

Unit - I

1.a) Draw any two types of lines and mention their names.

1. Continuous narrow line



2. Continuous narrow freehand line



3. Continuous narrow line with zigzags



4. Continuous wide line



5. Dashed narrow line



6. Dashed wide line



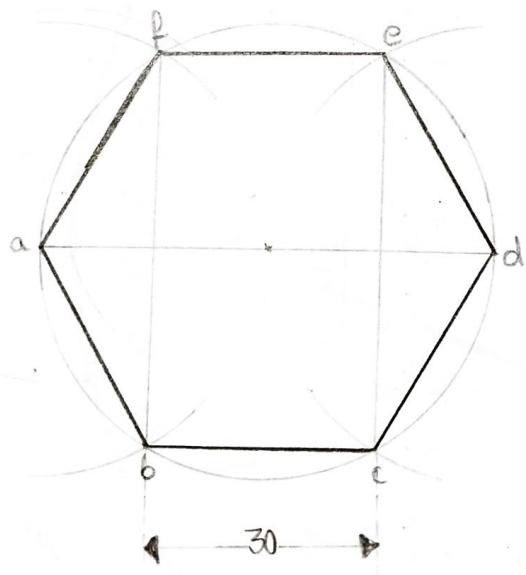
7. Long-dashed dotted narrowline



8. long-dashed dotted wideline.

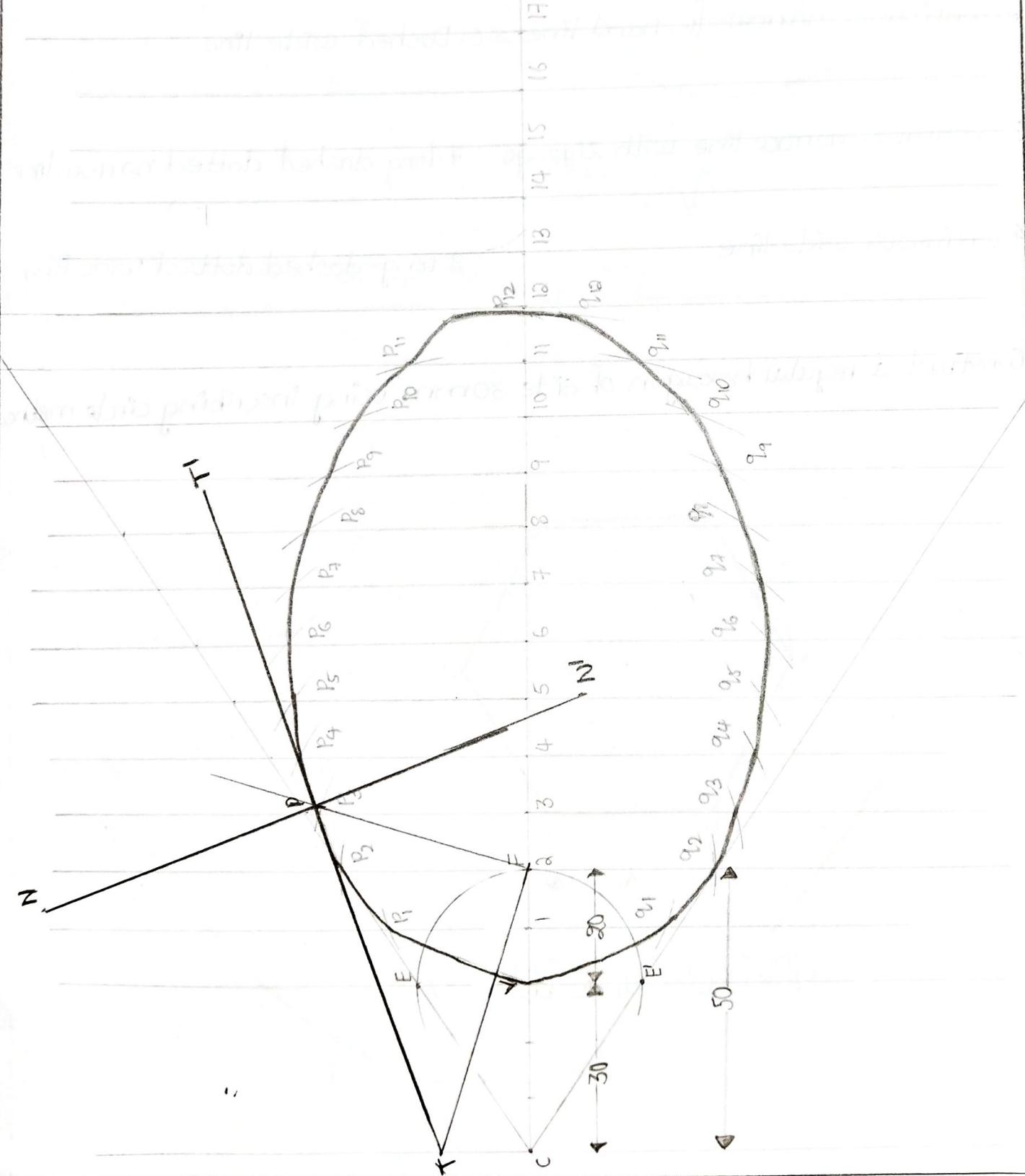


b) Construct a regular hexagon of side 30mm using inscribing circle method.



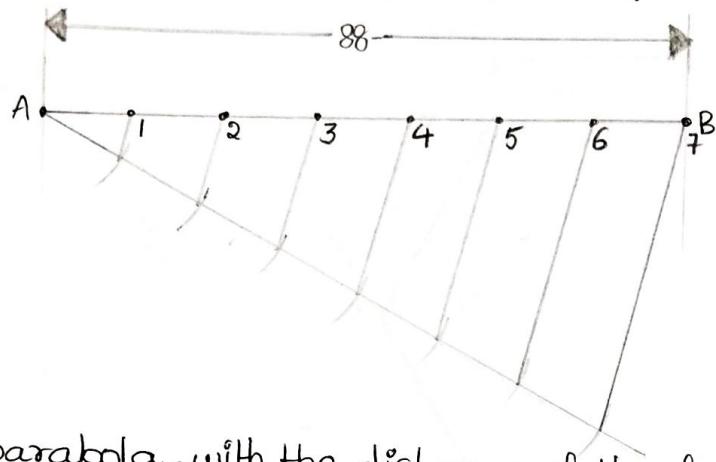
HORIZONTAL SIDE

c) Draw the ellipse if the distance of focus from the directrix is 50 mm & eccentricity is $\frac{2}{3}$. Also draw tangent & normal at a distance of 65 mm from the directrix.

