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Lesson 2: Types of scales

The types of scale normally used are

1. Plain scales
2. Diagonal

1. Plain scales

A plain scale is simply a line which is divided into a suitable number of equal parts, the first of which part is further sub-divided into small parts. It is used to represent either two units.

Example: On a survey map the distance between two places 1 km apart is 5 cm. Construct the scale to read 4.6 km

$$\text{R.F.} = \frac{5 \text{ cm}}{1 \times 1000 \times 100 \text{ cm}} = \frac{1}{20000}$$

$$\text{If } X \text{ is the drawing size required } X = 5 \times 1000 \times 100 \times \frac{1}{20000}$$

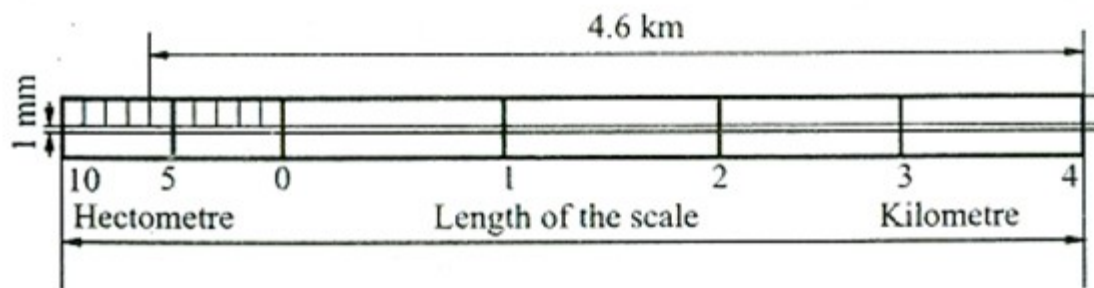
Therefore, $X = 25 \text{ cm}$

Draw a line of length 25 cm.

Divide this into 5 equal parts. Now each part is 1 km.

Divide the first part into 10 equal division. Each division is 0.1 km.

Mark on the scale the required distance 4.6 km



Plain Scale.

2. Diagonal scales

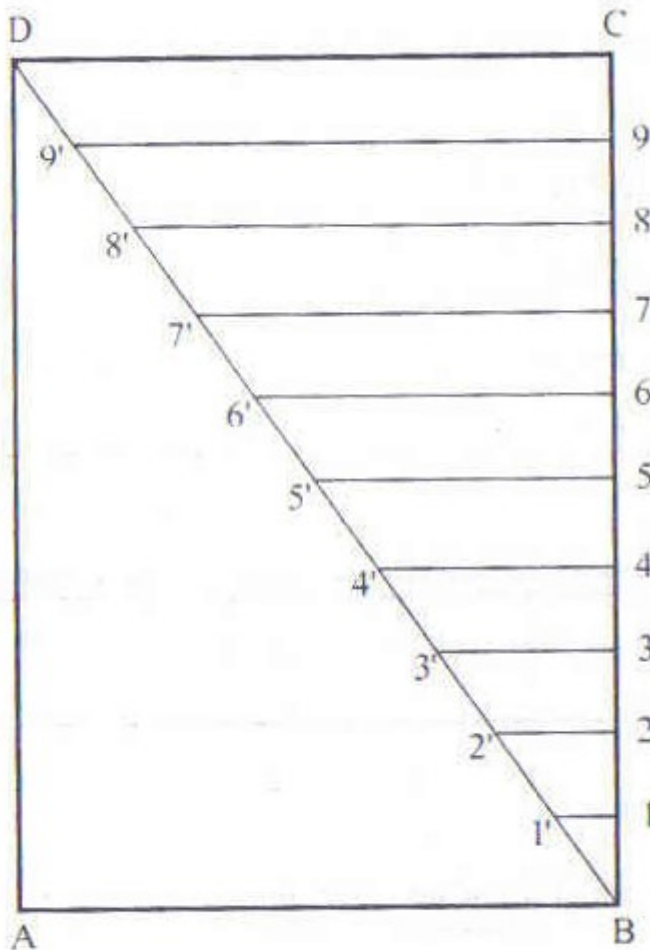
Plain scales are used to read lengths in two units such as meters and decimeters, centimeter and millimeters etc., or to read to the accuracy correct to first decimal.

