



# UD AAN 2024

**- FOR CLASS 10<sup>th</sup> STUDENTS**

**Lecture No.- 04**

- Subject Name- **Mathematics**
- Chapter Name- **Circles**



**By- RITIK SIR**

# Topic to be Covered



**Topic**

Important Question (Part III)



#Q. A circle touches the sides of a quadrilateral ABCD at P, Q, R, S respectively. show that the angles subtended at the centre by a pair of opposite sides are supplementary. [CBSE 2007]

To prove:

$$\angle COD + \angle AOB = 180^\circ$$

$$\angle AOD + \angle BOC = 180^\circ$$

Proof:

$$\angle 1 = \angle 8$$

$$\angle 3 = \angle 2$$

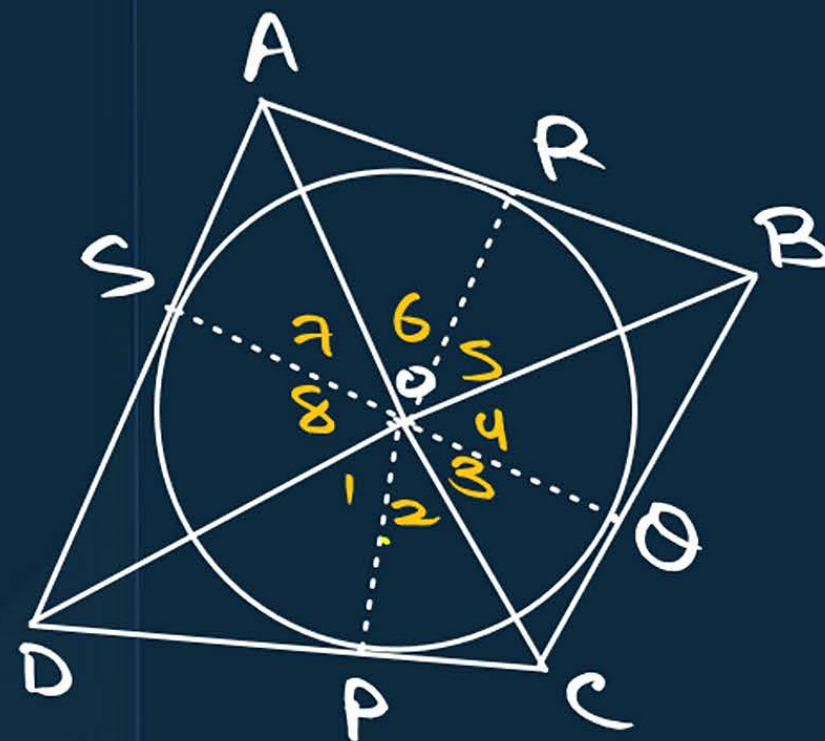
$$\angle 4 = \angle 5$$

$$\angle 6 = \angle 7$$

Tangents subtend equal angles at the centre.

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360^\circ$$

$$\angle 1 + \angle 2 + \angle 2 + \angle 5 + \angle 5 + \angle 6 + \angle 6 + \angle 1 = 360^\circ$$



$$2\angle 1 + 2\angle 2 + 2\angle 5 + 2\angle 6 = 360^\circ$$

$$\angle 1 + \angle 2 + \angle 5 + \angle 6 = 180^\circ$$

$$\angle COD + \angle AOB = 180^\circ$$

$$\angle 1 + \angle 2 + \boxed{\angle 3} + \boxed{\angle 4} + \angle 5 + \angle 6 + \boxed{\angle 7} + \boxed{\angle 8} = 360^\circ$$



$$\angle 8 + \angle 3 + \angle 3 + \angle 4 + \angle 4 + \angle 7 + \angle 7 + \angle 8 = 360^\circ$$