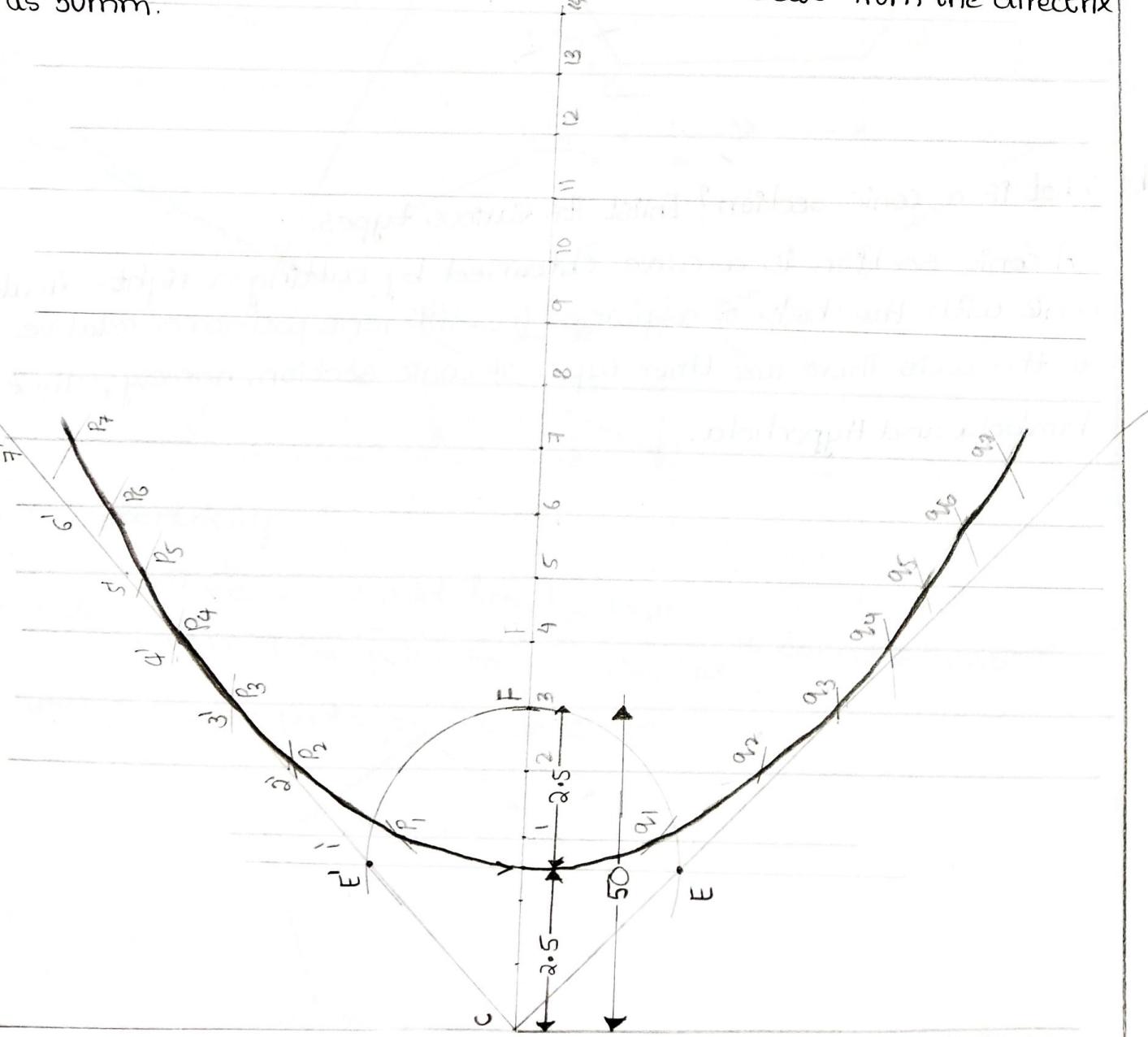


2. a) What are the two recommended systems of dimensioning?
Unidirectional system and aligned system.

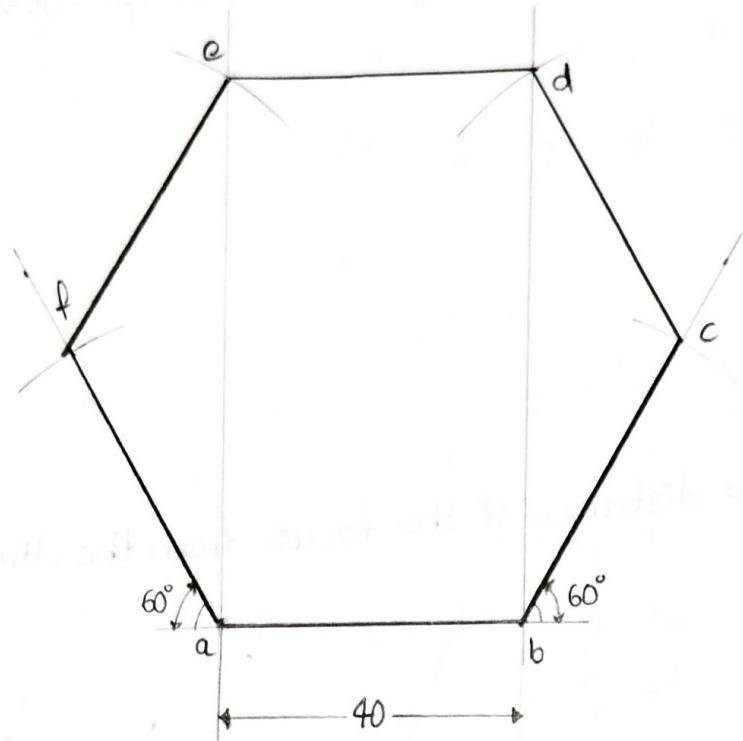
b) Divide a line of 88mm into 7 equal parts by an acute angle method.



c) Construct a parabola, with the distance of the focus from the directrix as 50mm.



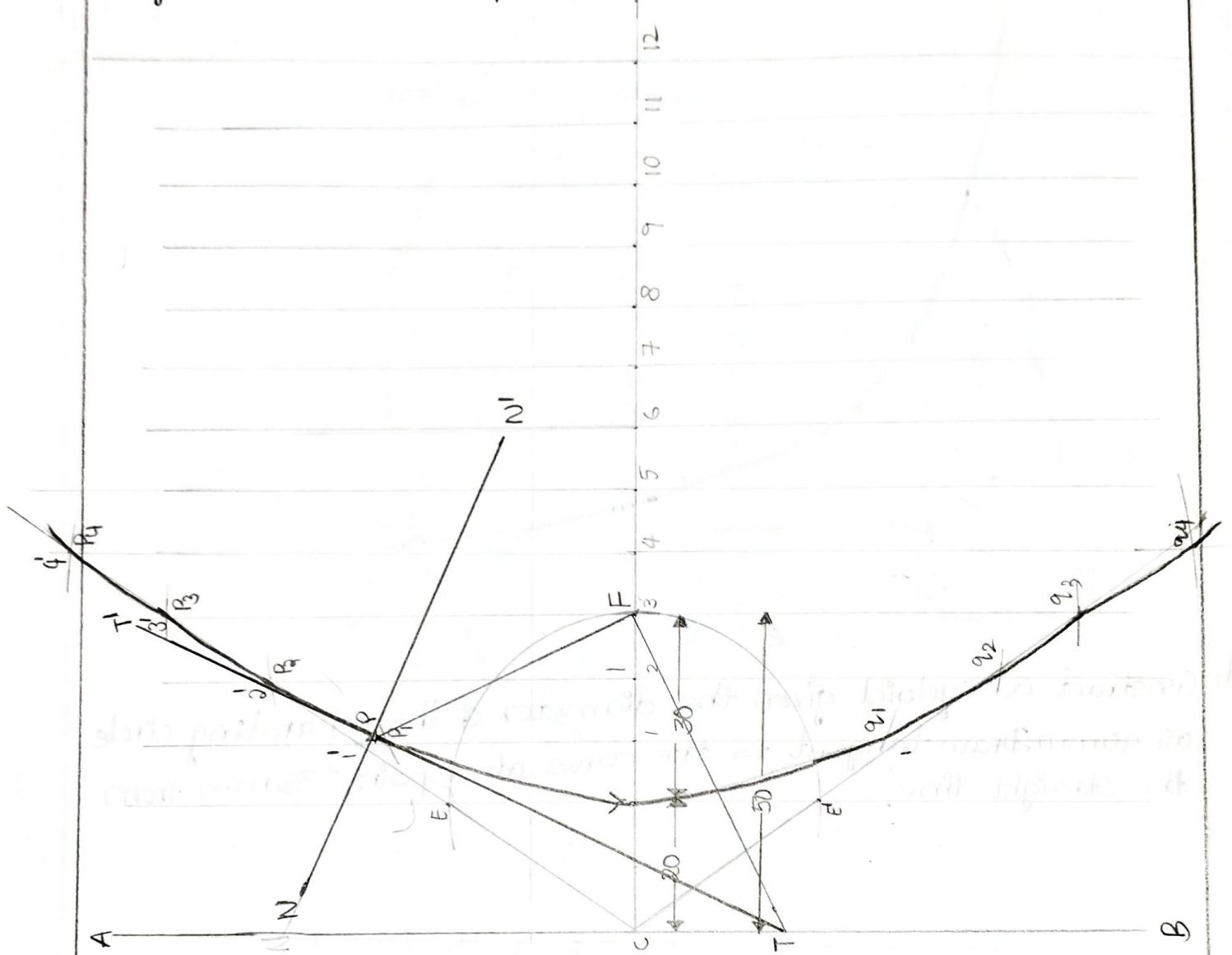
3.a) Construct a regular hexagon of side 40 mm.



b) What is a conic section? Enlist its various types.

