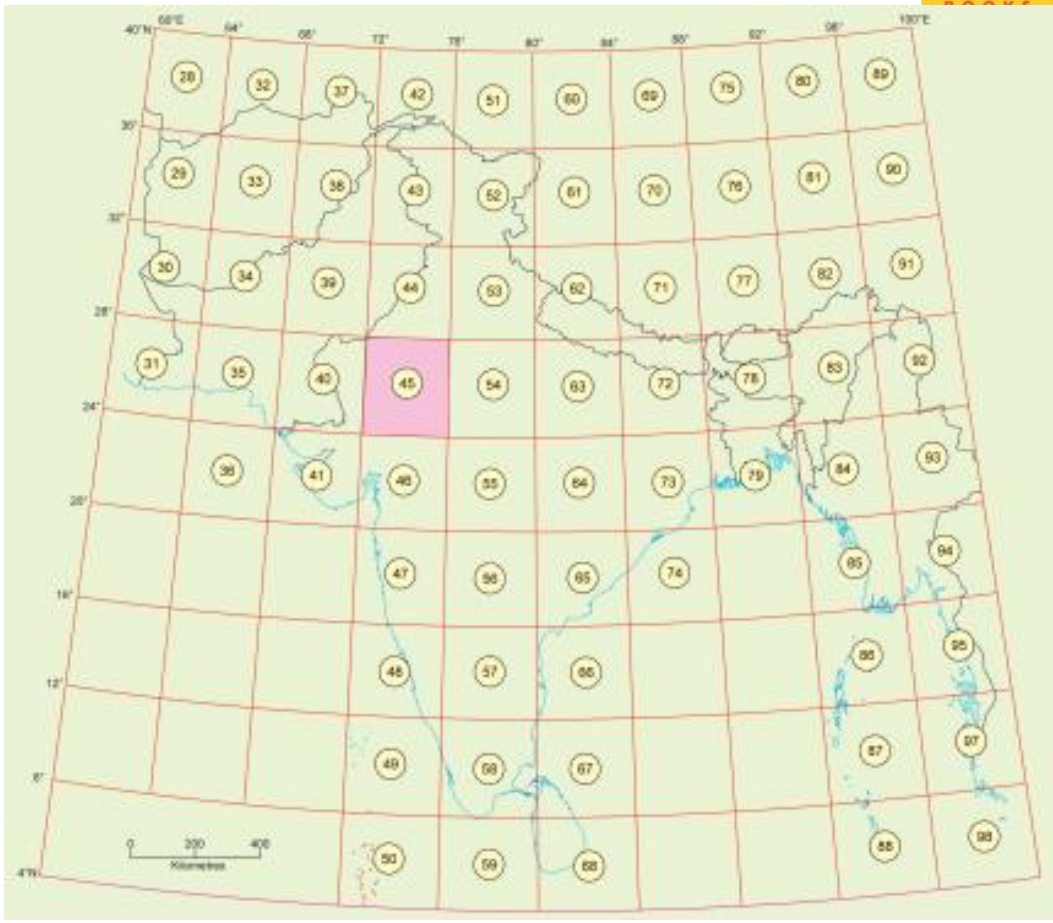
CONTENTS

ICSE GEOGRAPHY

Class 10

Chapter 1: PRACTICAL GEOGRAPHY – STUDY OF TOPOGRAPHICAL MAPS

Topographical maps : The Survey of India, which was set up by the Britishers in India in 1767 AD, prepared Topographical maps of India and adjacent countries on different scales. The word topography has been derived from two Greek words: ‘Topos’ meaning a place and ‘Grapho’ meaning to draw. The Topographical maps, also called Topo Sheets, are prepared after actual survey. These are large-scale maps, and thus, show in great details the relief features (through contours), drainage patterns, land use, settlement patterns, means of transport and communication and many social features.



Division of India and the adjacent countries into million sheets (old scheme)

Ordinance Survey maps :

The Topographical maps were mainly prepared for the British army in India before Independence. Thus, these maps are also called the Ordinance Survey maps.

The different scales used by the Survey of India, for drawing the Topographical maps: 1" : 16 miles; 1" : 4 miles and 1" : 1 mile. After the introduction of the metric system of measurement in India, the scales of the Topo Sheets were changed to 1 : 1,000,000; 1 : 250,000 and 1 : 50,000.

Types of Topo Sheets:

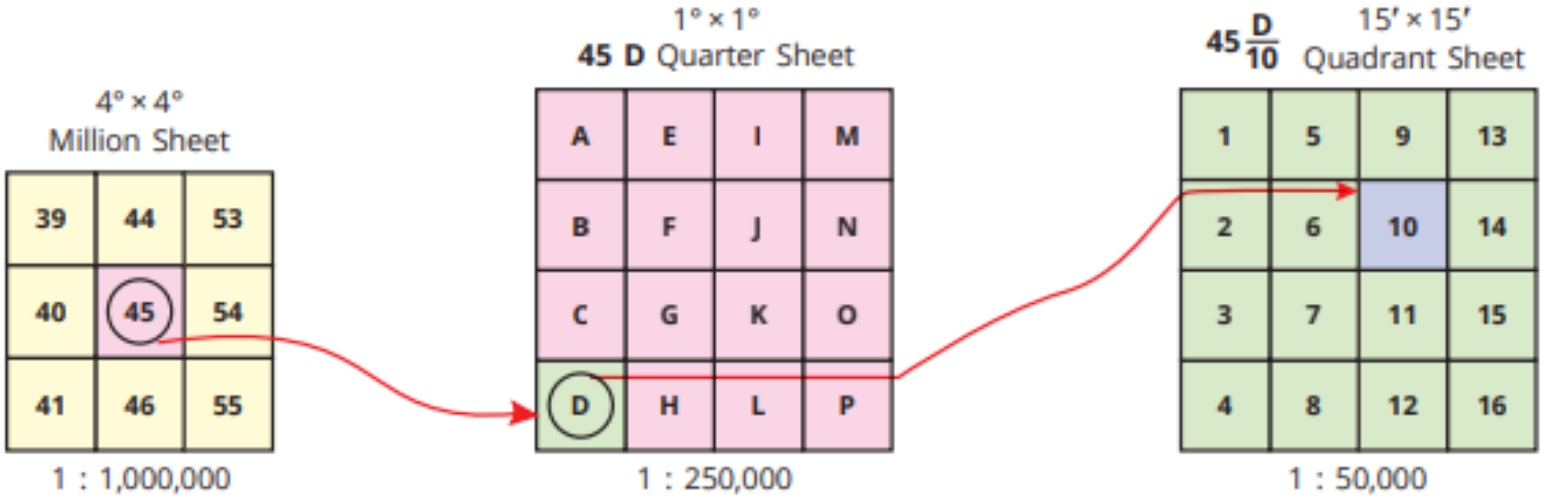
(i) the Million Sheets (ii) the Quarter Sheets (iii) the Quadrant Sheets

The parallel of 40°N was taken as the northern most boundary of the region to be surveyed.

Million sheets: The entire area was divided into 4° × 4° sheets. These were called million sheets.

Quarter Sheets: The million sheet was divided into 16 equal parts. Each extended from 1° × 1° and the scale was 1 : 250,000. These were called the Quarter Sheets.

Quadrant Sheet: The 1° sheet was further subdivided into 16 parts, and each part (scale 1 : 50,000) was the Quadrant Sheet.



Scheme of the topographical maps made by the Survey of India

The National Map Policy

The National Map Policy was adopted by the Survey of India in 2005 AD, which introduced the new Open Series Maps (OSM). These maps were drawn on the Universal Transverse Mercator (UTM) projection on the World Geodetic System (WGS) – 84 datum. The International Map of the World (IMW) was used for providing the new numbering system for the Topo Sheets.

The region under review was initially divided into rectangles of 4° × 6° (4° – latitudinal extent and 6° – longitudinal extent) of the IMW series. From the Equator upto 4°N latitude, the letter used to mark it is 'A'. (India is located in the Northern Hemisphere, thus, the first letter 'N' is omitted). Further 4°N to 8°N is B; 8°N to 12°N is C; 12°N to 16°N is D; and so on.

