

**WEEK: 5&7**

**DATE:**

**CLASS: SS ONE (1)**

**TOPIC: CONSTRUCTION AND MEASUREMENT OF SCALES**

### **SCALES**

It is a fact that the actual size of an object could be extra-large and may not be accommodated on a drawing paper. Sometimes, they are too small that they cannot be drawn full size on the drawing paper. However, in most cases, the size of an object could be accommodated in a drawing paper without stress. Therefore, when an object is too small or large for drawing, such object could be re-adjusted to a convenient and suitable size through the sizes of scales that will be mentioned shortly.

Scale is defined as a fixed standard of measurement which is used to prepare, reduce and enlarge drawings. They are also used to set off dimension and measure distances accurately.

#### **Sizes of scales**

There are various sizes of scale, but prominently, three sizes are to be discussed. They are;

- a. **Full scale (1:1):** This implies that the object must be drawn exactly to the dimension given or to its natural or original size.
- b. **Reduced scale (1:2, 1:5, 1:10, 1:100, etc.):** This implies that the object is (to be) drawn smaller than its original size using the given scale.
- c. **Enlarged scale (2:1, 5:1, 10:1, 50:1, 100:1, 1000:1 etc.):** This implies that the object is (to be) drawn larger than its original size using the given scale.

**NOTE:** The unit of measurement of scale is centimeter. In applying the sizes of scales listed above, the fractional representation of these figures otherwise called representative fraction is used in the calculations involving conversion of figures in the scale.

**Representative fraction (RF)** = distance of object on drawing ÷ corresponding actual distance of the object

#### **Types of scales**

There are three types of scales, namely;

1. **Plain scale:** this is an instrument used to measure or read up to two fractional units. E.g 1.2, 2.5, 3.7, 5.1, 9.4 etc.
2. **Diagonal scale:** this is an instrument used to measure or read up to three fractional units. E.g 2.45, 4.17, 8.71, 5.16 etc.

3. **Scale of chord:** this is an instrument used to measure or read angles of any magnitude.  
E.g  $1^{\circ}$ ,  $2^{\circ}$ ,  $9^{\circ}$ ,  $12^{\circ}$ ,  $50^{\circ}$ ,  $100^{\circ}$ ,  $215^{\circ}$  etc.

**The following table should be refreshed.**

10 millimeter (mm)	=	1 centimeter (cm)
10 centimeter (cm)	=	1 decimeter (dm)
10 decimeter (dm)	=	1 meter (m)
1000 meter (m)	=	1 kilometer (km)

**Example 1.**

Construct a plain scale to indicate hectometer and kilometer, given the length of the scale as 15cm. And  $2.5\text{cm} = 1\text{m}$ , find the representative fraction (RF) and read off a distance of 3.8 and 4.6 respectively.

Solution;

