ICSE 10,2019

AI21BTECH11016

PROBLEM 4-C :

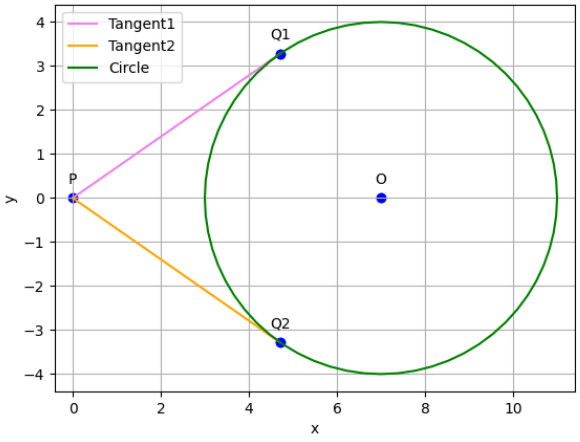
Draw a circle of radius $4cm$. Take a point P outside the circle at a distance of $7cm$ from the centre of the circle and construct a pair of tangents to the circle from that point. Measure and write down the length of any one tangent.

Solution: The input parameters for this construction are available in TABLE 1.

Symbol	Value	Description
r	4	$Radius$
d	7	Distance of **P** from the origin
$sin\theta$	$\frac{r}{d}$	Angle between the tangent from **P** and d
P	**0**	Origin
O	$\begin{pmatrix} d \\ 0 \end{pmatrix}$	Center of circle
$\mathbf{Q}_i$	$r\cot\theta \begin{pmatrix} \cos\theta \\ \pm\sin\theta \end{pmatrix}$	Points of Contact

TABLE I

Generating the figure using Python.



Given:

$$OP = d = 7 \tag{1}$$

$$OQ2 = r = 4 \tag{2}$$

From $\triangle OQ2P$,

$$sin\theta = \frac{r}{d}$$

$$\Rightarrow cos\theta = \frac{\sqrt{d^2 - r^2}}{d} \tag{3}$$

Also, From $\triangle OQ2P$,

$$cos\theta = \frac{PQ2}{d} \tag{4}$$

From equations 3 and 4,

$$\frac{\sqrt{d^2 - r^2}}{d} = \frac{PQ2}{d} \tag{5}$$

$$\Rightarrow PQ2 = \sqrt{d^2 - r^2} = \sqrt{7^2 - 4^2} = \sqrt{33}$$

$\therefore$ **The length of tangent drawn from P onto the Circle is $\sqrt{33}$.**