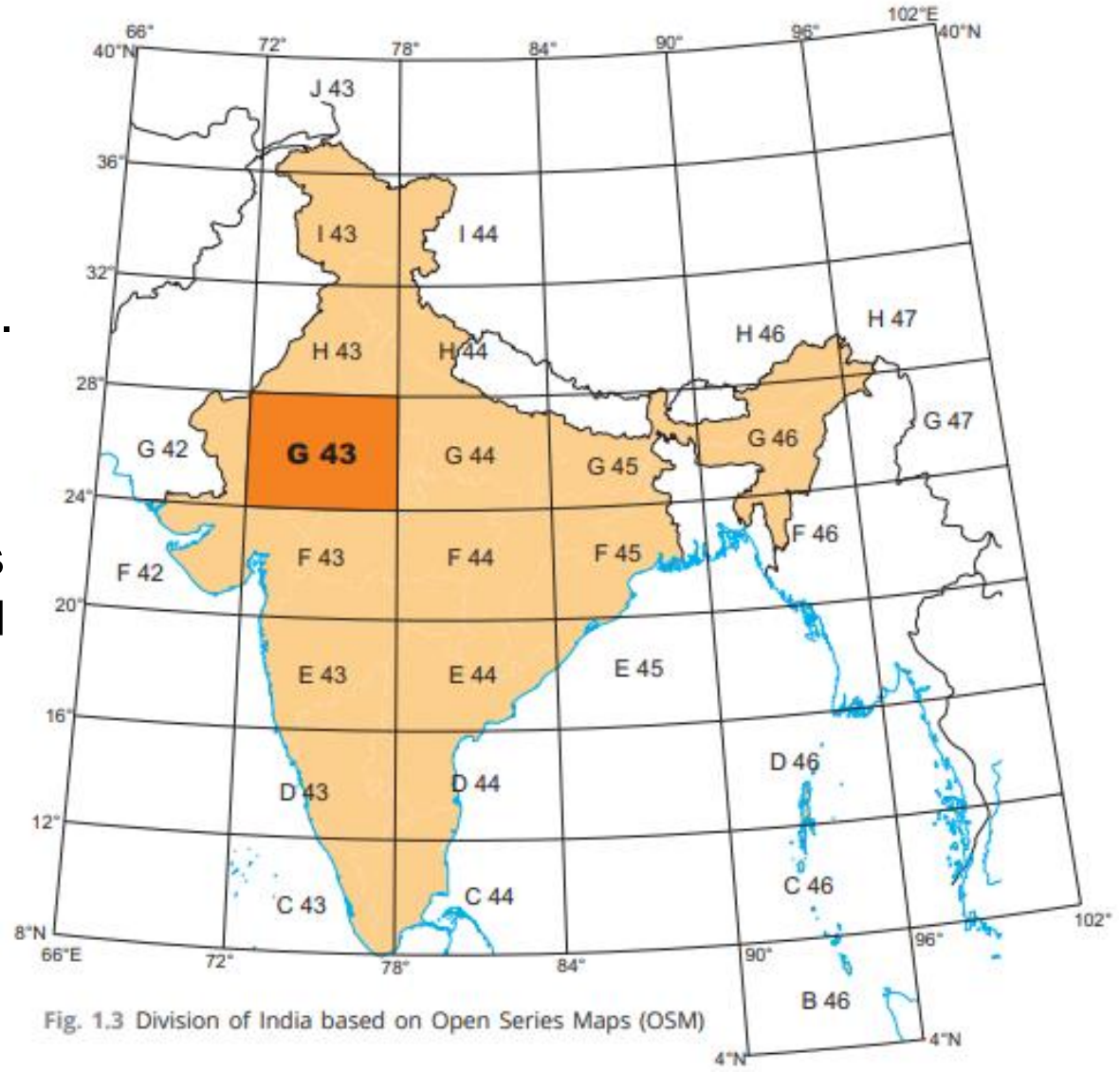


Fig. 1.3 Division of India based on Open Series Maps (OSM)

The area covered by each 4° × 6° rectangle is divided into 24 parts of 1° × 1° each (see Fig. 1.4). The numbering of these 24 regions (1° × 1°) is shown by the alphabet increasing first towards the east and then towards the south. The first region in the northwest corner is marked as 'A'

G43 (4°×6°) is divided into 24 parts

	72°	73°	74°	75°	76°	77°	78°E
28°N	A	B	C	D	E	F	
27°	G	H	I	J	K	L	
26°	M	N	O	P	Q	R	
25°	S	T	U	V	W	X	
24°							

The region under 1° × 1° square is further subdivided into 16 parts of 15' × 15' each (see Fig. 1.5). The numbering of these regions or squares is shown by numbers, increasing first towards the south and then towards the east. The numbers are from 1 to 16.

G43S (1°×1°) is divided into 16 parts

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

GRID REFERENCE

Most of the maps in the atlases, books or wall maps are marked with a network of parallels (lines of latitude) and meridians (lines of longitude). This network of parallels and meridians on the map forms a grid.

The arbitrary grid system

On the topo sheets prepared by the Survey of India, it is difficult to calculate the exact latitude and longitude of a place. To solve this problem, a set of vertical and horizontal lines are drawn in red colour on the topo sheets. These lines also form a grid and a network of squares, which is called the arbitrary grid system.

MAIN FEATURES OF THE ARBITRARY GRID SYSTEM

The main features of the arbitrary grid system drawn on the topo sheets on the scale of 1:50,000 are as follows:

- The southwest corner (bottom left) of the topo sheet is always taken as the starting point.
- The grid lines running vertically (from north to south) are called the eastings, as these lines lie towards the east of the southwest corner.
- The grid lines running horizontally (from east to west) are called the northings, as these lines lie towards the north of the southwest corner.
- The eastings and the northings intersect to form a network of squares called the grid system.
- The points of intersection between the eastings and northings on the topo sheet are called the coordinates.

INTERPRETATION OF TOPO SHEETS

The study or interpretation of a topo sheet can be done under the following heads:

1. Marginal Information includes:
   a. Name of the topo sheet
   b. Number of the topo sheet
   c. Area shown on the sheet
   d. Area covered by the topo sheet in square km
   e. Latitudinal and longitudinal extents of the sheet
   f. Scale of the sheet
   g. Special information, if any

2. Relief Features and Drainage include:
   a. Contour interval on the topo sheet
   b. Major landforms and their location
   c. Drainage pattern
   d. Description of relief features
   e. Prominent water bodies

3. Prominent Land Uses include:
   a. Various types of natural vegetation
   b. Major types of possible land uses
   c. Major occupations possible in the region or the main sources of livelihood, such as lumbering, livestock raising, farming, mining, industries, etc.

4. Means of Transport and Communication include:
   a. Different means of transport and communication as shown on the sheet, such as tracks, footpaths, roads, railways, telegraph and telephone lines and post offices
   b. Correlation between topography and means of transport and communication

5. The Human Settlements include:

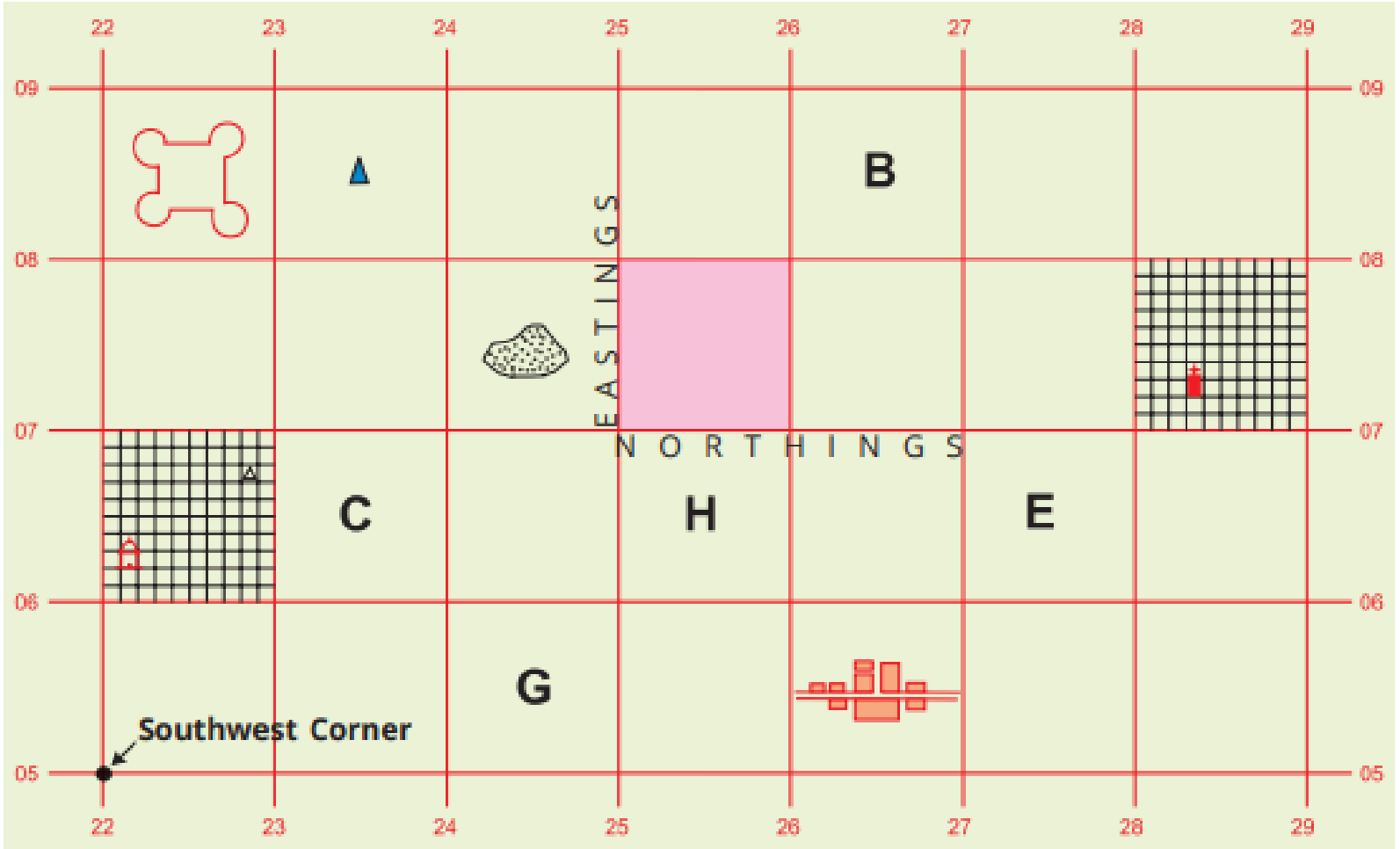
a. Urban and rural centres and their location