A conic section is a curve obtained by cutting a right-circular cone with the help of a plane in different positions relative to the axis. There are three types of conic section, namely; Ellipse, Parabola and Hyperbola.

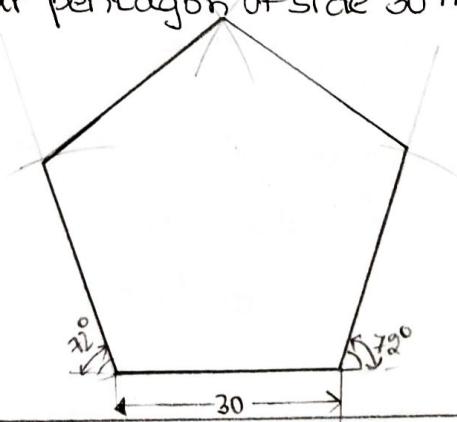
- c) Construct a hyperbola, with the distance between the focus and the directrix as 50mm and eccentricity as $3/2$. Also, draw a normal and tangent to the curve at a point 30mm from the directrix.



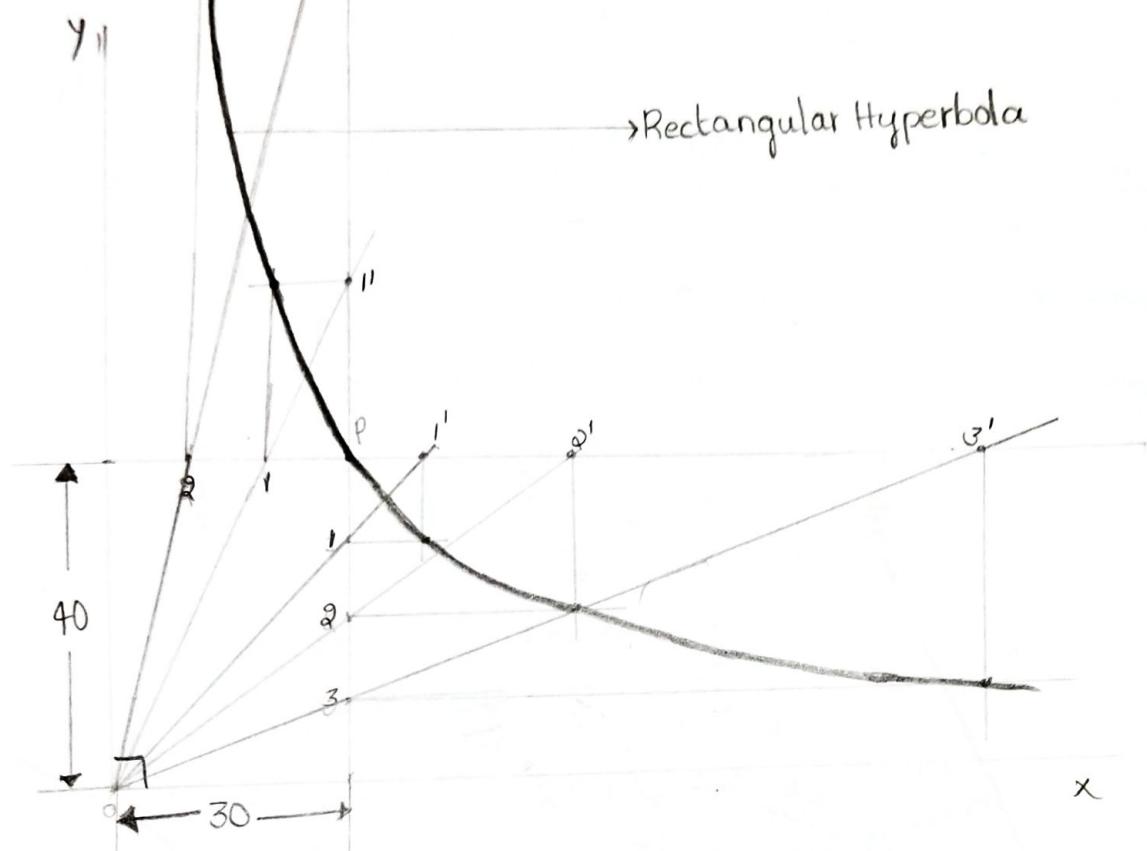
- 4.a) Define eccentricity.

The ratio $\frac{\text{distance of the point from the focus}}{\text{distance of the point from the directrix}}$ is called eccentricity.

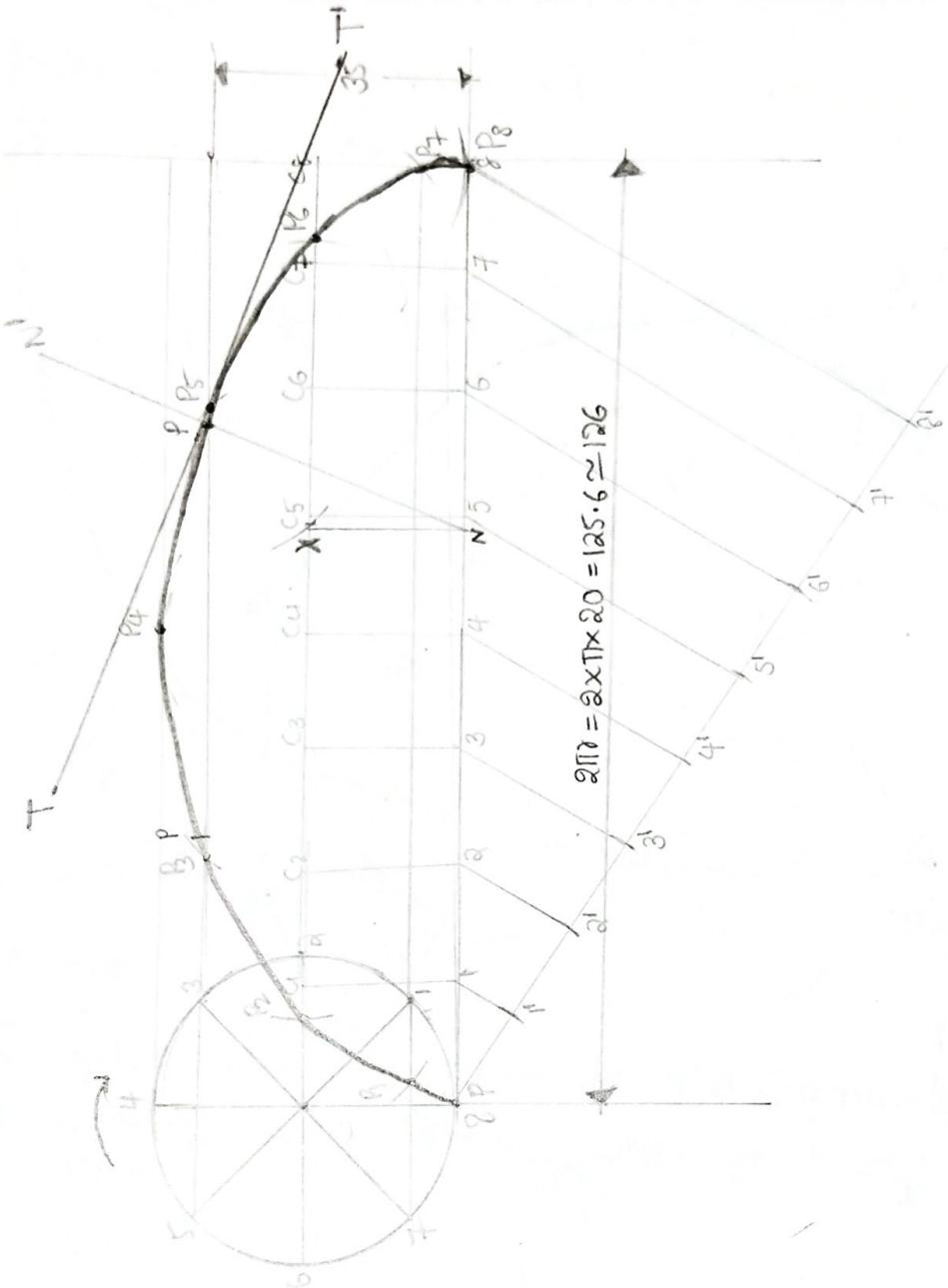
- b) Construct a regular pentagon of side 30 mm.



