

CDS 1 2024

SSBCrack
EXAMS

LIVE

MATHS

GEOMETRY

CLASS 2

NAVJYOTI SIR





17 June 2024 Live Classes Schedule

8:00AM	17 JUNE 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	17 JUNE 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

AFCAT 2 2024 LIVE CLASSES

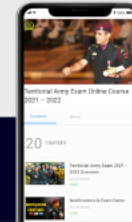
2:30PM	STATIC GK - INTERNATIONAL ORGANIZATION & HQ	DIVYANSHU SIR
4:00PM	MATHS - GEOMETRY - CLASS 2	NAVJYOTI SIR

NDA 2 2024 LIVE CLASSES

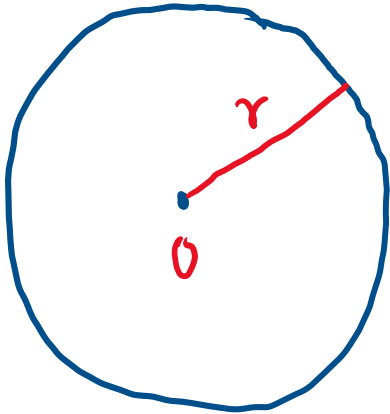
11:30AM	GK - MINERAL & RESOURCES	RUBY MA'AM
2:30PM	GS - CHEMISTRY - CLASS 6	SHIVANGI MA'AM
6:30PM	MATHS - MATRICES & DETERMINANTS - CLASS 2	NAVJYOTI SIR

CDS 2 2024 LIVE CLASSES

11:30AM	GK - MINERAL & RESOURCES	RUBY MA'AM
2:30PM	GS - CHEMISTRY - CLASS 6	SHIVANGI MA'AM
4:00PM	MATHS - GEOMETRY - CLASS 2	NAVJYOTI SIR



CIRCLE

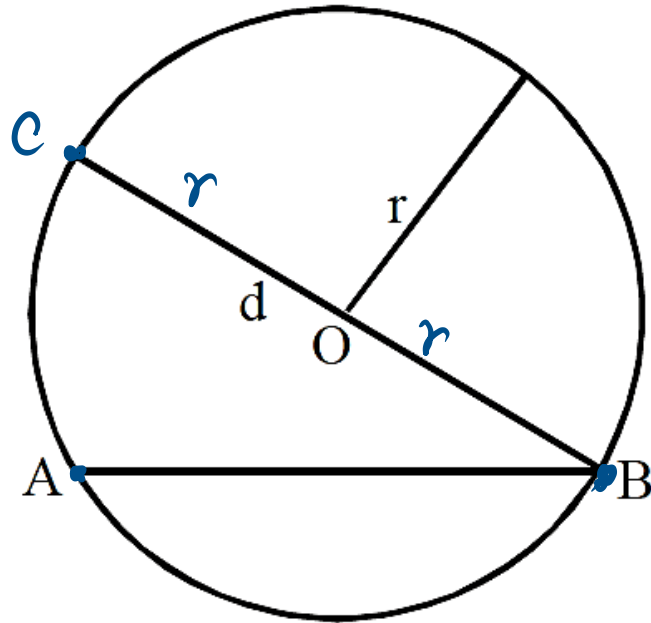


O - centre

r - radius

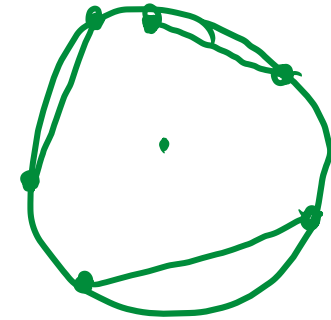
TERMS

✓ **Chord** : A chord is a segment whose endpoints lie on the circle.
AB is a chord in the figure.



BC is diameter (d).

$$\underline{d = 2r.}$$



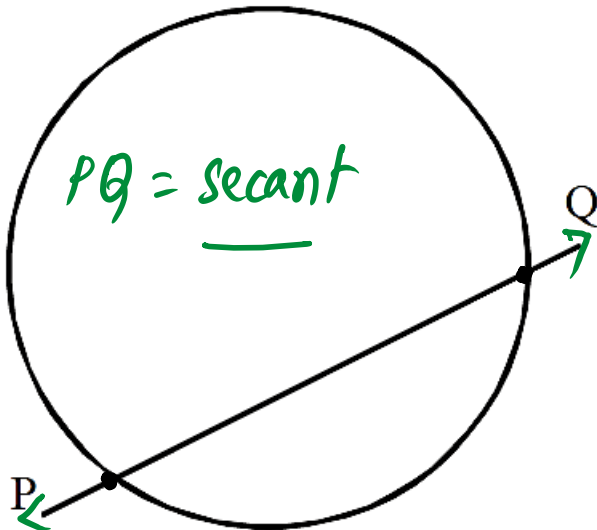
✓ **Diameter** : The chord, which passes through the centre of the circle, is called the diameter (d) of the circle. The length of the diameter of a circle is twice the radius of the circle.

