**Q)** A circle of 50 mm rolls on a horizontal straight line for half revolution. For another half revolution it rolls on a line inclined at 60^0 to the horizontal. Trace the path of a point P on the circumference of the circle. Take the generating point as top most point of circle.

Ans) The **Curve** is a **cycloid** as the **circle** rolls along a **straight line** without slipping. The **length** for one revolution will be equal to $\prod*D$ (i.e. 3.14* Diameter of circle).

L = PA= 3.14 * 50 = 157mm.
Since there are 2 half revolutions, the length for each ½ revolution will be = $(\prod*D)/2$.

1) Draw a circle of 25 mm radius with centre C and mark P as the top most point. Divide the circle into 12 parts and label them as 1, 2, 3…12 after P.
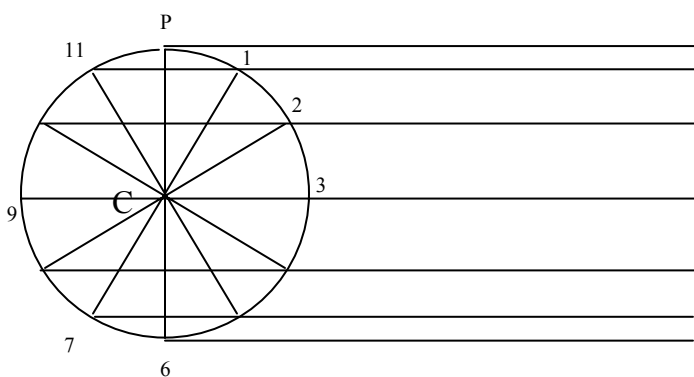
2) At 6, draw a tangent 6A (straight line) length for **half** revolution will be equal to $(\prod*D)/2$ (i.e. PA=157/2=78.5 mm). Divide 6A into 6 equal parts and mark 1', 2'.., 6'.
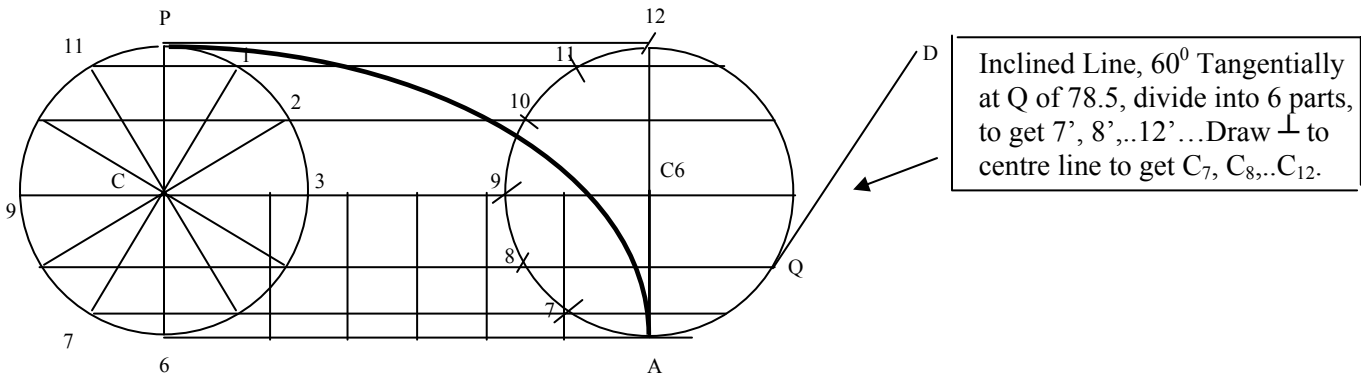On 1', 2'.., 6' draw lines $\perp$ to 6A to cut center line CB at C_1, $C_{2..}$, C_6.
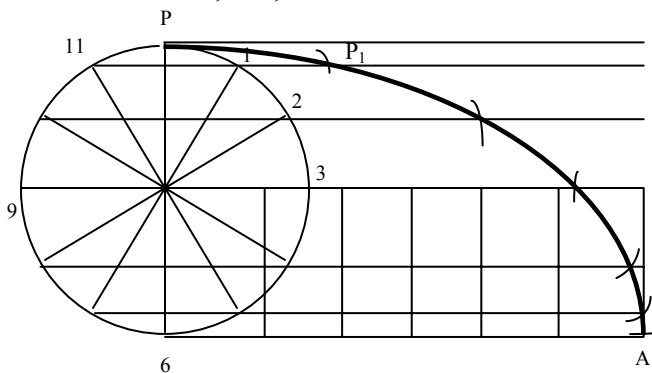
3) With C_1 as centre and CP (=25) as radius, cut arc on 1-11 line of circle to the right side to get first point P_1. Similarly, repeat with CP radius and C_2, C_3,..C_6 to get **half cycloid**. The steps are similar like earlier cycloids, but P is at top and next points after P are labeled as 1,2,3…12.
The above figure is the completed cycloid for first ½ revolution.

Since there are 2 half revolutions, the length for each ½ revolution will be = ($\prod$*D)/2.

4) For the 2nd half revolution, the length of line will be = ($\prod$*D)/2 = 78.5 mm.
Draw the same circle at C_6 with radius = CP (25), with C_6 as centre.

The line should be tangential to circle when it rolls and hence draw inclined line of
78.5mm from Q at 60^0 with horizontal. Mark 7, 8, 9..12 from A on 2nd circle. On
7,8,9..12, draw lines ‖ to QD(inclined base line of 60^0)

Inclined Line, 60^0 Tangentially
at Q of 78.5, divide into 6 parts,
to get 7', 8',..12'…Draw $\perp$ to
centre line to get C_7, C_8,..C_{12}.

5) For 2nd half cycloid, start with C_7 as **centre**, CP radius, cut arc on **7-11** line of 2nd circle.
Similarly for C8, C9, etc, get the other points of cycloid.
Note: For **7,8,9** arcs to be cut on **left side of centers** and for **10, 11 and 12 arcs** to be cut on the
right side of centers. **Last arc** will **cut 6-12** line on **extended lines beyond C_{12}**

Inclined Line, 60^0
Tangentially at Q of
78.5, divide into 6
parts, to get 7',
8',..12'…Draw $\perp$ to
centre line to get C_7,
C_8,..C_{12}.