- c) Construct a rectangular Hyperbola when a point P on it is at distances of 30mm and 40mm from two asymptotes.



- d) Construct a cycloid given the diameter of the generating circle as 40mm. Draw tangent to the curve at a point 35mm from the straight line.



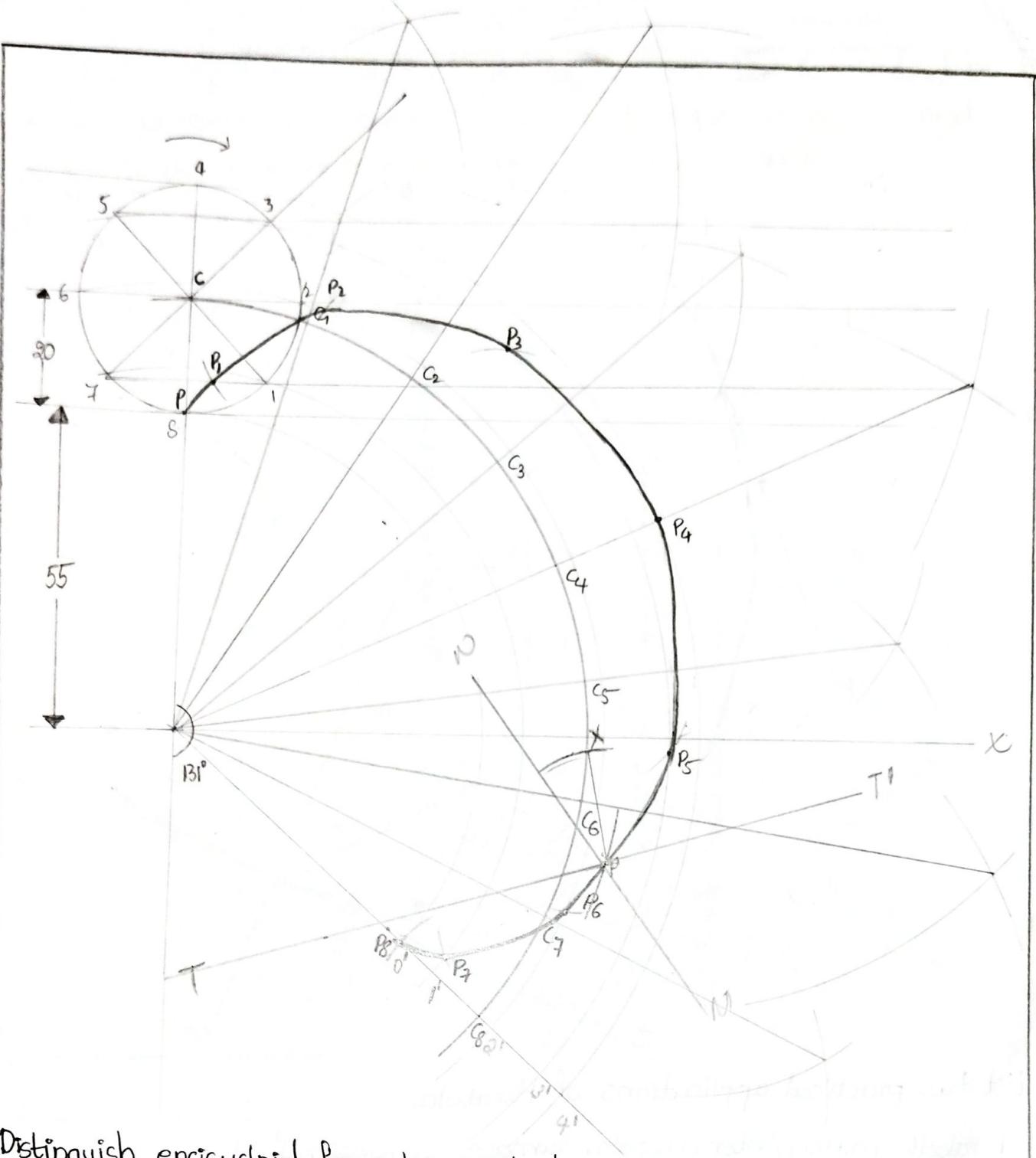
5.a) List two practical applications of Parabola.

Parabolic mirror, Antenna, Solar furnace, suspension bridges.

b) What is cycloid?

A cycloid is a curve traced by a point on the circumference of a circle which rolls along a fixed straight line without slipping.

c) Draw an epicycloid of a circle of 40mm diameter, which rolls on another circle of 120mm diameter for one revolution clock-wise. Draw a tangent and normal to it at a point 80 mm from the Centre of the directing circle.

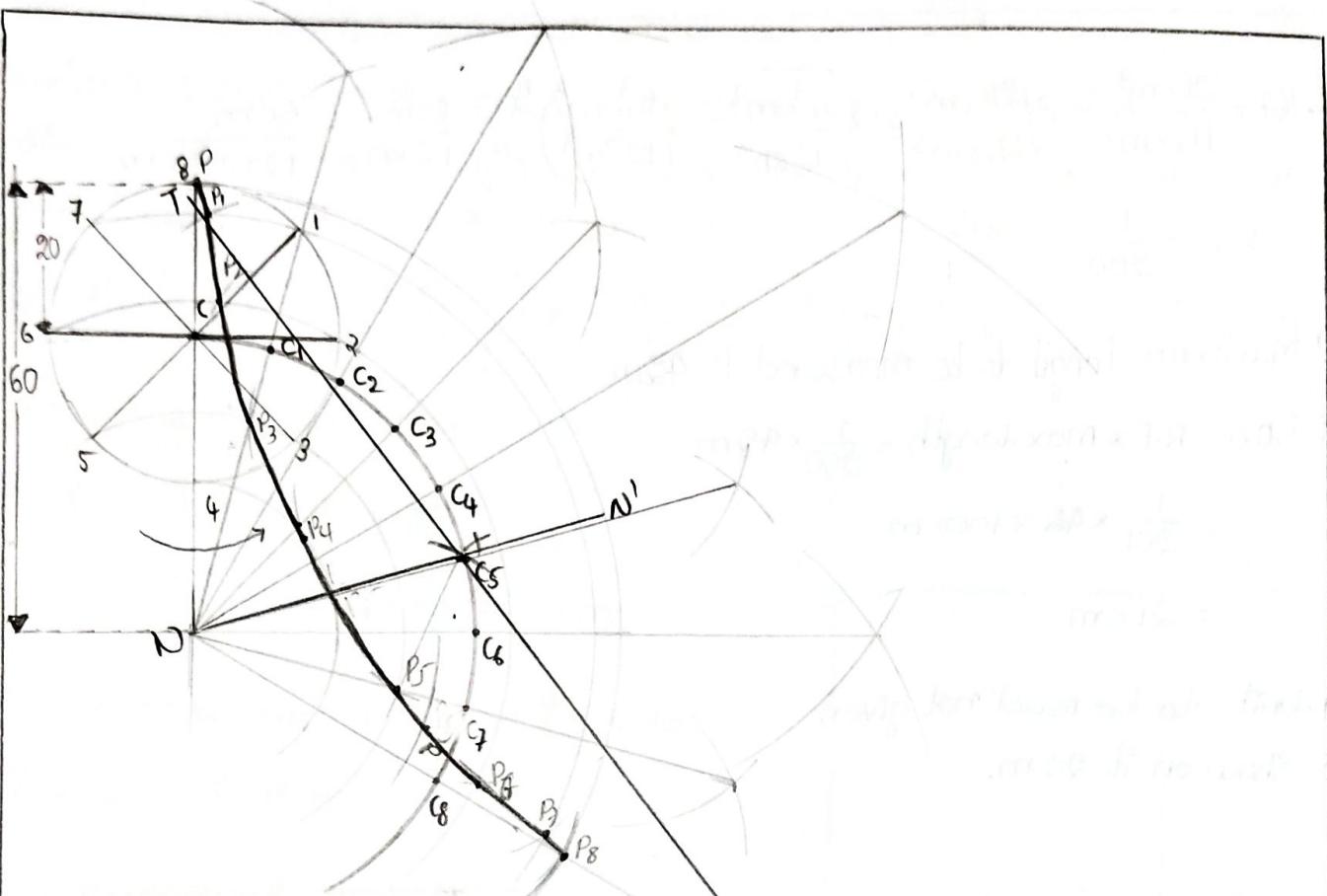


6. a) Distinguish epicycloid from hypocycloid.