$$d = 2r$$

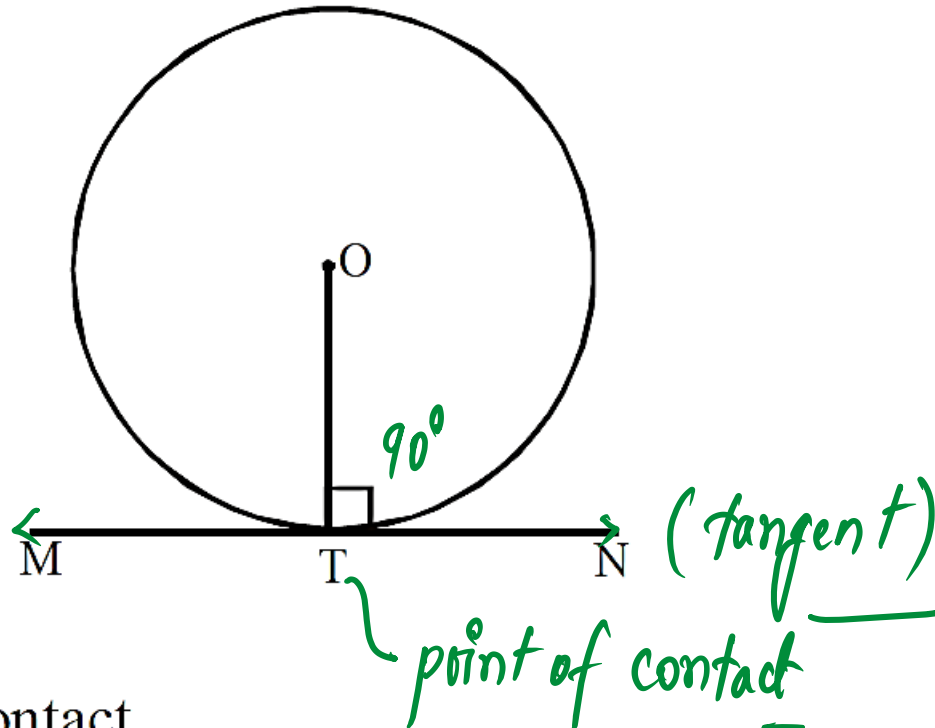
TERMS

Secant : A secant is a line, which intersects the circle in two distinct points.

Tangent : Tangent is a line in the plane of a circle and having one and only one point common with the circle. The common point is called the point of contact.

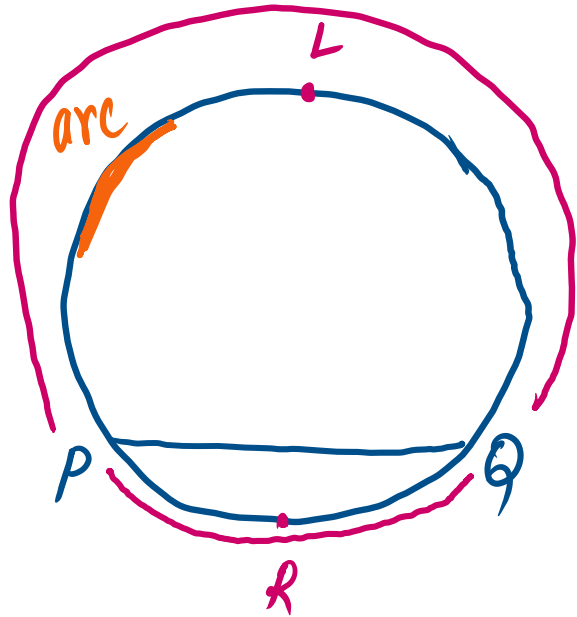


PQ is a secant



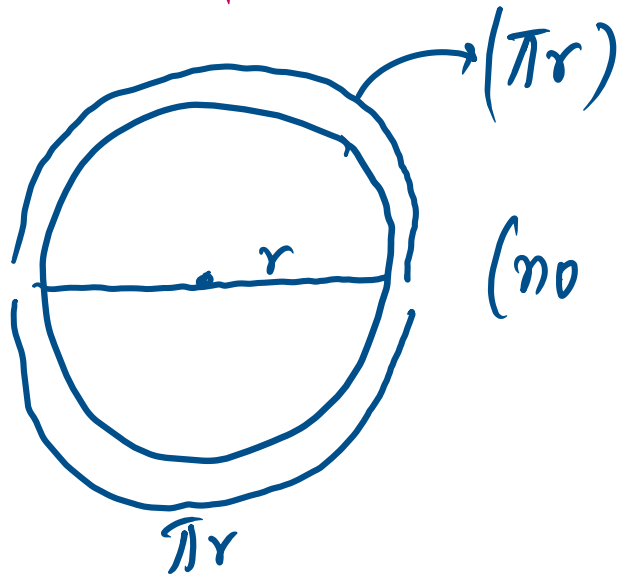
MN is a tangent. T is the point of contact.