$$2\angle 3 + 2\angle 8 + 2\angle 4 + 2\angle 7 = 360^\circ$$

$$2[\angle 3 + \angle 8 + \angle 4 + \angle 7] = 360^\circ$$

$$\angle AOD + \angle BOC = 180^\circ$$



To Find: PA

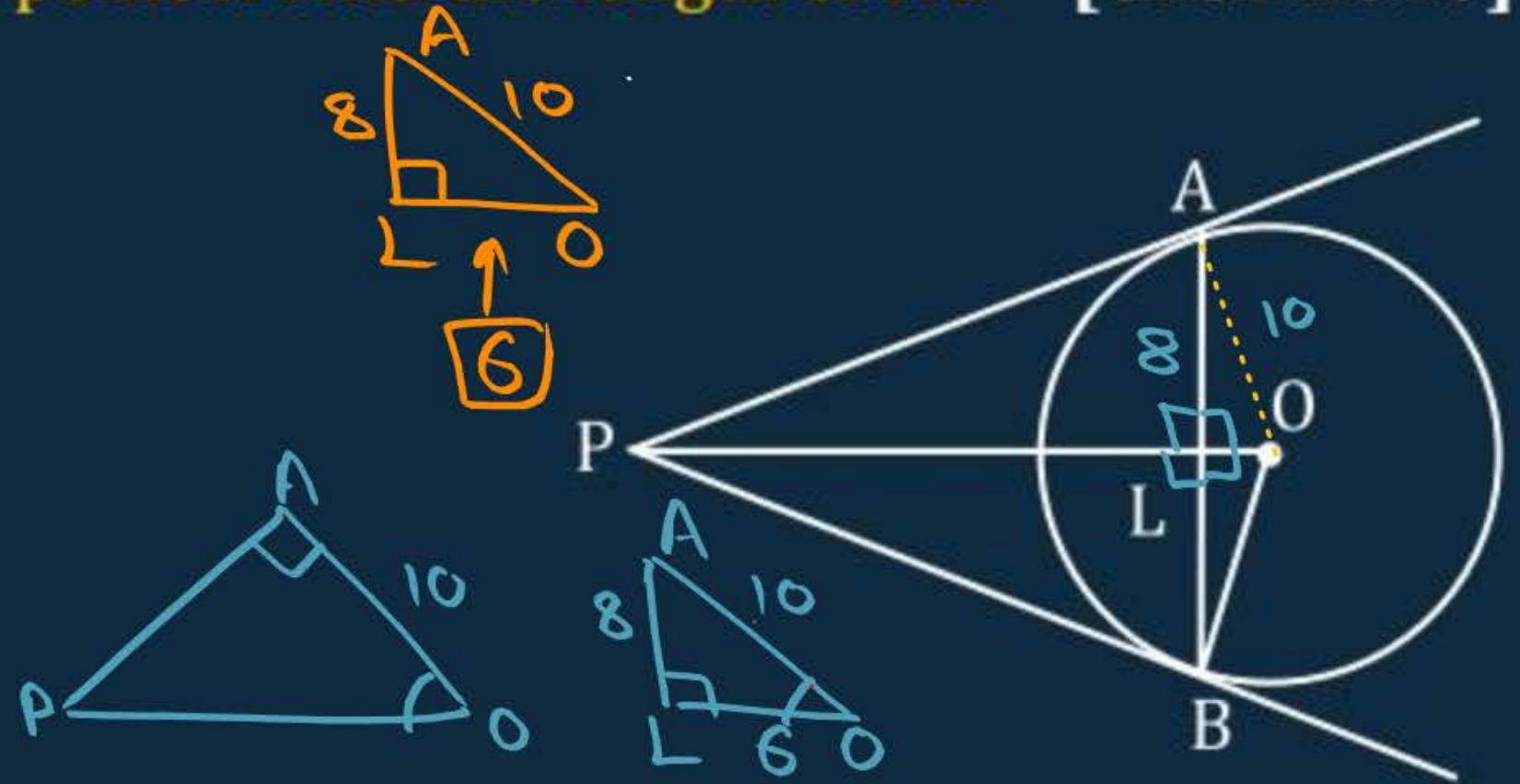
$\Rightarrow$  By CPCT...

$$AL = LB$$
$$\angle ALP = \angle BLP = 90^\circ$$

In DALO...

$$(A_0)^2 = (A_L)^2 + (L_0)^2$$

$$6 = 20$$



$$\angle PAO = \angle ALO [90^\circ]$$

$$\angle AOP = \angle AOL \text{ [Common]}$$

By AA...

$$\Delta AOP \sim DLOA$$

$\Delta AOP \sim \Delta LOA$

By CPST...

$$\frac{AO}{LO} = \frac{OP}{OA} = \frac{AP}{LA}$$

$$\boxed{\frac{10}{6}} = \frac{OP}{10} = \boxed{\frac{AP}{8}}$$

$$\frac{10}{6} = \frac{AP}{8}$$

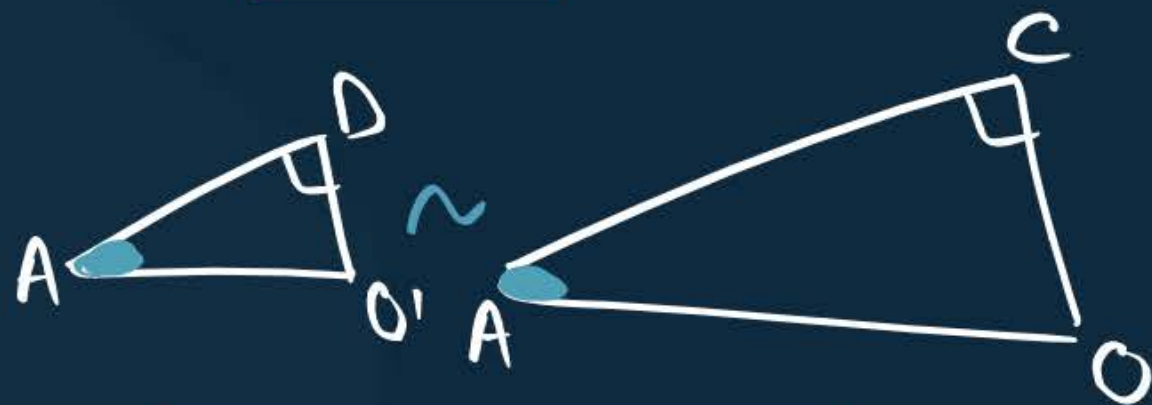
3 4

$\frac{40}{3} = AP$



#Q. In the figure, two equal circles, with centres  $O$  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  $\frac{DO'}{CO}$ . [2016 OD]