An epicycloid is a curve traced by a point on the circumference of a circle which rolls along another circle outside it, without slipping.

b) When eccentricity is greater than 1, then the curve is called?
Hyperbola.

c) Draw a hypo-cycloid of a circle of 40mm diameter which rolls inside another circle of 120mm diameter, for one revolution counter clockwise.
Draw a tangent & normal to it at any point from the center of the directing circle.



7.(a) What are steps involved in construction of scale.

1. The R.F of the scale.

2. The units which it must represent, for example, millimeters and centimetres, or feet and inches etc.

3. The maximum length which it must show.

4. The length of the scale is determined by the formula:

$$\text{Length of the scale} = \text{R.F} \times \text{maximum length required to be measured}$$

b) What is reduced scale?

If actual dimension of an object is reduced so as to accommodate that object in the drawing to be drawn on the provided drawing sheet, then the scale used is called reducing scale.

c) A room of 1728 m^3 volume is shown by a cube of 216 cm^3 volume.

Find R.F and construct a plane scale to measure up to 42 m. Mark a distance of 92 m on the scale.

$$1. R.F = \frac{216 \text{ cm}^3}{1728 \text{ m}^3} = 3\sqrt{\frac{216 \text{ cm}^3}{1728 \text{ m}^3}} = 3\sqrt{\frac{6^3 \text{ cm}^3}{12^3 \text{ m}^3}} = \left(\frac{6^3 \text{ cm}^3}{12^3 \text{ m}^3}\right)^{1/3} = \frac{6 \text{ cm}}{12 \text{ m}} = \frac{6 \text{ cm}}{12 \times 100 \text{ cm}}$$

$$R.F = \frac{1}{200}$$

2. Maximum length to be measured is 42m

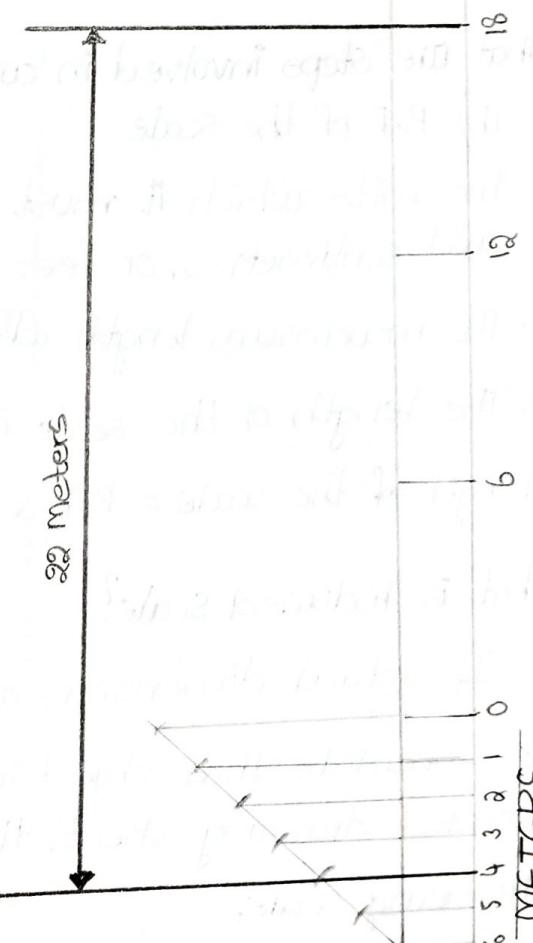
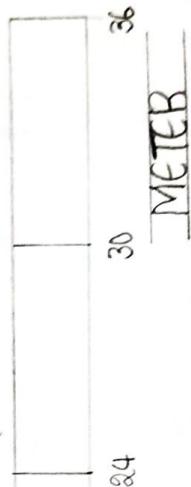
$$3. L.O.S = R.F \times \text{Max. length} = \frac{1}{200} \times 42 \text{ m}$$

$$= \frac{1}{200} \times 42 \times 100 \text{ cm}$$

$$= 21 \text{ cm}$$

4. Units to be read: not given

5. Show on it 22 m.



d) Constr A 3.2 cm long line on a map represents a length of 4m. Extend this line to measure length upto 25m and show on it units of meter and 5 meters. Show on a length of 17 m on this line.

$$1. R.F = \frac{\text{Length of the drawing}}{\text{Actual length of object}} = \frac{3.2 \text{ cm}}{4 \text{ m}} = \frac{3.2 \text{ cm}}{4 \times 100 \text{ cm}} = \frac{8}{1000}$$

2. Maximum length = 25 m

3. L.O.S = R.F × Max. length

$$= \frac{3.2}{4 \times 100} \times 25 \times 100 = 20 \text{ cm}$$

4. Units to be read meter and 5 meter

5. Show on it 17 m.

8.a) Define Length of the Scale.

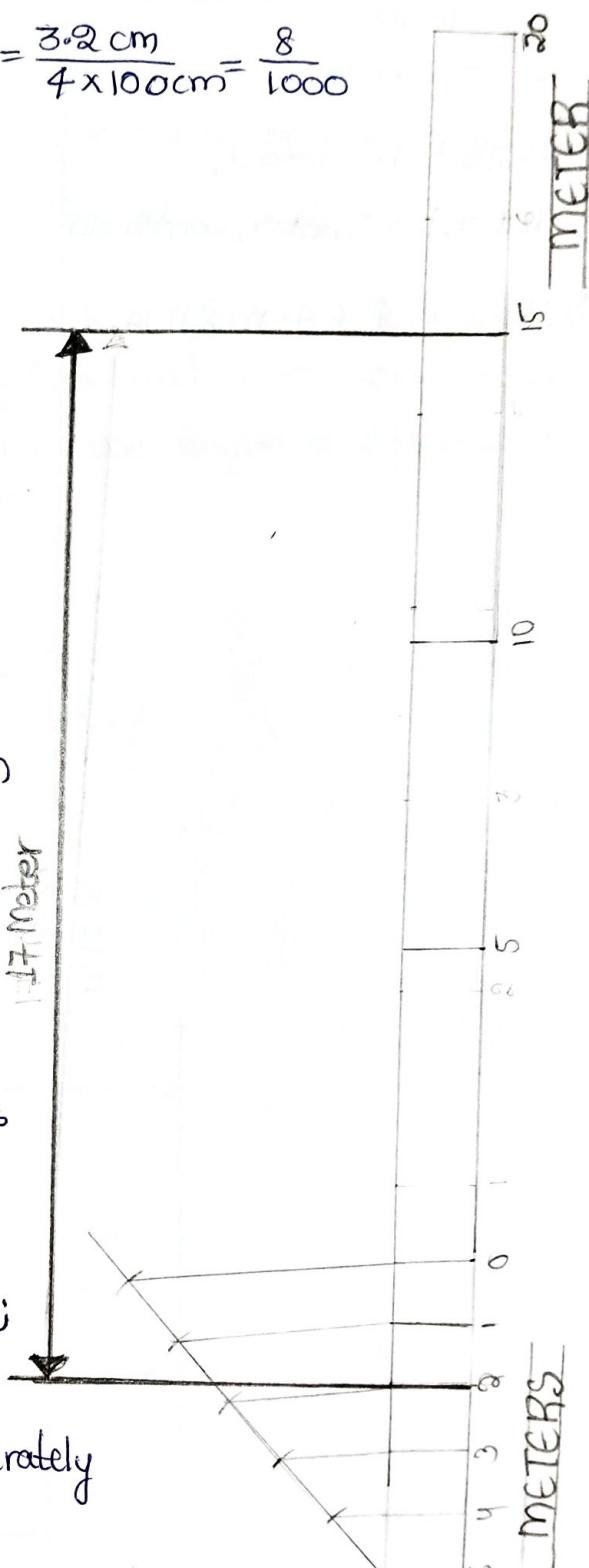
Length of the scale = R.F × Maximum length required to be measured.

b) What are the advantages of using a distance-diagonal scale over a plain scale?