ARCS



arc — PLQ — major arc

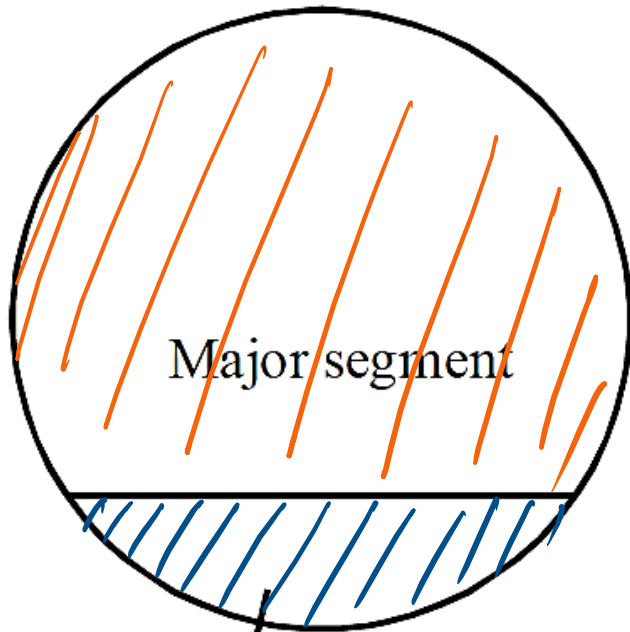
arc — PRQ — minor arc



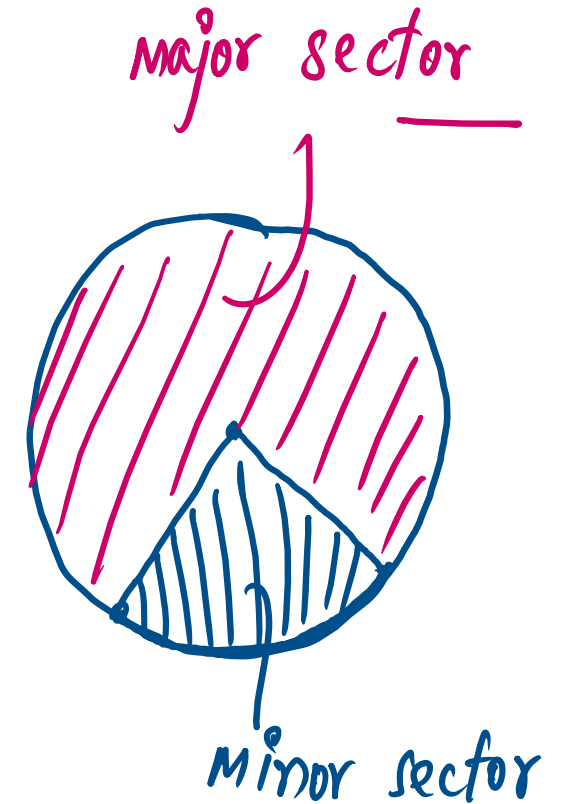
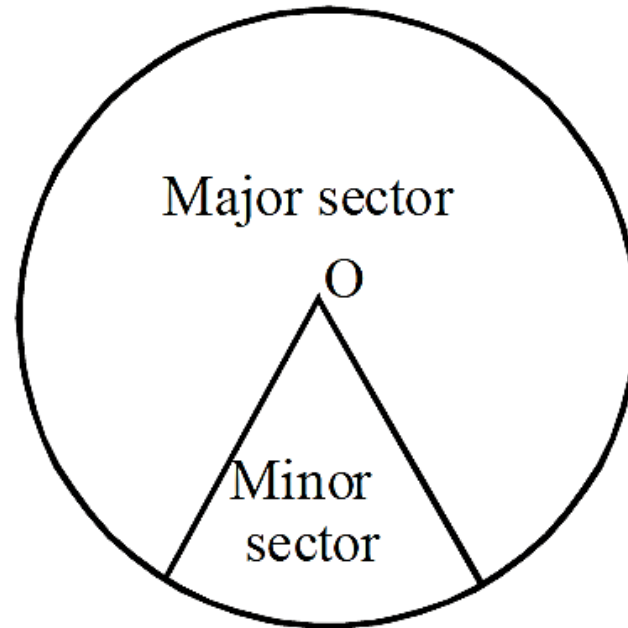
(no major & minor)

TERMS

Segment : The region between a chord and either of its arcs is called a segment. *(chord + arc)*



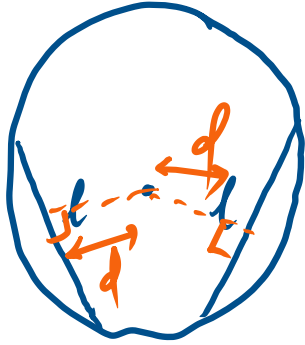
Minor segment



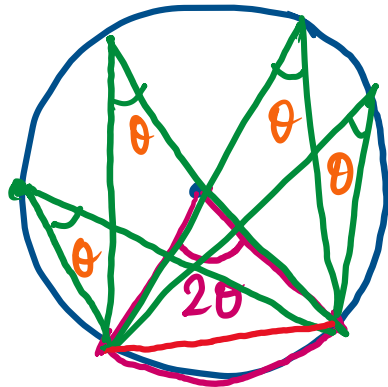
Sector : The region between an arc and the two radii, joining the centre to the endpoints of the arc is called a sector. *(Two radii + arc)*

IMPORTANT PROPERTIES

- ★ Equal chords of a circle are equidistant from the centre.



- ★ The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

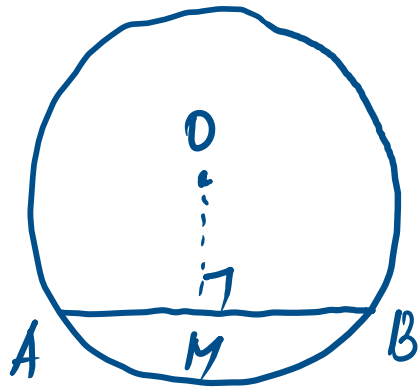


(Arc subtending angles in same segment are equal) — (θ)

IMPORTANT PROPERTIES

- ★ The perpendicular from the centre of a circle to a chord bisects the chord.

— (converse) — (reverse)
 OM is perpendicular from centre.

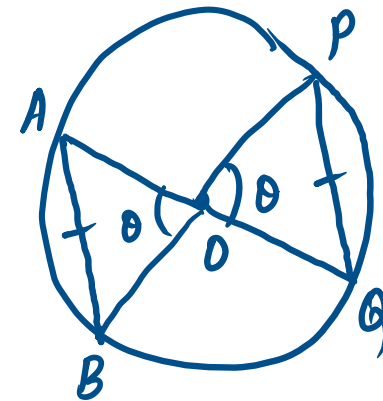


$$(AM = BM)$$

$$\angle OMB = 90^\circ \text{ (perpendicular)}$$

- ★ Equal chords of a circle subtend equal angles at the centre.

(If equal angles are subtended, chords are equal — (reverse) is true also.)



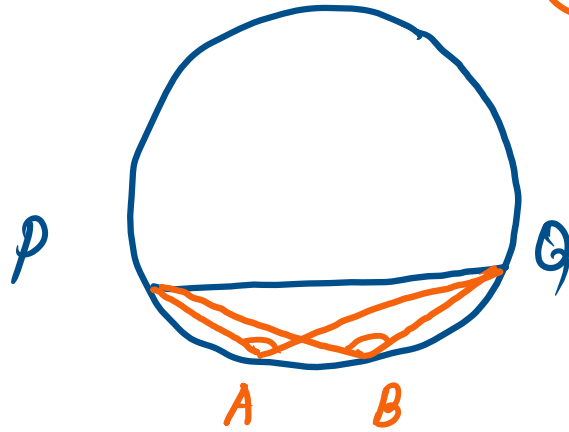
$$(AB = PQ)$$

$$\angle AOB = \angle POQ$$

IMPORTANT PROPERTIES

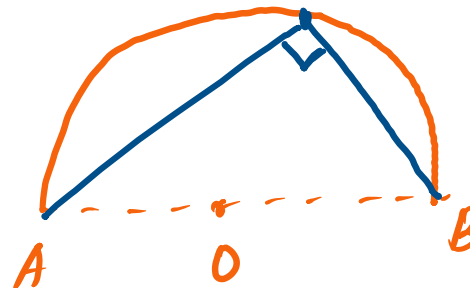
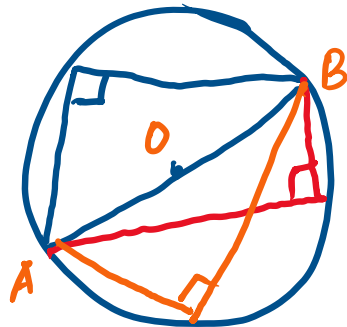
★ Angles in the same segment of a circle are equal.