To Find =  $\frac{DO'}{CO}$

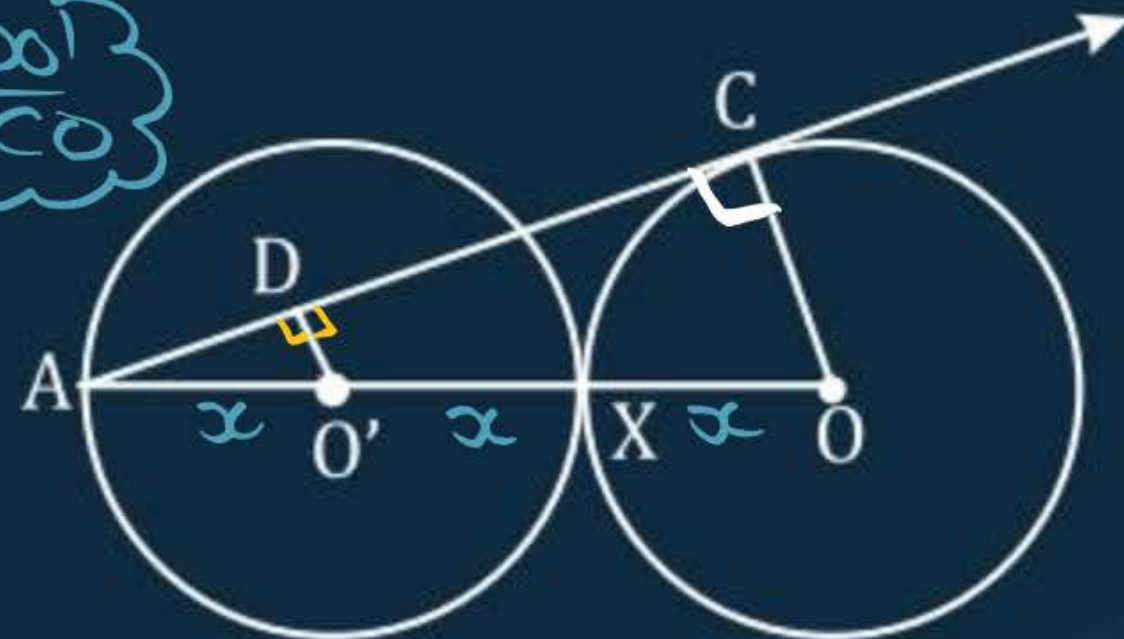


$\Delta DAO' \sim \Delta CAO$

$$\frac{DA}{CA} = \frac{AO'}{AO} = \frac{DO'}{CO} \quad (\text{C.P.S.T})$$

$$\frac{x}{3x} = \frac{DO'}{CO}$$

$$\frac{1}{3} = \frac{DO'}{CO}$$





#Q. In the figure,  $l$  and  $m$  are two parallel tangents to a circle with centre  $O$ , touching the circle at  $A$  and  $B$  respectively. Another tangent at  $C$  intersects the line  $l$  at  $D$  and  $m$  at  $E$ . Prove that  $\angle DOE = 90^\circ$ .

$$\angle ADE + \angle BED = 180^\circ \text{ [co-interior angles]}$$

$$\angle ADO = \angle CDO = \angle 1$$

$$\angle BEO = \angle CEO = \angle 2$$

Tangents are equally inclined to the line segment joining the Centre to that point.