Through Diagonal Scale, measurements can be up to second decimal places. Are used to measure distances in a unit & its immediate two subdivisions; eg:- dm, cm & mm (or) yard, foot & inch.

Diagonal Scale can measure more accurately than the plain scale.

c) On a building plan a line 20 cm long represents a distance of 10 m. Device the building diagonal scale for plan to read upto 12 m showing meter, Decimeter, Centimeter. Show your scale a length 6.48 m and 11.14 m.



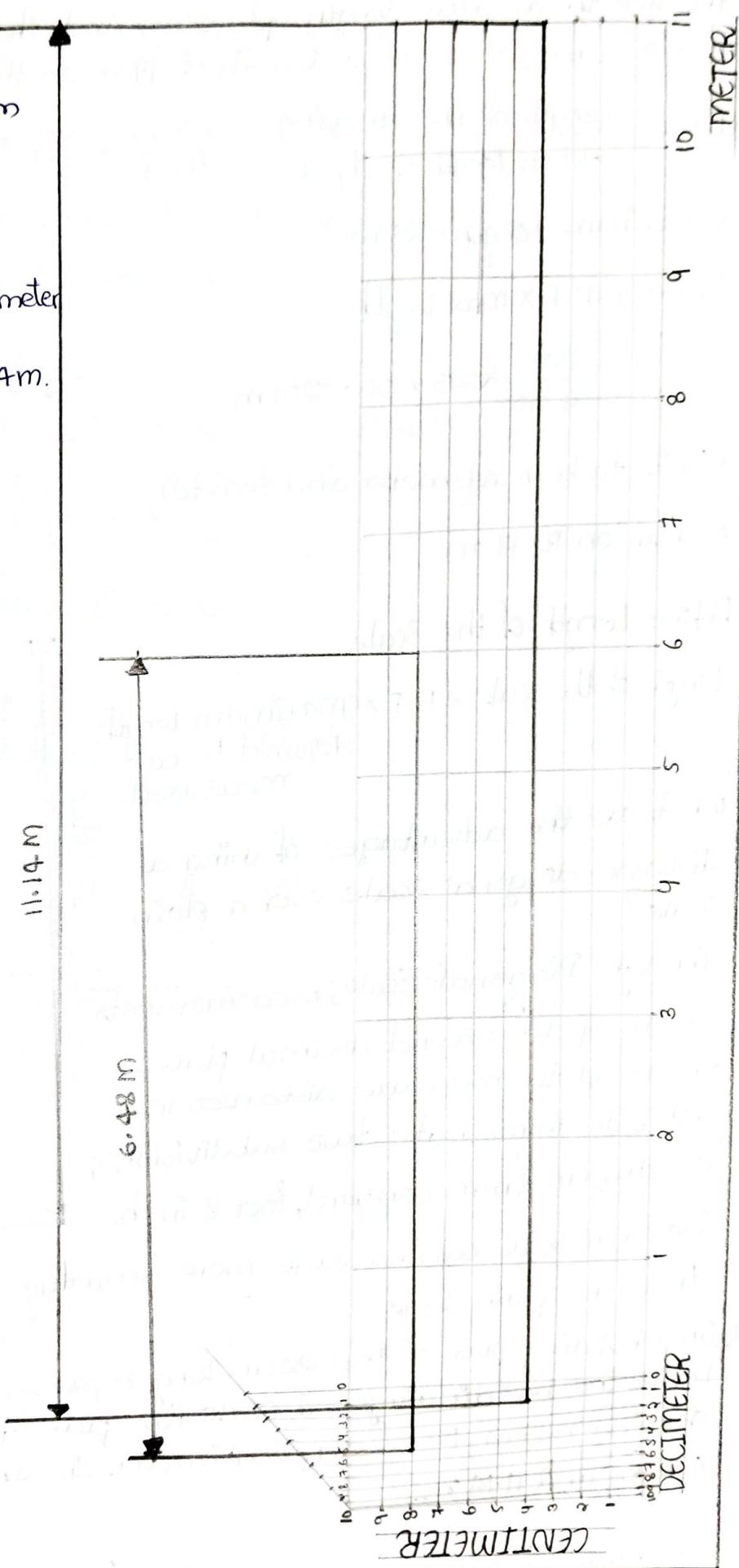
$$1) R.F = \frac{20\text{cm}}{10\text{m}} = \frac{20\text{ cm}}{10 \times 100\text{cm}}$$

2) Max length = 12m

$$3) LOS = R.F \times \text{max length}$$
$$= \frac{20}{10 \times 100} \times 12 \times 100 \text{ cm}$$
$$= 24 \text{ cm.}$$

4) Units to be read;
Meter, Decimeter, Centimeter

5) Show on it 6.48m & 11.14m.



9.a) What is an enlarged scale?

Enlarging scale means that the drawing is drawn with the bigger dimensions in comparison to the actual dimensions of the object.

b) Define Representative factor.

The representative factor is defined as the ratio of the length of the drawing to the actual length of the object.

c) The area of a field is 50,000 sq.m. The length & the breadth of the field, on the map are 10 cm and 8 cm respectively. Construct a diagonal scale which can measure upto 300 meters. Mark the length of 235 meters on the scale. What is the R.F of the scale?

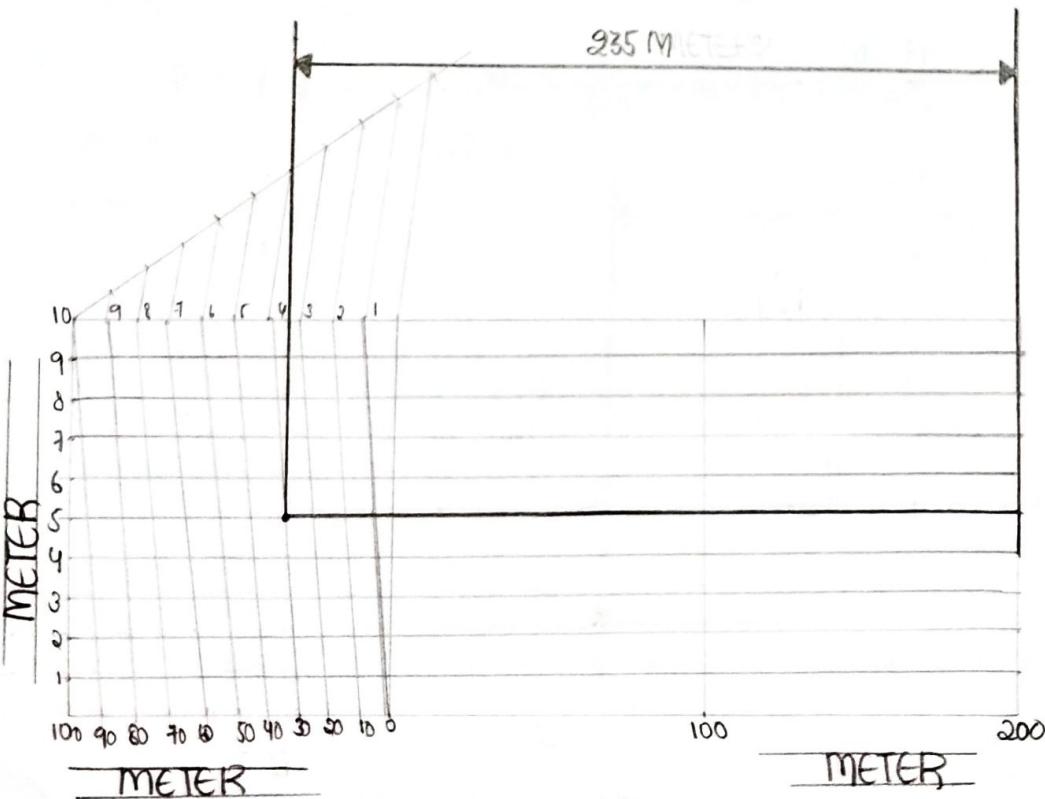
$$1, R.F = \frac{LD}{AL} = \frac{80 \text{ cm}^2}{50,000 \text{ m}^2} = \sqrt{\frac{80 \text{ cm}^2}{50000 \text{ m}^2}} = \frac{1}{2500}$$

2, Max length = 300 m

$$3) LOS = R.F \times \text{max length} = \frac{1}{2500} \times 300 \times 100 = 12 \text{ cm}$$

4) Units to be read not given

5) Show on it 235 m.



