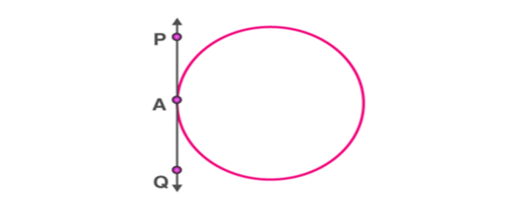
CIRCLES
PPT-2

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 10
CHAPTER NAME : CIRCLES

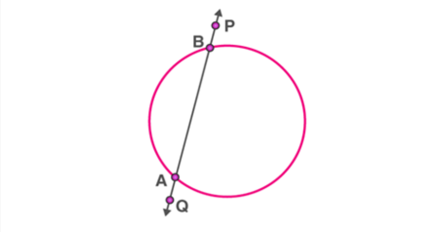
Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: 1800 120 2316
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

PREVIOUS KNOWLEDGE TEST

1.A **tangent to a circle** is a line which touches the circle at exactly one point. For every point on the circle, there is a unique tangent passing through it



2.A secant to a circle is a line which has two points in common with the circle. It cuts the circle at two points, forming a chord of the circle.



LEARNING OUTCOME

1 Students will be able to know about tangents.

2.Students will be able to identify whether a given line is a tangent or secant to a circle.

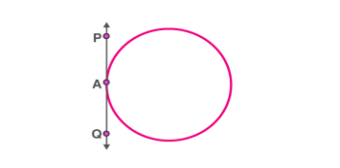
3. Students will be able to prove that he lengths of tangents drawn from an external point to a circle are equal.

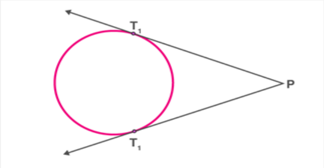
4. Students will be able to apply the knowledge of above theorem in solving questions.

The number of tangents drawn from a given point

i) If the point is in an **interior region of the circle**, any line through that point will be a secant. So, **no tangent** can be drawn to a circle which passes through a point that lies inside it.

ii) When a point of tangency lies on the circle, there is **exactly one tangent** to a circle that passes through it.





iii) When the point lies outside of the circle, there are **accurately two tangents** to a circle through it

The length of the segment of the tangent from the external point and the point of contact with the circle is called the length of the tangent.

ODM EDUCATIONAL GROUP
Changing your Tomorrow

Theorem 10.2 : The lengths of tangents drawn from an external point to a circle are equal.

https://youtu.be/l7BX-UPxEn8 (10.55)

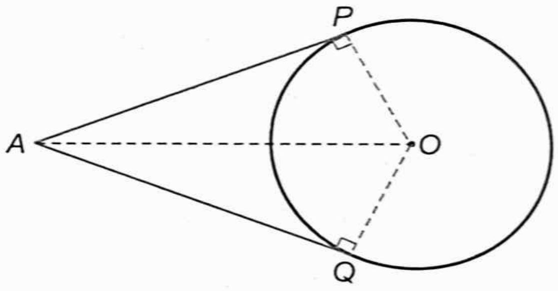
Theorem 10.2 : The lengths of tangents drawn from an external point to a circle are equal.

Given. AP and AQ are two tangents drawn from an external point A to a circle with centre O.

To Prove. $AP = AQ$.

Construction. Join OA, OP and OQ.

Proof. As the tangent to a circle is perpendicular to the radius through the point of contact, so



$$\angle OPA = \angle OQA = 90°$$

Now, in right ΔOPA and ΔOQA, we have

	$OP = OQ$	[Radii of the same circle]
	$OA = OA$	[Common]
$\therefore$	$\Delta OPA \cong \Delta OQA$	[RHS congruency]
Hence,	$AP = AQ$	[CPCT]

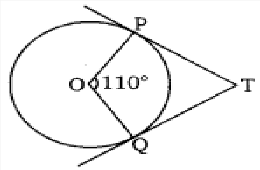
ODM EDUCATIONAL GROUP
Changing your Tomorrow

A.choose the correct option and give justification.

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. The radius of the circle is (A) 7 cm (B) 12 cm (C) 15 cm (D) 24.5 cm

2. In Fig., if TP and TQ are the two tangents to a circle with Centre O so that ∠ POQ = 110°, then ∠ PTQ is equal to (A) 60° (B) 70° (C) 80° (D) 90°

3. 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 ∠ POA is equal to (A) 50° (B) 60° (C) 70° (D) 80°



ODM EDUCATIONAL GROUP
Changing your Tomorrow

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. The radius of the circle is

(a) 7 cm

(b) 12 cm

(c) 15 cm

(d) 24.5 cm.

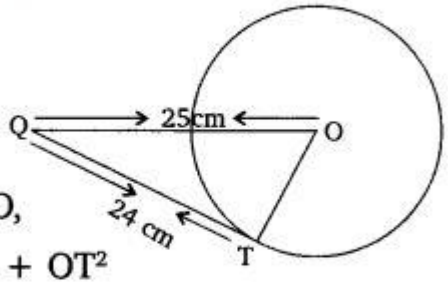
1.From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. The radius of the circle is
(a) 7 cm
(b) 12 cm
(c) 15 cm
(d) 24.5 cm.

