

# NTSE

NCERT Solutions for Class 10  
MATHS – Circle



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1. How many tangents can a circle have?

**Sol.** A circle can have infinite number of tangents because a circle has 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.

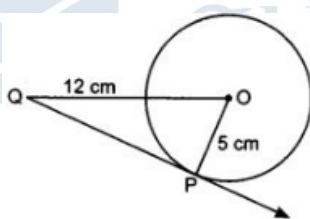
3. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is :

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

**Sol.** Radius of the circle = 5 cm

$$OQ = 12 \text{ cm}$$

$$\angle OPQ = 90^\circ$$



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

$$PQ^2 = OQ^2 - OP^2 \quad \text{[By Pythagoras theorem]}$$

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

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

Hence correct option is (D).

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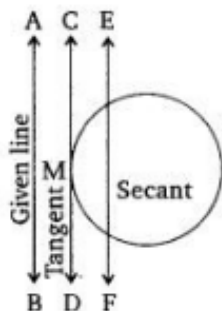
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4. Draw a circle and two lines parallel to a given line such that one is a tangent and the other, a secant to the circle.

**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.



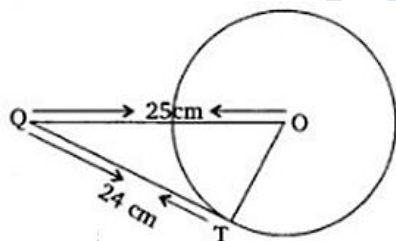
**In Qs. 5 to 7, choose the correct option and give justification.**

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  $\triangle QTO$ ,



$$QO^2 = QT^2 + OT^2 \quad [\text{By Pythagoras' Theorem}]$$

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

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

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

Hence correct option is (a)

**Success  
STORY**

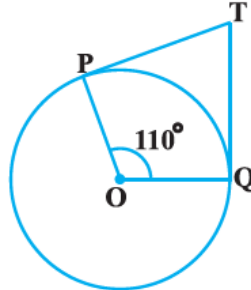
*I still wonder how one man has such a deep understanding of an examination. It becomes the truth what ever Vipin Sir says about NTSE.*

*M. Pareek*

An  
**NTSE Scholar**  
IIT-JEE (Adv.) AIR-3  
Mukesh Pareek



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



- (a)  $60^\circ$       (b)  $70^\circ$       (c)  $80^\circ$       (d)  $90^\circ$

**Sol.** (b)  $\angle OPT = 90^\circ$

$$\angle OQT = 90^\circ$$

$$\angle POQ = 110^\circ$$

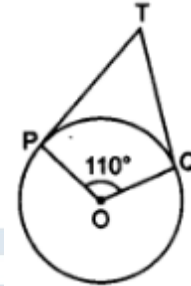
$TPOQ$  is a quadrilateral,  $\angle OPT + \angle POQ + \angle OQT + \angle PTQ = 360^\circ$

$$\therefore \angle PTQ + \angle POQ = 180^\circ$$

$$\Rightarrow \angle PTQ + 110^\circ = 180^\circ$$

$$\Rightarrow \angle PTQ = 180^\circ - 110^\circ = 70^\circ$$

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  $80^\circ$ , then  $\angle POA$  is equal to :

- (a)  $50^\circ$       (b)  $60^\circ$       (c)  $70^\circ$       (d)  $80^\circ$

**Sol.** (a) In  $\triangle POA$  and  $\triangle POB$ ,

$$\angle PAO = \angle PBO$$

[Each of  $90^\circ$ ]

$$OA = OB$$

[Radii of the circle]

$$PA = PB$$

[Both are tangents]

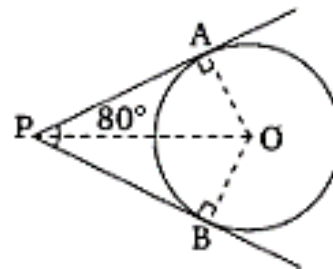
$$\therefore \triangle POA \cong \triangle POB$$

[By SAS congruence]

$$\Rightarrow \angle APO = \angle BPO$$

[CPCT]

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



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In  $\triangle PAO$ ,  $\angle APO + \angle POA + \angle OAP = 180^\circ$

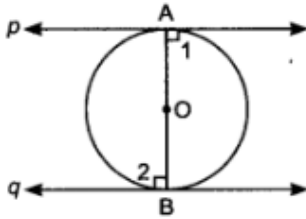
$$\Rightarrow 40^\circ + \angle POA + 90^\circ = 180^\circ$$

$$\Rightarrow \angle POA = 50^\circ.$$

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  $OB \perp q$

$$\therefore \angle 1 = \angle 2 = 90^\circ$$

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

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,

$$\angle O'PB = 90^\circ \quad \dots(1)$$

We know that radius is perpendicular to tangent.

$$\therefore \angle OPB = 90^\circ \quad \dots(2)$$

Comparing (1) & (2)

$$\angle O'PB = \angle OPB$$

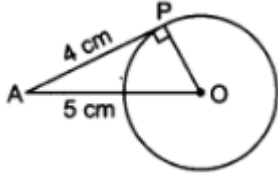
From figure it is clear that, it is possible only when  $OP$  and  $O'P$  are coincident lines. Therefore the perpendicular drawn at P passes through the centre O.

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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



$$\angle OPA = 90^\circ$$

[Radius and tangent are perpendicular]

$$OA^2 = AP^2 + OP^2$$

[By Pythagoras theorem]

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

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

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

$$\Rightarrow 9 = OP^2$$

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

$$\Rightarrow OP = 3 \text{ cm}$$

$$\therefore \text{Radius} = 3 \text{ cm}$$



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