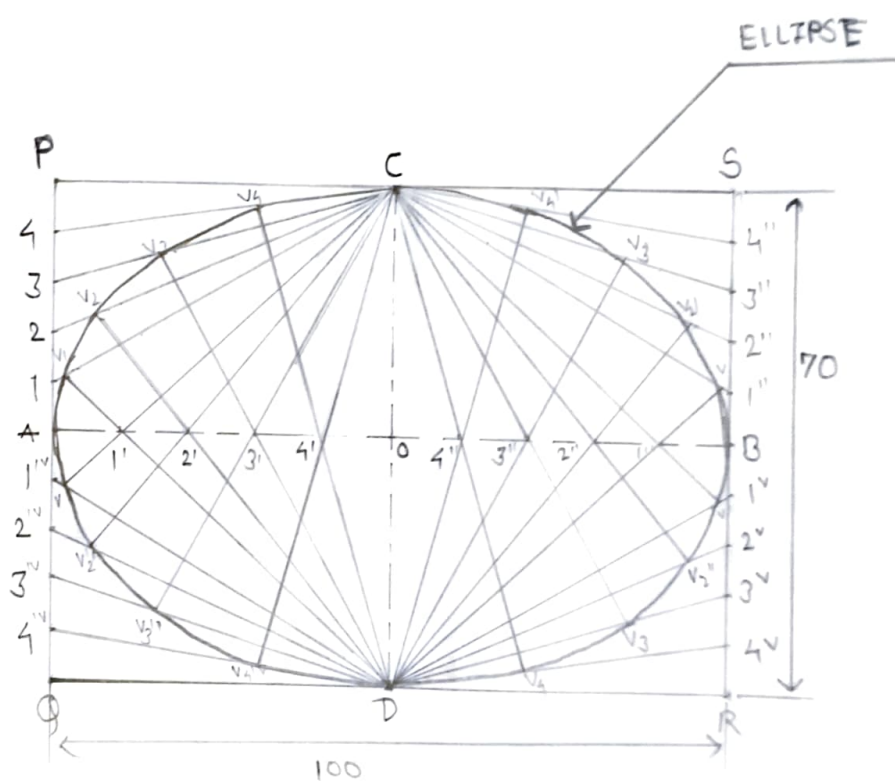


★ RECTANGULAR METHOD ELLIPSE
 1) MAJOR AXIS AND MINOR AXIS OF AN ELLIPSE IS GIVEN AS 100MM AND 70MM RESPECTIVELY. DRAW ELLIPSE BY RECTANGLE METHOD

★ STEPS:-

- 1) Draw the rectangle
- 2) Divide it in the 4 quadrants
- 3) Divide each side of 1 quadrant into 5
- 4) Divide middle line into 5 parts and join the p's and draw ellipse



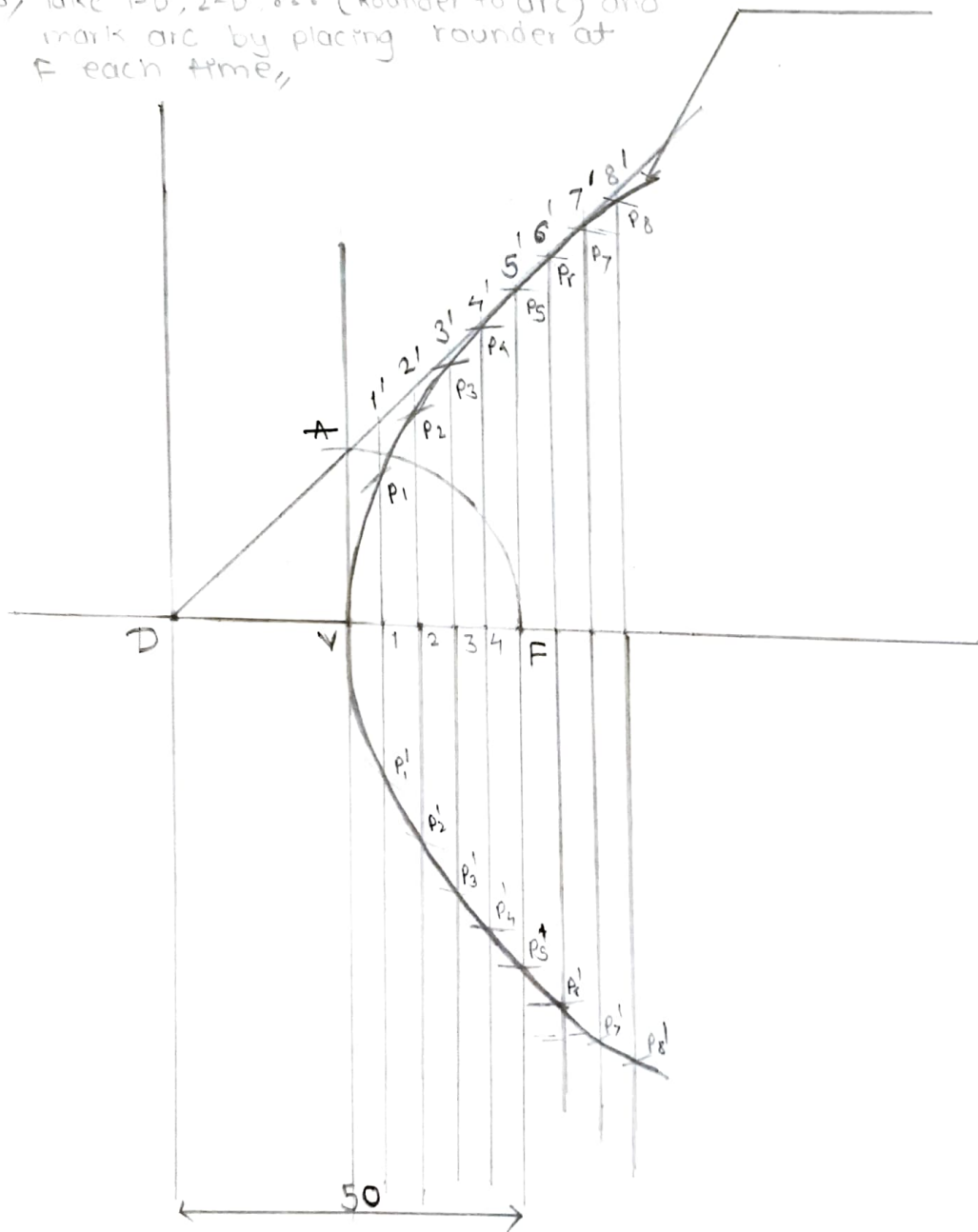
* PARABOLA BY DIRECTRIX METHOD

2) CONSTRUCT A PARABOLA WHEN THE DISTANCE OF FOCUS FROM DIRECTRIX IS 50MM

* Steps:-

- 1) Draw a straight line
- 2) Draw \perp
- 3) Set the given directrix focus distance
- 4) bisect DF and draw \perp through point V
- 5) Take distance VF and draw an arc which bisect V at P+A and draw line at point of intersection
- 6) Take 1-D, 2-D... (Rounder to arc) and mark arc by placing rounder at F each time

