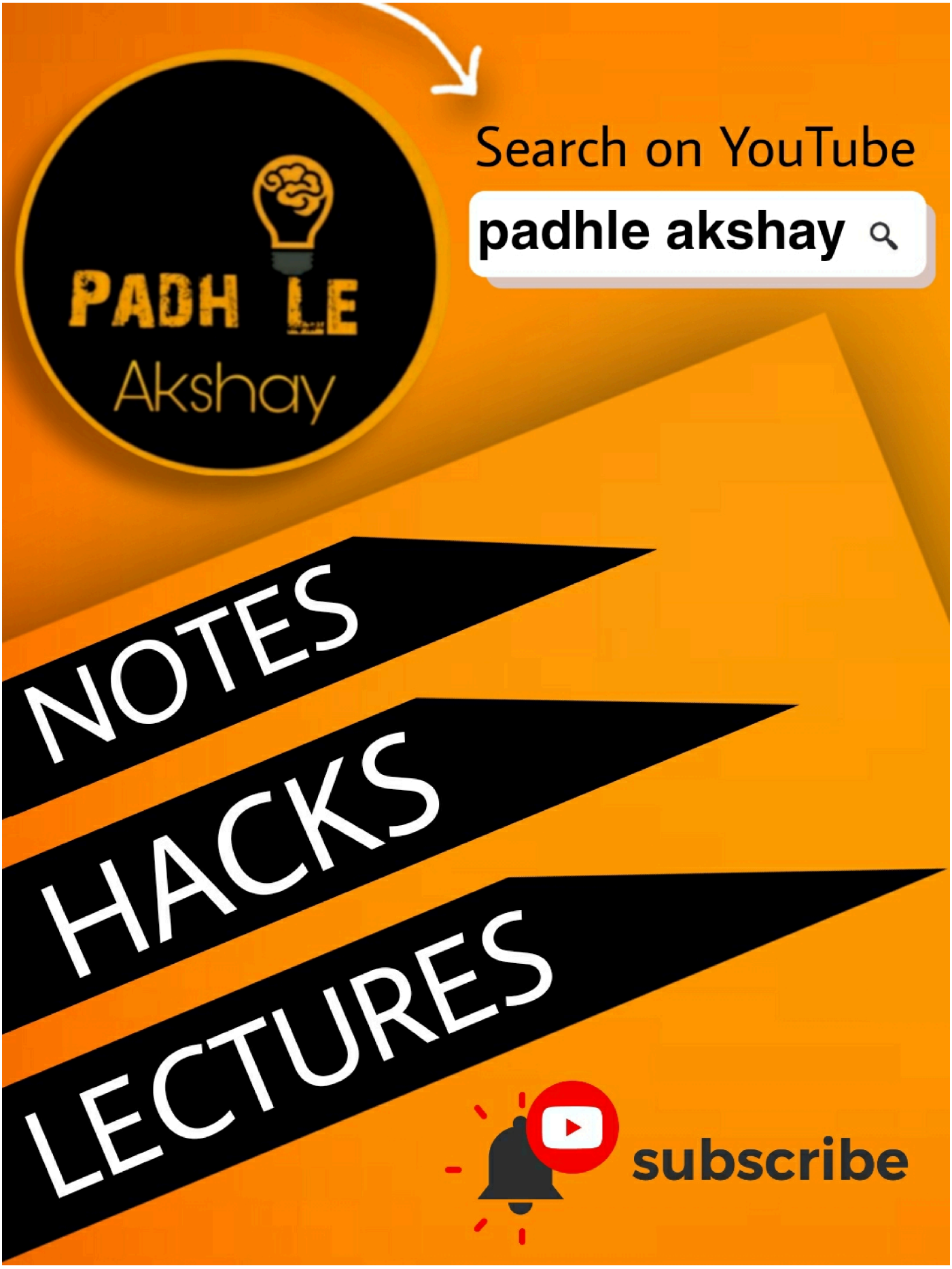
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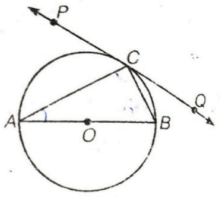
Chapter-10 Circle

Very Short question

Q. 1. In fig., PQ is a tangent at a point C to a circle with centre O. If AB is a diameter and $\angle CAB = 30°$, find $\angle PCA$.