b. Settlement patterns

c. Special activities associated with the urban centres, such as industries, mining, trading, administrative and defence services

d. Pattern of the rural settlements

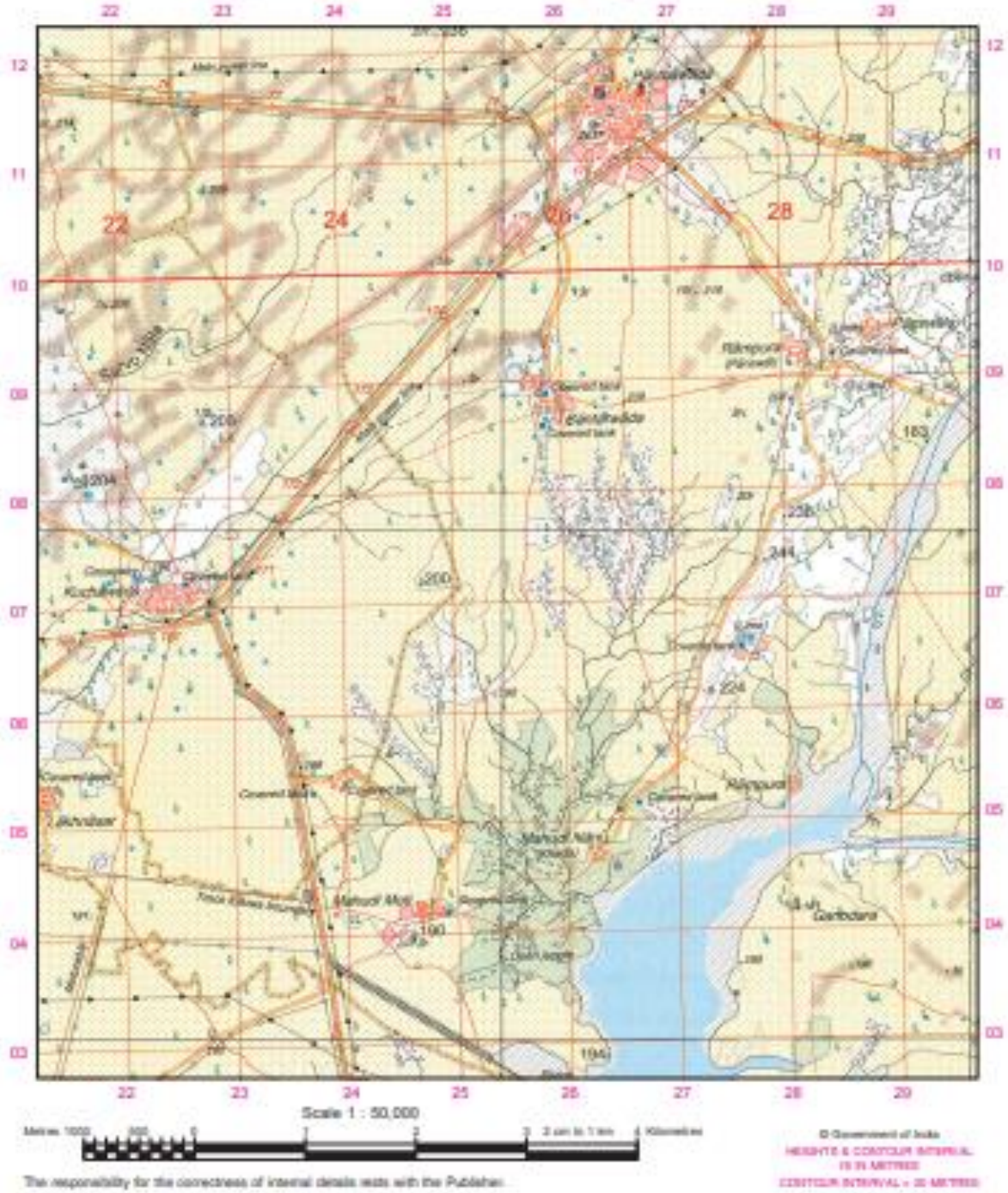
e. Land use patterns and major occupations



Sample of an arbitrary grid map for practice

Extract of the Survey of India Topo Sheet no. G43S7

(Eastings 22 to 29 and Northings 03 to 12)



Part of the topo sheet no. G43S7

MEASURING DISTANCES

Map distance : The distance between any two places on a map is called the map distance.
Ground distance: The distance between the same two places on the ground is called the ground distance.
Scale of the map : The ratio between the map distance and the ground distance is called the scale of the map.

There are three ways in which the scale can be expressed on a map. These are as follows:

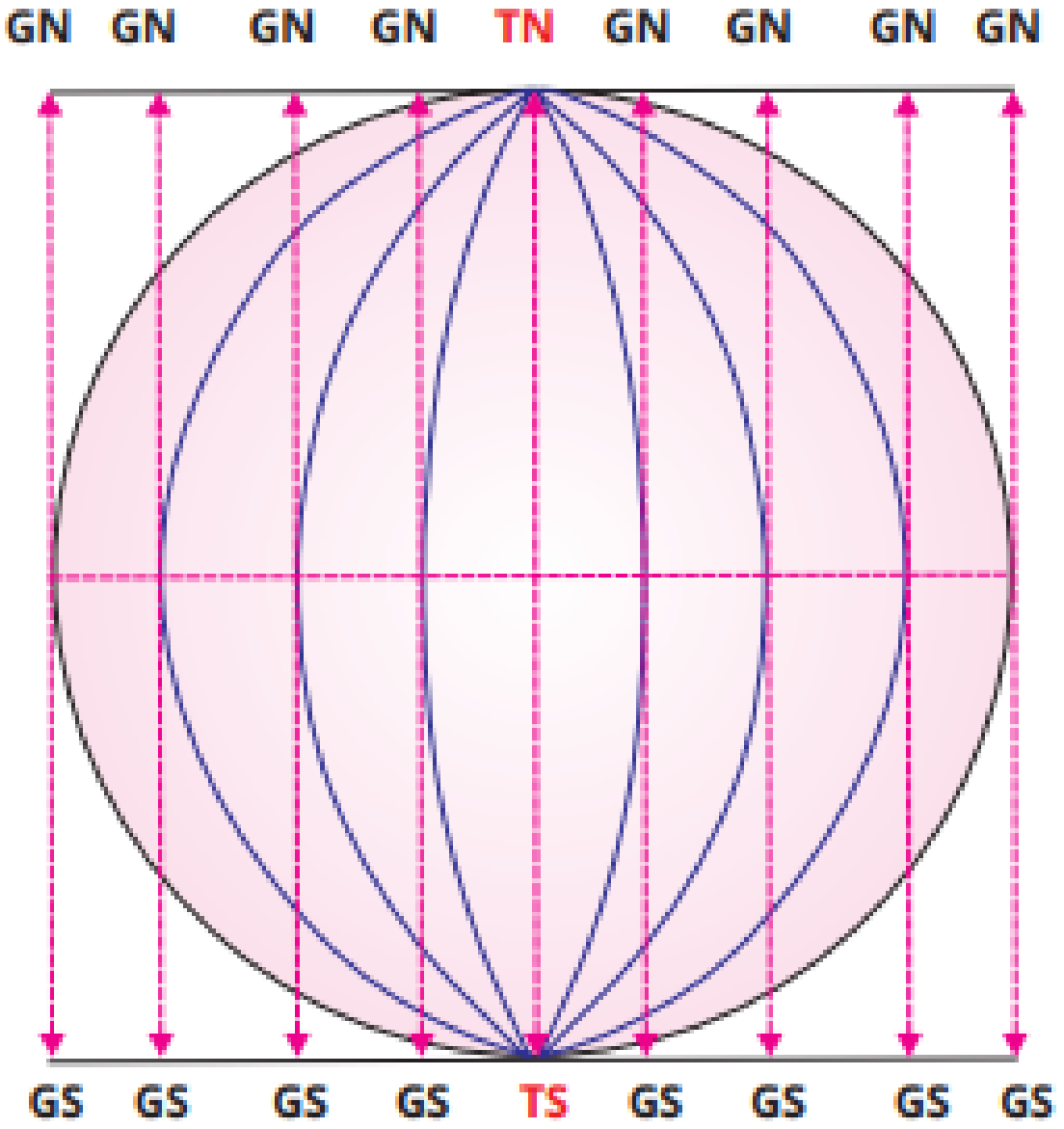
1. By a Statement, such as 2 cm : 1 km
2. By a Representative Fraction or R.F., such as 1:50,000 or 1/50,000.
3. By a Graphical Scale or Linear Scale, as given below.