PARABOLA



★ ELLIPSE BY DIRECTRIX METHOD

Q) CONSTRUCT AN ELLIPSE BY FOCUS DIRECTRIX METHOD IF DISTANCE BETWEEN FOCUS & DIRECTRIX IS 50MM & ECCENTRICITY = $\frac{2}{3}$

$$e = \frac{2}{3} = \frac{2+3}{3} = 5$$

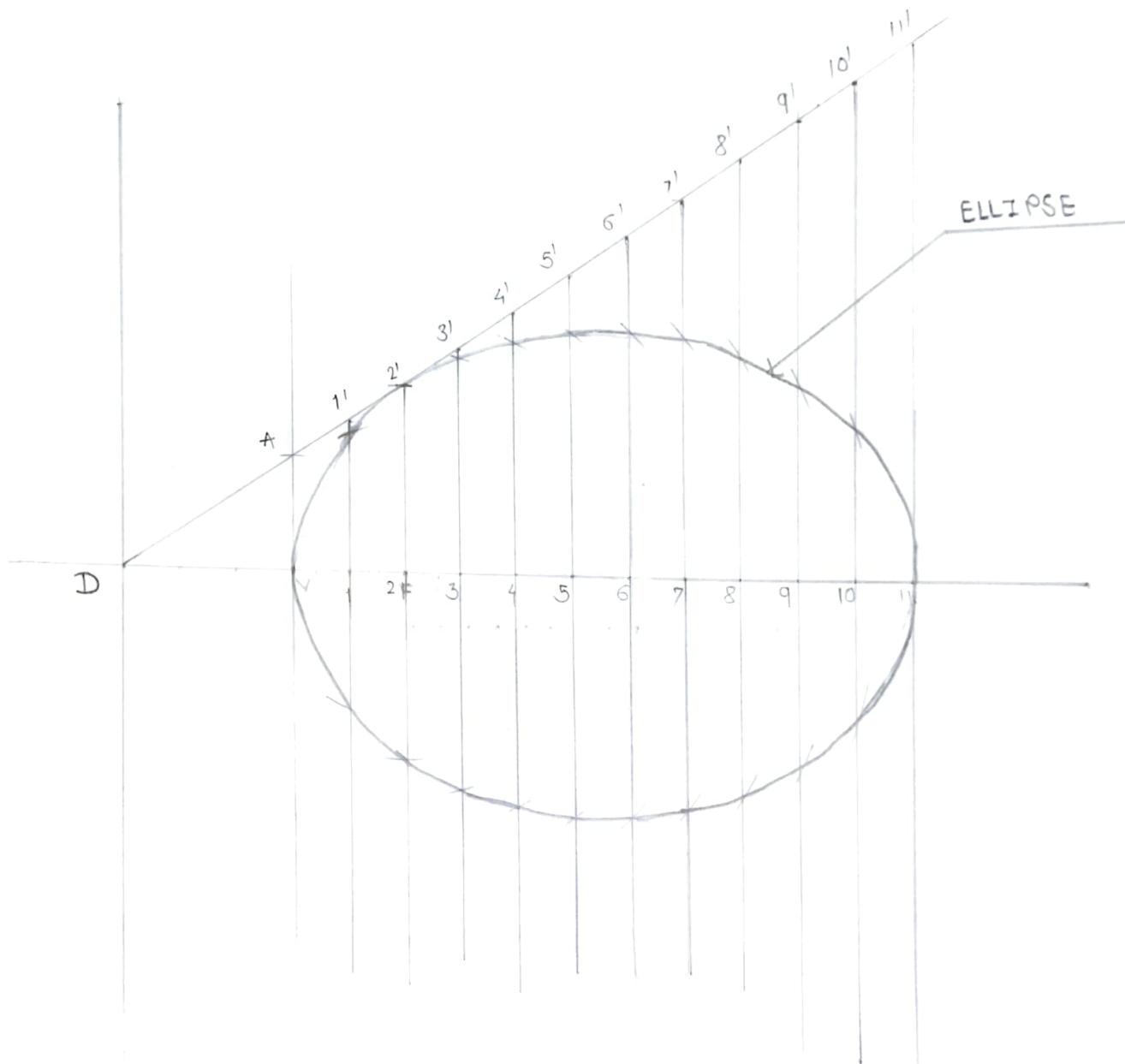
$$\frac{50}{5} = 10 \text{ MM}$$

$$e = \frac{2}{3} = \frac{FV}{DV}$$

$$DV = 30 \text{ MM}$$

$$VF = 20 \text{ MM}$$

$$e = \frac{\text{distance of pt from focus}}{\text{distance of pt from directrix}}$$

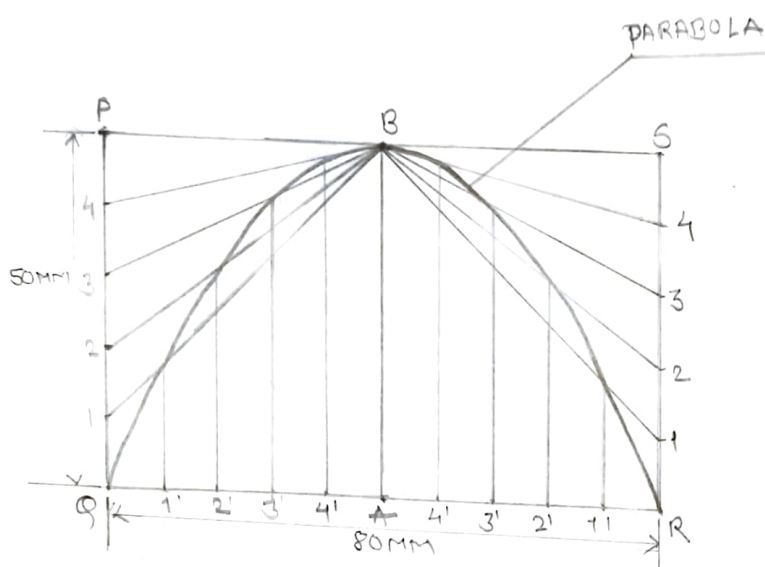


Steps:-

- 1) Draw a horizontal line & draw a vertical line to it
- 2) Take a point 'F' on the horizontal line & mark it as focus [Mark point 'V' using $e = \frac{2}{3}$]
- 3) Take a point 'D' on the vertical line & mark it as directrix (IMP)
- 4) Draw a line segment 'FD' & divide it into 5 equal parts & mark the arcs
- 5) Take a point '1' on the horizontal line & draw a vertical line to it

* PARABOLA BY RECTANGULAR METHOD.