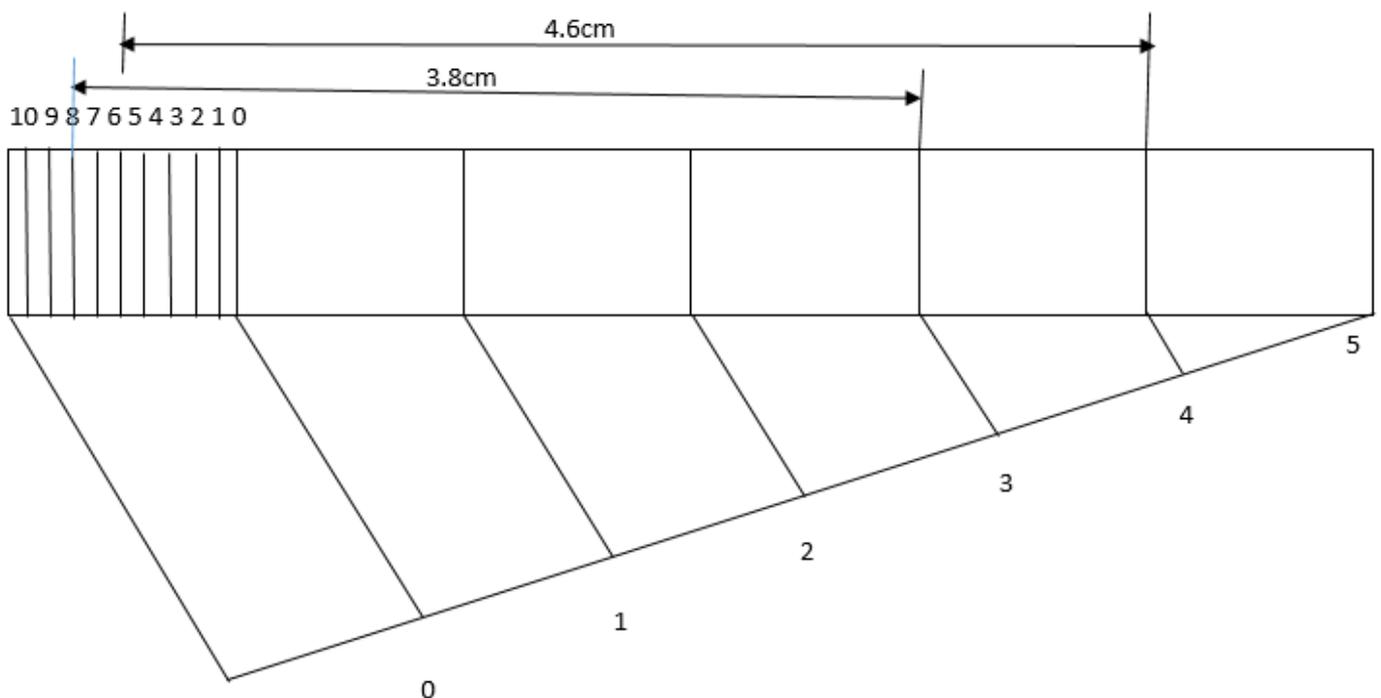
Given  $2.5 = 1\text{m}$

Length of scale = 15cm

$$\frac{15}{2.5} = 6\text{m}$$

$$\text{RF} = \frac{2.5}{100} = \frac{1}{40} = 1:40$$

**Construction of plain scale**



### Example 2.

Construct a diagonal scale of kilometer and meter. Assuming 2cm =1m. if the length of scale is 16cm, find the RF and read off a distance 3.37 and 4.53 respectively.

Solution;

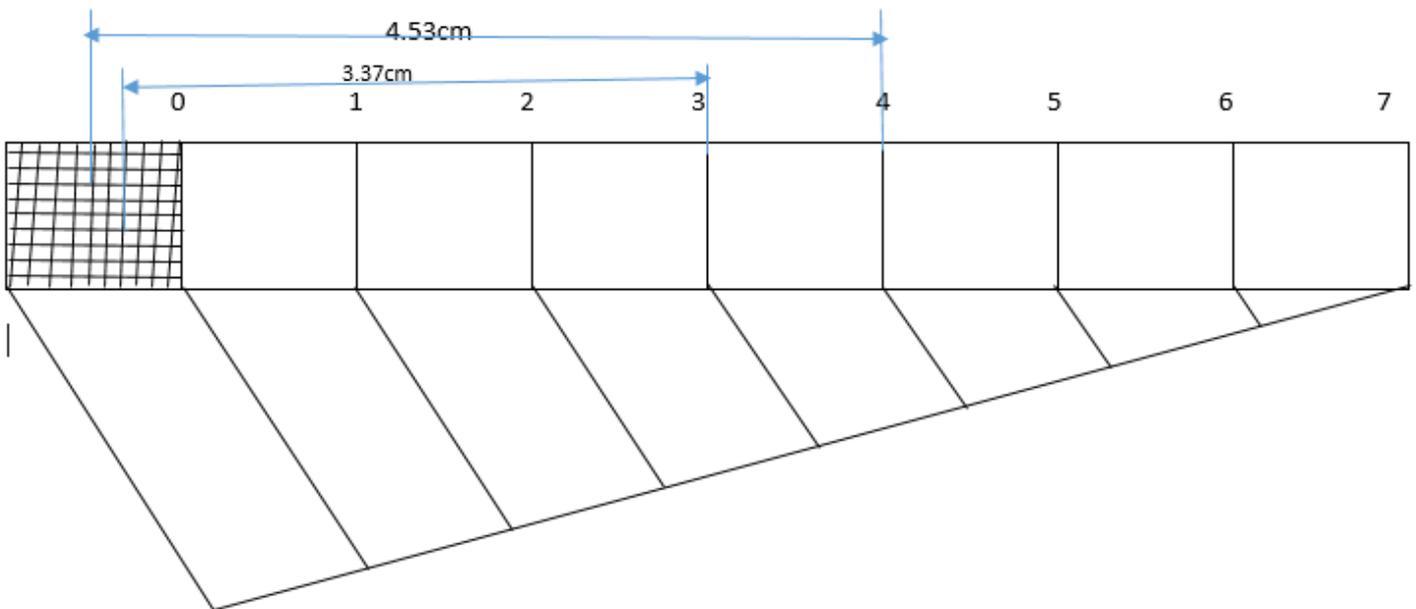
Given: 2cm = 1m

Length of scale = 16

$$\frac{16}{2} = 8cm$$

$$RF = \frac{2}{1000} = \frac{1}{500} = 1:500$$

#### Construction of diagonal scale



#### ASSIGNMENT:

1. Reproduce a given rectangle of length and breadth of 30 and 40mm respectively using ratio 2:1
2. What is the size of ratio used above
3. Construct a plain scale length 6cm to read the following values a. 3.8 b. 2.4 on the same scale.