FINDING DIRECTIONS

Direction is a relative term and is always expressed with reference to a given point. For example, Kolkata is towards the east of Mumbai.

The direction on a map is measured and expressed with respect to the direction North. The top of the map is always considered as the North. If we know the direction of the North, then it is easy to find the other three directions, namely, East, West and South.

The True North is the direction towards which the North Pole of the earth points. It is fixed and is also known as the Geographic North.



True North and Grid North

Magnetic compass

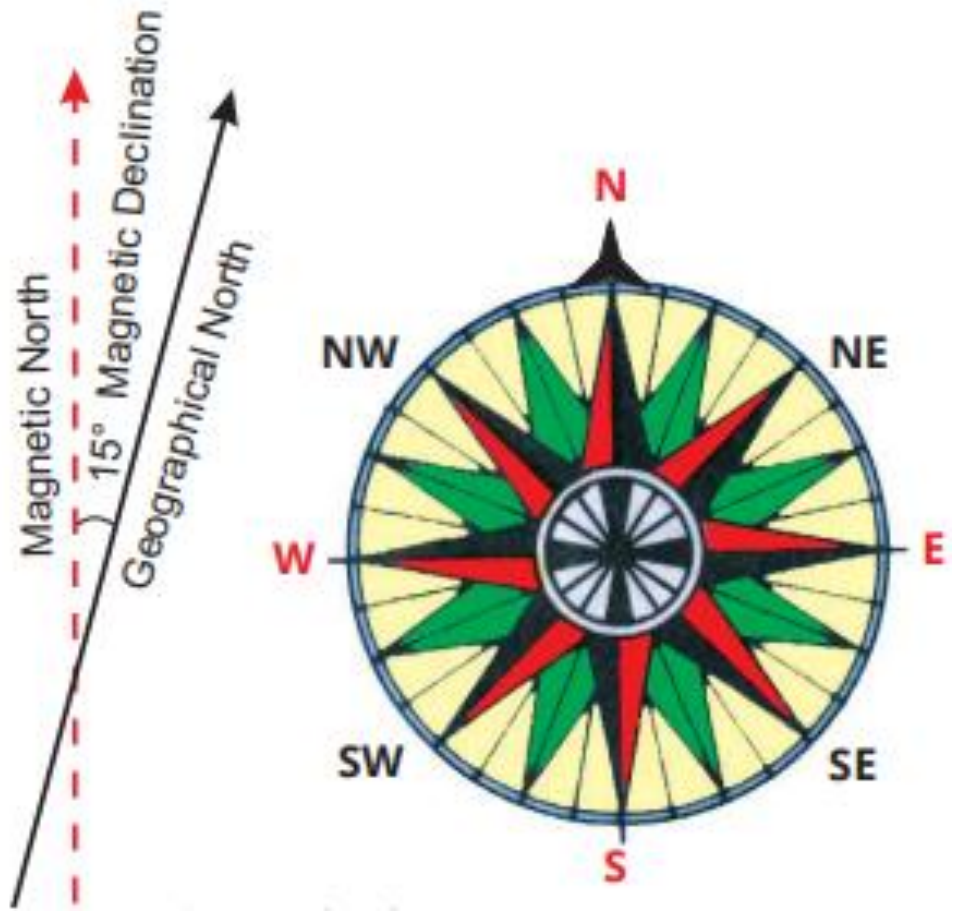
The direction of North can be found in many ways, but the best way is to find with the help of a magnetic compass. The needle of the magnetic compass always points towards the Magnetic North Pole.

Magnetic Declination:

The angle between the True North–South line and the Magnetic North–South line is known as Magnetic Declination.

Geographic North:

The True North is the direction towards which the North Pole of the earth points. It is fixed and is also known as the Geographic North. The position of the Magnetic North can change from time to time and also from place to place.



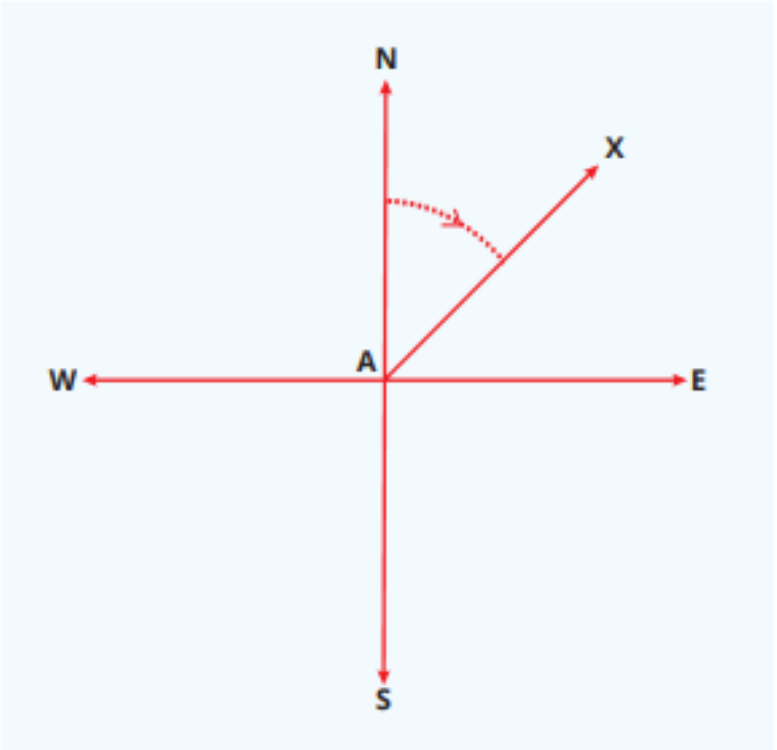
The directions on a compass

True Bearing and the Magnetic Bearing

The angular distance of any point on the map with respect to True North and Magnetic North is called the True Bearing and the Magnetic Bearing of that point, respectively. The bearing is always measured in the clockwise direction. The True Bearing is always constant.

The Grid North

The Grid North is the direction of the North– South grid lines on the topo sheets. It coincides with the True North only along the meridian of origin. Thus, the true bearing of any point on the topo sheet can be measured with reference to the North–South line on the topo sheet.



Finding direction with the help of bearing

RELIEF FEATURES ON A MAP

A relief map shows the height of the land above the mean sea level on a flat surface. Several methods have been developed to show the relief features on a map. Some of them are – the contours, formlines, layercolouring, hill-shading, spot heights, bench marks, hachures, etc. These methods have their merits and demerits. Sometimes a combination of these methods is adopted, such as contours and formlines, contours and layer-colouring, etc.