Q) CONSTRUCT A PARABOLA IF BASE LENGTH IS 80MM & AXIS HEIGHT IS 50MM
BY RECTANGULAR METHOD

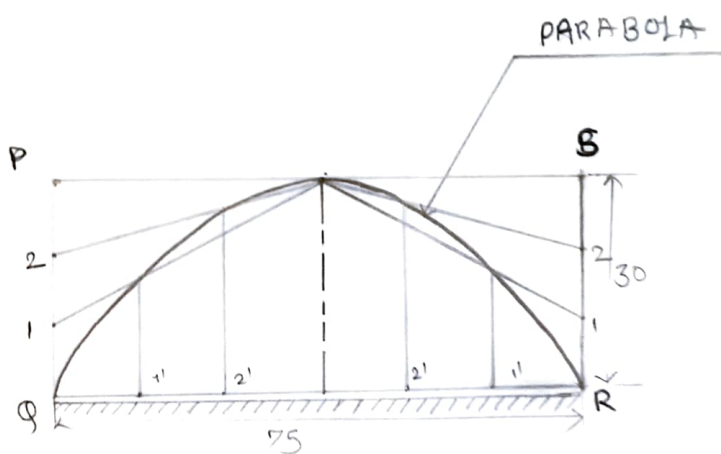


* Steps:-

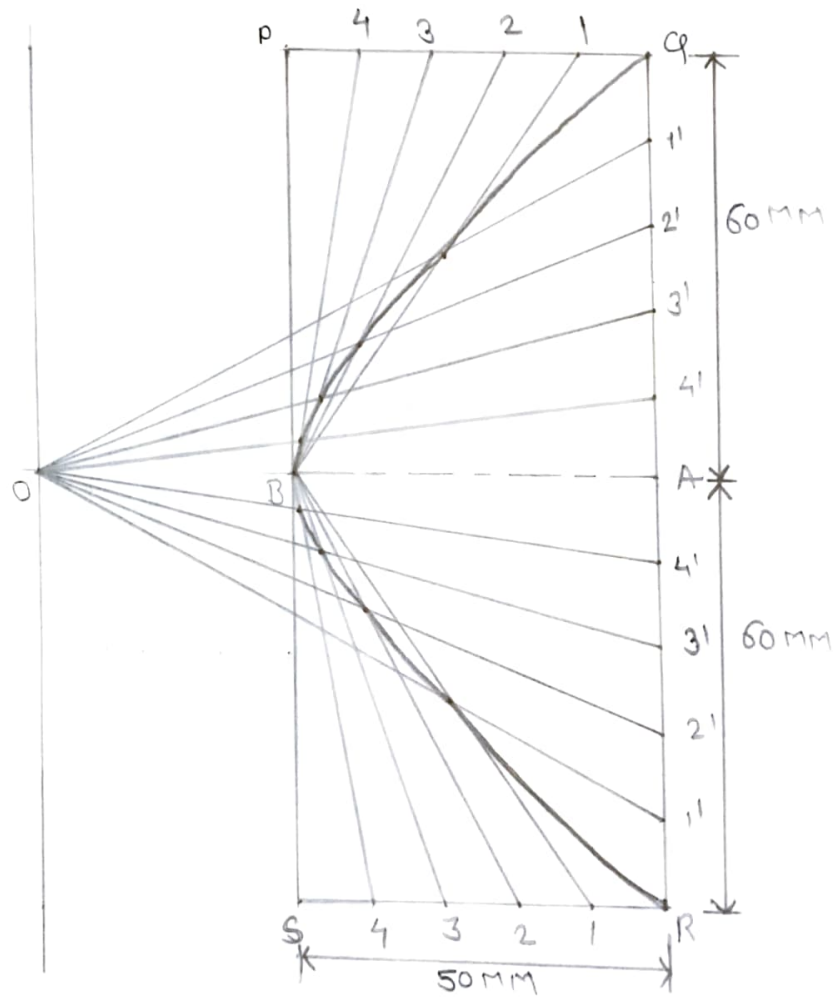
- 1) Draw a rectangle & divide it into two parts
- 2) Divide each part into 4 sub-parts.
- 3) Draw vertical pt to pt R and draw vertical lines 1'-1, 2'-2, ... 7-7 join the points.

Q) A THROW OF A BALL FROM A FIELDER ON A CRICKET GROUND REACHES TO THE WICKET KEEPER IN PARABOLIC PATH THE BALL IS MAX 30 FT ABOVE THE GROUND THE BALL IS THROWN FROM 1M. THE DISTANCE BETN FIELDER AND WICKET-KEEPER IS 75M

SCALE
1M = 1CM

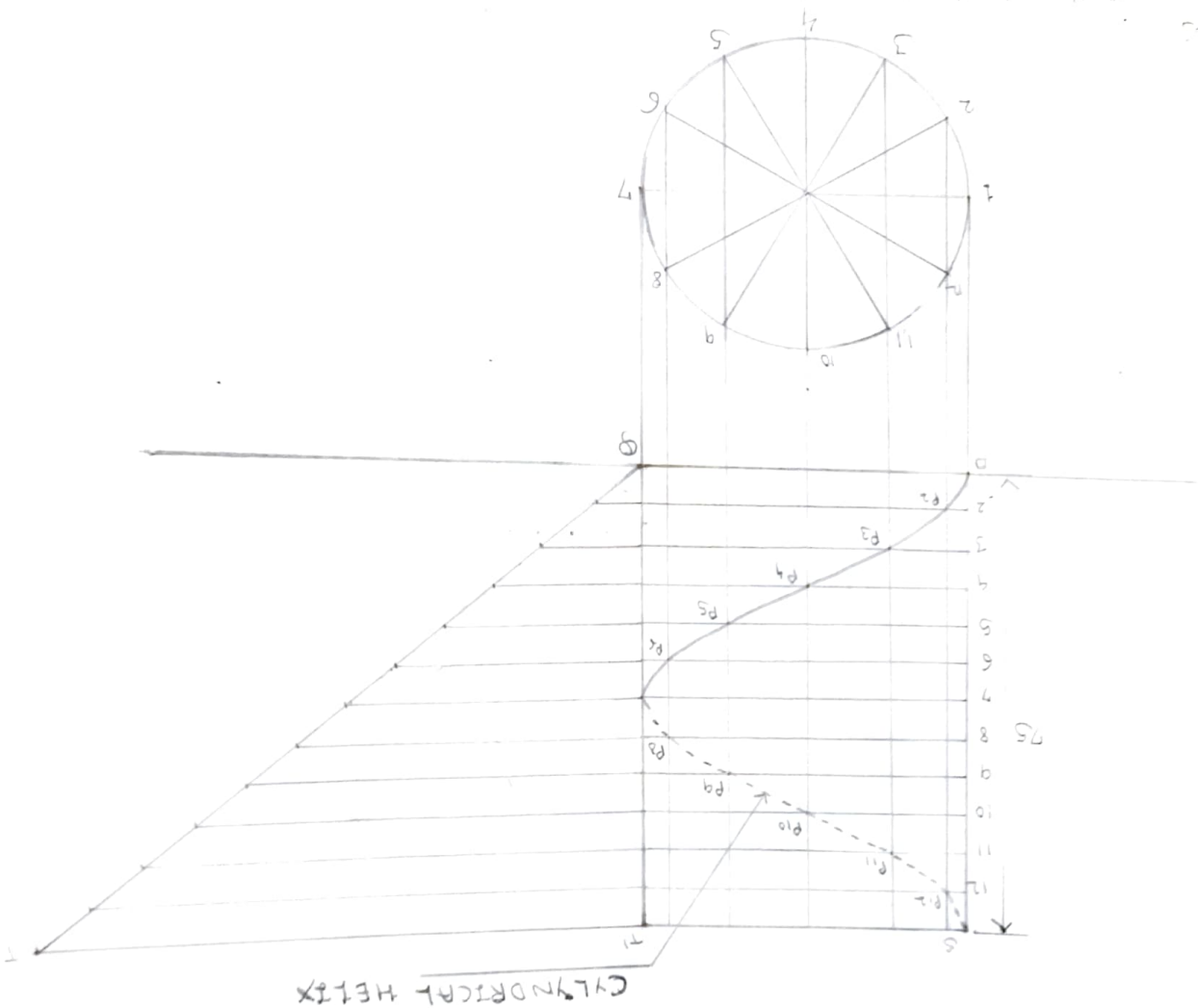


8) DRAW A HYPERBOLA HAVING TRANSVERSE AXIS 20MM ABSCISSA 50MM AND DOUBLE ORDINATE 120MM USING RECTANGULAR METHOD.



- Steps:-
1. Draw Rectangle of given dimensions
 2. Divide it in two parts and mark pt O along centre line of rectangle
 3. Divide each part of rectangle into 4 parts and join vertical pt to pt O
 4. Join these points to pt B.