[CBSE 2016]

Sol. We know that angle in a semi-circle is right angle.

$\therefore \quad \angle ACB = 90°$

Also, $\quad \angle CAB = 30°$ [given]

$\therefore \quad \angle CBA = 180° - 90° - 30°$

[Angles sum property of a triangle]

$= 60°$

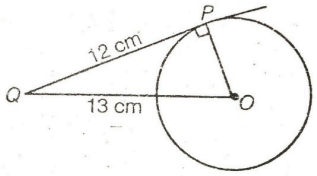
Now, $\quad \angle PCA = \angle CBA = 60°$

[$\because$ Angles in the corresponding alternate segment are equal]

Q. 3. From a point Q, 13 cm, away from the centre of a circle, the length of tangent PQ to the circle is 12 cm. Find the radius of the circle (in cm).

[CBSE 2012]

Sol. Since $OP \perp PQ$ (The tangent at any point of circle is perpendicular to the radius through the point of contact)



$\therefore$ In right-angled ΔOPQ,

$\Rightarrow \quad OP^2 = OQ^2 - PQ^2$

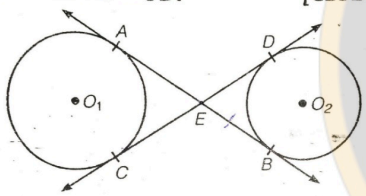
$\Rightarrow \quad OP^2 = (13)^2 - (12)^2$

$= 169 - 144 = 25$

$\Rightarrow \quad OP = \sqrt{25} = 5$ cm

Q. 6. In fig., common tangents AB and CD to two circles with centres O_1 and O_2 intersect at E. Prove that $AB = CD$.

[CBSE 2014]



Sol. Since, the tangent drawn from the external point to the circle are equal

$\therefore \quad AE = CE \quad \ldots(1)$

and, $\quad BE = ED \quad \ldots(2)$

On adding eqs. (1) and (2), we get

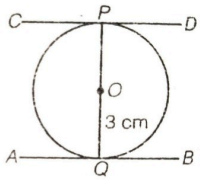
$AE + BE = CE + ED$

$\Rightarrow \quad AB = CD$ **Hence proved**

Q. 6. Find the distance between two parallel tangents of a circle of radius 3 cm.

[CBSE 2011]

Sol. Given, radius of a circle $= 3$ cm *i.e.*, $OP = OQ = 3$ cm



Now, distance between two parallel tangents,

$PQ = OP + OQ$

$= 3 + 3 = 6$ cm

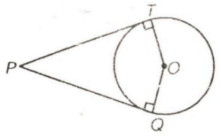
Hence, the distance between two parallel tangents of a circle is 6 cm.

Q.10. PQ and PT are tangents to a circle with centre O and radius 5 cm. If $PQ = 12$ cm, then find the perimeter of quadrilateral $PQOT$.

[CBSE 2011]

Sol. Here,

$OQ = OT = 5$ cm [radii of same circle]



and $\quad PQ = PT = 12$ cm

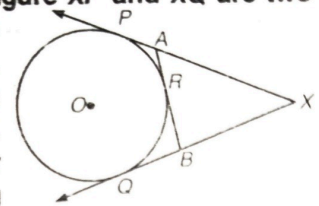
[tangents from an external point]

Perimeter of quadrilateral $PQOT$

$= PQ + QO + OT + TP$

$= (12 + 5 + 5 + 12)$ cm $= 34$ cm

Q. 3. In the given figure XP and XQ are two tangents to the circle with centre O, drawn from an external point X. ARB is another tangent, touching the circle at R. Prove that $XA + AR = XB + BR$.



