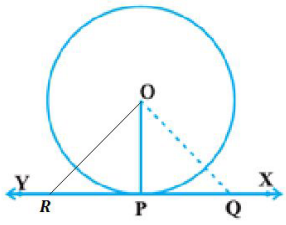
DAY 2

Theorem ***The tangent at any point of a circle is perpendicular to the radius through the point of contact.***



Given :- A circle with centre O and XY is tangent to the circle.

To Prove OP ⊥ XY

Proof:- Let Q is any other point on tangent XY other than P and Join OQ.

It is observed that Q lies outside the circle

⇒ OQ> OP

Since it happens for every point on XY except P.

∴ OP is the shortest of all the distances of the points from O to the points on XY.

We know that shortest distance from a point to a line is the perpendicular.

So OP is perpendicular to XY.

Hence OP ⊥ XY

1. **From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle.** **[Ex 10.2. Q1]**

Sol:- In right ∠d ΔOQP,

$$OQ^2 = OP^2 + PQ^2$$

$$\Rightarrow 25^2 = r^2 + 24^2$$

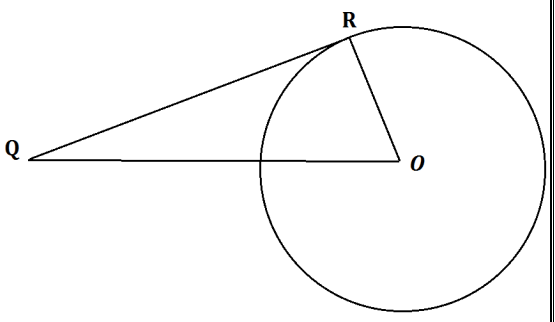
$$\Rightarrow 25 \times 25 = r^2 + 24 \times 24$$

$$\Rightarrow 625 = r^2 + 576$$

$$\Rightarrow r^2 = 625 - 576 = 49 = 7^2$$

$$\Rightarrow r = 7$$

Hence $\boldsymbol{r = 7\ cm}$



2. **The length of a tangent from a point A at distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle.** **[Ex 10.2. Q 6]**

Sol:- In right ∠d ΔOAP,

$$H^2 = P^2 + B^2$$

$$\Rightarrow 5^2 = r^2 + 4^2$$

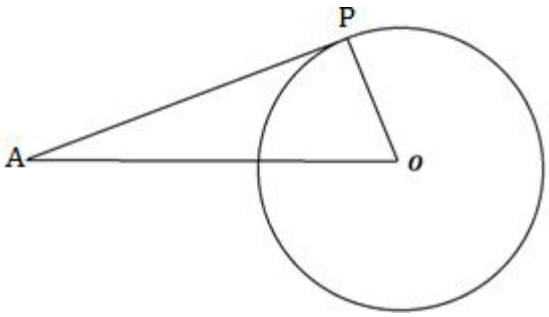
$$\Rightarrow 5 \times 5 = r^2 + 4 \times 4$$

$$\Rightarrow 25 = r^2 + 16$$

$$\Rightarrow r^2 = 25 - 16 = 9 = 3^2$$

$$\Rightarrow r = 3$$

Hence $\boldsymbol{r = 3\ cm}$

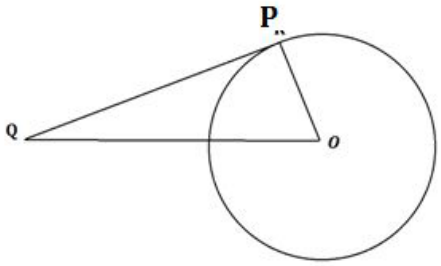


3. **A point PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 13 cm. Find the length of PQ.**

Sol:- In right ∠d ΔOQP,

$$H^2 = P^2 + B^2$$
$$\Rightarrow 13^2 = 5^2 + x^2$$
$$\Rightarrow 13 \times 13 = 5 \times 5 + x^2$$
$$\Rightarrow 169 = 25 + x^2$$
$$\Rightarrow x^2 = 169 - 25 = 144 = 12^2$$
$$\Rightarrow x = 12$$

Hence **PQ = 12 *cm***



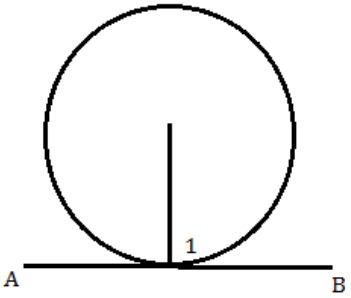
4. **Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.** **[Ex 10.2, Q5]**

Sol:- Let AB is a tangent to a circle at a point P.

Since Perpendicular is drawn to a tangent at point of contact.

$$\therefore \angle 1 = 90^0$$

But we know that tangent at any point of circle is perpendicular to the radius through the centre.



EXERCISE

1. From a point P, the length of the tangent to a circle is 15 cm and the distance of Q from the centre is 17 cm. Find the radius of the circle.
2. A tangent AB of length12 cm of a circle of radius 5 cm intersect circle at point A. Find the distance of the centre from the point B.
3. From a point Q, the length of the tangent to a circle is 6 cm and the distance of Q from the centre is 10 cm. Find the radius of the circle.
4. Find the length of the tangent drawn to a circle with radius 3 cm from a point 5 cm the centre of the circle.