9 DRAW A CYLINDRICAL HELIX OF DIAMETER 50MM AND

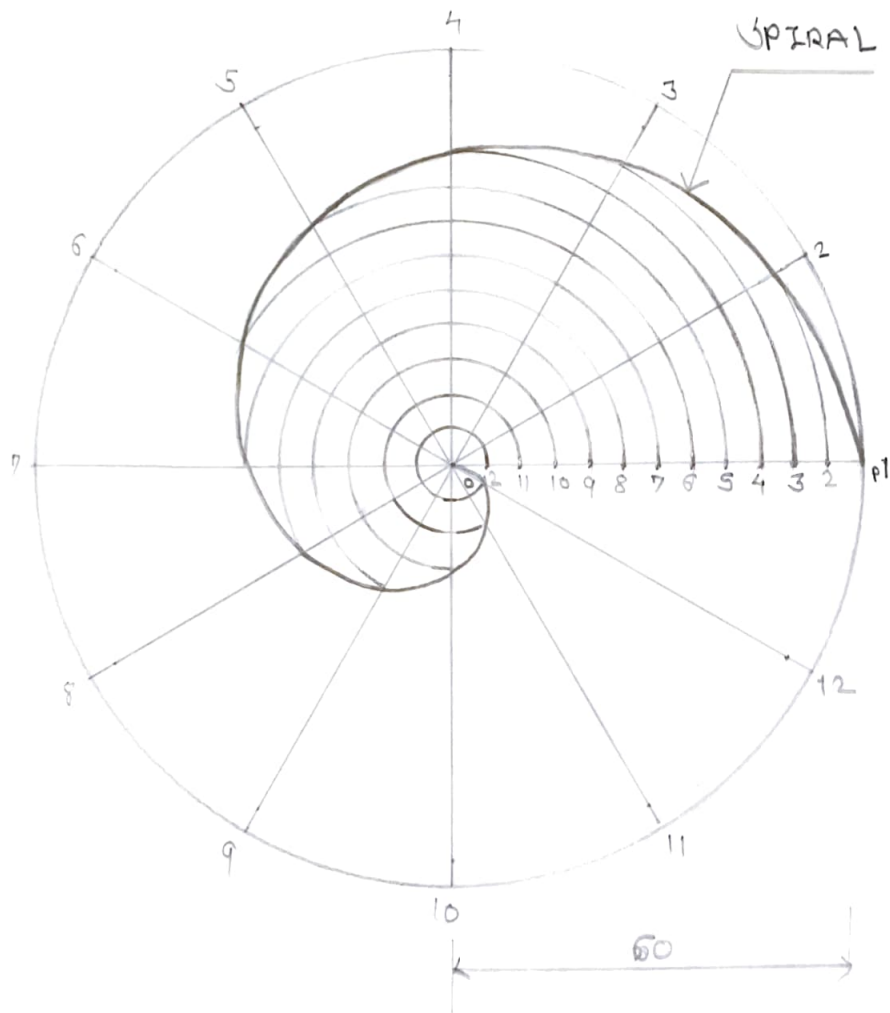


Steps

1. Draw a circle & divide it into 12 parts.
2. Draw a rectangle equal to the vertical diameter of circle and construct a rectangle of same distance from diameter of circle and construct a rectangle.
3. Draw a rectangle line at any angle & in pt Q.
4. Draw a rectangle line at any angle & in pt Q.
5. Draw a rectangle line at any angle & in pt Q.
6. Draw a rectangle line at any angle & in pt Q.
7. Draw a rectangle line at any angle & in pt Q.
8. Draw a rectangle line at any angle & in pt Q.
9. Draw a rectangle line at any angle & in pt Q.
10. Draw a rectangle line at any angle & in pt Q.
11. Draw a rectangle line at any angle & in pt Q.
12. Draw a rectangle line at any angle & in pt Q.

at last the drawing is complete.

Q) DRAW THE ARCHIMEDEAN SPIRAL HAVING OUTER DIAMETER 60MM.

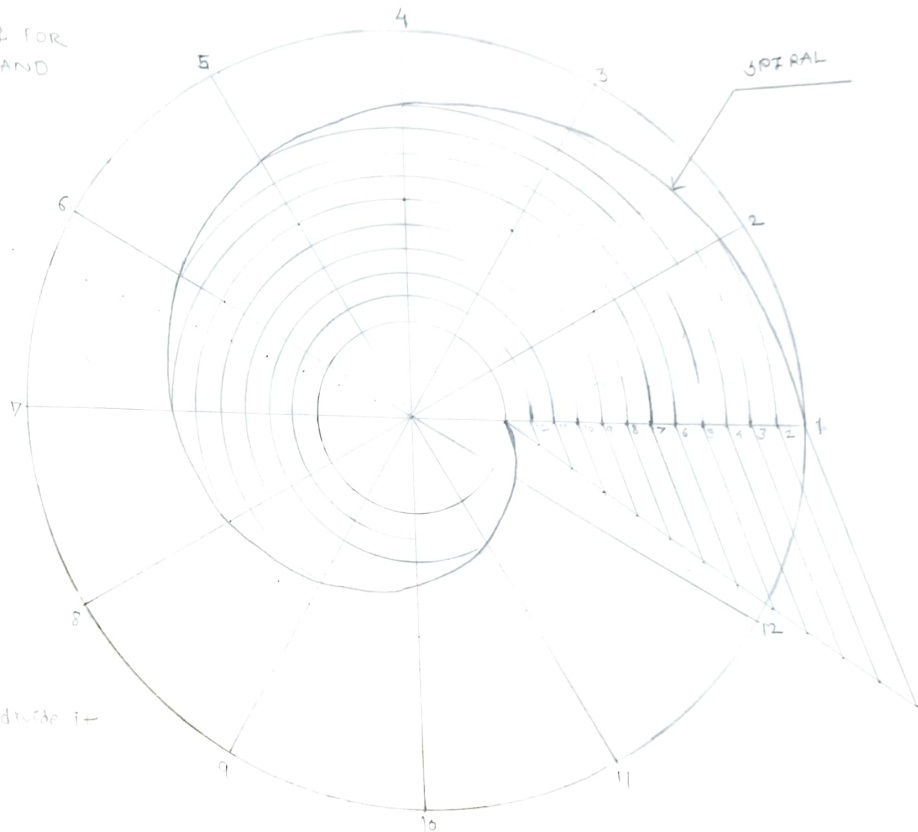


* STEPS:-

- 1) First draw a circle of given diameter and then divide it into 12 parts
- 2) Divide it in 12 equal parts.
- 3) Take rounder and then join 2-2, 3-3, 4-4 Join the intersection pt.

CONSTRUCTING AN ARCHIMEDEAN SPIRAL FOR ONE CONVOLUTION WITH GREATEST AND LEAST OF 100MM AND 20MM.

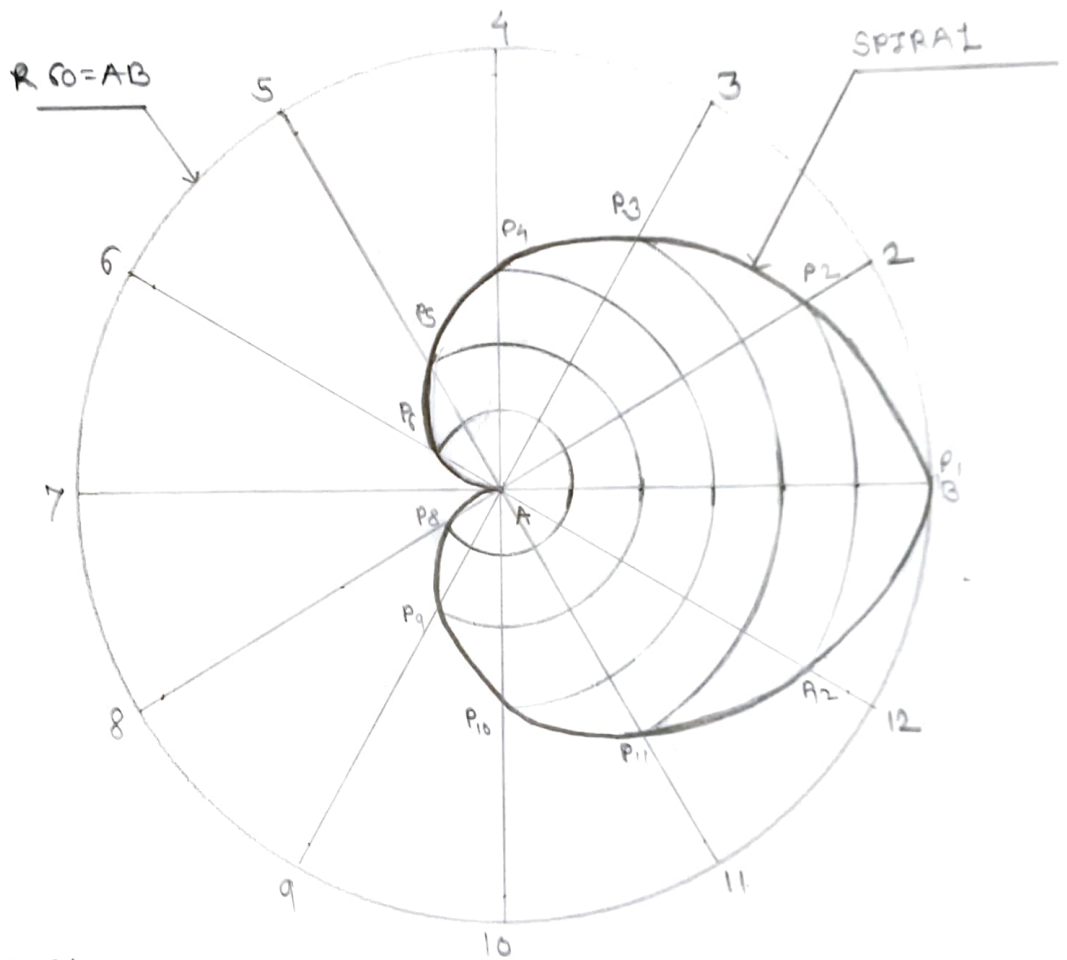
Q) CONSTRUCT AN ARCHIMEDEAN SPIRAL FOR ONE CONVOLUTION WITH GREATEST AND LEAST OF 100MM AND 20MM.