[CBSE 2014]

Sol. In the given figure,

$AP = AR$

$BR = BQ$

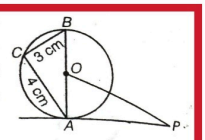
$XP = XQ$ [Tangent to a circle from an external point are equal]

$XA + AP = XB + BQ$

$XA + AR = XB + BR$ **Hence proved**

Short Question

Q.10. ***PA*** **is a tangent to the circle with centre** ***O.*** **If** $BC = 3$ **cm,** $AC = 4$ **cm and** $\Delta ACB \sim \Delta PAO$, **then find** OA **and** $\frac{OP}{AP}$.



[CBSE 2013]

Sol. Given, $BC = 3$ cm, $AC = 4$ cm

In $\Delta ACB, \angle BCA = 90°$ [angle in semi-circle]

Using Pythagoras theorem,

$$AB^2 = AC^2 + BC^2$$

$$\Rightarrow \quad AB^2 = 4^2 + 3^2$$

$$\Rightarrow \quad AB^2 = 16 + 9 = 25$$

$$\Rightarrow \quad AB = \sqrt{25} = 5 \text{ cm}$$

$$\therefore \quad OA = \frac{1}{2} \times AB$$

$$[\because \text{radius} = \frac{1}{2} \times \text{diameter}]$$

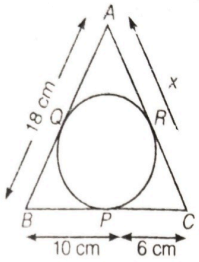
Now, $\Delta ACB \sim \Delta PAO$

$$\therefore \quad \frac{AB}{AC} = \frac{OP}{AP}$$

$$\Rightarrow \quad \frac{5}{4} = \frac{OP}{AP}$$

$$\text{i.e.,} \quad \frac{OP}{AP} = \frac{5}{4}$$

Q.14. **In fig., all three sides of a triangle touch the circle. Find the value of** x. [CBSE 2011]



Sol. Since, the tangents drawn from an external point to the circle are equal.

$$\therefore \quad CR = CP = 6 \text{ cm}$$

$$BQ = BP = 10 \text{ cm}$$

$$AR = AQ = AB - BQ$$

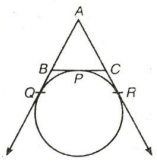
$$= 18 \text{ cm} - 10 \text{ cm} = 8 \text{ cm}$$

$$\therefore \quad x = AC = AR + CR = 8 \text{ cm} + 6 \text{ cm}$$

$$= 14 \text{ cm}$$

Hence, the value of x is 14 cm.

Q.21. **A circle touches the side** ***BC*** **of a** ΔABC **at** ***P*** **and** ***AB*** **and** ***AC*** **when produced at** ***Q*** **and** ***R*** **respectively as shown in the figure. Show that** $AQ = \frac{1}{2}$ **(Perimeter of** ΔABC**).** [CBSE 2011, 12]



or **Show that** $AQ = \frac{1}{2}(BC + CA + AB)$

Sol. We know that, tangents drawn from an exterior point to a circle are equal in length.

$$\therefore \quad AQ = AR \quad \text{[tangents from } A\text{]} \ldots (1)$$

$$BP = BQ \quad \text{[tangents from } B\text{]} \ldots (2)$$

$$\text{and} \quad CP = CR \quad \text{[tangents from } C\text{]} \ldots (3)$$

Now, Perimeter of

$$\Delta ABC = AB + BC + AC$$

[$\because$ sum of three sides of a triangle]

$$= AB + BP + CP + AC$$

$$= (AB + BQ) + (CR + AC)$$

[using eqs. (2) and (3)]

$$= AQ + AR$$

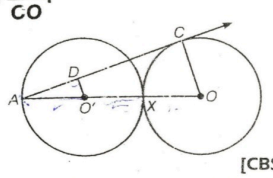
$$= AQ + AQ = 2AQ \quad \text{[from eq. (2)]}$$