(either in major or minor)



$\angle PAQ = \angle PBQ$ (minor segment)

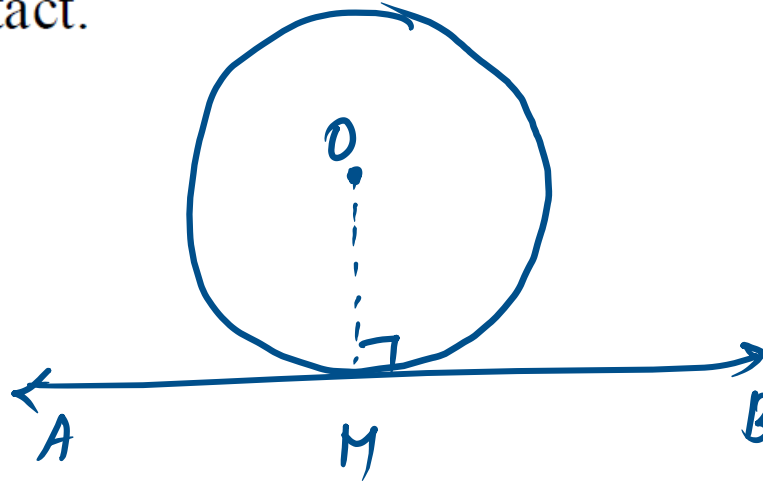
★ Angle in a semicircle is a right angle.



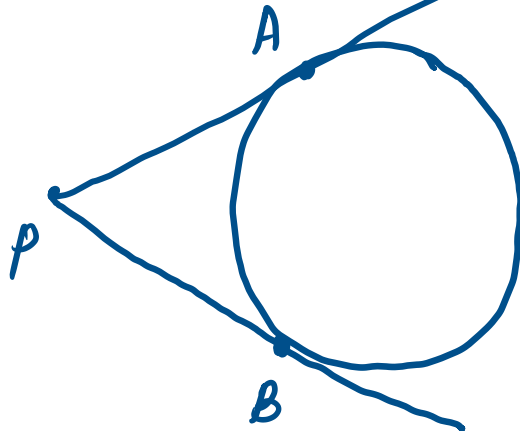
IMPORTANT PROPERTIES

- ★ The tangent at any point of a circle is perpendicular to the radius through the point of contact.

(reverse — true)



- ★ The length of tangents drawn from an external point to a circle are equal.



$$\underline{PA = PB}$$

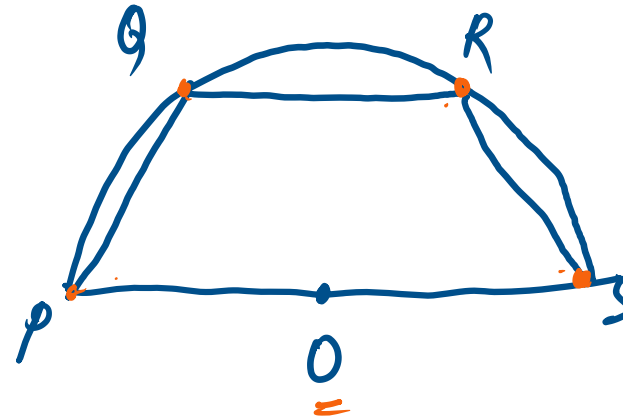
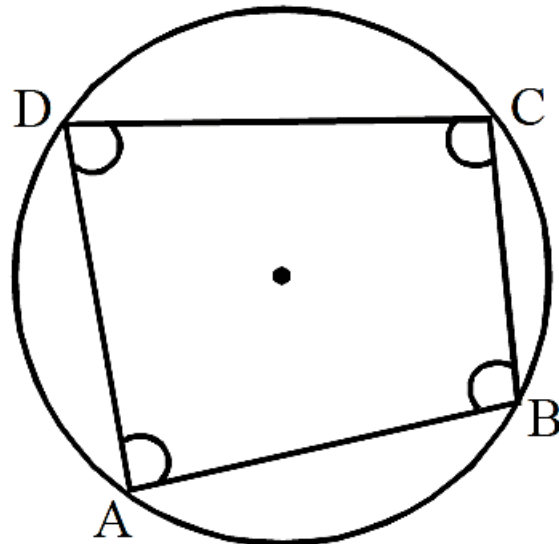
CYCLIC QUADRILATERAL

If all the four vertices of a quadrilateral lies on a circle then the quadrilateral is said to be cyclic quadrilateral.

- The sum of either pair of the opposite angles of a cyclic quadrilateral is 180° .

i.e. $\angle A + \angle C = 180^\circ$ ✓

$\angle B + \angle D = 180^\circ$ ✓

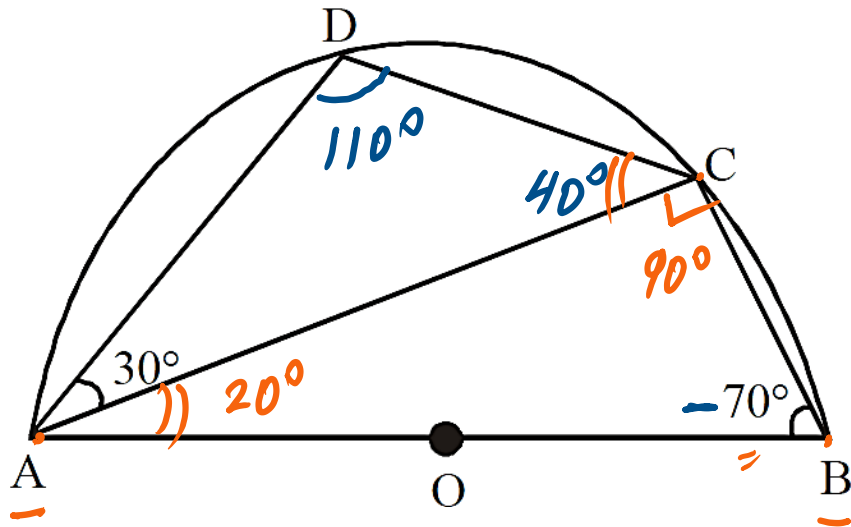


PS is diameter.