$$2\angle 1 + 2\angle 2 = 180^\circ$$

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

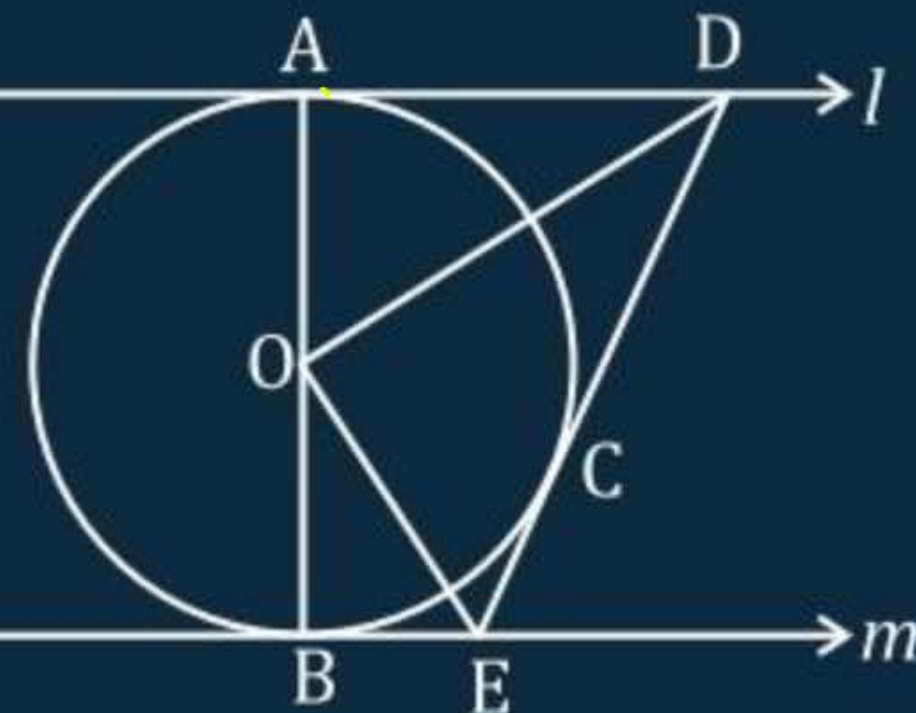
$$\angle ODC + \angle CEO = 90^\circ$$

In  $\triangle DOE$

By angle sum property--

$$\angle DOE + \angle ODC + \angle OEC = 180^\circ$$

$$\angle DOE = 90^\circ$$





## Topic : Circle



#Q. The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to the smaller circle touching it at D. Find its length AD.

In  $\triangle OBD$ ...

By P.T....

$$(OB)^2 = (OD)^2 + BD^2$$

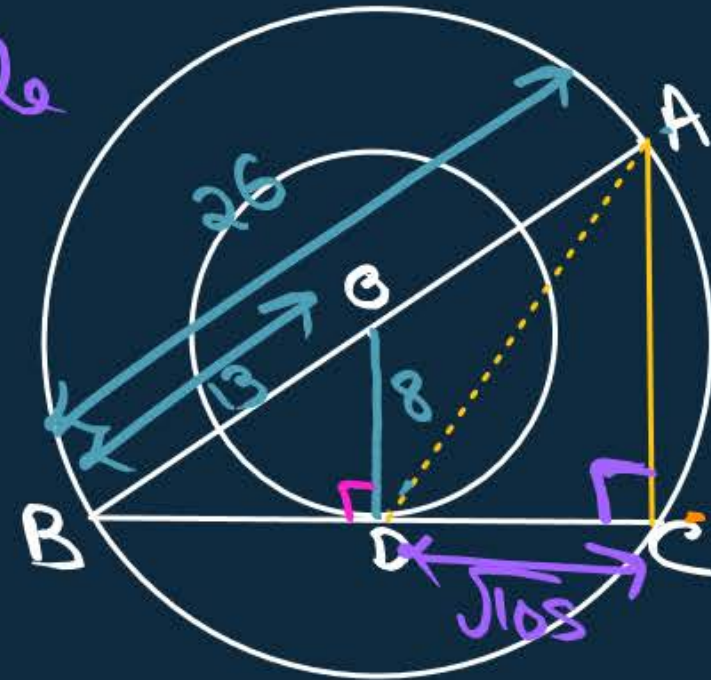
$$169 = (8)^2 + (BD)^2$$

$$\sqrt{105} = BD$$

$$CD = \sqrt{105}$$

Angle in the Semi-circle is  $90^\circ$

$$\therefore \angle ACB = 90^\circ$$



line from the center of a circle and perpendicular to the chord, bisects the chord.

