Construction of Scales

Presented by : DM

Technology Campus, University of Calcutta, Kolkata-700106, India

Contents

- Introduction.
- Importance .
- Examples.
- Scaling Methodologies
- Full Size Scale, Enlarged Scale & Reduced Scale with applications.
- Customized Scales/User defined Scale.
- Parameters for Construction
- Types of Scales
- Plain Scale
- Diagonal Scale
- Vernier Scale
- How to divide a line segment into equal nos of subdivisions with principles
- General Procedure to Construct a Scale
- Examples
- References

Introductions

In order to manufacture a product it is necessary to generate engineering drawing or the manufacturing drawing of the product . Based on manufacturing drawing of the product undergoes certain manufacturing processes. An engineering drawing is consists of series of dimensions and measurements. The actual sizes of the product are to be identified in the standard Drawing sheets. Most often in reality the actual size of the products are much higher than the available maximum standard paper size. So there will be problems in accommodating the true size of the product within the standard available Drawing sheets. To overcome this problem it is important to adopt a suitable proportion between the sizes used in the drawing sheet and the sizes of the original object, and this proportion or the ratio of dimension or the ratio is known as the Scale. Therefore the scale of a drawing is defined as the ratio of the dimensions of an object as represented in the drawing sheet to the actual dimension of the object itself.

Importance of Scales and Scale Sets

Definition:.

The scales are used to measure the required lengths and set them in the drawing. Scales are made of plastic or cardboard for making technical drawings and are available in 15 cm or 30 cm length usually .

The width will range from 2cm to 3 cm .They are usually 1 mm thick and edges are bevelled for greater thickness. Both the longer edges of the scale are mark in centimeters and are subdivided into millimeters or one longer edge in centimeter or millimeter units, whereas the other longer edge contains inches and subunits.

Standard Scales:

➢ A set of reduced scales classified as M1, M2,….,M8 is shown in table 1.1 as recommended by Bureau of Indian Standard specifications.

Table 1(recommended standard Scales set)

S. no.	Designation	Scale		Value
		Description		1:1
1.	M1	Actual size		1:2
		50 cm to a metre		1:2.5
2.	M2	40 cm to a metre		1:5
		20 cm to a metre		1:10
3.	M3	10 cm to a metre		1:20
		5 cm to a metre		1:50
4.	M4	2 cm to a metre		1:100
		1 cm to a metre		1:200
5.	M5	0.5 cm to a metre		1:500
		0.2 cm to a metre		1:300
6.	M6	0.33 cm to a metre		1:600
		0.66 cm to a metre		1:400
7.	M7	0.25 cm to a metre		1:800
		0.125 cm to a metre		1:1000
8.	M8	1 mm to a metre		1:2000
		0.5 mm to a metre		

Table 1.1 Recommended standard scales

Scaling Methodologies

➢ The scale of drawing can be mathematically represented by representative fraction(RF), which is defined as the ratio of the drawing size to the respective actual size of an object, both expressed in the same units.

➢ Thus,

$$RF = \frac{Drawing\ Size}{Actual\ Size}$$

Following three situations may be arises…

RF=1 or RF<1 or RF>1

➢ Full Size Scale RF=1,

➢ Reduced Scale RF<1

And

➢ Enlarged Scale RF>1

Parameters to construct a scale

➢ Types of scale to be constructed Plain or Diagonal or Vernier.

➢ Representative Fraction, $$RF = \frac{Drawing\ Size}{Actual\ Size}$$

➢ Units associated with

➢ Maximum Length than can be measured with the help of user defined scale.

✓ Types of Scales

Plain Scale
Can measure only two consecutive units and accuracy upto single decimal place.

