NCERT Solutions For Class 10 Maths Chapter 10 Circles Exercise 10.2

In Q 1 to 3, choose the correct option and give justification.

Q1. 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

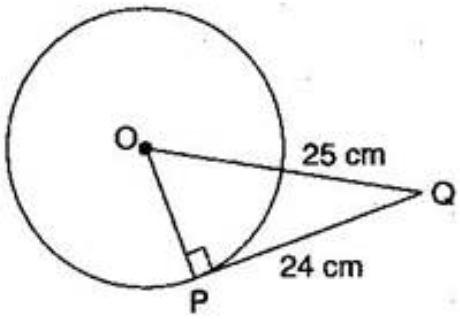
(B) 12 cm

(C) 15 cm

(D) 24.5 cm

Ans: (A) $\because \angle OPQ = 90°$

[The tangent at any point of a circle is $\perp$ to the radius through the point of contact]



$\therefore$ In right triangle OPQ,

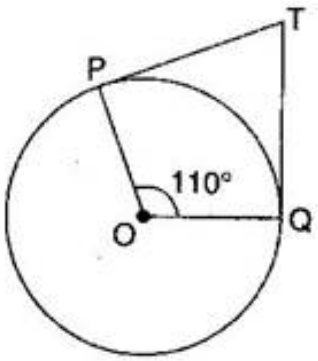
$OQ^2 = OP^2 + PQ^2$

[By Pythagoras theorem]

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

$\Rightarrow 625 = OP^2 + 576$

Q2. 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°

Ans: (B) $\angle$ POQ = 110°, $\angle$ OPT = 90° and $\angle$ OQT = 90°

[The tangent at any point of a circle is $\perp$ to the radius through the point of contact]

In quadrilateral OPTQ,

$\angle$ POQ + $\angle$ OPT + $\angle$ OQT + $\angle$ PTQ = 360°

[Angle sum property of quadrilateral]

$\Rightarrow 110^{\circ} + 90^{\circ} + 90^{\circ} + \angle$ PTQ = 360°

$\Rightarrow 290^{\circ} + \angle$ PTQ = 360°

$\Rightarrow \angle$ PTQ = 70°

Q3. 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°

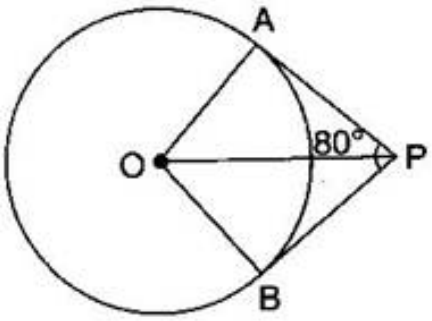
(C) 70°

(D) 80°

Ans: (A) $\because \angle$ OPQ = 90°

[The tangent at any point of a circle is $\perp$ to the radius

through the point of contact]



$\angle OPA = \frac{1}{2}\angle BPA$

[Centre lies on the bisector of the

angle between the two tangents]

In ΔOPA,

$\angle OAP + \angle OPA + \angle POA = 180°$

[Angle sum property of a triangle]

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

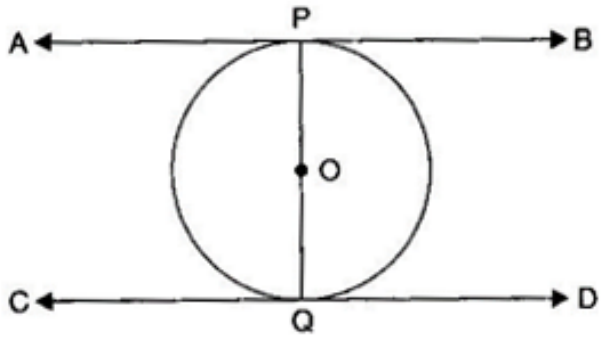
$\Rightarrow 130° + \angle POA = 180°$

$\Rightarrow \angle POA = 50°$

Q4. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Ans: Given: PQ is a diameter of a circle with centre O.

The lines AB and CD are the tangents at P and Q respectively.



To Prove: AB $\parallel$ CD

Proof: Since AB is a tangent to the circle at P and OP is the radius through the point of contact.

$\therefore \angle OPA = 90°$.....(i)

[The tangent at any point of a circle is $\perp$ to the radius through the point of contact]

$\because$ CD is a tangent to the circle at Q and OQ is the radius through the point of contact.