Is PQRS cyclic?
 —————
 Yes ✓

EXAMPLE

In the adjoining figure, C and D are points on a semi-circle described on AB as diameter. If $\angle ABC = 70^\circ$ and $\angle CAD = 30^\circ$, calculate $\angle BAC$ and $\angle ACD$.



$$\angle BAC = 20^\circ$$

$$\angle ACD = 40^\circ$$

$$\angle ACD = 90^\circ$$

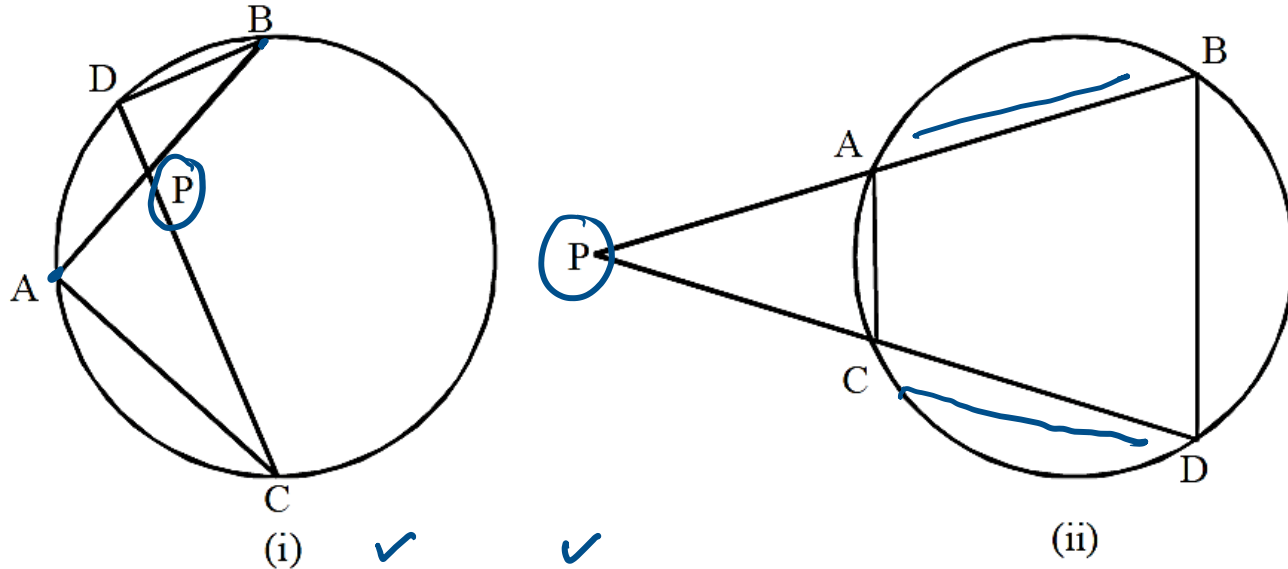
$\triangle ACB \Rightarrow$ angle-sum

ABCD is a cyclic quadrilateral.

$$\angle ADC = 180^\circ - 70^\circ = 110^\circ$$

$\triangle ADC$ — angle sum,

IMPORTANT PROPERTIES

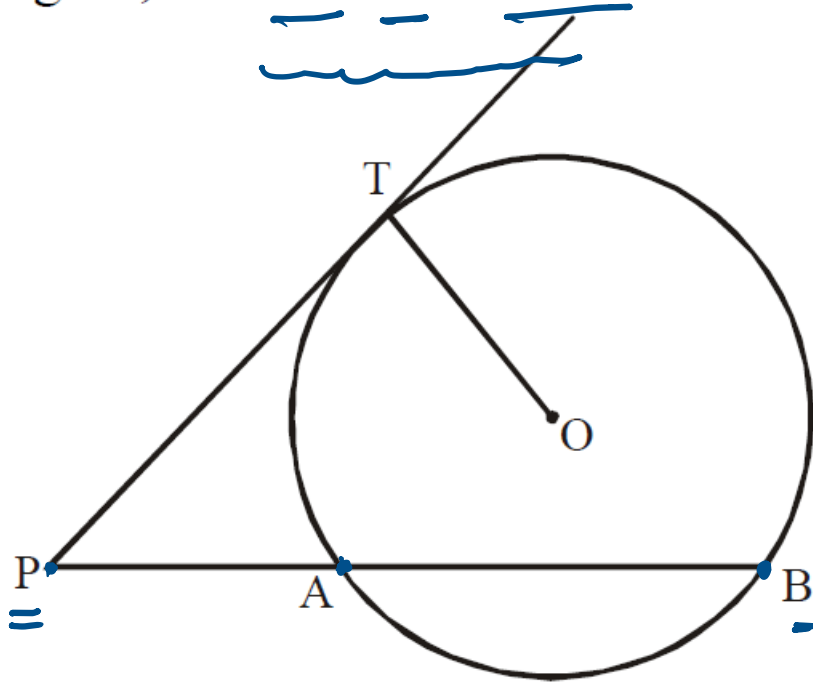


Two chords AB and CD of a circle such that they intersect each other at a point P lying inside (fig. (i)) or outside (fig. (ii)) the circle.

$$\boxed{PA \cdot PB = PC \cdot PD}$$

IMPORTANT PROPERTIES

If PAB is a secant to a circle intersecting it at A and B, and PT is a tangent, then $PA \cdot PB = PT^2$.



