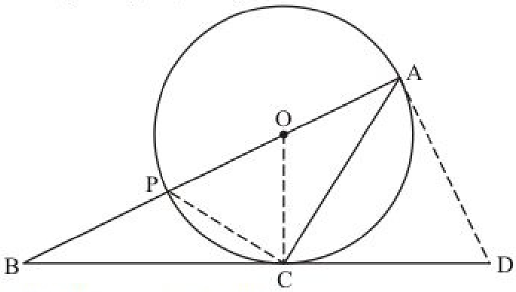
Circles Ex 10.2 Q17

Answer :

In the given figure, let us join *D* an *A*.



Consider ΔOCA. We have,

OC = *OA* (Radii of the same circle)

We know that angles opposite to equal sides of a triangle will be equal. Therefore,

$\angle OCA = \angle OAC$ ...... (1)

It is clear from the figure that

$\angle DCA + \angle OCA = \angle OCD$

Now from (1)

$\angle DCA + \angle OAC = \angle OCD$

Now as BD is tangent therefore $\angle OCD = 90°$

Therefore $\angle DCA + \angle OAC = 90°$

From the figure we can see that $\angle OAC = \angle BAC$

$\angle DAC + \angle BAC = 90°$

Thus we have proved.

Circles Ex 10.2 Q18

Answer :

We know that the lengths of tangents drawn from an external point to a circle are equal.

In the given figure, TQ and TP are tangents drawn to the same circle from an external point T.

∴ TQ = TP .....(1)

Also, TP and TR are tangents drawn to the same circle from an external point T.

∴ TP = TR .....(2)

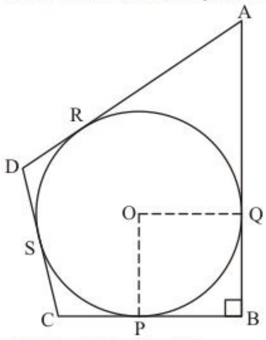
From (1) and (2), we get

TQ = TR

Circles Ex 10.2 Q19

Answer :

Let us first consider the quadrilateral *OPBQ*.



It is given that $\angle B = 90°$.

Also from the property of tangents we know that the radius of the circle will always be perpendicular to the tangent at the point of contact. Therefore we have,

$\angle OPB = 90°$

$\angle OQB = 90°$

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

$$\angle B + \angle OPB + \angle OQB + \angle POQ = 360°$$
$$90° + 90° + 90° + \angle POQ = 360°$$
$$270° + \angle POQ = 360°$$
$$\angle POQ = 90°$$

Also, in the quadrilateral,

OQ = *OP* (both are the radii of the same circle)

PB = *BQ* (from the property of tangents which says that the length of two tangents drawn to a circle from the same external point will be equal)

Since the adjacent sides of the quadrilateral are equal and also since all angles of the quadrilateral are equal to 90°, we can conclude that the quadrilateral OPBQ is a square.

It is given that *DS* = 5 cm.

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

DS = *DR*

DR = 5

It is given that,

AD = 23

DR + *RA* = 23

5 + *RA* = 23

RA = 18

Again from the same property of tangents we have,

RA = *AQ*

We have found out *RA* = 18. Therefore,

AQ = 18

It is given that *AB* = 29. That is,

AQ + *QB* = 29

18 + *QB* = 29

QB = 11

We have initially proved that *OPBQ* is a square. *QB* is one of the sides of the square. Since all sides of the square will be of equal length, we have,

OP = 11

OP is nothing but the radius of the circle.

Thus the radius of the circle is equal to 11 cm.

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