Diagonal Scale
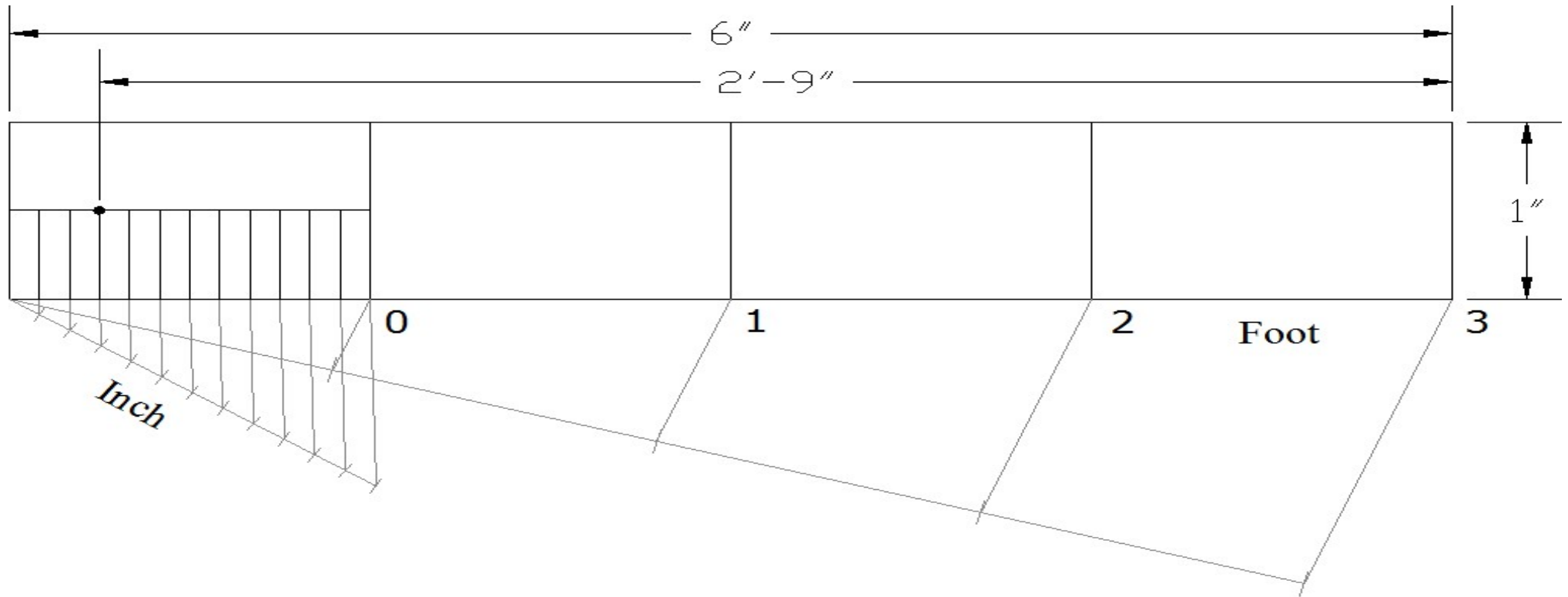It is an extension of plain scale.
Associated with 3 consecutive units.
Accuracy 2nd decimal places.

Vernier Scale

Examples

Problem : 01. Draw a plain scale of RF 1/8 or 1 = 1" to show feet and inch and indicate a length of 3'-9". The length of the scale will be 4'.

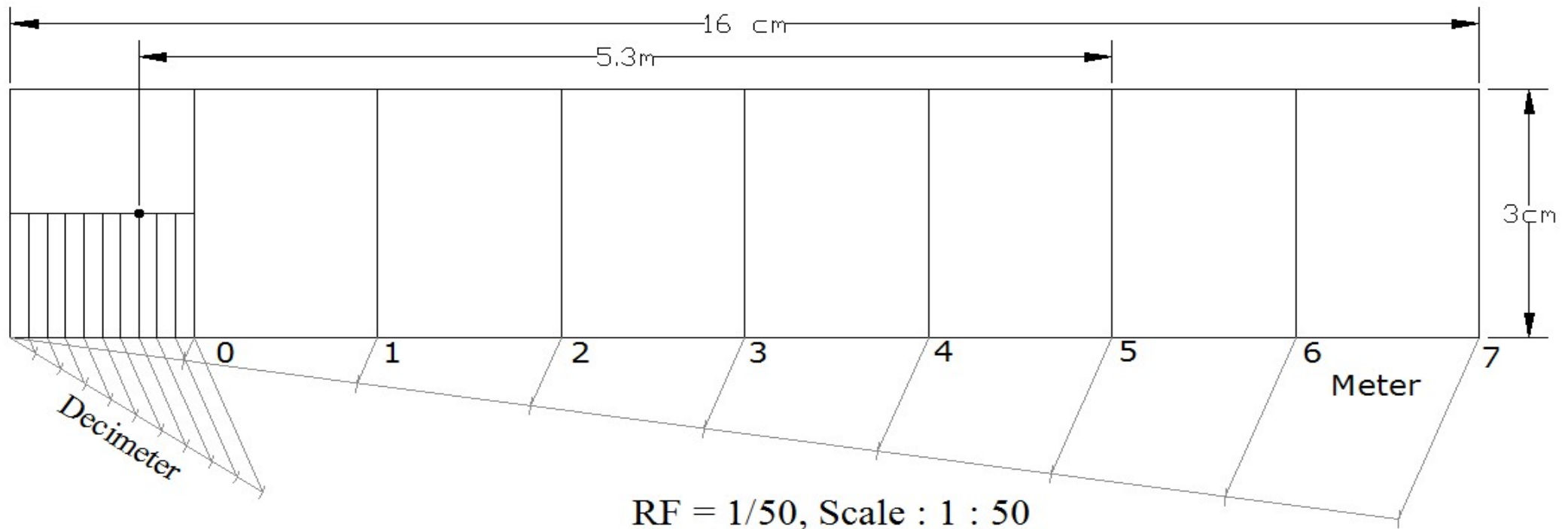Solve :RF= 1/8, Length of scale = x 4" = (1/8 x 4 x 12) inch = 6"