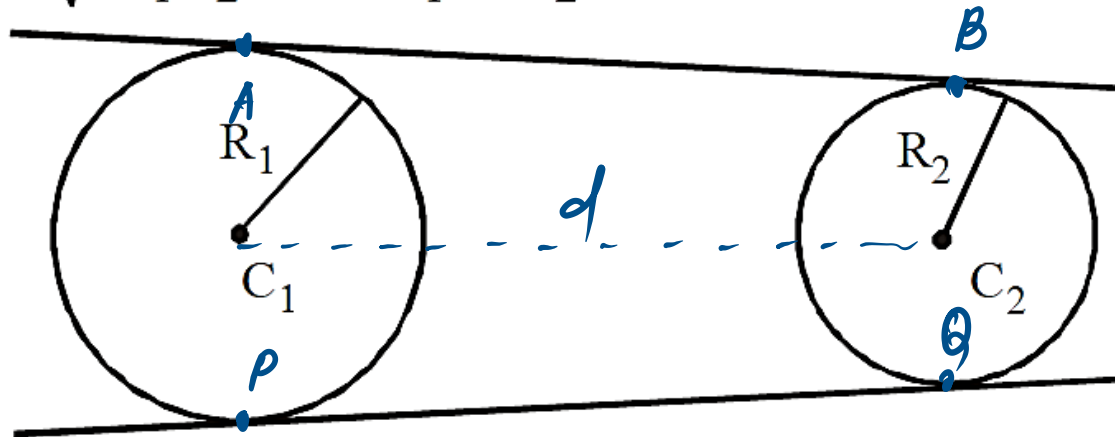
PAB - secant

PT - tangent

COMMON TANGENT

Length of direct common tangent

$$L_1 = \sqrt{(C_1C_2)^2 - (R_1 - R_2)^2}$$



where C_1C_2 = Distance between the centres

$$\underline{AB = PQ = L_1}$$

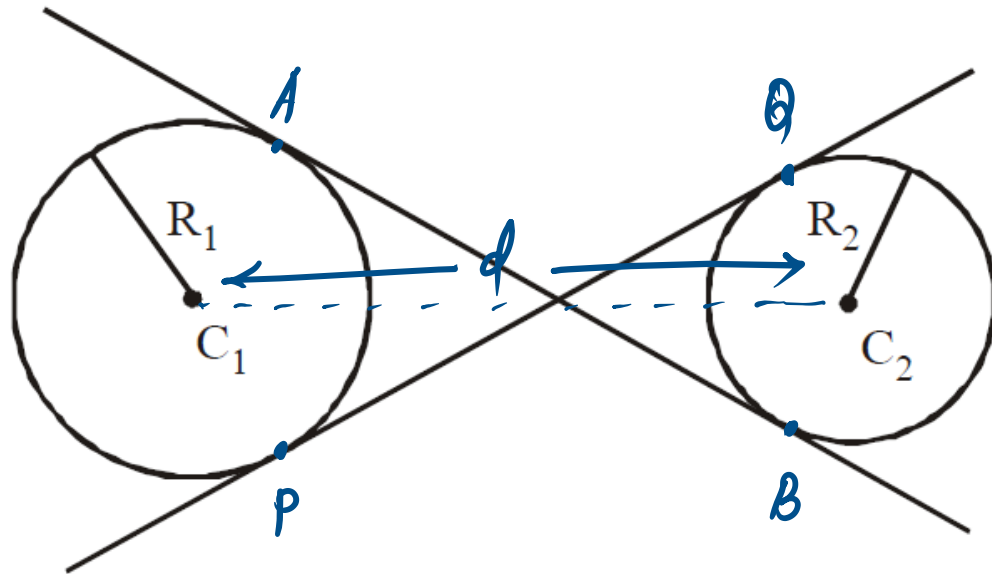
$$L_1 = \sqrt{d^2 - (r_1 - r_2)^2}$$

COMMON TANGENT

Length of transverse common tangent

$$L_2 = \sqrt{(C_1C_2)^2 - (R_1 + R_2)^2} ;$$

where C_1C_2 = Distance between the centres, and R_1 and R_2 be the radii of the two circles.

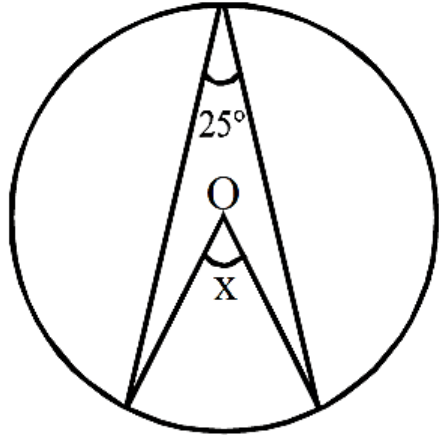


$$\underline{AB = PQ = L_2}$$

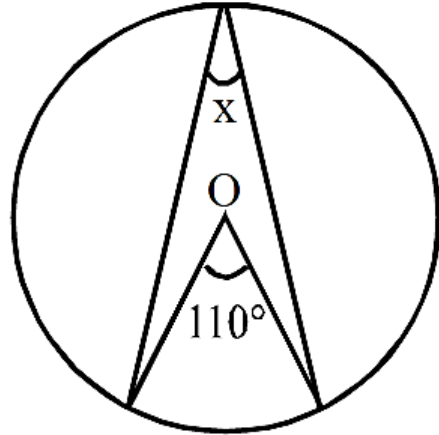
$$L_2 = \sqrt{d^2 - (r_1 + r_2)^2}$$

EXAMPLE

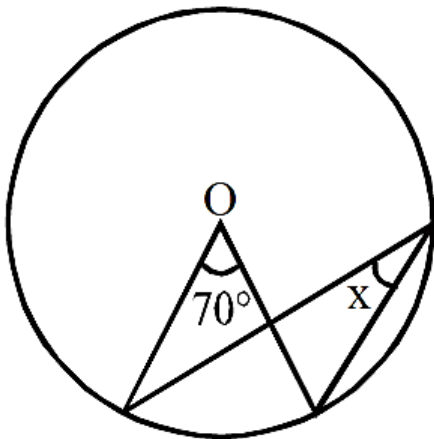
Find the angle marked as x in each of the following figures where O is the centre of the circle.



(a)



(b)



(c)

$$(a) \ x = 50^\circ$$

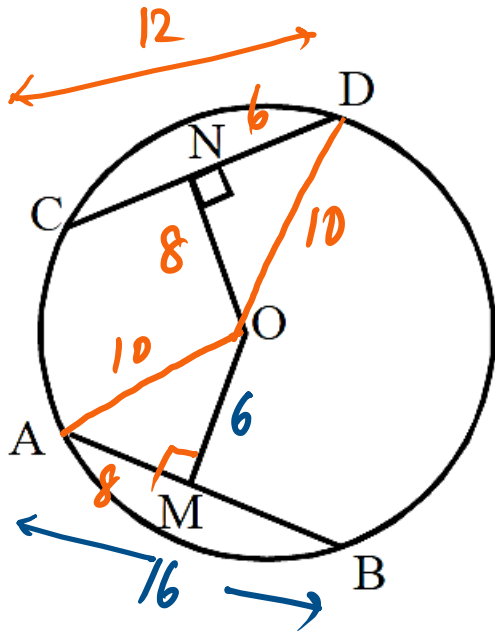
$$(b) \ x = 55^\circ$$

$$(c) \ x = 35^\circ$$

(angle subtended by arc at the centre is double the angle subtended by arc at any other point on the circle)

EXAMPLE

In the figure, $AB = 16$ cm, $CD = 12$ cm and $OM = 6$ cm.
Find ON .