Diagonal scales are used to represent either three units of measurement such as metres, decimeters, centimeters or to read to the accuracy correct to two decimals.

Principle of diagonal scale:

- 1 Draw a line AB and erect a perpendicular at B.
- 2 . Mark 10 equal distant points (1, 2, 3 etc.) of any suitable length along this perpendicular and mark C.
- 3 Complete the rectangle ABCD.
- 4 Draw a diagonal BD.
- 5 Draw a horizontal through the division points to meet BD at 1', 2', 3, etc.

The line 1-1', 2-2' etc. measure $0.1CD$, $0.2CD$, etc. respectively. The line CD is divided into $1/10$ the divisions by the diagonal BD, i.e. each horizontal lines is a multiple of $1/10CD$.



Principle of diagonal scale

Problem:

On a plan, a line of 22 cm long represents a distance of 440 metres. Draw a diagonal scale for the plan to read up to a single metre. Measure and mark a distance of 187 m on the scale.

Solution:

$$1. \text{ R.F.} = \frac{22}{440 \times 100} = \frac{1}{2000}$$

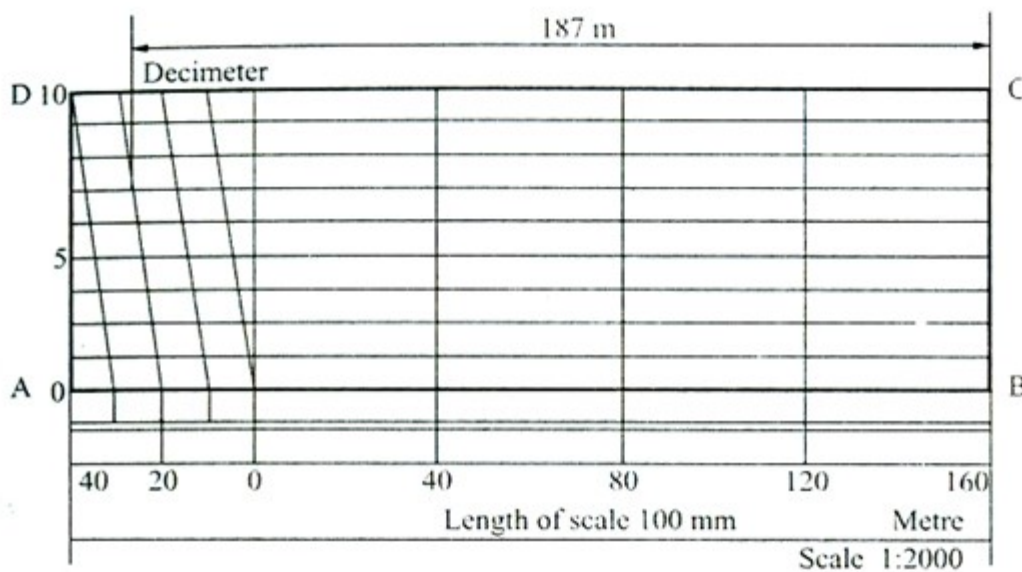
2. As 187 m are required, consider 200 m.

$$3. \text{ Drawing size} = \text{R.F.} \times \text{actual size} = \frac{1}{2000} \times 200 \times 100 = 10 \text{ cm}$$

4. When a length of 10 cm representing 200 m is divided into 5 equal parts, each part represents 40 m as marked in the figure.

5. The first part is sub-divided into 4 divisions, so that each division is 10 m.

6. On the diagonal portion 10 divisions are taken to get 1 m.



Diagonal Scale.

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DE-3