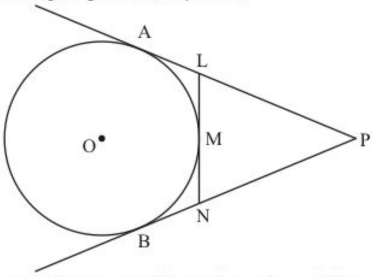
Circles Ex 10.2 Q22

Answer :

The figure given in the question



From the property of tangents we know that the length of two tangents drawn from an external point will we be equal. Hence we have,

PA = PB

PL + LA = PN + NB ...... (1)

Again from the same property of tangents we have,

LA = LM (where L is the common external point for tangents LA and LM)

NB = MN (where N is the common external point for tangents NB and MN)

Substituting *LM* and *MN* in place of *LA* and *NB* in equation (1), we have

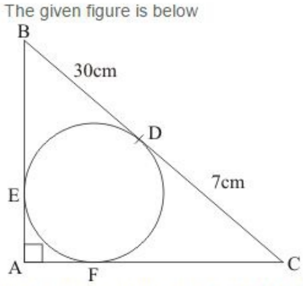
PL + LM = PN + MN

Thus we have proved.

Circles Ex 10.2 Q23

Answer :

The given figure is below



(i) The given triangle *ABC* is a right triangle where side BC is the hypotenuse. Let us now apply Pythagoras theorem. We have,

$AB^2 + AC^2 = BC^2$

Looking at the figure we can rewrite the above equation as follows.

$(BE + EA)^2 + (AF + FC)^2 = (30 + 7)^2$ ...... (1)

From the property of tangents we know that the length of two tangents drawn from the same external point will be equal. Therefore we have the following,

BE = BD

It is given that BD = 30 cm. Therefore,

BE = 30 cm

Similarly,

CD = FC

It is given that CD = 7 cm. Therefore,

FC = 7 cm

Also, on the same lines,

EA = AF

Let us substitute these in equation (1). We get,

$$(BE + EA)^2 + (AF + FC)^2 = (30 + 7)^2$$

$$(30 + AF)^2 + (AF + 7)^2 = 37^2$$

$$(30^2 + 2 \times 30 \times AF + AF^2) + (AF^2 + 2 \times 7 \times AF + 7^2) = 1369$$

$$900 + 60AF + AF^2 + AF^2 + 14AF + 49 = 1369$$

$$2F^2 + 74AF - 420 = 0$$

$$AF^2 + 37AF - 210 = 0$$

$$AF^2 + 42AF - 5AF - 210 = 0$$

$$AF(AF + 42) - 5(AF + 42) = 0$$

$$(AF - 5)(AF + 42) = 0$$

Therefore,

$AF = 5$

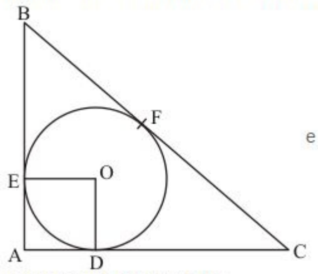
Or,

$AF = -42$

Since length cannot have a negative value,

$AF = 5$

(ii) Let us join the point of contact *E* with the centre of the circle say *O*. Also, let us join the point of contact *F* with the centre of the circle *O*. Now we have a quadrilateral *AEOF*.



e

In this quadrilateral we have,

$\angle EAD = 90°$ (Given in the problem)

$\angle ODA = 90°$ (Since the radius will always be perpendicular to the tangent at the point of contact)

$\angle OEA = 90°$ (Since the radius will always be perpendicular to the tangent at the point of contact)

We know that the sum of all angles of a quadrilateral will be equal to $360°$. Therefore,

$\angle EAD + \angle ODA + \angle EOD + \angle OEA = 360°$

$90° + 90° + 90° + \angle EOD = 360°$

$\angle EOD = 90°$

Since all the angles of the quadrilateral are equal to 90° and the adjacent sides are equal, this quadrilateral is a square. Therefore all the sides are equal. We have found that

AF = 5

Therefore,

OD = 5

OD is nothing but the radius of the circle.

Thus we have found that *AF* = 5 cm and radius of the circle is 5 cm.

*********** END **********