

With the present political boundaries, there are thirty-six 4° sheets in India, each of these 36 sheets is subdivided into 16 uniform rectangles of 1° x 1° dimension and are designated by 16 letters of the English alphabet (A to P)

- These are known as **degree sheets**.
- They are drawn on a scale of 1:250,000 (or 1 inch to 4 miles).
- These maps are known as **quarter-inch maps**.

A	E	I	M
B	F	J	N
C	G	K	O
D	H	L	P

45 F degree sheets  
1° x 1°  
1: 50,000

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

45 F/6: inch map  
15' x 15'  
1: 50,000

Each of these 16 degree sheets is further subdivided into 16 basic topographic sheets with uniform rectangles of 15' x 15' dimensions and are numbered from 1 to 16.

- They are drawn on a scale of 1: 50,000 (or 1 inch to 1 mile)
- These maps are known as **topographic maps or one inch-maps**.

## Scale

A map is a graphic representation of features on the Earth's surface. Each map has a definite relationship between what exists on the surface of the Earth and what is represented on the map. Scale is the ratio between a distance measured on a map and the corresponding distance on the Earth.

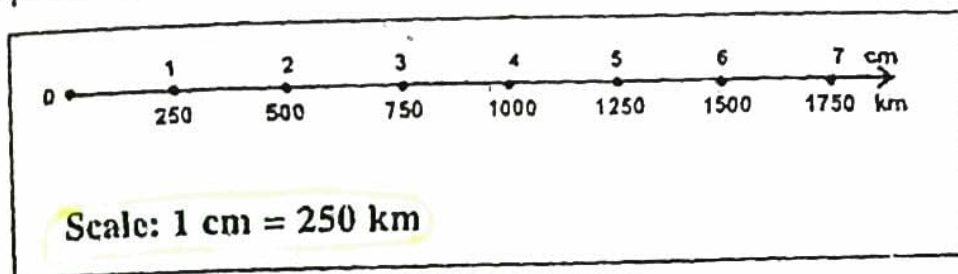
Map scales are represented in three forms:

- A Statement
- A Representative Fraction / Ratio
- A Graphical/ Linear Scale

## Representation of Map Scales:

Map scales are represented in three forms:

i) **A Statement:** This is the easiest method of describing a map scale. It is usually written on maps as 1 cm to 10 km or 1 inch to 50 miles.



The value on the left-hand side of the statement always indicates the map distance

ii) **A Representative Fraction / Ratio:** In this method the map scale is expressed as a numeric ratio. The numerator represents the map distance and it is always expressed as a unit. The denominator represents the corresponding ground distance, i.e., one unit on the map is equivalent to a number of units on the ground. It is also known as ratio scale or Representative Fraction (R.F.).

$$\text{Representative Fraction (R.F.)} = \frac{\text{distance on the map}}{\text{distance on the ground}}$$

Both the numerator and the denominator are expressed in the same unit of measurement and therefore it is a dimensionless fraction.

### Advantages of Representative Fraction

A map with a representative fraction can be universally used. Statement in any system of measurement can be easily calculated and plotted.

For example,

- A scale of 1: 100000 can be written as 1 cm to 100,000 cm

Or  $1 \text{ cm to } \frac{100,000}{100,000} \text{ km}$

Or  $1 \text{ cm to } 1 \text{ km}$

- A scale of 1: 100000 can be written as 1 inch to 100,000 inches

Or  $1 \text{ inch to } \frac{100,000}{63,360} \text{ miles}$

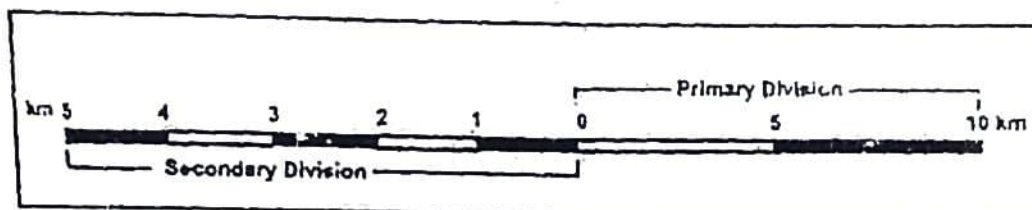
Or  $1 \text{ inch to } 1.58 \text{ miles}$