$$\Rightarrow \quad \frac{1}{2}(\text{Perimeter of} \Delta ABC) = AQ$$

$$AQ = \frac{1}{2} \quad \text{(Perimeter of } \Delta ABC)$$

Hence proved

Q.19. **In fig., two equal circles, with centre** ***O*** **and** ***O′,*** **touch each other at** ***X.*** ***OO′*** **produced meets the circle with centre** ***O′*** **at** ***A.*** ***AC*** **is tangent to the circle with centre** ***O,*** **at the point** ***C.*** ***O′D*** **is perpendicular to** ***AC.*** **Find the value of** $\frac{DO'}{CO}$.



[CBSE 2016]

Sol. Here, AC is tangent to the circle with centre O, at point C.

$$\therefore \quad OC \perp AC \quad \Rightarrow \quad \angle ACO = 90°$$

Also, $O'D$ is perpendicular to AC [given]

$$\Rightarrow \quad \angle ADO' = 90°$$

Now, in $\Delta ADO'$ and ΔACO, we get

$$\angle A = \angle A \quad \text{[common]}$$

$$\angle ADO' = \angle ACO \quad \text{[each = 90°]}$$

$$\Delta ADO' \sim \Delta ACO \quad \text{(By AA similarity axiom)}$$

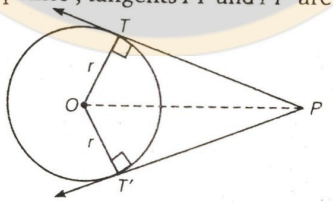
$$\Rightarrow \quad \frac{DO'}{CO} = \frac{AO'}{AO} = \frac{AO'}{AX + XO}$$

$$= \frac{r}{2r + r} = \frac{r}{3r} = \frac{1}{3}$$

$$[\because AX = AO' + O'X = r + r = 2r]$$

Q.30. **Prove that the lengths of tangents drawn from an external point to a circle are equal.** [CBSE 2018]

Sol. Given A circle of centre O. Through the external point P, tangents PT and PT' are drawn.



To prove : $PT = PT'$

Construction : Join PO, TO and $T'O$.

Proof : In ΔPTO and $\Delta PT'O$, we have

$$TO = T'O = r$$

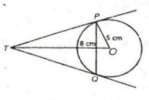
hypotenuse PO = hypotenuse PO [common]

$$\angle PTO = \angle PT'O = 90°$$

$$\therefore \quad \Delta PTO \cong \angle PT'O \text{ [by RHS congruency axiom]}$$

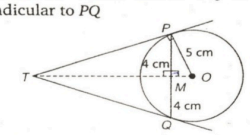
$$\Rightarrow \quad PT = PT' \quad \text{[c.p.c.t.]}$$

Q.31. ***PQ*** **is a chord of length 8 cm of a circle of radius 5 cm. The tangents at** ***P*** **and** ***Q*** **intersect at a point** ***T*** **(see fig.). Find the length** ***TP***



[CBSE 2019]

Sol. Join OT which bisects PQ at M and perpendicular to PQ



In ΔOPM,

$$OP^2 = PM^2 + OM^2$$

[By Pythagoras Theorem]

$$\Rightarrow \quad (5)^2 = (4)^2 + OM^2$$

$$\Rightarrow \quad OM = 3 \text{ cm}$$

In ΔOPT and ΔOPM,

$$\angle MOP = \angle TOP \quad \text{[Common angles]}$$

$$\angle OMP = \angle OPT \quad \text{[Each 90°]}$$

$$\therefore \Delta POT \sim \Delta MOP \quad \text{[By AA similarity]}$$

$$\Rightarrow \quad \frac{TP}{MP} = \frac{OP}{OM}$$

$$\Rightarrow \quad TP = \frac{4 \times 5}{3}$$

$$[\because OP = 5 \text{ cm}, PM = 4 \text{ cm}, MO = 3 \text{ cm}]$$

$$\Rightarrow \quad TP = \frac{20}{3} = 6\frac{2}{3} \text{ cm}$$

Question : Find the length of tangent drawn to a circle with radius 7 cm from a point 25 cm away from the centre.