Examples
Problem : 02.
Draw a plain scale of 1 : 50 to show meters and decimeters and long enough to measure 8 m. Show on it a distance equal to 5.3 m.
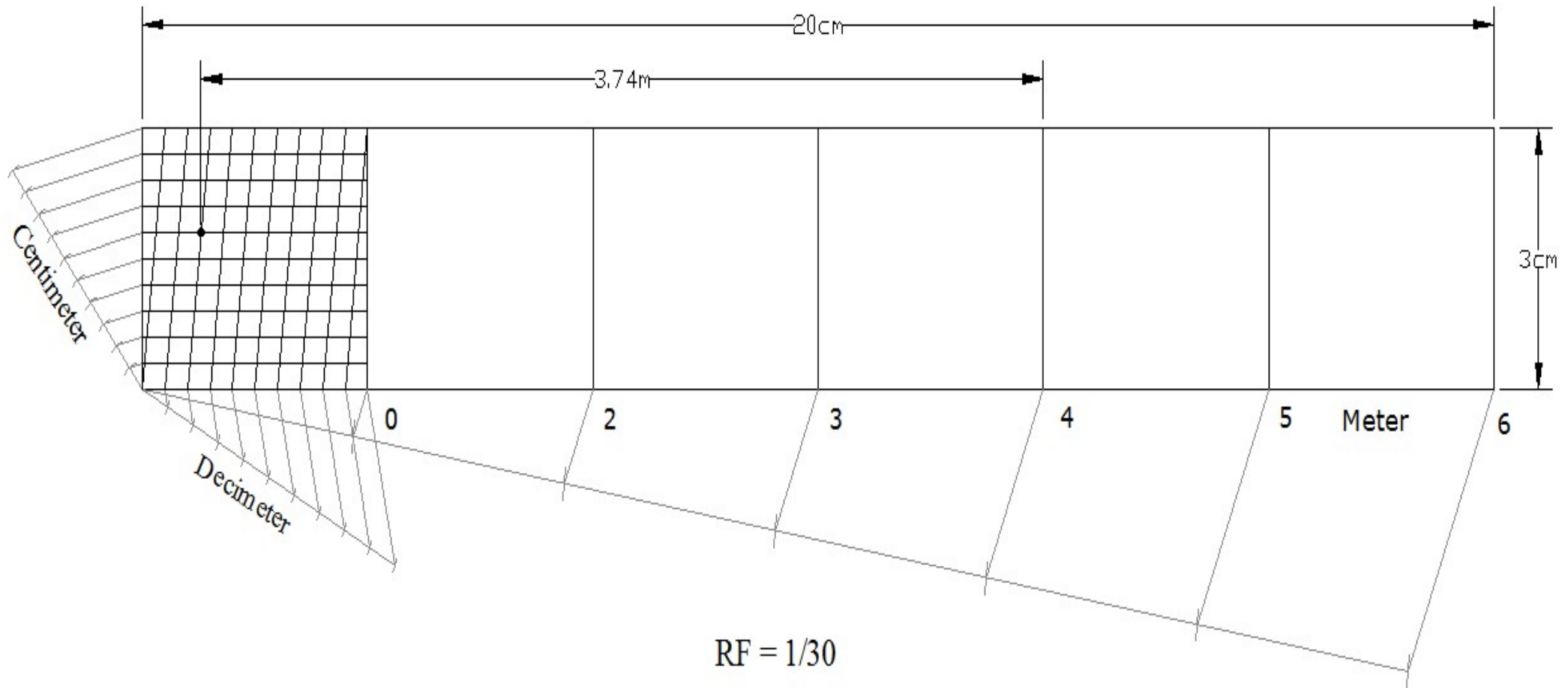.Solve :   RF= 1/50,   Length of scale = (1/50 x 8 x 100) cm = 16cm =160mm