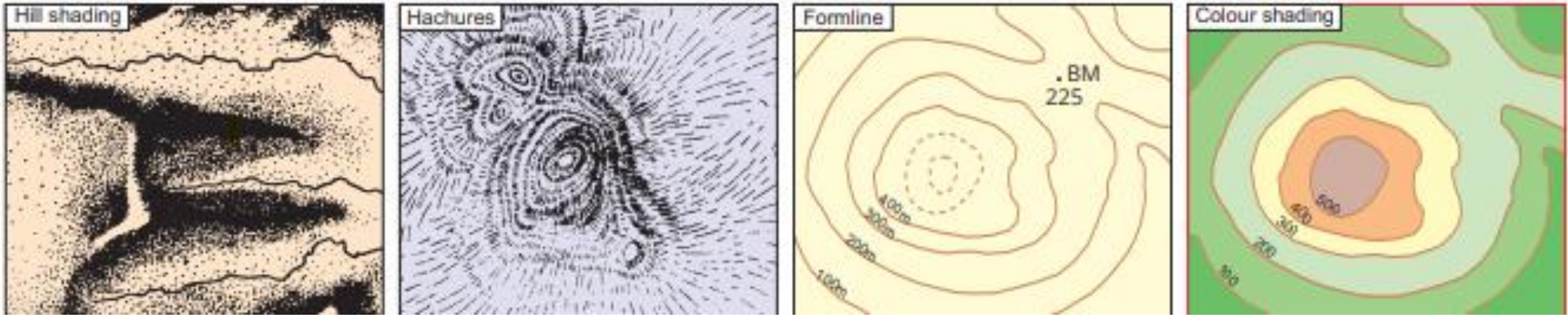
Contours: A contour is an imaginary line of constant height above the mean sea level. The difference between the value of any two successive contours is known as the contour interval, or the vertical interval (V.I.). The horizontal distance between any two contours is called the horizontal equivalent (H.E.).

Formlines: These are approximate contour lines, based on general observation. They show approximate heights of the place. They are shown by broken lines in brown colour. The formlines help in finding the minor details of topography. These lines are not numbered.

Spot Height: It shows the exact height of a place above the mean sea level on the map. It is shown as a dot in black colour, followed by a number, which is the height of that point, such as .560 in Figure 1.12. These are plotted on the map after actual survey. The spot height does not give any idea about the relief.

Bench Mark: These are the marks shown on prominent places, such as rocks or buildings in the field. They indicate the actual height as measured by the surveys. It is marked on the map as .BM225 (Fig. 1.11). The bench marks serve as points of reference for other places.

Hachures: These are finely drawn disconnected straight lines and indicate the direction of water flow. They are drawn along the direction of the maximum slope. The hachure lines are thicker and drawn closely on the steep slopes while these are thin and wide apart on the gentle slope



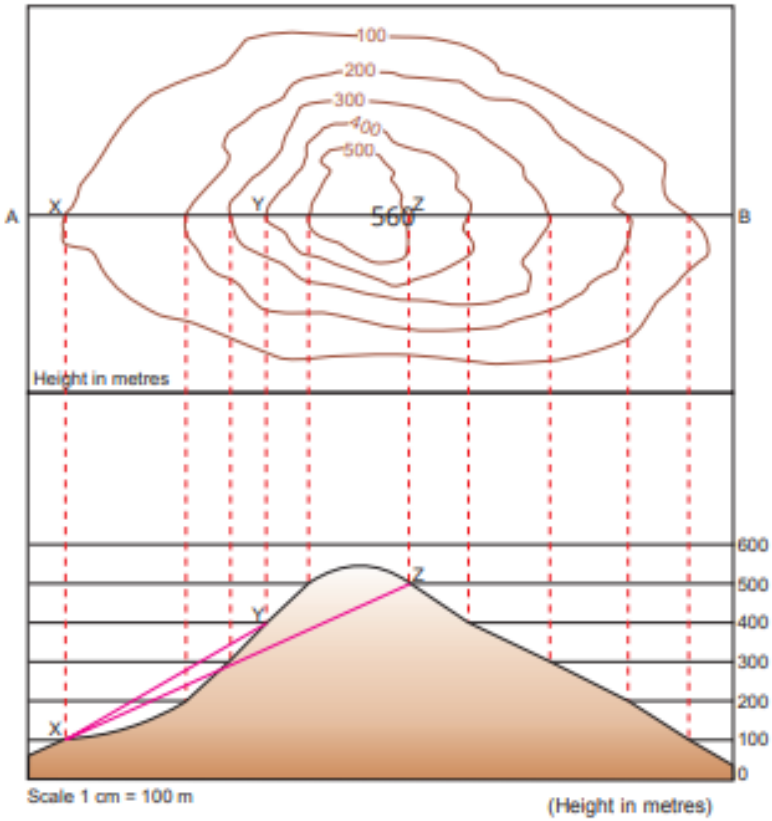
Methods of showing relief on a map

INTERVISIBILITY

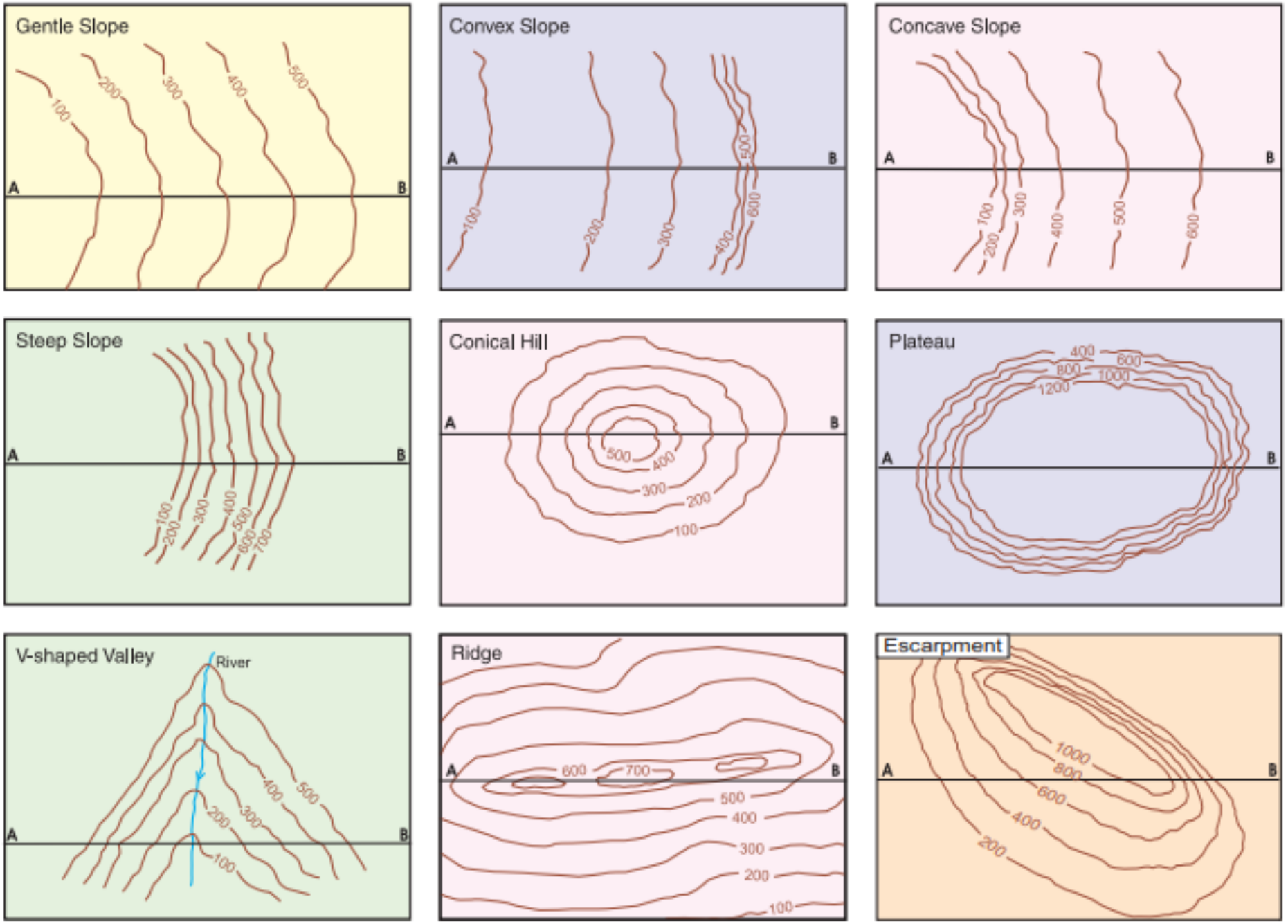
Sometimes it becomes necessary to find out from a contour map, whether one place is visible from the other place and vice versa. This can be easily done by studying the relief along a straight line or the line of sight between the two places.

The main facts about intervisibility are

- When two places are on a level ground, the intervisibility will depend on the presence or absence of obstacles like trees and buildings.
- When two places are on the same side of a valley, then both the places are intervisible.
- When the slope joining the two places is concave, then these two places are probably intervisible.
- When the slope joining the two places is convex, then these two places will not be intervisible.
- If the obstacle between the two places is higher than those places, then the two places will not be intervisible.
- If the obstacle between the two places is higher than one of the places, then the places may or may not be intervisible.
- If there is no obstruction along the line of sight between the two places, then the places are intervisible.



