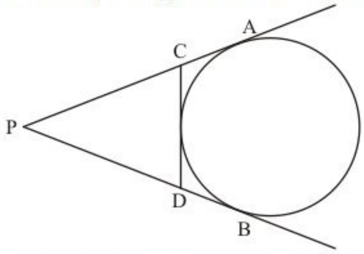
## Circles Ex 10.2 Q10

**Answer :**

Let us first put the given data in the form of a diagram.




It is given that PA = 14cm. we have to find the perimeter of $\triangle PCD$.

Perimeter of $\triangle PCD$ is *PC* + *CD* + *PD*

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

Perimeter of $\triangle PCD$ is *PC* + *CE* + *ED* + *PD* ......(1)

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

*CE* =*CA*

*ED* =*DB*

Replacing the above in equation (1), we have,

Perimeter of $\triangle PCD$ as *PC* + *CA* + *DB* + *PD*

By looking at the figure we get,

*PC* +*CA* =*PA*

*PC* +*CA* =*PA*

*DB* +*PD* =*PB*

Therefore,

Perimeter of $\triangle PCD$ is *PA* + *PB*

It is given that PA = 14 cm. again from the same property of tangents which says that the length of two tangents drawn to a circle from the same external point will be equal, we have,

*PA* = *PB*

Therefore,

Perimeter of $\triangle PCD$ = 2*PA*

Perimeter of $\triangle PCD$ = 2 × 14

Perimeter of $\triangle PCD$ = 28

Thus perimeter of $\triangle PCD$ is 28 cm.

## Circles Ex 10.2 Q11

**Answer :**

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

*BQ* = *BP*

Let us denote *BP* and *BQ* by *x*

*AP* = *AR*

Let us denote *AP* and *AR* by *y*

*RC* = *QC*

Let us denote *RC* and *RQ* by *z*

We have been given that $\triangle ABC$ is a right triangle and *BC* = 6 cm and *AB* = 8 cm. let us find out *AC* using Pythagoras theorem. We have,

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

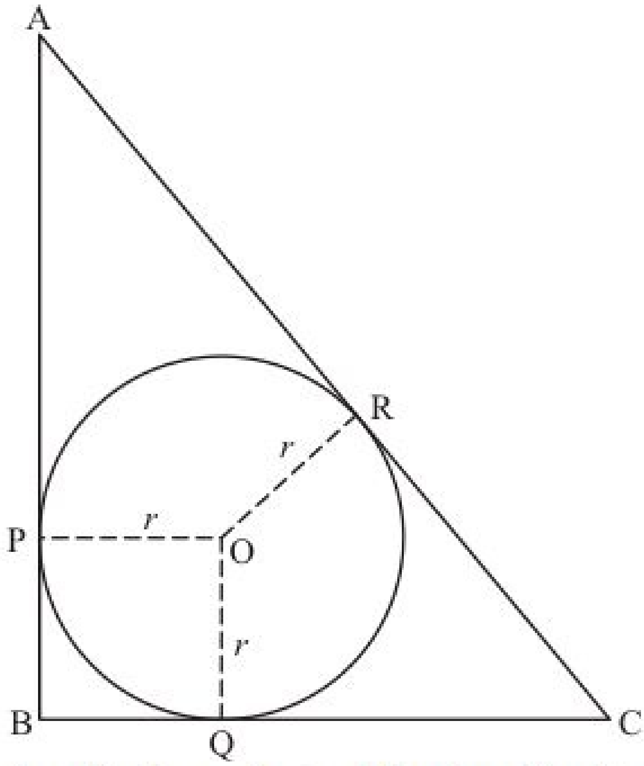
$$AC^2 = 6^2 + 8^2$$

$$AC^2 = 36 + 64$$

$$AC^2 = 100$$

$$AC = \sqrt{100}$$

$$AC = 10$$




Consider the perimeter of the given triangle. We have,

$AB + BC + AC = 8 + 6 + 10$

$AB + BC + AC = 24$

Looking at the figure, we can rewrite it as,

$AP + PB + BQ + QC + AR + RC = 24$

Let us replace the sides with the respective *x*, *y* and *z* which we have decided to use.

$$\begin{aligned} y + x + x + z + y + z &= 24 \\ 2x + 2y + 2z &= 24 \\ 2(x + y + z) &= 24 \\ x + y + z &= 12 \qquad \text{......(1)} \end{aligned}$$

Now, consider the side *AC* of the triangle.

$AC = 10$

Looking at the figure we can say,

$AR + RC = 10$

$y + z = 10$ ...... (2)

Now let us subtract equation (2) from equation (1). We have,

$x + y + z = 12$

$y + z = 10$

After subtracting we get,

$x = 2$

That is,

$BQ = 2$, and

$BP = 2$

Now consider the quadrilateral *BPOQ*. We have,

$BP = BQ$ (since length of two tangents drawn to a circle from the same external point are equal)

Also,

$PO = OQ$ (radii of the same circle)

It is given that $\angle PBQ = 90^\circ$.

From the property of tangents, we know that the tangent will be at right angle to the radius of the circle at the point of contact. Therefore,

$\angle OPB = 90^\circ$

$\angle OQB = 90^\circ$

We know that sum of all angles of a quadrilateral will be equal to $360^\circ$. Therefore,

$$\begin{aligned}\angle PBQ + \angle OPB + \angle OQB + \angle POQ &= 360^\circ \\ 90^\circ + 90^\circ + 90^\circ + \angle POQ &= 360^\circ \\ 270^\circ + \angle POQ &= 360^\circ \\ \angle POQ &= 90^\circ\end{aligned}$$

Since all the angles of the quadrilateral are equal to $90^\circ$ and the adjacent sides also equal, this quadrilateral is a square. Therefore, all sides will be equal. We have found out that,

*BP* = 2 cm

Therefore, the radii

*PO* = 2 cm

Thus the radius of the incircle of the triangle is 2 cm.

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