Note: In R.F. conversion, both sides are expressed in the same units. The denominator of the R.F. should be rounded off.



iii) A Graphical / Linear Scale: In this method, scale is represented by means of a linear (line) graph. It consists of a straight line divided into a number of equal parts (primary and secondary) which are marked to show what these divisions represent on the actual ground.

It is easy to convert a verbal statement and a representative fraction into a linear scale. A linear scale is easily used to measure distances on a map.



## Grid Reference

A grid is a set of lines used to find the exact location of places on a map.

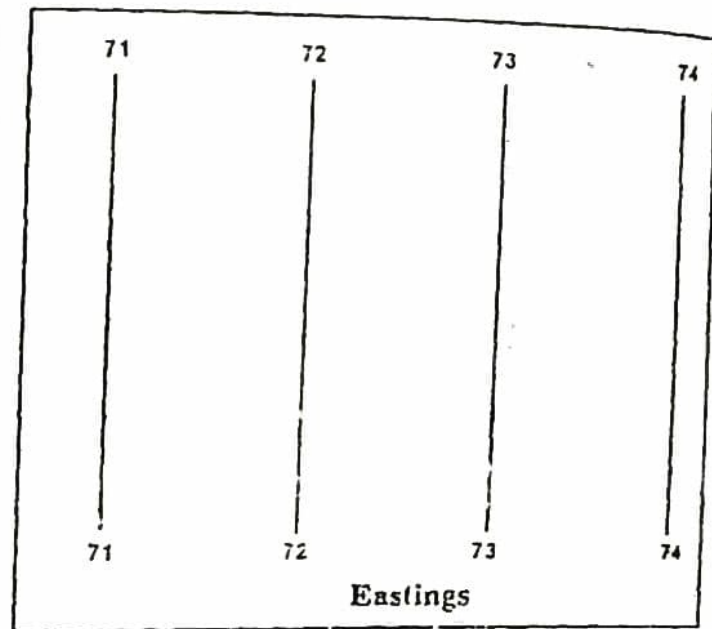
The National Grid Reference is a system of rectangular co-ordinates. The origin of the grid reference lies at a point in the south-west corner of the map. Thus, any place on the map can be located by stating its distance east or north of the origin of the grid reference.

In topographical maps, exact locations cannot be expressed accurately by the grid of latitudes and longitudes because topographical maps focus on a small area.

The grid system used in topographical maps consists of a network of lines on toposheets running from north to south (Eastings) and from east to west (Northings). These lines and squares are used as grid reference.

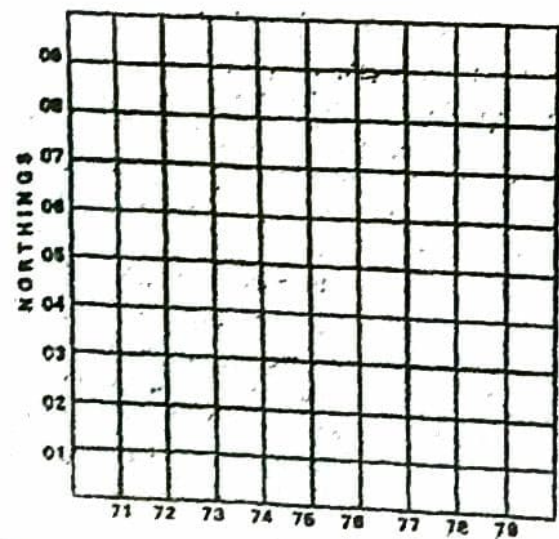
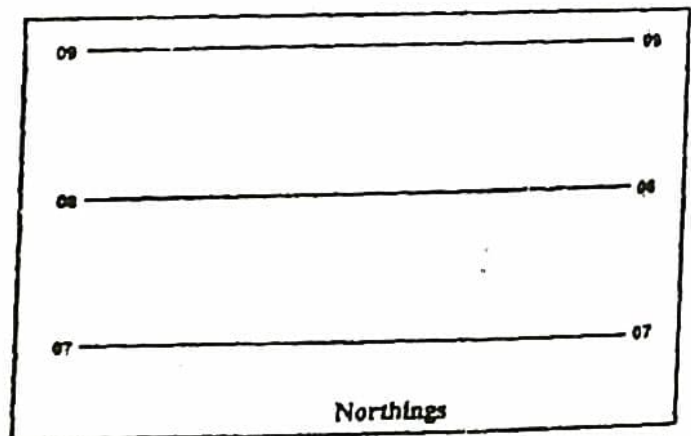
## Eastings:

- Lines running from north to south are called eastings since they indicate a distance east of the origin of the grid reference.
- Eastings increase numerically eastwards.
- Eastings are always quoted first when giving a grid reference.
- The easting that lies to the left of the object is to be read.



## Northings:

- Lines running from east to west are called northings since they indicate a distance north of the origin of the grid reference.
- Northings increase numerically northwards.
- Northings are always quoted after the eastings.
- The northing that lies below the object is to be read.

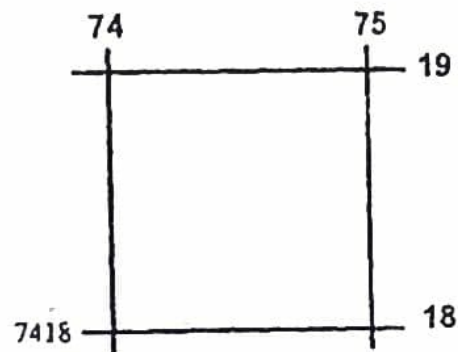


**Note:** In topographical maps using the metric system, the area is divided into squares of 1 km every map, two-figure eastings and northings are printed at intervals of 1 km along the north and east edges of the map. The eastings and northings increase numerical eastwards and northwards respectively.



## Four Figure Grid Reference

In the four figure grid reference, the first two figures are the eastings and the last two are the northings. The crossing point of eastings and northings is taken as the originating point as shown in the adjoining figure.



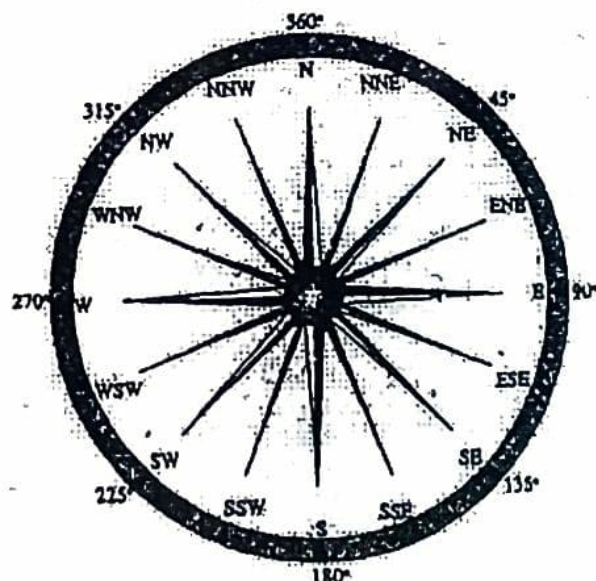
Four Figure Grid Reference

## Directions

- Direction is that element of a map that helps us find the way.
- Direction is a relative term. The direction of a place or object is expressed in relation to a given point, for example, Mumbai is west of Allahabad or **Bangaluru is south of Nagpur.**
- There are four main directions, called the **cardinal directions** – East, West, North and South.