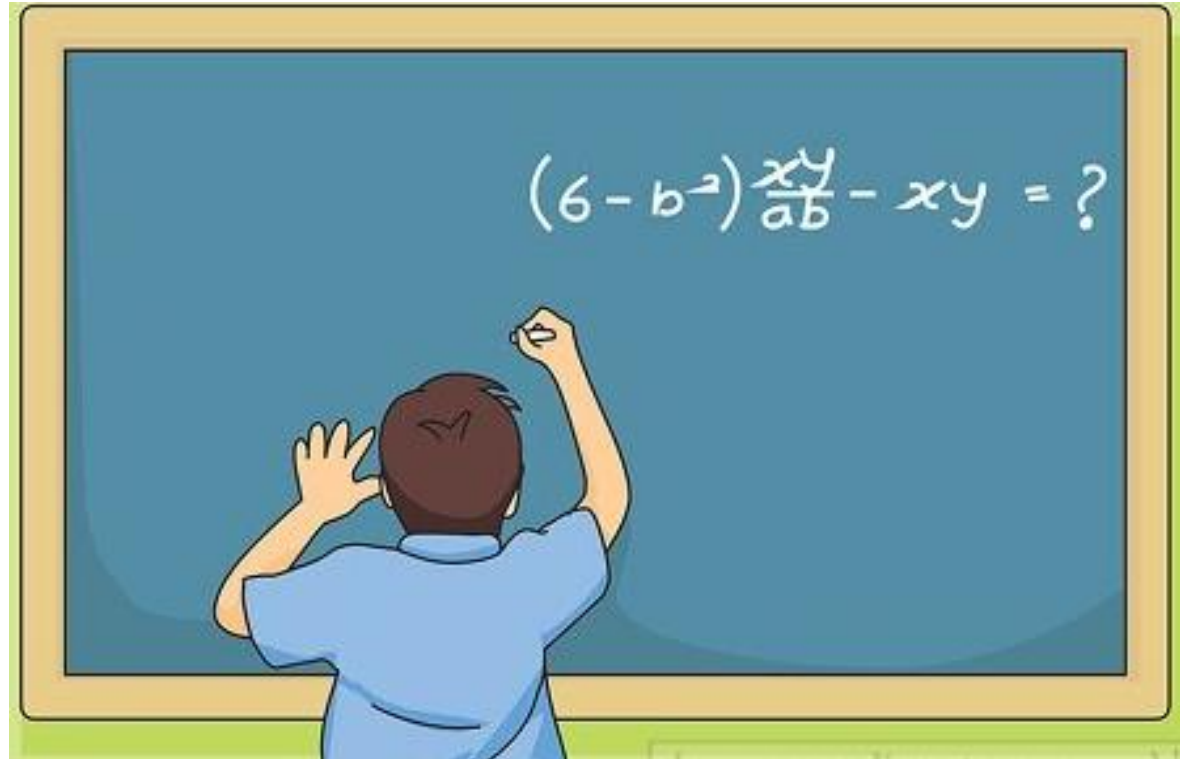
$$AM = 8$$

$$OA^2 = 8^2 + 6^2 = 64 + 36 = 100$$

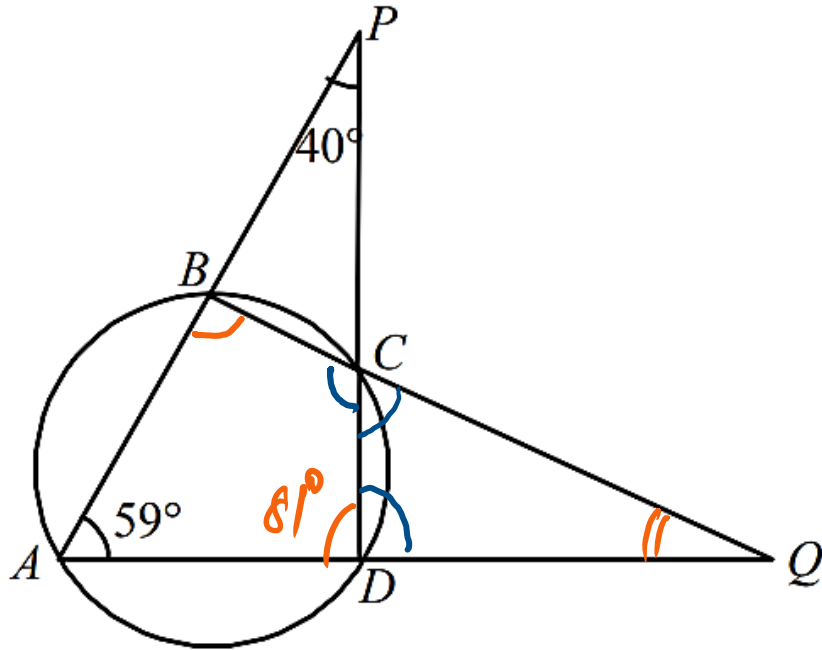
$$\left. \begin{array}{l} OA = 10 \\ OD = 10 \end{array} \right\} \text{radii}$$

$$\underline{ON = 8 \text{ cm}}$$

PRACTISE
TIME !



Q)



In the given figure, if $\angle PAQ = 59^\circ$, $\angle APD = 40^\circ$, then what is $\angle AQB$?