10. a) What is AutoCAD?

AutoCAD is a 2D and 3D computer-aided design software application developed by Autodesk.

b) What are the different CAD software's available?

AutoCAD, Creo, CATIA, Fusion 360, Autodesk Inventor, Solidworks, BricsCAD, SketchUp and Tinkercard.

c) On a map the distance between two points is 14cm. The real distance between them is 20 km. Draw the diagonal scale of this map to read km & hm and to measure upto 25km. Show a distance of 17.6km on it.

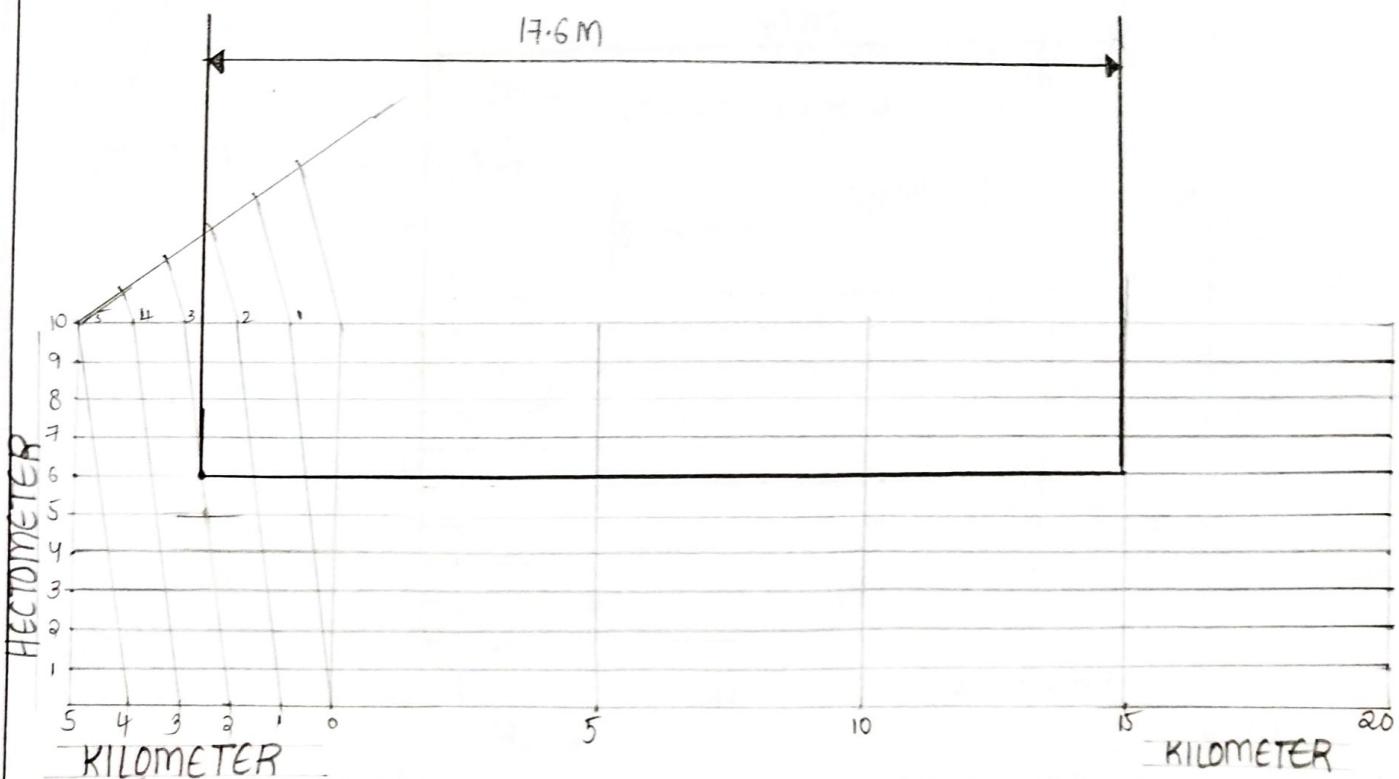
$$1) R.F = \frac{L.O.D}{A.L} = \frac{14 \text{ cm}}{20 \text{ km}} = \frac{14}{20 \times 10^5}$$

$$2) \text{Max. Length} = 25 \text{ km}$$

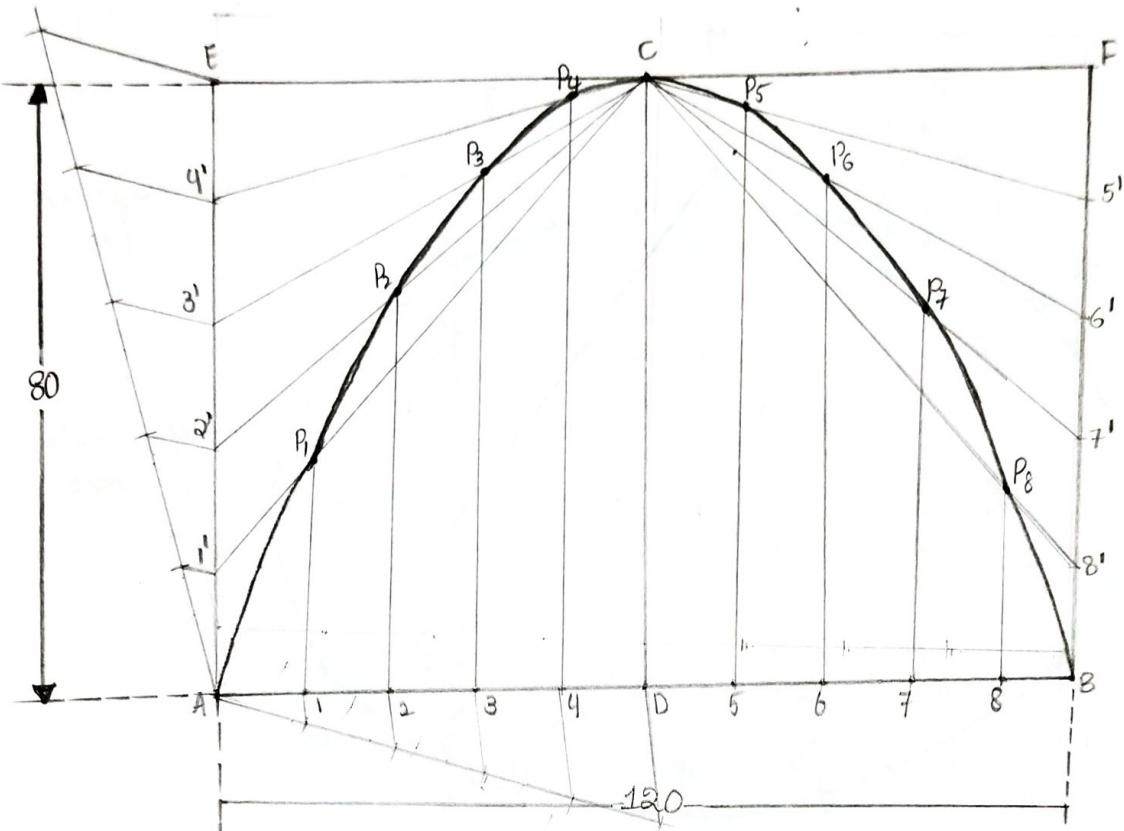
$$3) \text{Length of Scale} = \frac{14}{20 \times 10^5} \times 25 \times 10^5 = 17.5 \text{ cm}$$

4) Units to be read Kilometer & Hectometer.