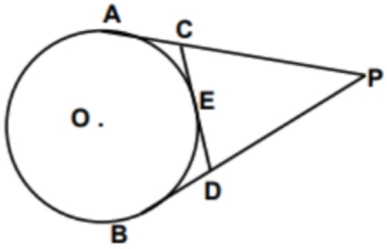
(a) 24 cm
(b) 27 cm
(c) 26 cm
(d) 25 cm

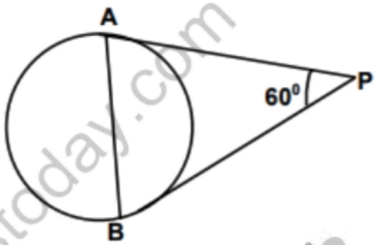
Question : A point P is 26 cm away from the centre of a circle and the length of the tangent drawn from P to the circle is 24 cm. Find the radius of the circle.

(a) 11 cm
(b) 10 cm
(c) 16 cm
(d) 15 cm

Question : From an external point P, tangents PA and PB are drawn to a circle with centre O. If CD is the tangent to the circle at a point E and PA = 14 cm, find the perimeter of the DPCD.

(a) 28 cm
(b) 27 cm
(c) 26 cm
(d) 25 cm



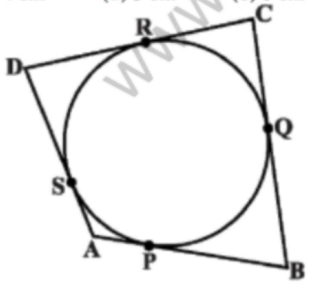


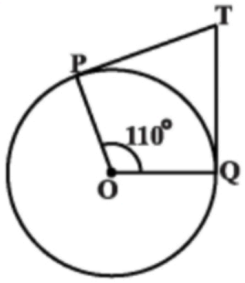
Question : In the above sided figure, PA and PB are tangents such that PA = 9cm and ĐAPB = 60^0. Find the length of the chord AB.

(a) 4 cm
(b) 7 cm
(c) 6 cm
(d) 9 cm

Question : In the below figure the circle touches all the sides of a quadrilateral ABCD whose three sides are AB = 6 cm, BC = 7 cm, CD = 4 cm. Find AD.

(a) 4 cm
(b) 3 cm
(c) 6 cm
(d) 9 cm





Question : In the above sided Fig., if TP and TQ are the two tangents to a circle with centre O so that ĐPOQ = 110°, then ĐPTQ is equal to

(a) 60^0
(b) 70^0
(c) 80^0
(d) 90^0

Question : 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 ĐPOA is equal to

(a) 60^0
(b) 70^0
(c) 80^0
(d) 50^0

Question : 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 ĐPOA is equal to

(a) 60^0

(b) 70^0

(c) 80^0

(d) 50^0

Question : 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.

(a) 4 cm

(b) 3 cm

(c) 6 cm

(d) 5 cm

Question : From a point P, 10 cm away from the centre of a circle, a tangent PT of length 8 cm is drawn. Find the radius of the circle.

(a) 4 cm

(b) 7 cm

(c) 6 cm

(d) 5 cm

Question : PT is tangent to a circle with centre O, OT = 56 cm, TP = 90 cm, find OP

(a) 104 cm

(b) 107 cm

(c) 106 cm

(d) 105 cm

Question : TP and TQ are the two tangents to a circle with center O so that angle ĐPOQ = 130°. Find ĐPTQuestion :

(a) 50^0

(b) 70^0

(c) 80^0

(d) none of these

Question : From a point Q, the length of the tangent to a circle is 40 cm and the distance of Q from the centre is 41 cm. Find the radius of the circle.

