1. How many tangents can a circle have?

Sol. A circle can have infinite number of tangents because a circle have infinite number of points on it and at every point a tangent can be drawn.

2. Fill in the blanks:

(i) A tangent to a circle intersects it in ……. point (s).

(ii) A line intersecting a circle in two points is called a …….. .

(iii) A circle can have …… parallel tangents at the most.

(iv) The common point of a tangent to a circle and the circle is called ……. .

Sol. **(i)** One

(ii) Secant

(iii) Two

(iv) Point of contact.

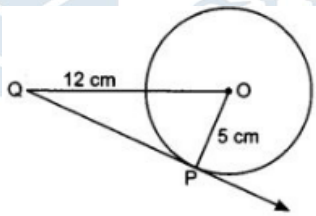
3. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is :

(A) 12 cm (B) 13 cm (C) 8.5 cm (D) $\sqrt{119}$ cm.

Sol. Radius of the circle = 5 cm

$OQ = 12cm$

$\angle OPQ = 90°$



[The tangent to a circle is perpendicular to the radius through the point of contact]

$PQ^2 = OQ^2 - OP^2$ [By Pythagoras theorem]

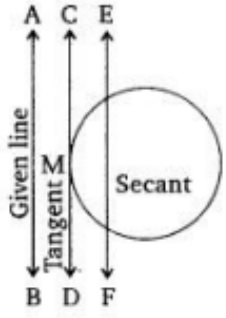
$PQ^2 = 12^2 - 5^2 = 144 - 25 = 119$

$PQ = \sqrt{119}\, cm$

Hence correct option is (D).

4. Draw a circle and two lines parallel to a given line such that one is a tangent and the other, a secant to the circle.

Sol. **Here, AB is the given line CD is tangent to the given circle at the point M and parallel to AB, and EF is a secant parallel to AB.**



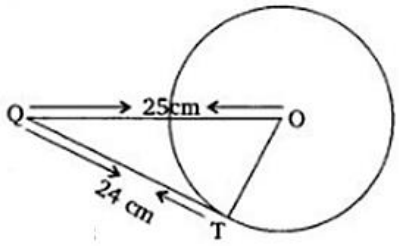
In Qs. 5 to 7, choose the correct option and give justification.

5. 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. The radius of the circle is:

(a) 7 cm (b) 12 cm (c) 15 cm (d) 24.5 cm

Sol. **(a)** Let OT be x cm.

Then in right ΔQTO,



$QO^2 = QT^2 + OT^2$ [By Pythagoras' Theorem]

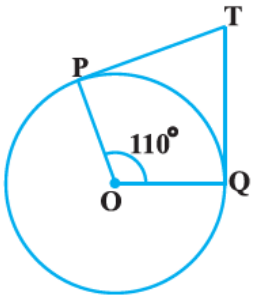
$\Rightarrow \quad (25)^2 = (24)^2 + x^2$

$\Rightarrow \quad x^2 = 625 - 576 = 49$

$\Rightarrow \quad x = \sqrt{49} = 7cm.$

Hence correct option is (a)

6. In Figure, if TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110°$, then $\angle PTQ$ is equal to :

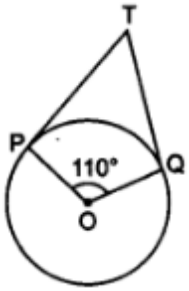


(a) $60°$ (b) $70°$ (c) $80°$ (d) $90°$

Sol. **(b)** $\angle OPT = 90°$

$\angle OQT = 90°$

$\angle POQ = 110°$



$TPOQ$ is a quadrilateral, $\angle OPT + \angle POQ + \angle OQT + \angle PTQ = 360°$

$\therefore \quad \angle PTQ + \angle POQ = 180°$

$\Rightarrow \quad \angle PTQ + 110° = 180°$

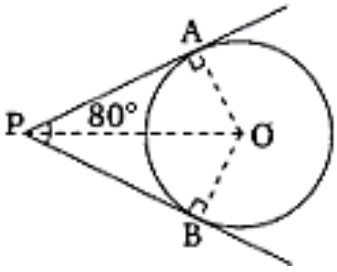
$\Rightarrow \quad \angle PTQ = 180° - 110° = 70°$

Hence, correct option is (b)

7. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of $80°$, then $\angle POA$ is equal to :

(a) $50°$ (b) $60°$ (c) $70°$ (d) $80°$

Sol. **(a)** In ΔPOA and ΔPOB,



$\angle PAO = \angle PBO$	**[Each of $90°$]**
$OA = OB$	**[Radii of the circle]**
$PA = PB$	**[Both are tangents]**
$\therefore \quad \Delta POA \cong \Delta POB$	**[By SAS congruence]**
$\Rightarrow \quad \angle APO = \angle BPO$	**[CPCT]**

$\Rightarrow \angle APO = \frac{1}{2}\angle APB = \frac{1}{2} \times 80° = 40°$

In $\Delta PAO, \angle APO + \angle POA + \angle OAP = 180°$

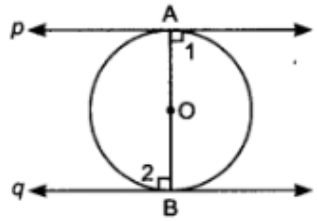
$\Rightarrow \quad 40° + \angle POA + 90° = 180°$

$\Rightarrow \quad \angle POA = 50°$.

Hence correct option is (a).

8. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Sol. AB is a diameter of the circle, p and q are two tangents.



$OA \perp p$ and $OB \perp q$

$\therefore \quad \angle 1 = \angle 2 = 90°$

$\Rightarrow \quad p \parallel q$ [$\angle 1$ and $\angle 2$ are alternate angles]

9. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.

Sol. Let O, be the centre of circle and AB is tangent at P. We have to prove that perpendicular at P to AB, passes through O.

Let perpendicular drawn at P point of AB does not pass through O. It passes through O'.

Join OP and $O'P$.

Tangent drawn at P passes through O'.

Therefore,

$\angle O'PB = 90°$ .....(1)

We know that radius is perpendicular to tangent.

$\therefore \quad \angle OPB = 90°$ ……(2)

Comparing (1) & (2)

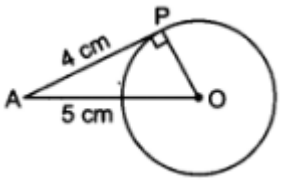
$\angle O'PB = \angle OPB$

From figure it is clear that, it is possible only when OP and $O'P$ are coincident lines. Therefore the perpendicular drawn at P passes through the centre O.

10. 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.

Sol. **OA = 5 cm, AP = 4 cm**

OP = Radius of the circle



$\angle OPA = 90°$ **[Radius and tangent are perpendicular]**

$OA^2 = AP^2 + OP^2$ **[By Pythagoras theorem]**

$5^2 = 4^2 + OP^2$

$\Rightarrow \quad 25 = 16 + OP^2$

$\Rightarrow \quad 25 - 16 = OP^2$

$\Rightarrow \quad 9 = OP^2$

$\Rightarrow \quad \sqrt{9} = OP$

$\Rightarrow \quad OP = 3cm$

$\therefore \quad$ Radius $= 3cm$