5) Show on it 17.6 km.



11. Construct a parabola, with the length of base as 120 mm & axis 80 mm long by using oblog method.



12. Construct a scale of $1.5 \text{ cm} = 1 \text{ dm}$ to read up to 1 meter & show on it a length of 0.6 meter.

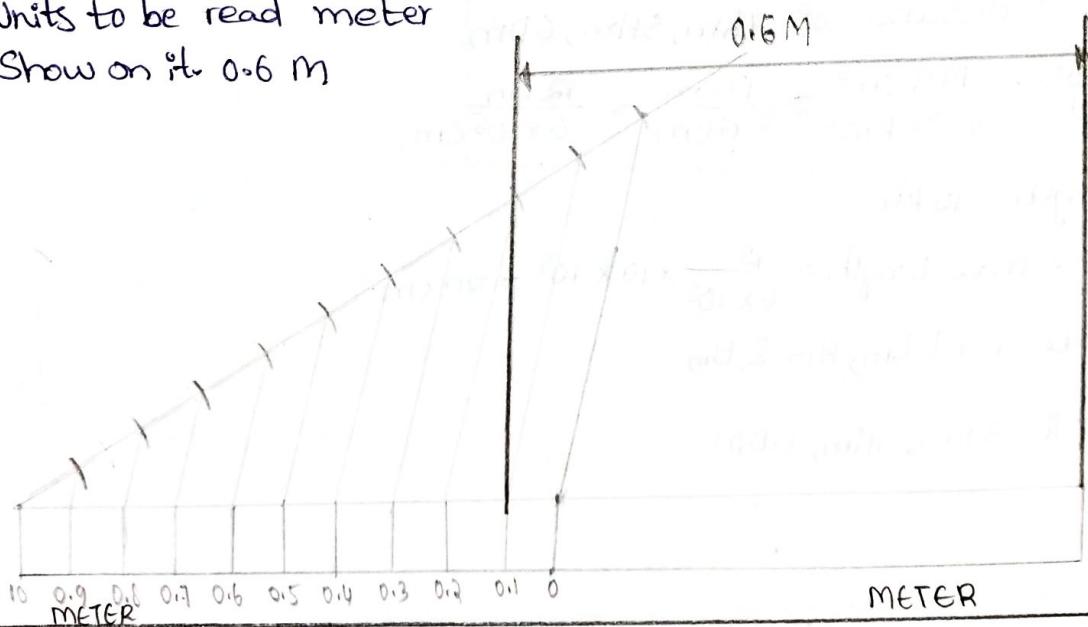
$$R.F = \frac{100 \text{ cm}}{15 \text{ cm}} = \frac{3}{20}$$

Max length = 1m

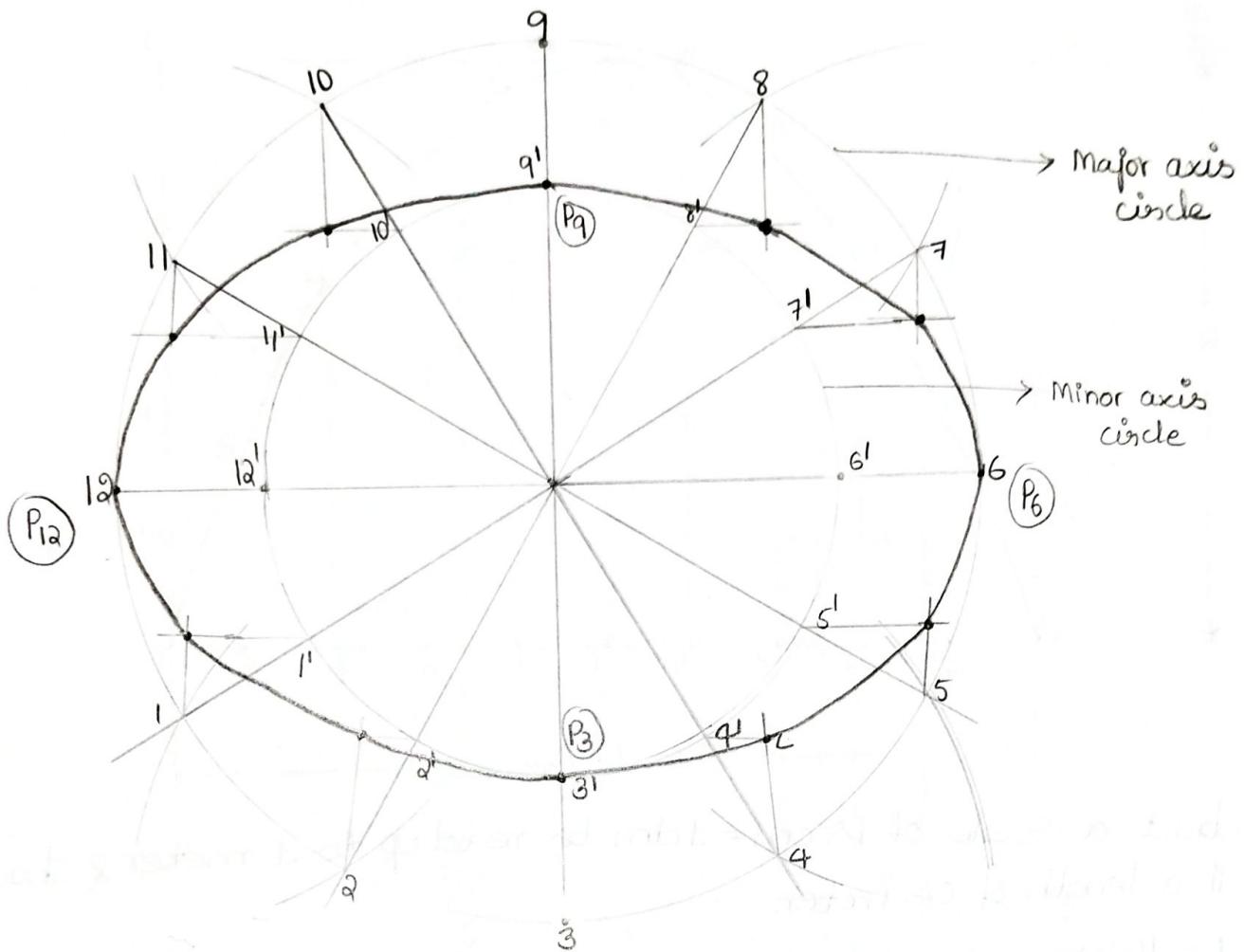
$$L.O.S = R.F \times M.L = \frac{3}{20} \times 1\text{m} = \frac{3}{20} \times 100\text{cm} = 15\text{cm}$$

Units to be read meter

Show on it 0.6 m



13. The major axis of an ellipse is 120 mm long and the minor axis is 80 mm. Draw the ellipse by concentric circles method.



14. An area of 144 cm^2 on a map represents an area of 36 km^2 on the field. Find the R.F. of the scale of this map and draw a diagonal scale to show Km, Hm & Dm & to measure upto 10 km. Indicate on the scale a distance of 7km, 5Hm, 6Dm.

$$1) \text{R.F.} = \frac{\text{L.O.D}}{\text{A.L.}} = \sqrt{\frac{144 \text{ cm}^2}{36 \text{ km}^2}} = \frac{12 \text{ cm}}{6 \text{ km}} = \frac{12 \text{ cm}}{6 \times 10^5 \text{ cm.}}$$

2) Max. Length = 10 km

$$3) \text{L.O.S.} = \text{R.F.} \times \text{max. length} = \frac{12}{6 \times 10^5} \times 10 \times 10^5 = 20 \text{ cm.}$$

4) Units to be read km, Hm & Dm

5) Show on it 7 km, 5Hm, 6Dm