Intervisibility .Point Y is visible from X, while point Z is not visible from X



Various types of slopes and relief features shown with the help of contours (Height in metres)

GRADIENT

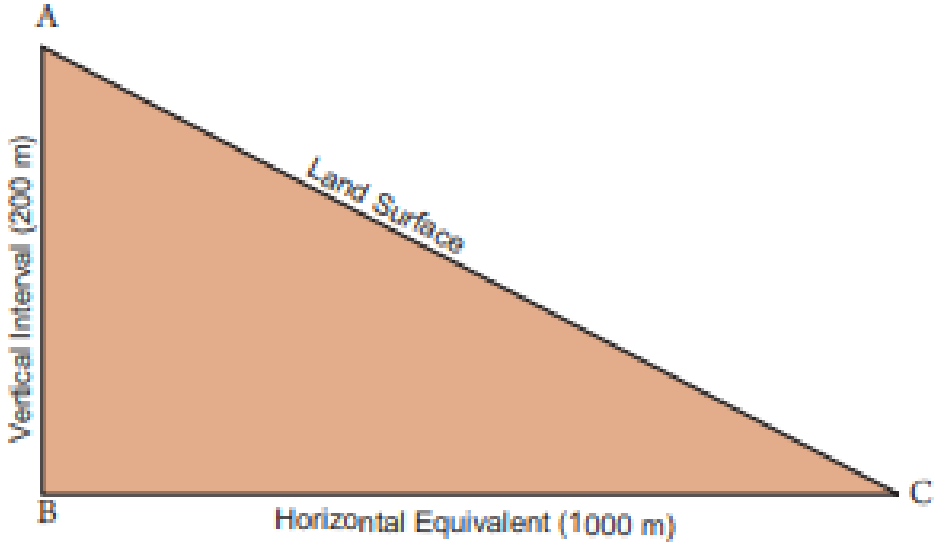
The gradient or slope is normally expressed by stating how much one should travel to gain a given height. See Fig. 1.14. In this right-angled triangle, CA is the distance to be travelled to gain the height AB (200 metres). AB is the vertical interval (V.I.) which canbe easily found from the contours. BC is the horizontal equivalent (H.E.), which can be easily measured from the contour map. The ratio between V.I. and H.E. gives the measure of the steepness and is called the gradient.

$$\text{Slope or Gradient} = \frac{\text{Vertical Interval or V.I.}}{\text{Horizontal Equivalent or H.E.}}$$

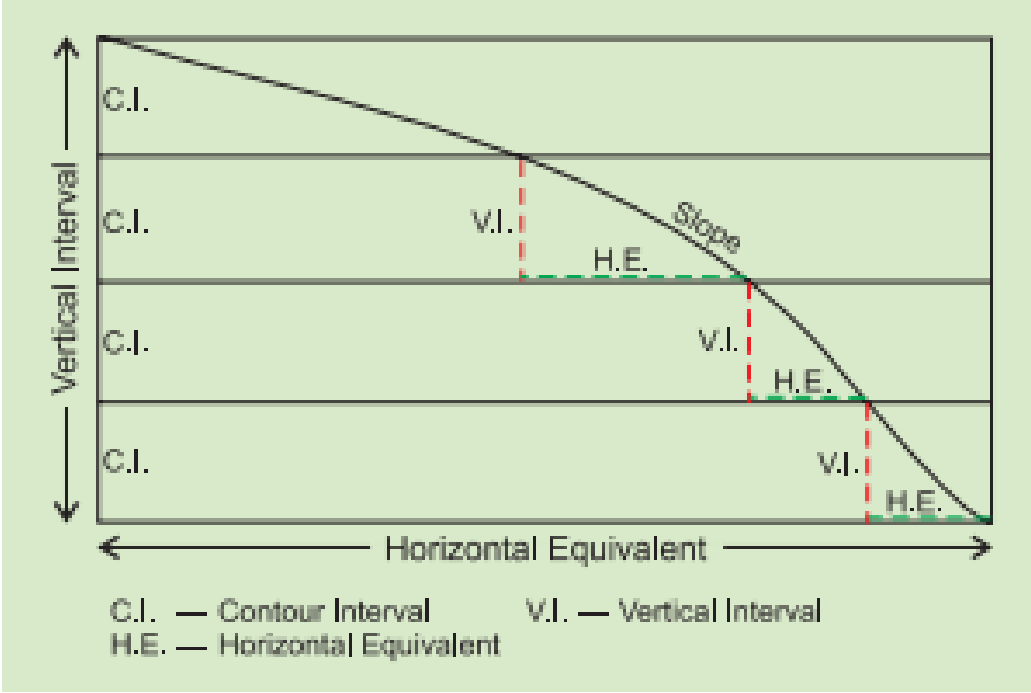
In Fig. 1.14, V.I. = 200 metres and

H.E. = 1000 metres

$$\text{Thus, the gradient} = \frac{200 \text{ metres}}{1000 \text{ metres}} = \frac{1}{5} \text{ or } 1:5 \text{ or } 1 \text{ in } 5.$$



Finding out the gradient



Gradient (slope) of the land

DRAINAGE PATTERNS

Most of the rivers originate in the mountains. Initially the water moves down the slope in the form of rills or streams. In due course of time, a number of small streams, called tributaries, join the main stream.

- The main stream, with all its tributaries, develops a drainage system. The total area occupied by a drainage system is known as the drainage basin.
- The higher ground, which separates the two drainage basins, is called the watershed or the water-divide.

Consequent streams: The streams flowing in the direction of the slope of the land, are called the consequent streams.

Subsequent stream: As soon as such a stream is joined by a tributary, that tributary is called the subsequent stream.

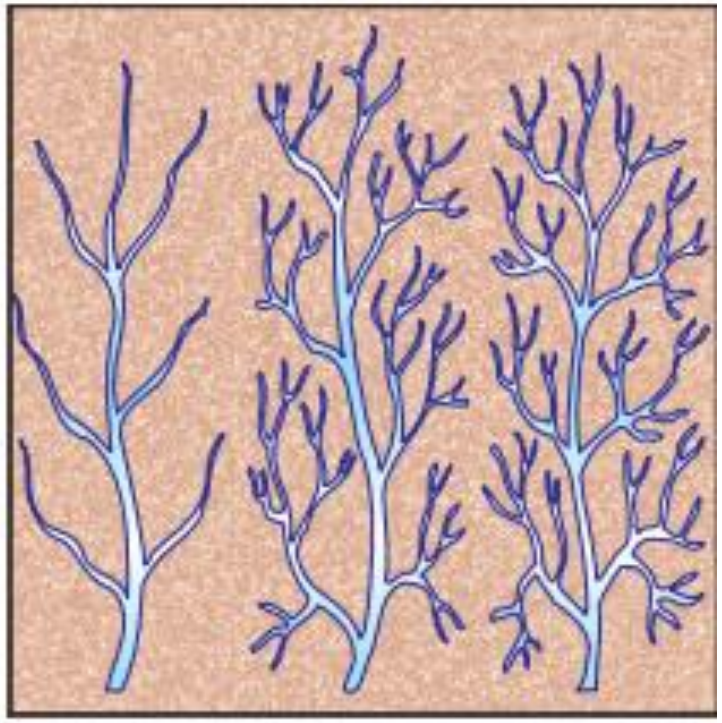
The drainage pattern: The drainage pattern means the special arrangement of streams in a particular region. The location, number and the direction of flow of various streams in a region depend on the nature of the relief, shape of the land, climatic conditions, etc.