The correct option is **(A)**.

Justification:

Let OT be x cm.

Then in right ΔQTO,



$$QO^2 = QT^2 + OT^2$$

[By Pythagoras' Theorem]

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

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

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

2.In figure, if TP and TQ are the two tangents to a circle with centre O so that ∠POQ = 110°, then ∠PTQ is equal to
(a) 60°
(b) 70°
(c) 80°
(d) 90°.

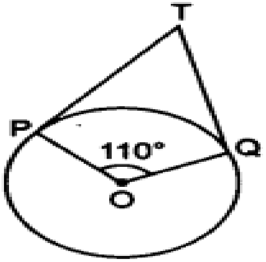
2.In figure, if TP and TQ are the two tangents to a circle with centre O so that ∠POQ = 110°, then ∠PTQ is equal to

(a) 60°

(b) 70°

(c) 80°

(d) 90°.



∠OPT = 90°

∠OQT = 90°

∠POQ = 110°

TPOQ is a quadrilateral,

∴ ∠PTQ + ∠POQ = 180°

⇒ ∠PTQ + 110° = 180°

⇒ ∠PTQ = 180°- 110° = 70°

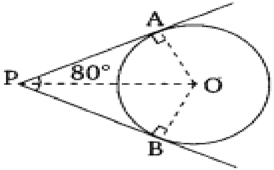
Hence, correct option is **(b)**.

3. 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 ∠ POA is equal to (A) 50° (B) 60° (C) 70° (D) 80°

3. 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 ∠ POA is equal to (A) 50° (B) 60° (C) 70° (D) 80°

The correct option is **(A)**.

Justification:



In ΔPOA and ΔPOB,

$\angle PAO = \angle PBO$ [Each of 90°]

$OA = OB$ [Radii of the circle]

$PA = PB$ [Both are tangents]

$\therefore \Delta POA \cong \Delta POB$ [By SAS congruence]

$\Rightarrow \angle APO = \angle BPO$ [CPCT]

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

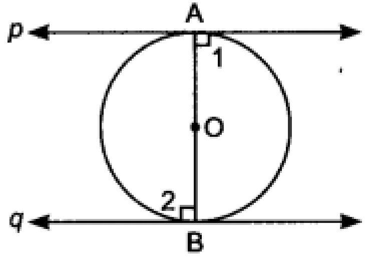
In ΔPAO, $\angle APO + \angle POA + \angle OAP = 180°$

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

$\Rightarrow \angle POA = \mathbf{50°}$.

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

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



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

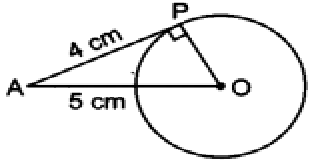
OA ⊥ p and OB ⊥ q

∴ ∠1 = ∠2 = 90°

⇒ p ||q [∠1 and ∠2 are alternate angles]

5. 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.

5. 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.



OA = 5 cm, AP = 4 cm

OP = Radius of the circle

∠OPA = 90° [Radius and tangent are perpendicular]

$$OA^2 = AP^2 + OP^2 \quad \text{[By Pythagoras theorem]}$$

$$5^2 = 4^2 + OP^2 \Rightarrow 25 = 16 + OP^2$$

$$\Rightarrow 25 - 16 = OP^2 \Rightarrow 9 = OP^2 \Rightarrow \sqrt{9} = OP$$

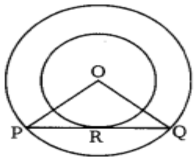
$$\Rightarrow OP = 3 \text{ cm}$$

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

6. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle..

6. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle..

In the given figure, PQ is the chord of the larger circle, which touches the smaller circle at R.



We have, $OP = OQ = 5$ cm [Radii of larger circle]

and $OR = 3$ cm [Radius of smaller circle]

Since PQ is tangent to the smaller circle.

$\therefore$ $OR \perp PQ$ [By theorem]

In ΔOPR and ΔOQR,

$\angle ORP = \angle ORQ$ [Each of 90°]

$OR = OR$ [Common]

$OP = OQ$ [Radii of the same circle]

$\therefore$ $\Delta OPR \cong \Delta OQR$ [By RHS congruence]

$\Rightarrow$ $PR = RQ$ [CPCT]

In ΔOPR,

$$PR^2 = OP^2 - OR^2 = (5)^2 - (3)^2 = 16 \text{ cm}$$

$\Rightarrow$ $PR = \sqrt{16} = 4$ cm

$\therefore$ $PQ = 2PR = 2 \times 4 =$ **8 cm.**

HOME ASSIGNMENT Ex. 10.2 Q. No 1 to Q7

AHA

1. Prove that the parallelogram circumscribing a circle is a rhombus.

THANKING YOU

ODM EDUCATIONAL GROUP