CHAPTER 09

Tangents and Secants to a Circle

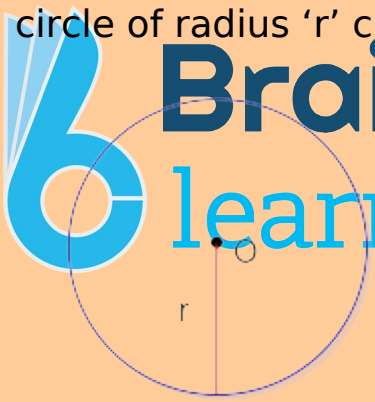
Construction of tangent to a circle:

Construction of a tangent to a circle from a point on it, when the centre of the circle is known:

Steps of construction:

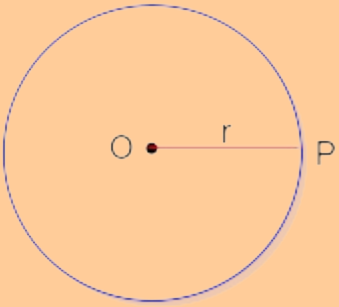
Step 1:

Draw a circle of radius ‘r’ cm with centre ‘O’.



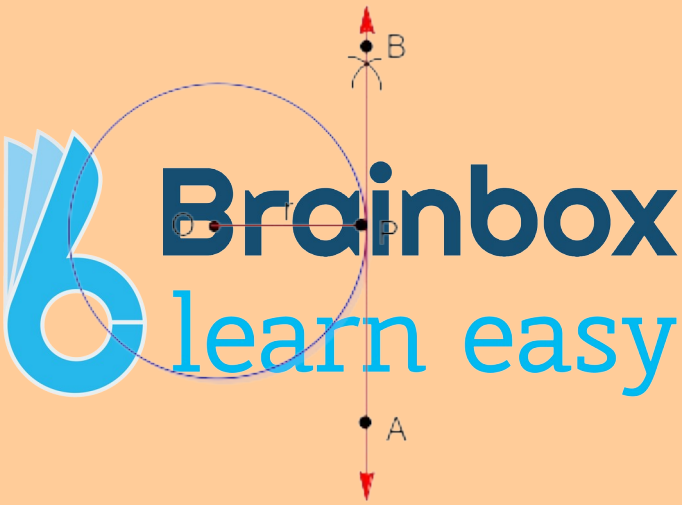
Step 2:

Let ‘P’ be any point on the circle. Join OP.



Step 3:

Draw a line AB perpendicular to OP at the point ‘P’.

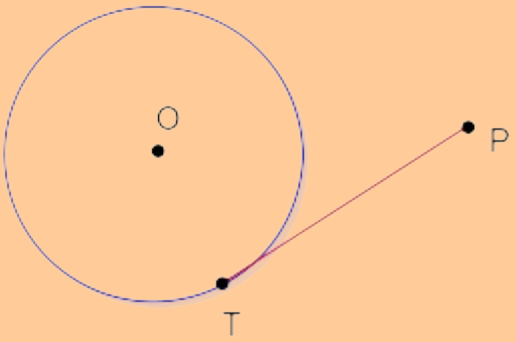


Thus, APB is the required tangent at ‘P’.

Finding length of the tangent:

Length of tangent:

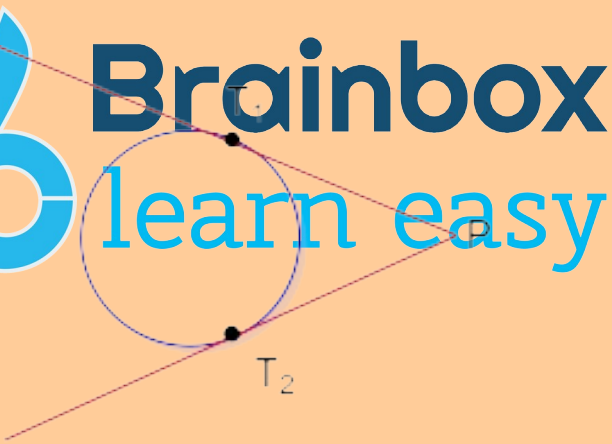
If ‘P’ is an external point to the circle and ‘PT’ is the tangent from ‘P’ to the circle, then $\overline{PT}$ is called the “Length of the tangent” from ‘P’ to the circle.



Example:

$\overline{PT_1}$ is the length of tangent.

$\overline{PT_2}$ is the another length of tangent.



Example:

Calculate the length of tangent from a point 15cm away from the centre of a circle of radius 9cm.

Sol.

Tangent is perpendicular to the radius at the point of contact.

Here PA is tangent segment and OA is radius of circle.

$\therefore\ OA \perp PA \Rightarrow \angle OAP = 90^\circ$

Now in ΔOAP, $OP^2 = OA^2 + PA^2$ (Pythagoras theorem)

$(15)^2 = (9)^2 + PA^2$

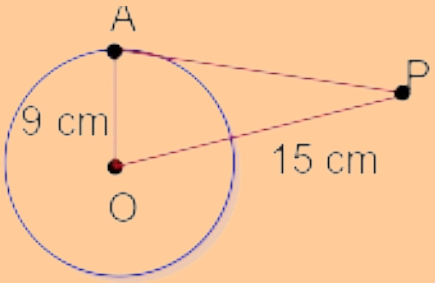
$225 = 81 + PA^2$

$PA^2 = 225 - 81$

$PA^2 = 144$

$PA = \sqrt{144}$

$\therefore PA = 12$ cm



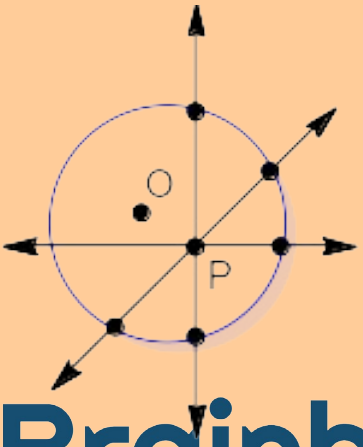
Number of tangents to a circle from any point:

The number of tangents drawn from a point, to a circle depends upon the position of the point with respect to the circle.

Case (i):

If the point lies inside the circle:

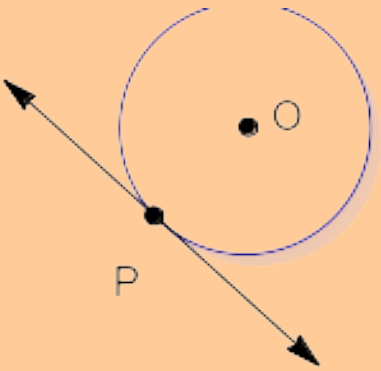
In this case, no tangent can be drawn because any line passing through the point, which intersect the circle at 2 points.



Case (ii):

If the point lies on the circle:

In this case, there exist only one tangent at the 'Point of contact'.



Case (iii):

If the point lies outside of the circle:

In this case, two tangents can be drawn from the external point ‘P’.

i.e. PT_1 and PT_2.