STEPS

- 1) Draw a circle of given diameter and divide it into 12 parts.
- 2) Divide the right side into 12 parts.
- 3) Draw the spiral in 12 parts.
- 4) For two convolution 24 parts.
- 5) Draw a circle of diameter 100mm.
- 6) Divide the circle into 12 parts.

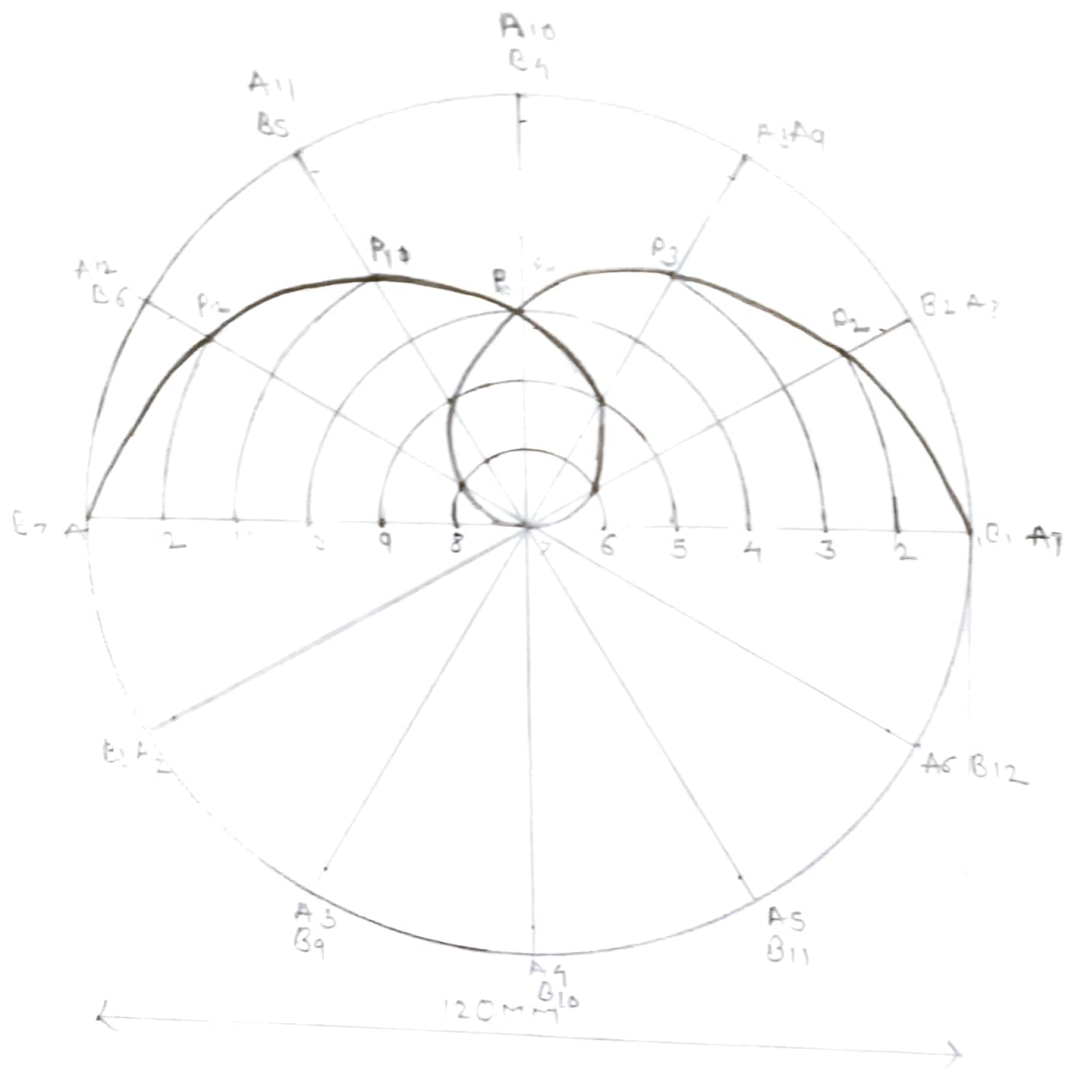
3) A ROD AB 60MM LONG ROTATES ABOUT POINT A FOR ONE ROTATION DURING THIS PERIOD POINT B MOVES FROM B TO A AND BACK TO B DRAW LOCUS AND NAME THE CURVE.



* STEPS:-

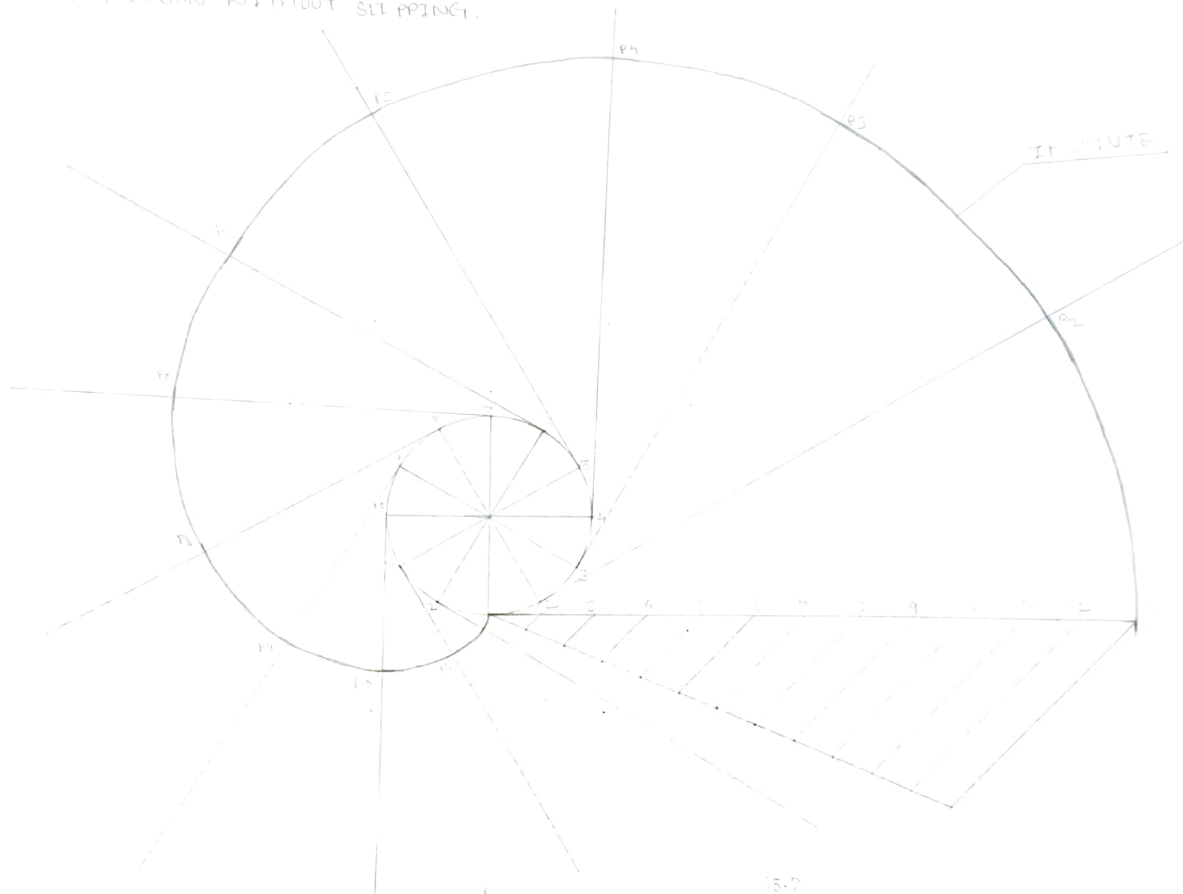
- 1) Draw a circle of give radius
- 2) Divide the circle into 12 parts
- 3) Divide AB into 6 parts
- 4) Draw arc by placing rounder at fixed at A
 Arc from 12-2, 11-3, 10-4, ...
- 5) Join the points to get heart shape curve.