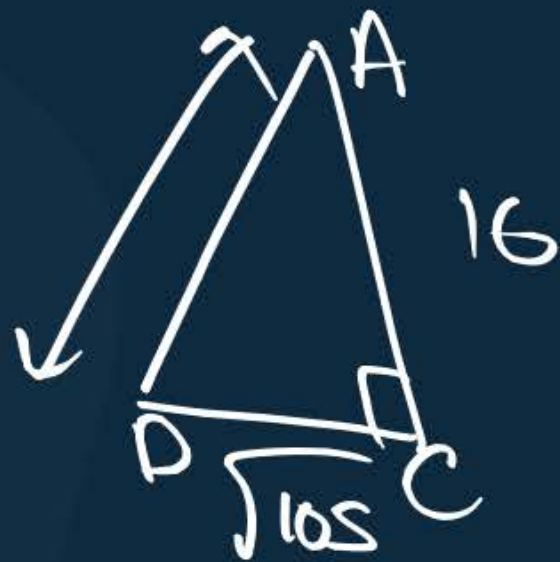


$$\rightarrow (26)^2 = (2\sqrt{105})^2 + (AC)^2$$

$$676 = 420 + (AC)^2$$

$$256 = (AC)^2$$

$$16 = AC$$



$$(AD)^2 = (16)^2 + (\sqrt{105})^2$$

$$(AD)^2 = 256 + 105$$

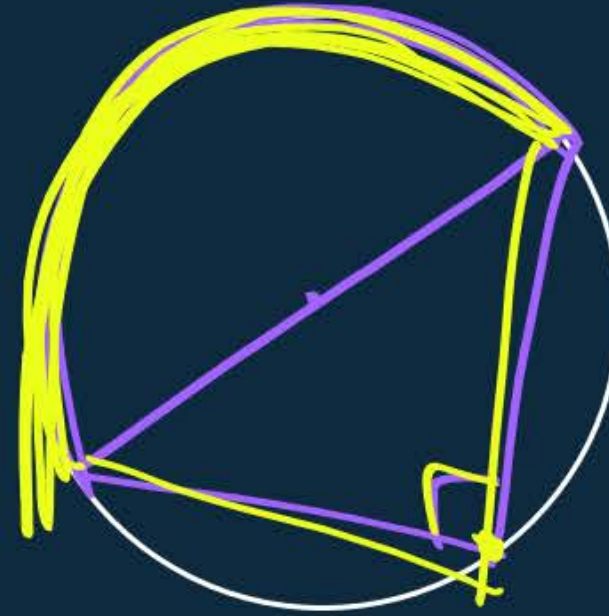
$$(AD)^2 = 361$$

$$AD = \sqrt{361}$$

$$AD = 19 \text{ cm} \quad \text{Ans,,}$$



Angle in the Semi  
Circle is  $90^\circ$ .



#Q. Show that tangent lines at the end of a diameter of a circle are parallel.

[CBSE 2014, 2017, NCERT]





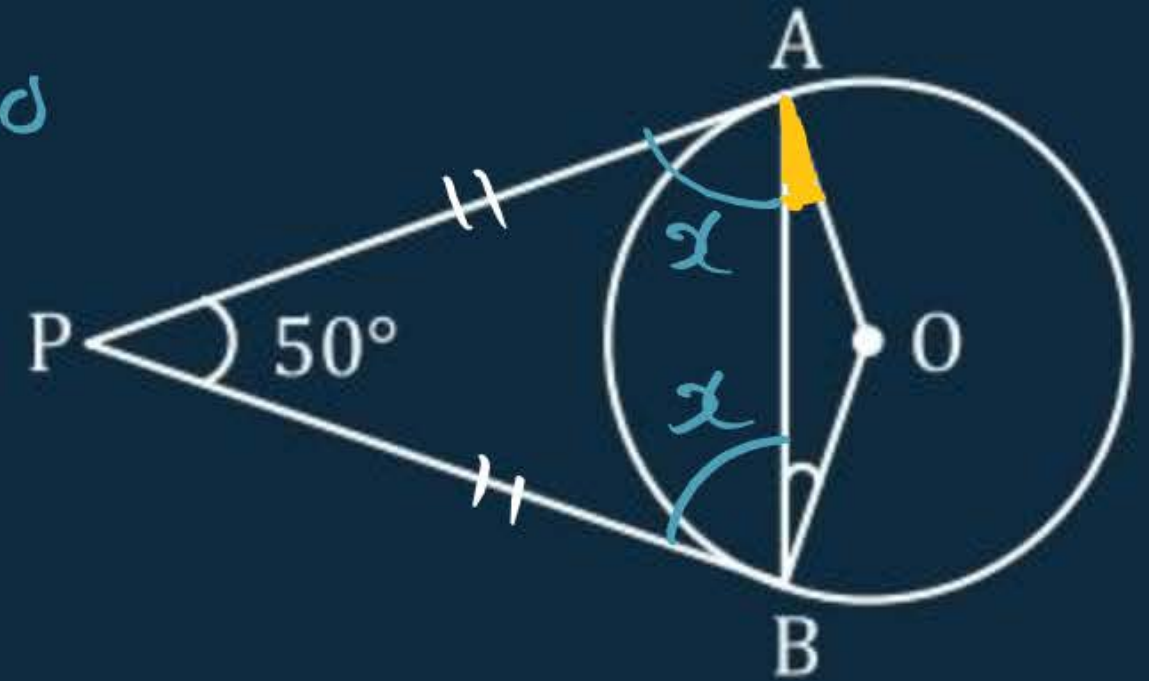
#Q. In figure, if PA and PB are tangents to the circle with centre O such that  $\angle APB = 50^\circ$ , then  $\angle OAB$  is equal to

- A**  $25^\circ$
- B**  $30^\circ$
- C**  $40^\circ$
- D**  $50^\circ$

$$2x + 2x + 50 = 180$$

$$2x = 130$$

$$x = 65$$



**#Q.** In two concentric circles, prove that a chord of larger circle which is tangent to smaller circle is bisected at the point of contact.  
**[CBSE 2012]**

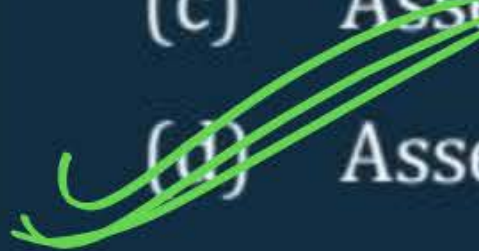




## Assertion and Reason Type Problem

Direction : In the following questions, a statement of assertion (A) is followed by a statement of reason (R).