The four main directions can be further subdivided. The mid-points between two given directions are given a common name as shown in the compass rose alongside.

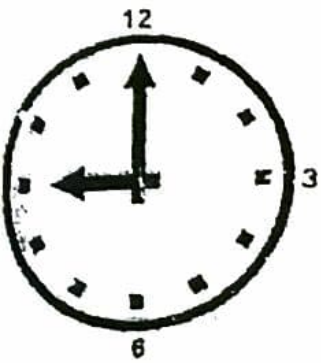
North refers to the direction you follow to get to the North Pole. If you are standing on the North Pole, the opposite direction is south. At



The Compass Rose

- a right angle to this North-South line lie east and west.

On the face of a non-digital clock, if 12 o'clock is north then 6 o'clock is south, 3 o'clock is east and 9 o'clock is west.



Distance and direction are the two fundamental components of mapping. After learning to find distances on the map, the next step is to be able to find direction.

## CONVENTIONAL SIGNS AND SYMBOLS

To interpret a map under study it is necessary to follow the signs and symbols used in the map, which may be given in a pictorial form or written form.

Conventional signs and symbols are used on a map because they give plenty of information in a small space and maps can be drawn easily, quickly and are simple to read.

### Legend or Key

- A list of signs and symbols and their meaning is called a map legend since it tells the story of the map.
- It is also called a map key since it unlocks meaning of the map's symbols.

There is a general understanding regarding the use of conventional signs and symbols in order to avoid confusion. Many of the signs and symbols are standardized and used throughout the world. Since all the conventional signs and symbols are not fully standardized, each map provides information in the margins or below the map.

The symbols and methods of lettering used by the Survey of India are set out in what is known as the "Characteristic Sheet". There are two kinds of features represented by symbols on a map:



- **Natural features:** These include relief features like mountains, plateaus and rivers.
- **Man-made features:** These are known as cultural features. A dot, used to represent a city belongs to this group of symbols. Special symbols are used to show roads, railways, canals, bridges, dams, tunnels and other man-made features.

(IMPORTANT)

### Colour Scheme used in Toposheets

On toposheets colours are used to show certain features. Each colour used on a map has significance.

- **Black:** All names, river banks, *ground that has been ploughed / dry* broken ground, dry stream, surveyed trees, heights and their numbering, railway lines, telephone and telegraph lines and lines of latitude and longitude
- **Blue:** Water features or water bodies that contain water
- **Green:** All wooded and forested areas, orchards, scattered trees and scrubs
- **Yellow:** All cultivated areas are shown with a yellow wash
- **White patches:** Uncultivated land.
- **Brown:** Contour lines and their numbering, form lines; and sand features such as sand hills and dunes
- **Red:** Grid lines (eastings and northings) and their numbering; roads, cart tracks, settlement, huts and buildings

## CONVENTIONAL SIGNS AND SYMBOLS

- **Stream:** It is a small river or any current of running water on the surface of the Earth.



- **River bed:** Dry river bed.



- **River bed (dry with water channel):** The river bed almost dries up, leaving a bed with a narrow channel of water flowing through it.



- **River with rocks and islands:** Most rivers in their lower course carry an enormous load of sediments. It is unable to carry it all the way to the mouth. The sediments consisting of rocks, stones, silt, gravel, etc are deposited in the river channel. In some cases, islands may form due to deposition.






- **Spring:** It is a flow of water which naturally appears on the Earth's surface from beneath.






- **Canal:** It is a channel cut through land. Water is diverted from rivers into canals for the purpose of irrigation and navigation. In India, presence of canals indicates intensive use of the land for agriculture.