Q. A ROD AB 120MM LONG ROTATES ABOUT ITS MIDPOINT
 FOR ONE ROTATION DURING THIS ROTATION A POINT
 P MOVS FROM B TO A. DRAW ITS LOCUS AND
 NAME THE CURVE



A THREAD IS WOUND AROUND A CIRCLE OF DIAMETER 50MM, KEEPING IT TIGHT SUCH THAT AFTER 1 ROTATION THE FREE END OF A CIRCLE TOUCHES THE FIXED POINT, WHICH IS THE POINT OF THE CIRCLE CIRCUMFERENCE. DRAW PATH OF THE FREE END.

SOLUTION:- IT IS THE CURVE TRACED BY THE END OF THE THREAD AS IT IS UNWOUND AROUND A POLYGON OR A CIRCLE, KEEPING IT TIGHT OR IT IS A PATH TRACED BY A POINT ON A STRAIGHT LINE WHEN IT ROLLS ALONG ON A CIRCLE OR POLYGON WITHOUT SLIPPING.



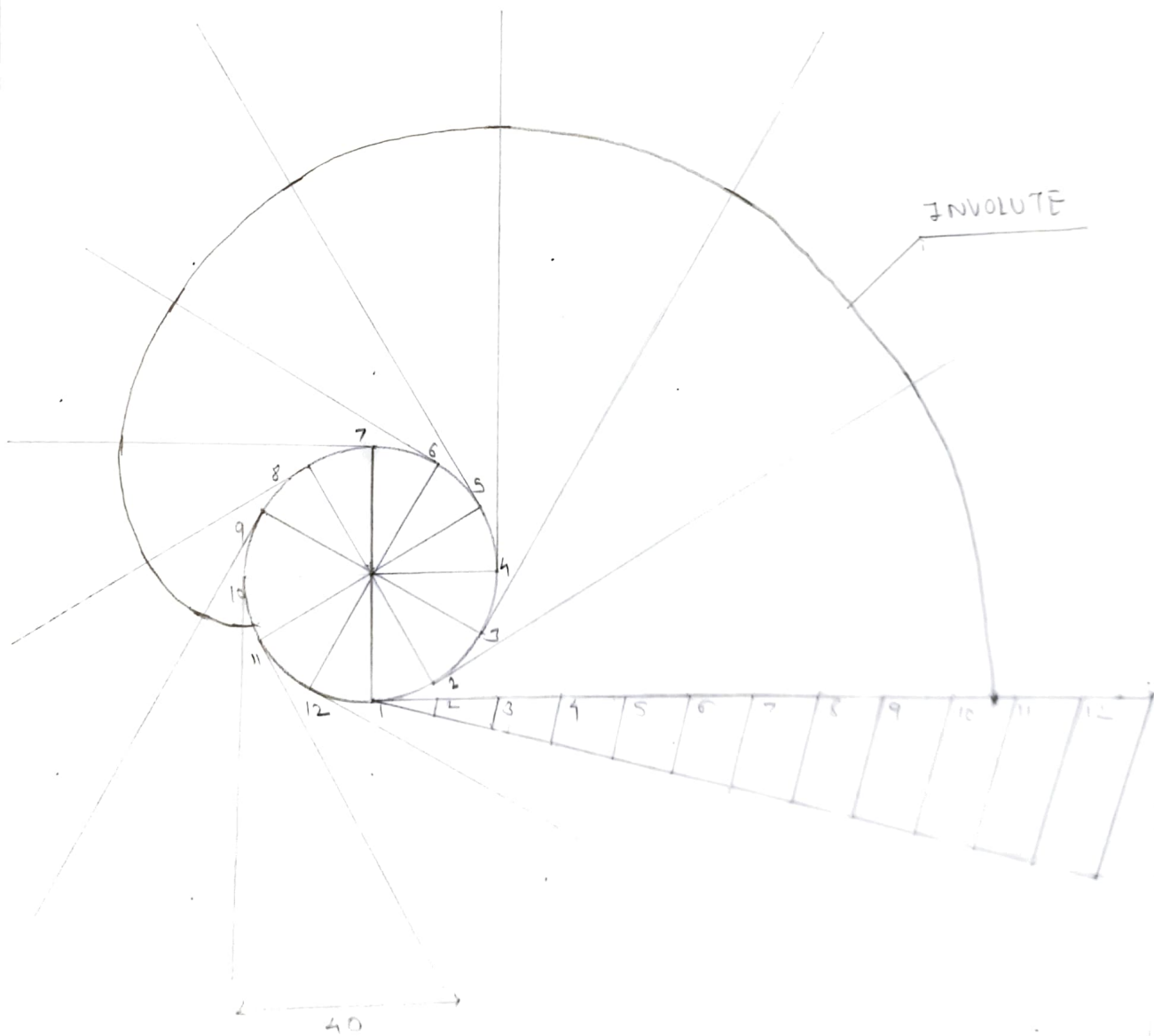
Q) AN INELASTIC STRING OF 100MM LENGTH IS WOUND AROUND A DISC OF 40MM DIAMETER. TRACE THE PATH OF FREE END OF A STRING

CALCULATIONS

$$\pi n = 360^\circ$$

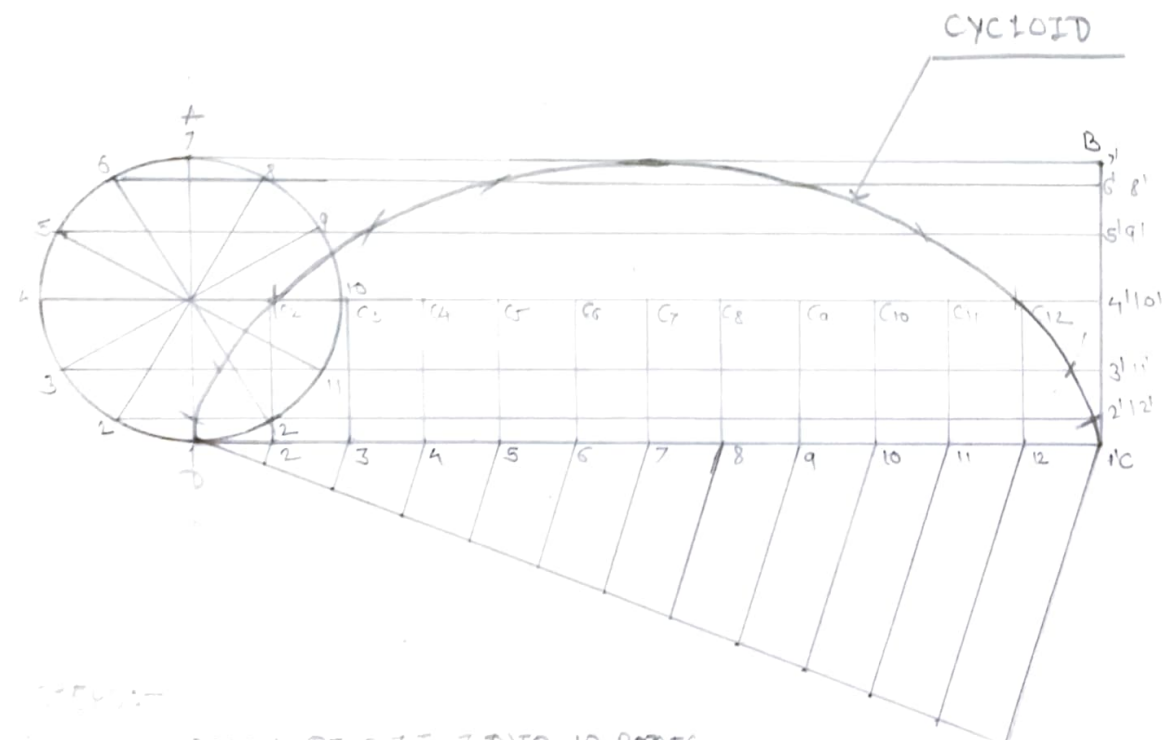
$$100 = ?$$

$$\theta = 286^\circ$$



CYCLOID : IT IS THE LOCUS OF A POINT ON A CIRCUMFERENCE OF ROLLING CIRCLE WHICH ROLLS WITHOUT SLIPPING OR SLIDING ALONG A FIXED STRAIGHT LINE. THE ROLLING CIRCLE IS CALLED AS GENERATING CIRCLE AND THE STRAIGHT LINE IS CALLED DIRECTING LINE.