Mark the correct the correct choice as :

- (a) Both Assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
- (b) Both assertion (A) and reason (R) are true but reason (R) is the correct explanation of assertion (A).
- (c) Assertion (A) is true but reason (R) is false
-  (d) Assertion (A) is false but reason (R) is true.



#Q. Assertion (A): If a chord AB subtends an angle of  $60^\circ$  at the centre of a circle, then the angle between the tangents at A and B is also  $60^\circ$ .  
*Galat*

Reason (R): The length of the tangent from an external point P on a circle with centre O is always less than OP.  
*Sahi*

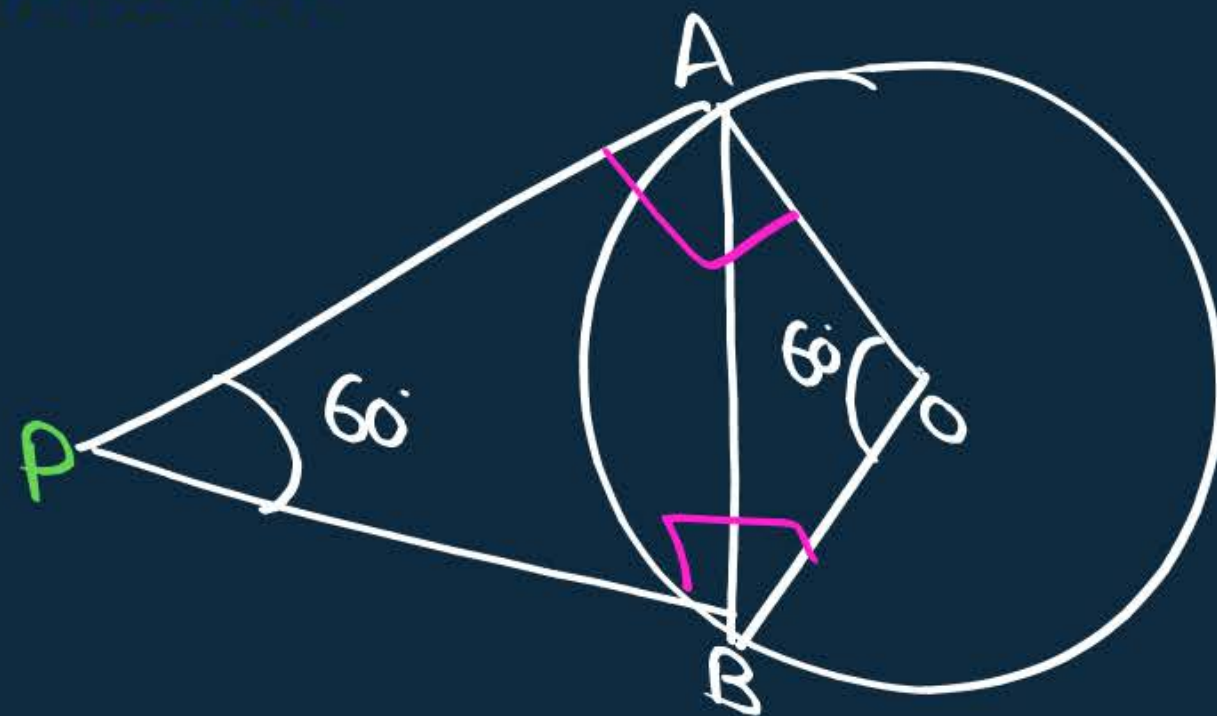
→ Quadrilateral —

PAOB.....