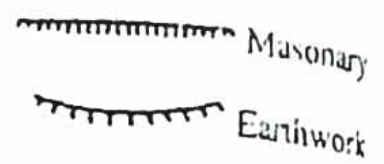


- **Tank (perennial):** Tanks are means of storing water in hollows where it occurs naturally. Presence of tanks usually indicates a rocky or hilly terrain. A perennial tank is one which has water throughout the year. 
- **Tank (dry):** A seasonal tank is one which has water only during rainy season. 
- **Well (lined, perennial):** A well is a bore made into the ground to reach the water table. A well lined with stones or bricks is called a lined well. It is shown on the map as a solid blue circle. If the well is deep enough to remain below the water table at all times of the year, it does not dry up and is called a perennial well. 

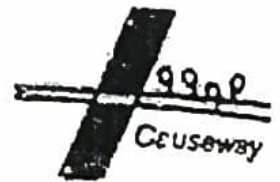
#### **Lined perennial well with brackish water:**

- **Brackish:** Water which is salty and is unfit for drinking. It occurs in dry regions, in lined perennial wells, where due to extreme heat, excessive evaporation occurs leaving high mineral content in the water. This water cannot be used for drinking or irrigation but is used for washing clothes and utensils. (Brackish) 
- **Well (unlined):** This is without any brick or stone lining and is represented on the map by a blue hollow circle. 
- **Tube well:** It is a deep bore (tube) dug into the ground and water is drawn with the help of a pump. It is shown on a map by a small blue triangle. Presence of tube wells on the map indicates intensive use of the land for agriculture. 

• **Dam:** It is a man-made structure built across a river in order to control the flow of water. The three main purposes of a dam are to control floods; provide water for irrigation; and to produce hydroelectricity.



• **Causeway:** It is a raised metalled road across a minor stream or low-lying marshy area at a shallow point. (It should not be confused with a bridge)



• **Island:** Land surrounded by water on all sides. Uncultivated islands are shown in white while cultivated ones are shaded.



## Vegetation and Forests:

**Fireline:** The word fireline is found in forest areas, in survey maps. This is a 5 metre wide path or trench, clear of all vegetation, **around the forest** to prevent forest fires from spreading. (A fire in the forest spreads from bush to bush or from tree to tree. In the absence of vegetation, the fire is unable to spread beyond this patch.)



Grass



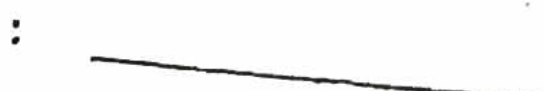
Palms



Conifer



Deciduous Forest





• Swamp

:



22

## Settlements:

• Permanent hut

:



• Temporary hut

:



• Deserted town or village

:



## Boundaries:

• International

:



• State

:



• District

:



## Roads:

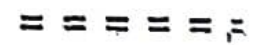
• Metalled

:



• Unmetalled

:



• Footpath

:



• Cart Track

:



## Railways

- Broad Gauge

\_\_\_\_\_



- Metre Gauge

\_\_\_\_\_



- Level Crossing

\_\_\_\_\_



- Bridge

\_\_\_\_\_



## Monuments and Buildings:

- Fort

\_\_\_\_\_



- Temple

\_\_\_\_\_



- Church

1 :

\_\_\_\_\_



- Mosque

\_\_\_\_\_



- Tomb

\_\_\_\_\_



- Graves

\_\_\_\_\_



- Light-house

\_\_\_\_\_



- Post Office

\_\_\_\_\_

PO

- Telegraph Office

\_\_\_\_\_

TO



- **Telegraph Line** : \_\_\_\_\_ .....  
Telephone line
- **Post and Telegraph Office:** \_\_\_\_\_ **PTO**
- **Police Station** : \_\_\_\_\_ **PS**
- **Dak Bungalow** : \_\_\_\_\_ **DB**
- **Inspection Bungalow** : \_\_\_\_\_ **IB**
- **Rest House** : \_\_\_\_\_ **RH**
- **Circuit House** : \_\_\_\_\_ **CH**
- **Dispensary** : \_\_\_\_\_ ■  
Dispensary
- **Aerodrome** : \_\_\_\_\_ ✈
- **Hospital** : \_\_\_\_\_ +