Q) A CIRCLE OF 40MM DIAMETER ROLLS ALONG A STRAIGHT LINE WITHOUT SLIPPING. DRAW THE CURVE TRACED OUT BY POINT P ON THE CIRCUMFERENCE FOR COMPLETE 1 REVOLUTION. CONSIDER P POINT IS AT POINT OF CONTACT.



CONSTRUCTION:-

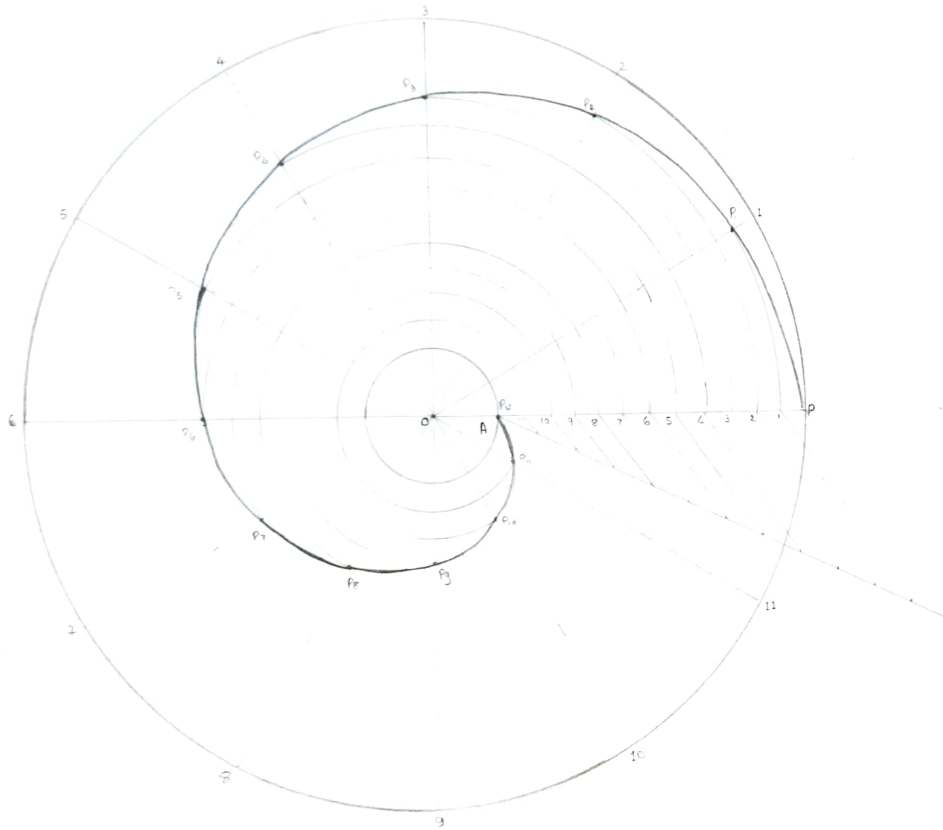
1. DRAW A CIRCLE DIAMETER IT INTO 12 PARTS.
2. DRAW A HORIZONTAL LINE DC OF 125MM AND DIVIDE IT INTO 12 PARTS.
3. TAKE THE DISTANCE OF 12 PARTS AND MARK IT ON LINE DC AS 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12.
4. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
5. TAKE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
6. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
7. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
8. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
9. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
10. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
11. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.
12. TAKE THE DISTANCE OF DIAMETER IN ROUNDER AND PLACE IT ON EACH OF THE PARTS OF LINE DC WITH HELP OF ROLLER SCALE.

CONSTRUCT AN ARCHIMEDEAN
SPIRAL FOR ONE CONVOLUTION
WITH GREATEST AND LEAST
RADIUS OF 30 mm AND 15 mm.

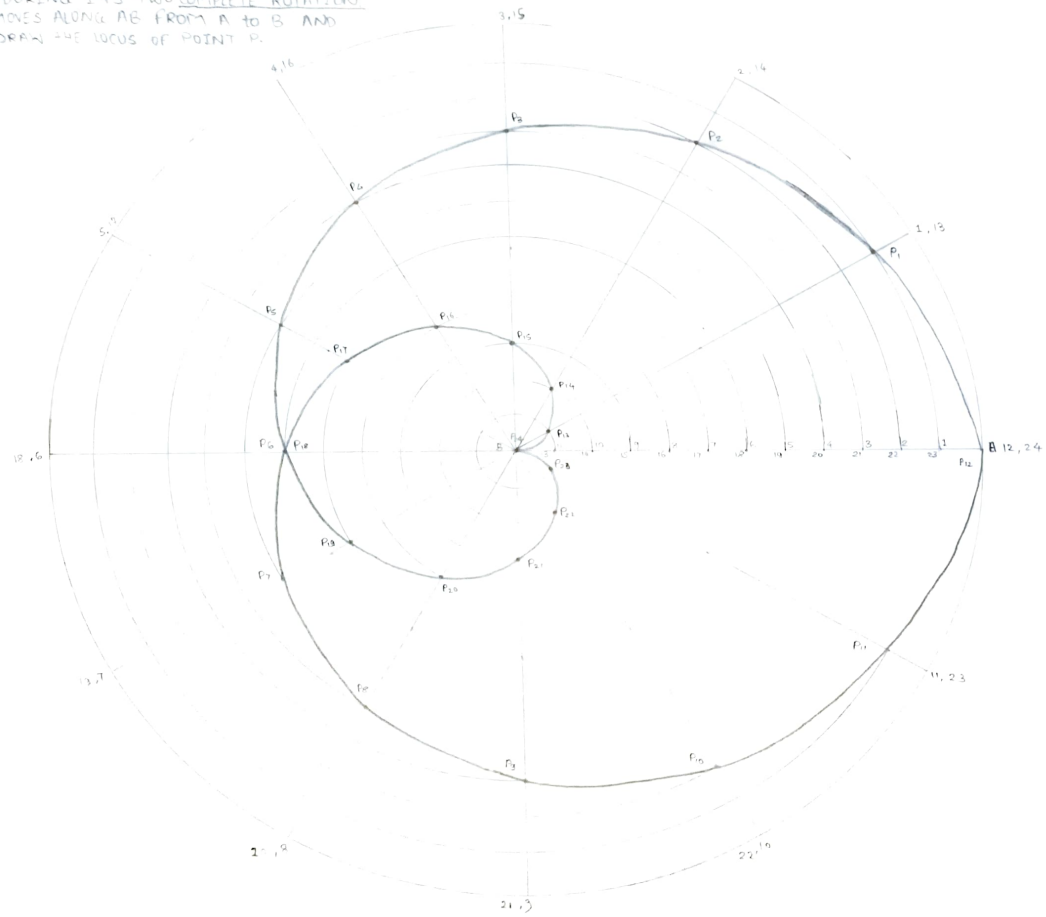
ARCHIMEDEAN SPIRAL

STEPS:

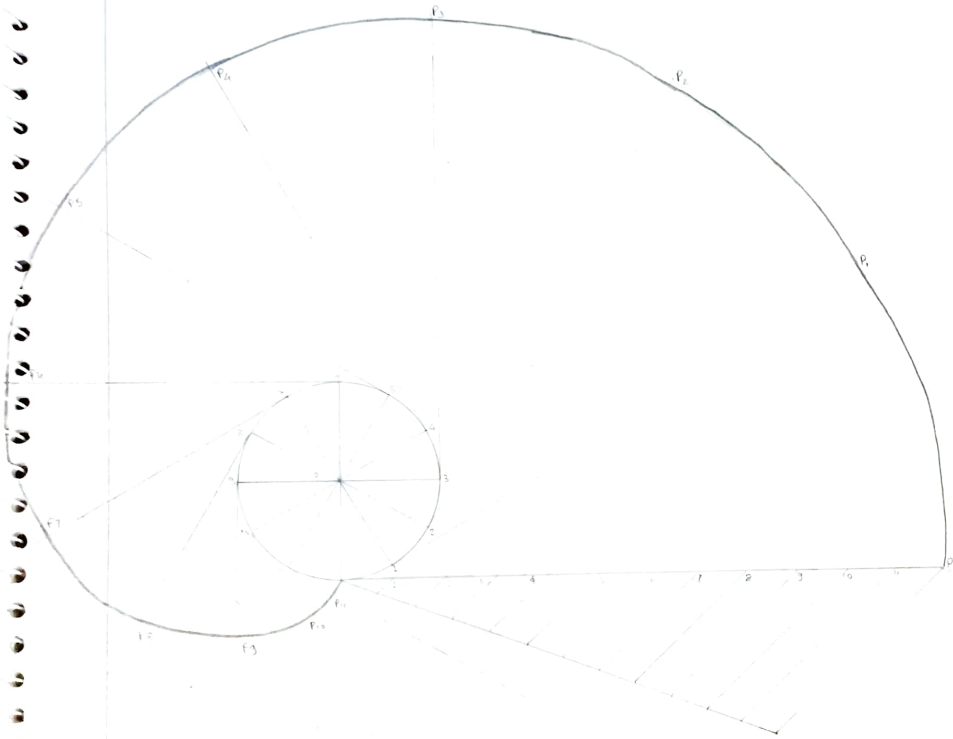
- ① Draw the circle of greatest spur radius and divide it into 12 parts of 30°
- ② Divide circles into 12 parts of 30°
- ③ Name the parts (radius) from point P anticlockwise with radius 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
- ④ Divide radius into
 - i) for one convolution 12 parts
 - ii) for two convolution 24 parts
- ⑤ draw the arcs from point 1 to radius 1, 2 to 2, 3 to 3, 4 to 4, 5 to 5, 6 to 6, 7 to 7, 8 to 8, 9 to 9, 10 to 10, 11 to 11, 12 to 12
- ⑥ Name points on OP from P to 1



A WHEEL OF RADIUS AB = 100 mm ROTATES ABOUT
 CENTRE B DURING ITS TWO COMPLETE ROTATIONS.
 A POINT P MOVES ALONG AB FROM A TO B AND
 BACK TO A. DRAW THE LOCUS OF POINT P.



Divide string length 12 equal parts
INVOLUTE
 DRAW AN INVOLUTE OF CIRCLE OF
 SOME DIAMETER ALSO DRAW TANGENT
 AND NORMAL ON THE CURVE



Steps: 1) Draw the circle of the given radius

2) Divide the circle into 12 equal parts

3) Draw the string (line) of given L or if not given then draw the line of circumference L

4) The line must be $90^\circ \perp$ from bottommost (12 o'clock) point

5) Divide the line in 12 equal parts using 12 cm or red line

6) Draw the tangents of 12 radii

7) Name the points on the line from point on circle to line

8) Name the points of radius anti-clockwise from bottommost (12 o'clock) point

9) To Draw arcs

Take the number and measure the line from point 1 to P and keep compass on radius 1 on circle and take arc and so on 2 to P and radius 2 arc

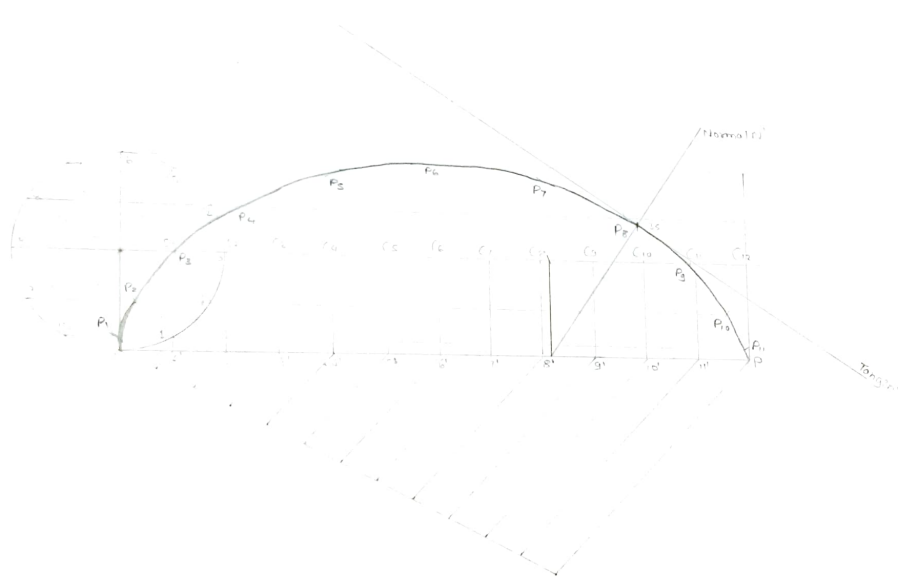
.....

10) Join arcs by curve

CYCLOID

DRAW A CYCLOID OF A CIRCLE OF DIAMETER 50mm FOR ONE REVOLUTION. ALSO DRAW A TANGENT & NORMAL TO THE CURVE AT A POINT 35mm ABOVE THE BASE LINE

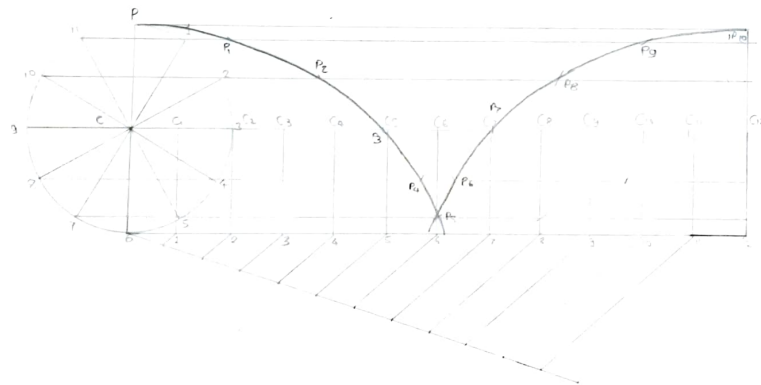
1. Divide the circle into 12 parts
2. Divide the circle into 12 parts



1. Draw the circle of given radius.
2. Divide the circle into 12 parts.
3. Draw a horizontal line from the centermost point of the circle, where it meets the base line.
4. Divide the circle into 12 equal parts.
5. Draw the horizontal line from the center of the circle, where it meets the base line.
6. Draw the horizontal line from the center of the circle, where it meets the base line.
7. Draw the horizontal line from the center of the circle, where it meets the base line.
8. Draw the horizontal line from the center of the circle, where it meets the base line.
9. Draw the horizontal line from the center of the circle, where it meets the base line.
10. Draw the horizontal line from the center of the circle, where it meets the base line.
11. Draw the horizontal line from the center of the circle, where it meets the base line.
12. Draw the horizontal line from the center of the circle, where it meets the base line.

CYCLOID

DRAW A CYCLOID FOR A CIRCULAR
PLANE 50mm DIAMETER WHICH
ROLLS ON HORIZONTAL SURFACE
FOR ONE COMPLETE REVOLUTION.
ASSUME THAT POINT P IS AT THE
TOP OF CIRCULAR PLANE.



Draw the
cycloid
according to the point.