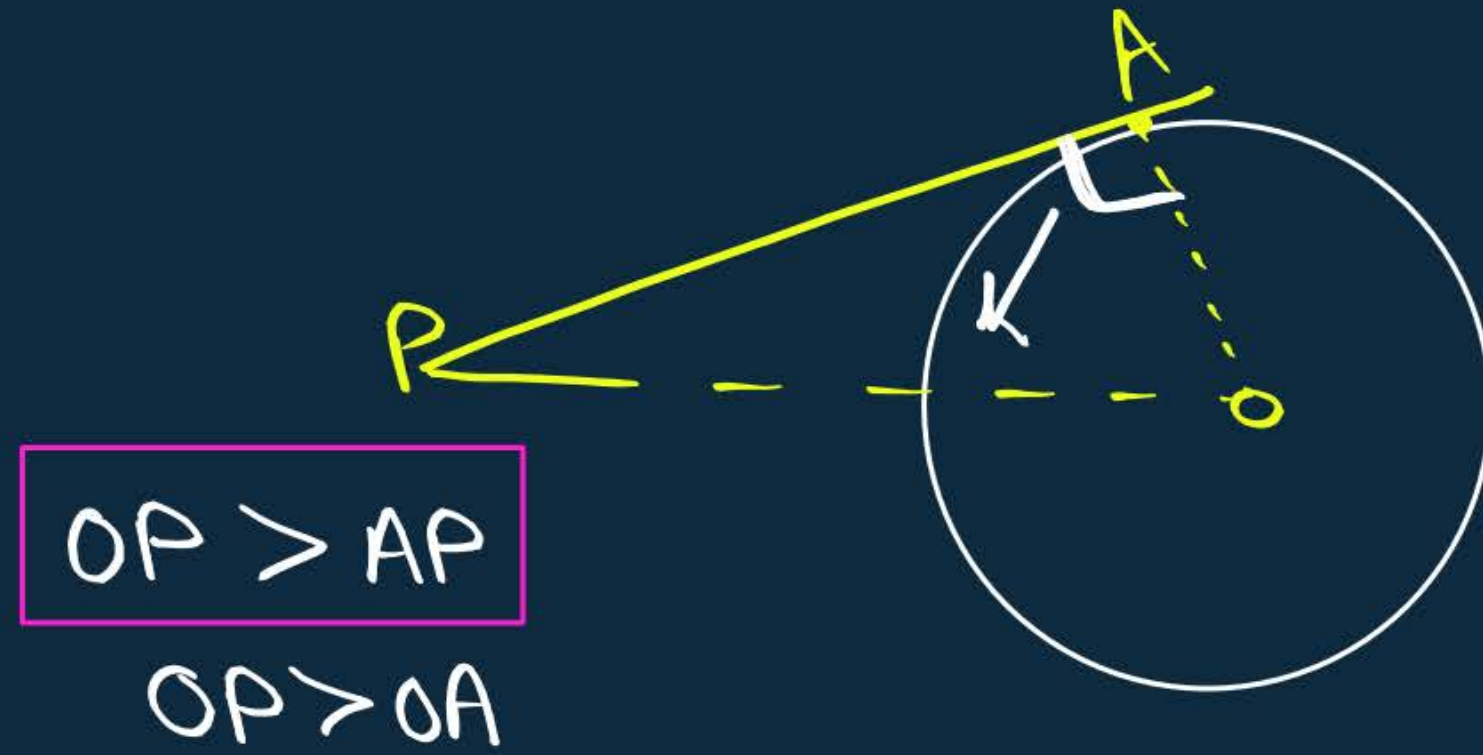
$$x + 90 + 90 + 60 = 360$$

$$x + 240 = 360$$

$$x = 120$$

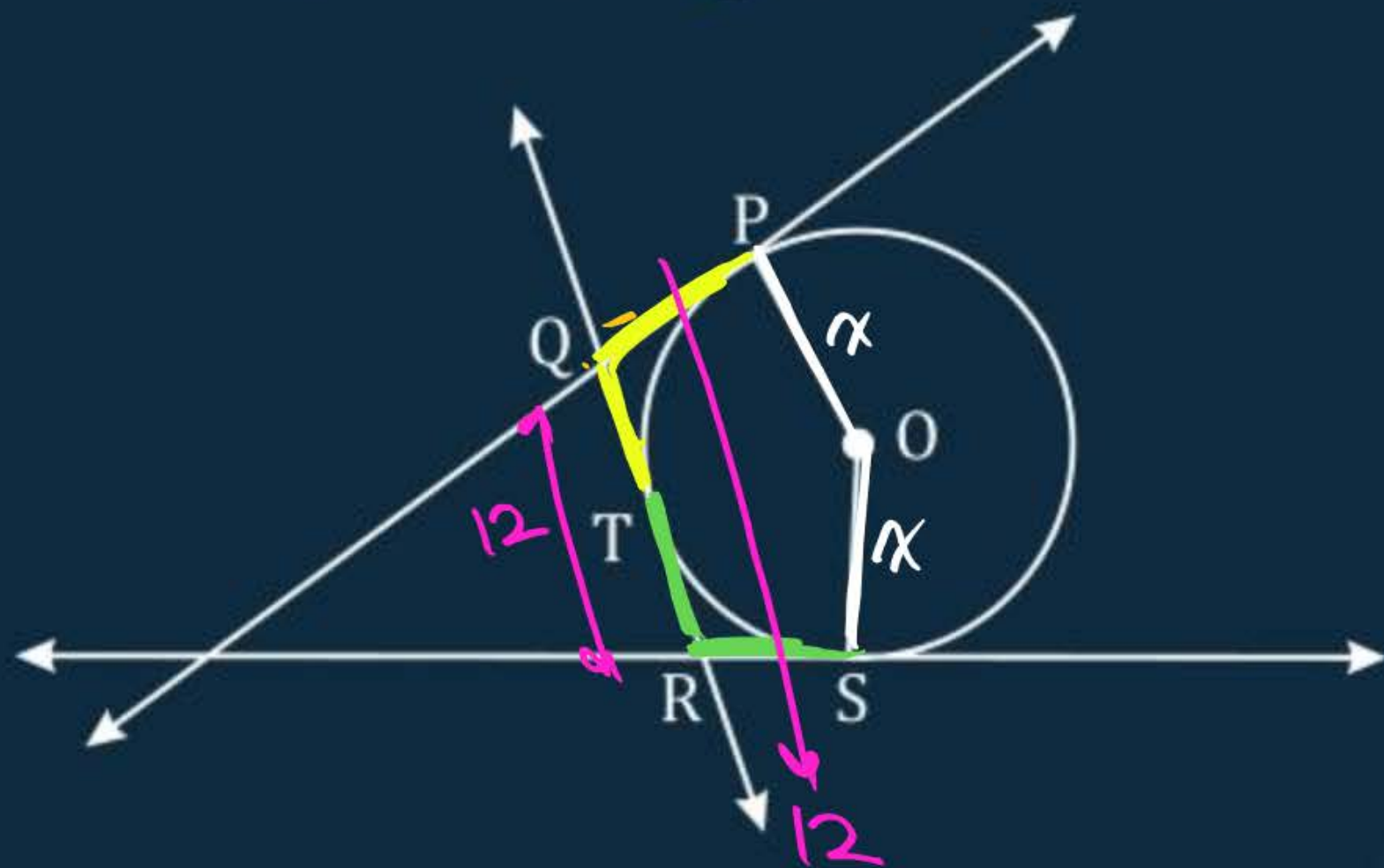






#Q. If  $QR = 12$  cm and the radius of the circle is 7 cm, what is the perimeter of the polygon PQTRS?

- A** 26 cm
- B** 31 cm
- C** 38 cm
- D** Cannot say with the given information





#Q. Two circles with centres O and N touch each other at point P as shown. O, P and N are collinear. The radius of the circle with centre O is twice that of the circle with centre N. OX is a