$\therefore \angle OQD = 90°$.....(ii)

[The tangent at any point of a circle is $\perp$ to the radius through the point of contact]

From eq. (i) and (ii), $\angle OPA = \angle OQD$

But these form a pair of equal alternate angles also,

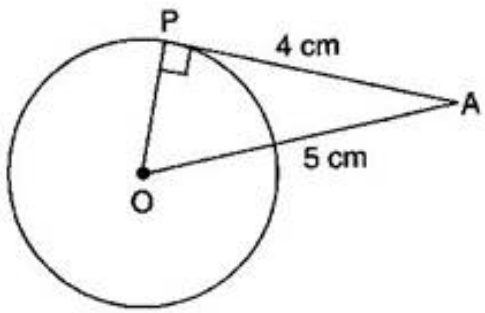
$\therefore$ AB $\parallel$ CD

Q5. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.

Ans: We know that the tangent at any point of a circle is perpendicular to the radius through the point of contact and the radius essentially passes through the centre of the circle, therefore the perpendicular at the point of contact to the tangent to a circle passes through the centre.

6. 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.

Ans: We know that the tangent at any point of a circle is $\perp$ to the radius through the point of contact.



$\therefore \angle$ OPA = 90°

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

[By Pythagoras theorem]

$\Rightarrow (5)^2 = (\text{OP})^2 + (4)^2$

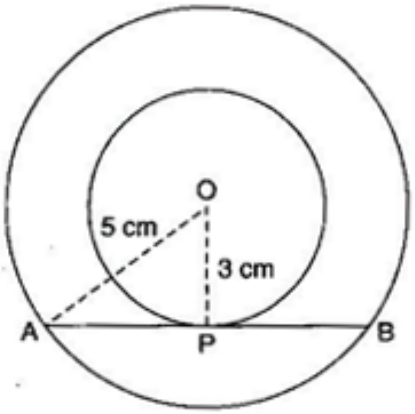
$\Rightarrow$ $25 = (\text{OP})^2 + 16$

$\Rightarrow$ $OP^2 = 9$

$\Rightarrow$ OP = 3 cm

Q7. 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.

Ans: Let O be the common centre of the two concentric circles.



Let AB be a chord of the larger circle which touches the smaller circle at P.

Join OP and OA.

Then, $\angle$ OPA = 90°

[The tangent at any point of a circle is $\perp$ to the radius through the point of contact

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

[By Pythagoras theorem]

$\Rightarrow (5)^2 = (3)^2 + AP^2$

$\Rightarrow 25 = 9 + AP^2$

$\Rightarrow AP^2 = 16$

$\Rightarrow$ AP = 4 cm

Since the perpendicular from the centre of a

circle to a chord bisects the chord, therefore

AP = BP = 4 cm

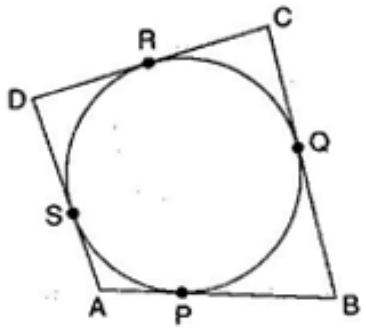
$\Rightarrow$ AB = AP + BP

= AP + AP = 2AP

= 2×4 = 8 cm

Q8. A quadrilateral ABCD is drawn to circumscribe a circle (see figure). Prove that:

AB + CD = AD + BC



Ans: We know that the tangents from an external point to a circle are equal.

$\therefore$ AP = AS .....(i)

BP = BQ .....(ii)

CR = CQ .....(iii)

DR = DS.....(iv)

On adding eq. (i), (ii), (iii) and (iv), we get

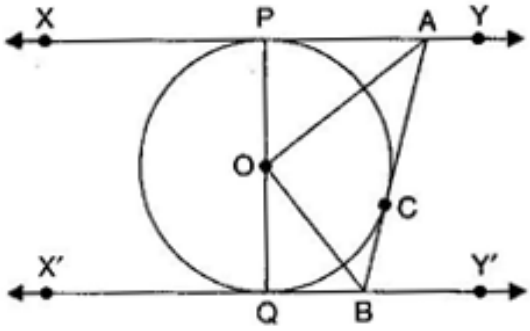
$(AP + BP) + (CR + DR)$

$= (AS + BQ) + (CQ + DS)$

$\Rightarrow AB + CD = (AS + DS) + (BQ + CQ)$

$\Rightarrow AB + CD = AD + BC$

Q9. In figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90°$.



Ans: Given: In figure, XY and X'Y' are two parallel tangents to a circle with centre O and another

tangent AB with point of contact C intersecting XY at A and X'Y' at B.

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