RF = 1/50, Scale : 1 : 50

Examples

Problem : 03.   Draw a diagonal scale of 1 : 30, showing m-dcm-cm and long enough to measure up to 6 m, indicate a length   of 3.74m on scale.   .
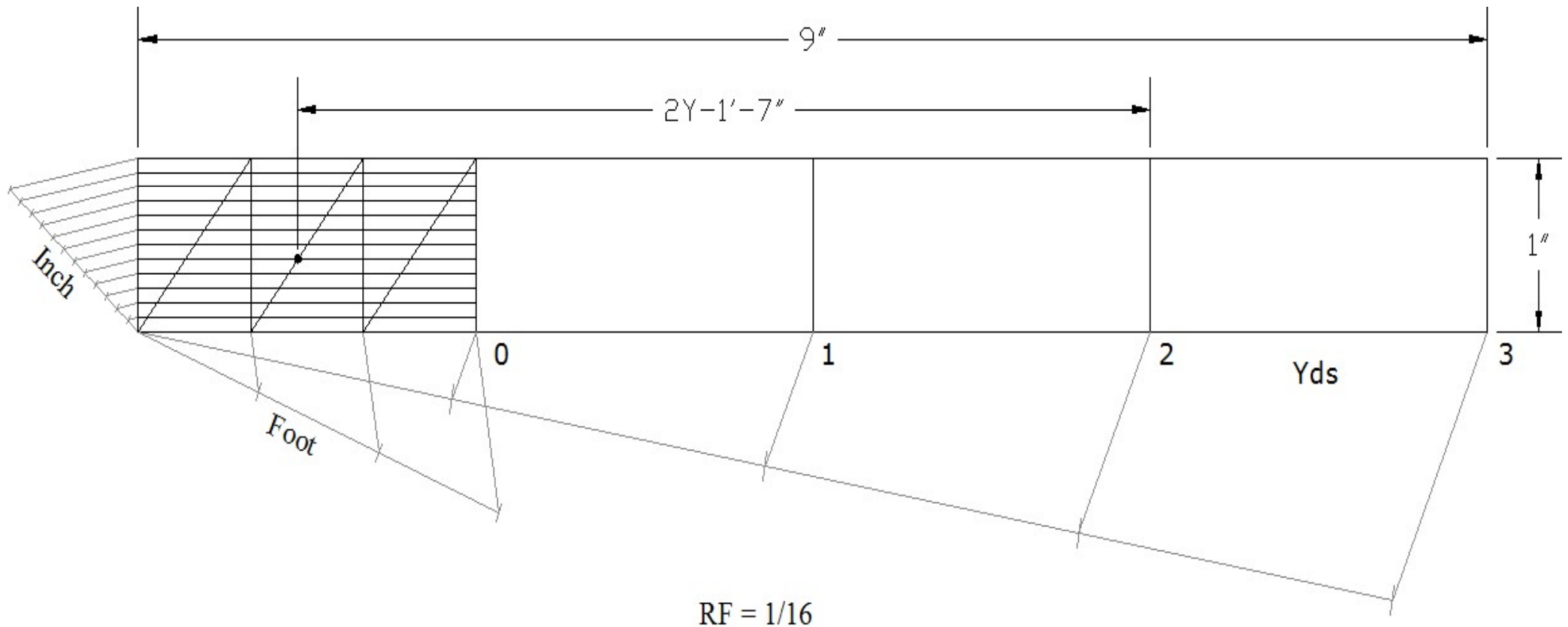
Solve : RF= 1/30,   Length of scale = (1/30 x 6 x 100) cm = 20cm = 200mm

RF = 1/30

Examples

Problem : 04. Construct a diagonal scale of RF = 1 : 16, showing yards-ft-in and measure upto 4yards, indicate a length of 2yards-1ft-7in. on scale.

Solve :   RF= 1/16,   Length of scale = (1/16 x 4 x 3 x 12) in = 9 inch

RF = 1/16

Thank You…

Q&A

Contact Details of Presenter:
E-mail, Phone Number etc..

E-mail:dmmechanical2021@gmail.com
Phone No. 9903916836