- The drainage patterns actually reflect the relief of the area, the nature of the rocks, the slope of the land and probably the amount of rainfall in the area.
- Since there is much variation in the environmental conditions of different regions, there are variations in the drainage patterns as well.
- But there are some common characteristics, that enable us to distinguish between the different drainage patterns

Dendritic Drainage Pattern

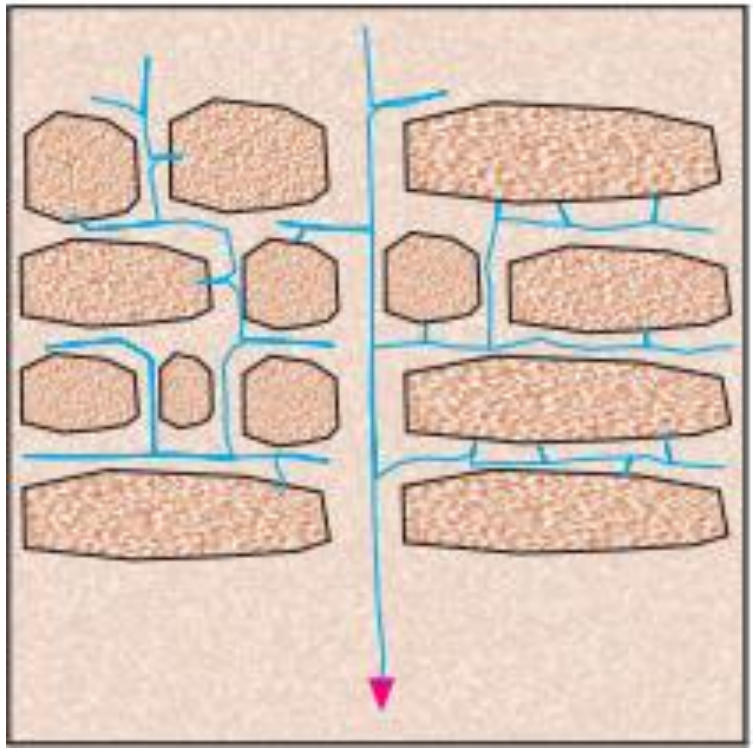
The word ‘dendron’ in Greek means a tree. In this treelike pattern, the main river is like the trunk and the tributary streams join it like the branches of a tree.

- The tributaries do not meet the main stream at right angles.
- This pattern is generally noticed in flat regions.
- It is the most common and widespread drainage pattern.



Trellis Drainage Pattern

- The tributaries join the main stream at right angles and thus form a trellis.
- This pattern is mostly developed in areas of simple folded structures, with parallel anticlinal ridges alternated by synclinal valleys.
- It has long and almost straight river valleys, with their tributaries, coming from the anticlinal ridges, joining almost at right angles.



Radial Drainage Pattern

- This drainage pattern develops when a number of streams radiate from a central high region in all directions like the spokes of a wheel.
- These are basically the consequent streams as they follow the slope of the land.
- The dome structures, volcanic cones, residual hills, small tablelands and isolated uplands favour the conditions for the development and growth of the radial drainage pattern

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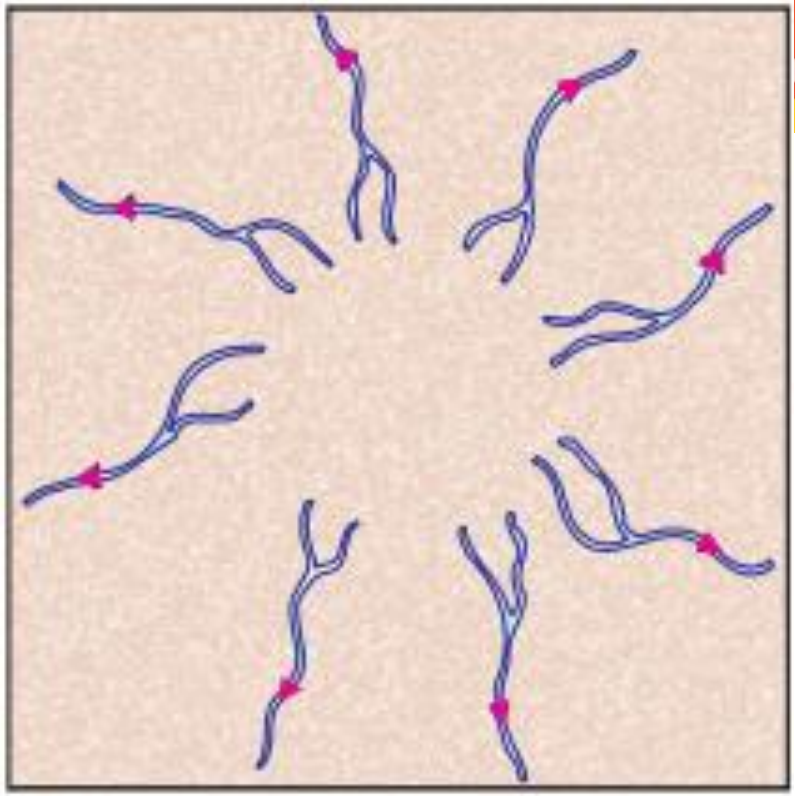
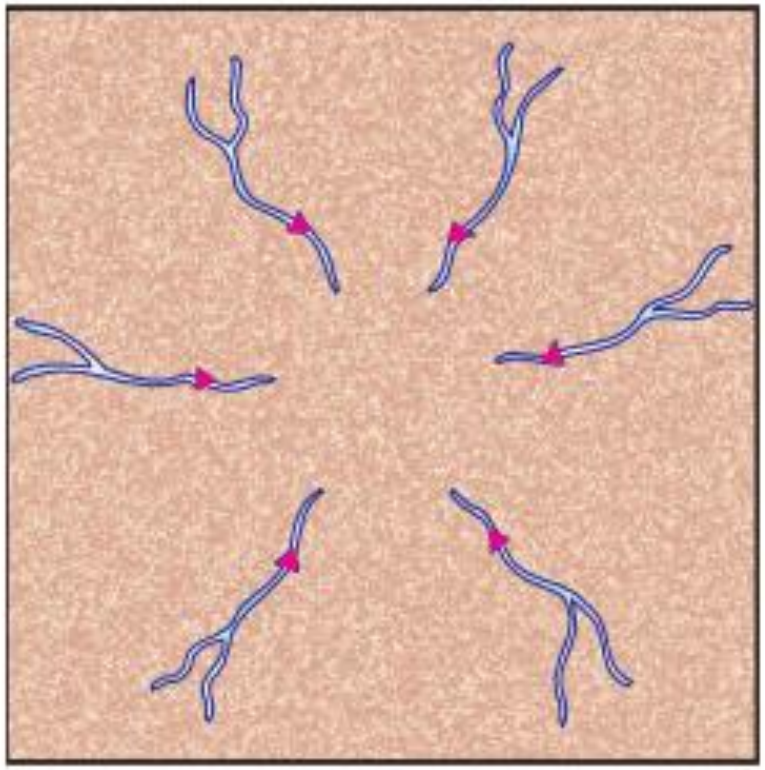
Centripetal Drainage Pattern

- This drainage pattern is just opposite to the radial drainage pattern, as the streams generally converge at a point, which is either a depression or a basin. The streams emerge from the surrounding uplands.





Inland Drainage Pattern

In some areas, due to physical and climatic conditions, the streams are unable to reach the sea, or the ocean, or a lake. This also includes the disappearing drainage pattern, where the streams disappear in the desert sands and fail to reach the sea coast.

- On the topo sheets, the streams or rivers that carry water throughout the year (the perennial rivers) are shown in blue colour.
- The smaller streams that become dry during a part of the year (seasonal rivers) are shown in black colour.
- The irregular streams, that disappear in the deserts are shown as black dotted lines.

SETTLEMENT PATTERNS

- The form of settlement in any particular region reflects the man's relationship with his environment.
- The various types of settlements have evolved over a long period of time.
- The development and growth of settlement also depend upon the religious and social customs of the society.
- The buildings used for various religious and social purposes give the settlements their distinctiveness.

The settlements are generally divided into two types – urban and rural or towns and villages.

The haphazard growth gives the settlement an irregular shape. The urban settlements are mostly classified on the basis of their functions. Some of them are:

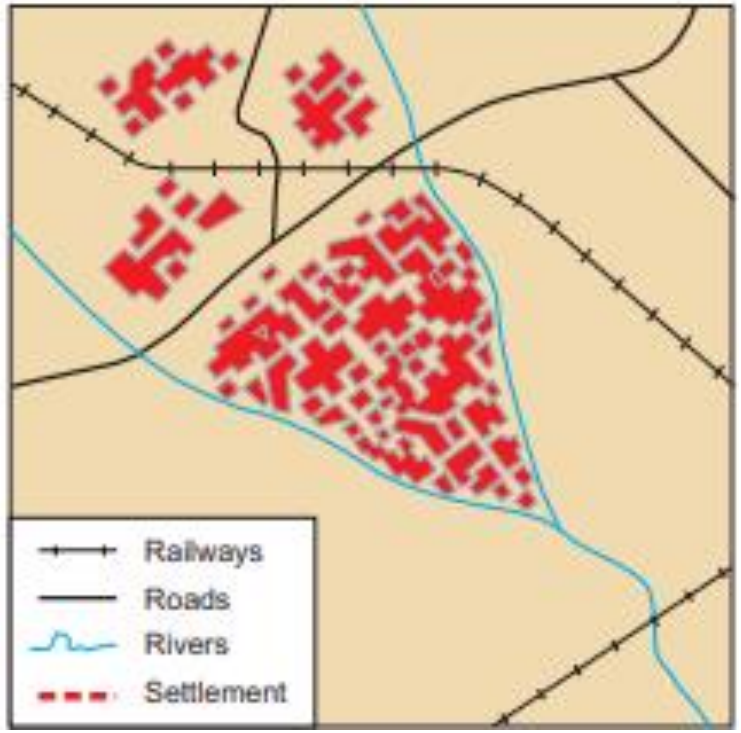
1. Administrative towns Like the capital cities
2. Defence towns Centres of military activities
3. Cultural towns Religious, educational or cultural centres
4. Economic towns Trading centres, mining towns, industrial centres, transport centres, etc.