(a) 4 cm

(b) 3 cm

(c) 6 cm

(d) 9 cm

Question : The common point of a tangent to a circle with the circle is called _____

(a) centre

(b) point of contact

(c) end point

(d) none of these.

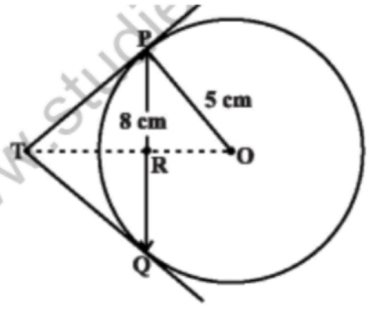
Question : PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T (see below figure). Find the length TP.

(a) 203cm

(b) 10 3cm

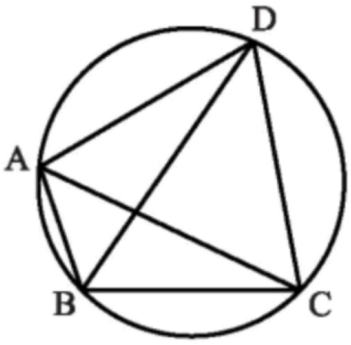
(c) 403cm

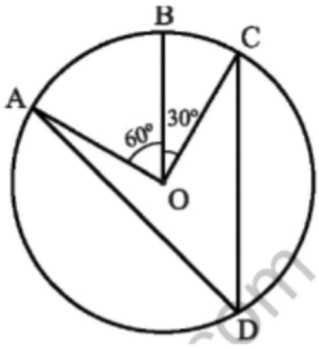
(d) none of these



Question : In below Fig, ABCD is a cyclic quadrilateral in which AC and BD are its diagonals. If Đ DBC =55° and ĐBAC = 45°, find ĐBCD.

(a) 80º (b) 60º (c) 90º (d) none of these





Question : In above sided Fig, A,B and C are three points on a circle with centre O such that ĐBOC = 30° and ĐAOB = 60°. If D is a point on the circle other than the arc ABC, find ĐADC.

(a) 45º
(b) 60º
(c) 90º
(d) none of these

Question : A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc

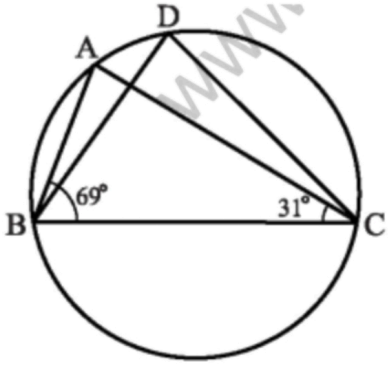
(a) 1500
(b) 30º
(c) 60º
(d) none of these

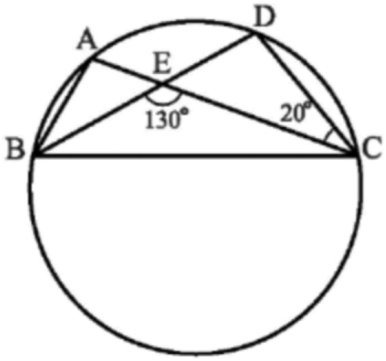
Question : A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the major arc.

(a) 1500
(b) 30º
(c) 60º
(d) none of these

Question : In the below Fig., ĐABC = 69°, ĐACB = 31°, find ĐBDC.

(a) 80º
(b) 60º
(c) 90º
(d) 1000





Question : In the above sided Fig., A, B, C and D are four points on a circle. AC and BD intersect at a point E such that ĐBEC = 130° and ĐECD = 20°. Find ĐBAC.

(a) 110º
(b) 150º
(c) 90º
(d) 1000

Question : ABCD is a cyclic quadrilateral whose diagonals intersect at a point E. If ĐDBC = 70°, ĐBAC is 30°, find ĐBCD.

(a) 80º
(b) 60º
(c) 90º
(d) 1000