tangent to the circle with centre N, and  $OX = 18$  cm. What is the radius of the circle with centre N?

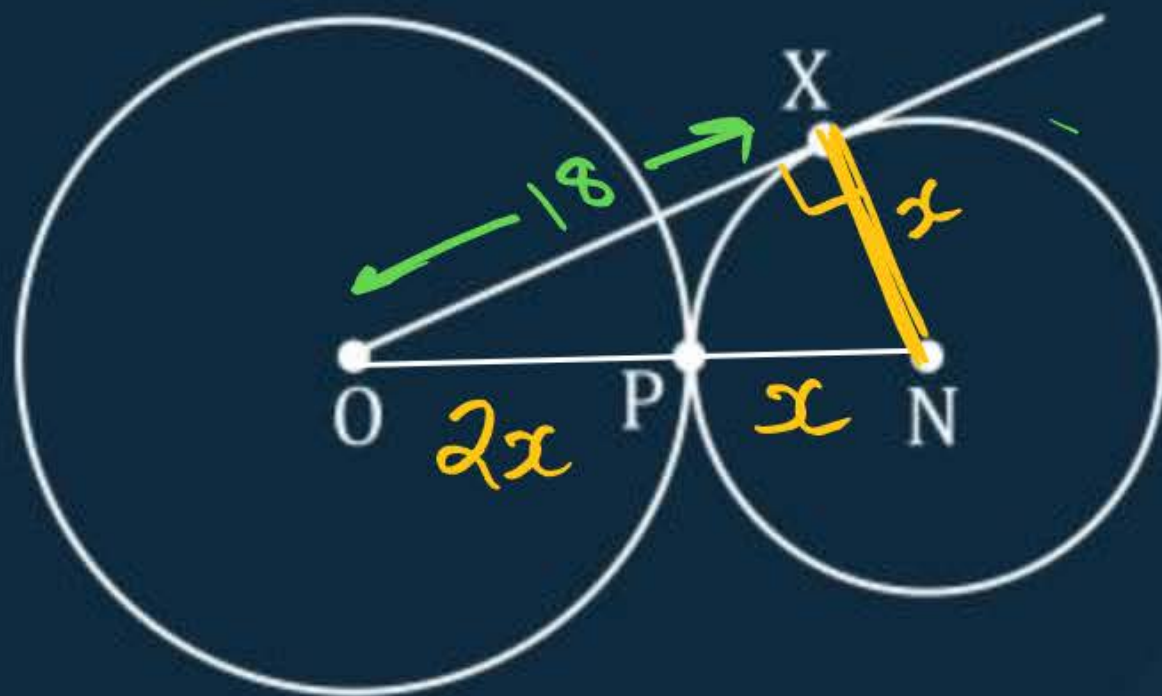
$$(ON)^2 = (XO)^2 + (XN)^2$$

$$(3x)^2 = (18)^2 + (x)^2$$

$$8x^2 = (18)^2$$

$$x^2 = \frac{18^2}{8}$$

$$x = \sqrt{\frac{18^2}{8}} = \frac{18}{\sqrt{8}} = \frac{18}{2\sqrt{2}} = \frac{9}{\sqrt{2}} \text{ cm}$$



**A**  $\frac{18}{\sqrt{2}}$  cm

**B** 9 cm

**C**  $\frac{9}{\sqrt{2}}$  cm

**D**  $\frac{18}{\sqrt{10}}$  cm



## [CBSE Latest Practice Sheet Questions]

**Hint**