The village, as a form of settlement, is closely related to the agricultural activities. The rural settlements can be compact or scattered.

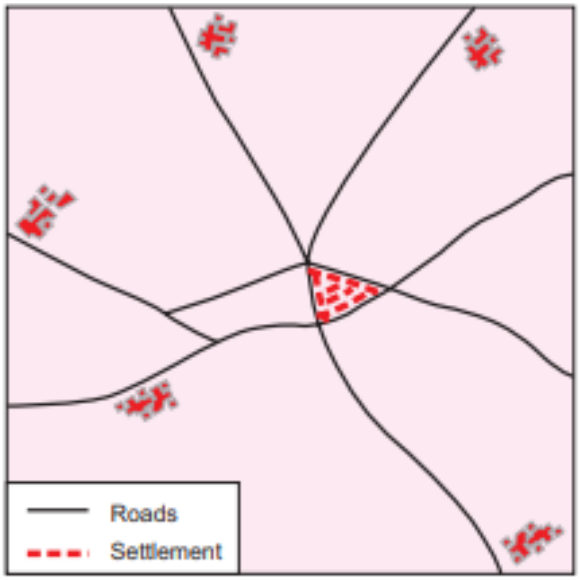
Generally, the settlements have five broad patterns. These are as follows.

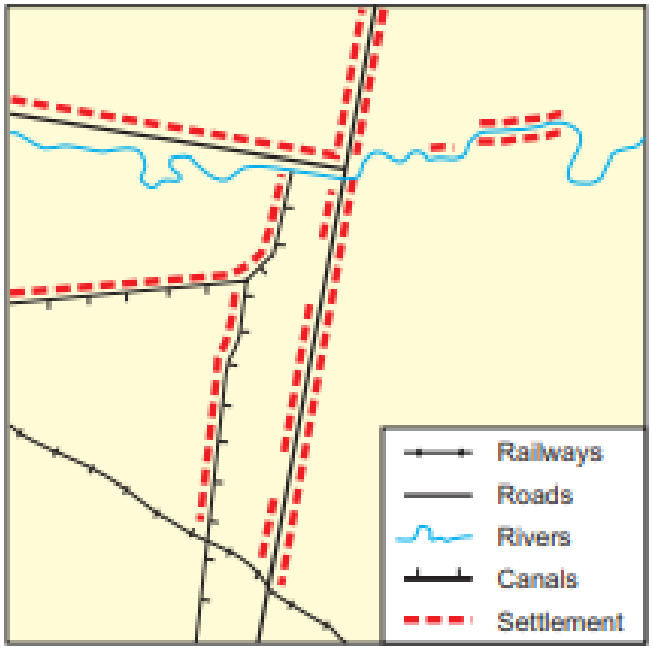
Compact or Nucleated Settlements

In such settlements, houses are built close to each other. These settlements generally develop close to a railway station, a well, a quarry or an industrial site.

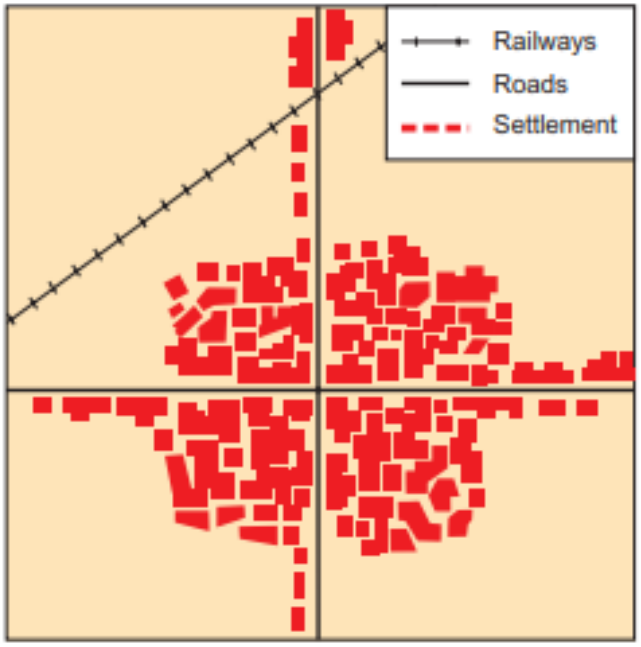


Scattered or Dispersed Settlements In such settlements, houses or the individual farmhouses are isolated or scattered and are located away from each other. They develop mostly in the plateau and forested or hilly areas



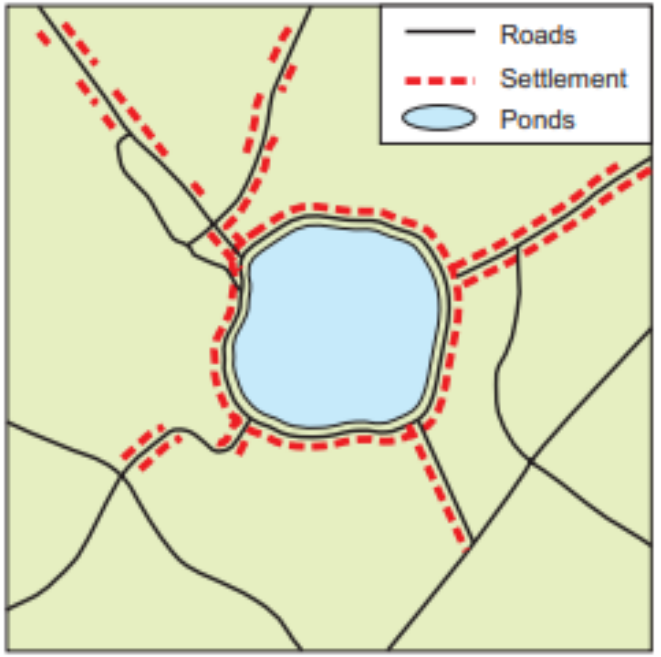


Linear or Ribboned Settlements
Such settlements generally develop along either sides of roads, railways, rivers or canals. The floodplains in hilly areas mostly have linear settlements.



Rectangular Settlements The pattern of such settlements is determined by the nature of junction of two or more routes. When they cross each other at right angles, the dwellings are built along the routes in all directions, thus forming rectangular settlements.

Radial or Star-shaped Settlements Such settlements are common in both towns and villages, where the dwellings spread out in several directions from a central point, either around a big water body or where many routes join together.



CONVENTIONAL SIGNS OR SYMBOLS

A geographer uses a map for recording and showing a variety of information, such as political or administrative boundaries, relief features, drainage patterns, climatic conditions, distribution of resources, means of irrigation, means of transport, distribution of population, location of settlements and other social and cultural features.

The maps do not have enough space to accommodate the actual size and shape of various features like mountains, plateaus, plains, rivers, lakes, bridges, dams, forests, forts, temples, mosques, churches, railway tracks, roads, footpaths and settlements. But a map without these features will be less informative.

Thus, different colours, signs, symbols and letters are used to show various information on a map. To understand the information given in the map, we should learn and make ourselves familiar with certain signs and symbols. These are also given in the form of a key or legend on every topo sheet.

There is a common agreement among most of the countries about the size, shape and use of such signs and symbols. Thus, these are called the conventional signs and symbols.

MEANING OF COLOURS (TINTS) ON A TOPO SHEET

Many colours are used on a topo sheet to represent certain physical, economic or cultural features. The details are as follows:

1. The **blue colour** is used to show all physical features associated with water, such as seas, rivers, ponds, wells, tubewells and springs.
2. The **black colour** is used for showing all names, dry water bodies (such as dry streams, wells, ponds and river banks), boundaries, railways, telephone and telegraph lines, grid of the parallels and meridians, surveyed trees, heights, etc.
3. The **green colour** is used for showing forested areas, trees, scrubs, orchards, etc.
4. The cultivated areas are shown in **yellow colour**.
5. The area in **white colour** shows the uncultivated land.
6. The **brown colour** is used for showing contours, their numbers, formlines, sand dunes, etc.
7. The **red colour** is used for depicting settlements, roads, and arbitrary grid lines, that is, eastings and northings.

THANK
YOU