- (a) 19° (b) 20°
 (c) 22° (d) 27°

$\triangle APD$

$$\begin{aligned} \angle PDA &= 180^\circ - (40^\circ + 59^\circ) \\ &= 180^\circ - 99^\circ = \underline{81^\circ} \end{aligned}$$

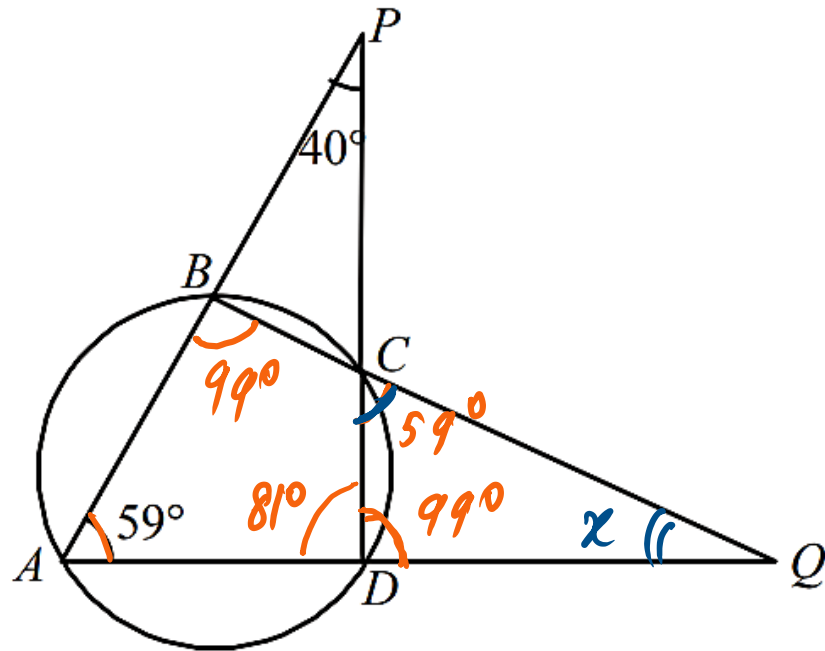
ABCD is cyclic,

$$\angle ABC = 99^\circ \rightarrow$$

$$\angle BCD = 121^\circ \rightarrow \angle DCQ = 59^\circ$$

$$\angle CDQ = 99^\circ$$

$$\begin{aligned} \angle AQB = \angle DQC &= 180^\circ - (59^\circ + 99^\circ) \\ &= 180^\circ - (158^\circ) \\ &= \underline{22^\circ} \end{aligned}$$

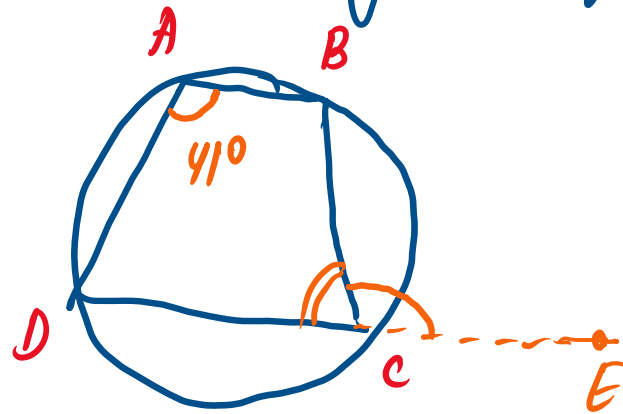


In the given figure, if $\angle PAQ = 59^\circ$, $\angle APD = 40^\circ$, then what is $\angle AQB$?

- (a) 19° (b) 20°
 (c) 22° (d) 27°

$\triangle CDQ \rightarrow$ exterior angle property
 $x + 59^\circ = 81^\circ \Rightarrow x = 22^\circ =$

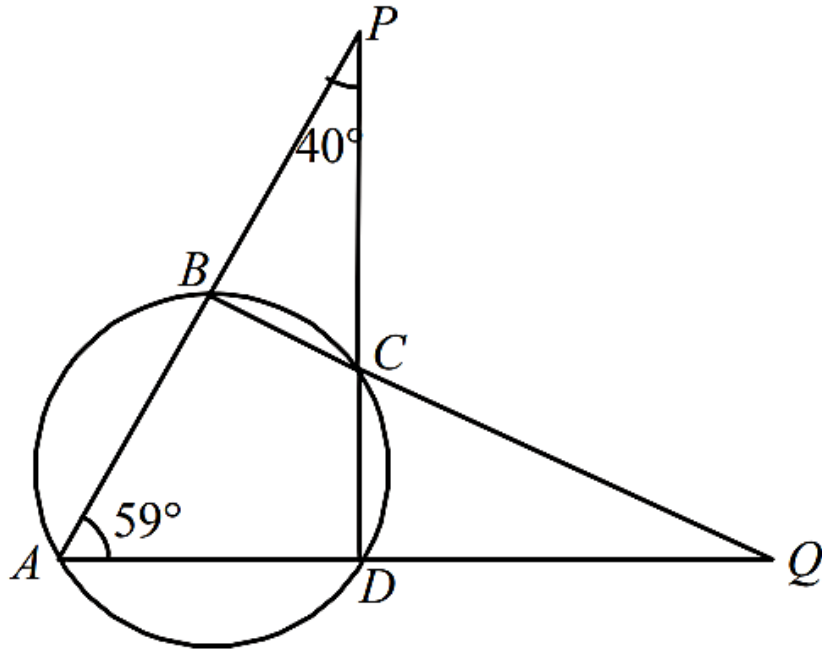
For a cyclic quadrilateral



$\angle BCE = \angle DAB = 41^\circ$

(exterior angle for a cyclic quadrilateral = interior opposite angle.)

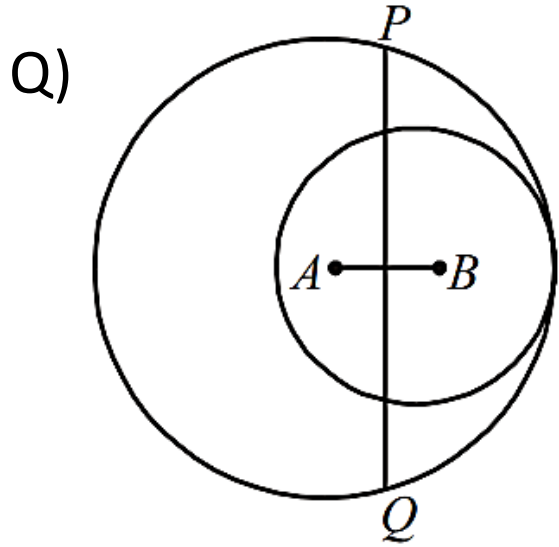
Q)



In the given figure, if $\angle PAQ = 59^\circ$, $\angle APD = 40^\circ$, then what is $\angle AQB$?

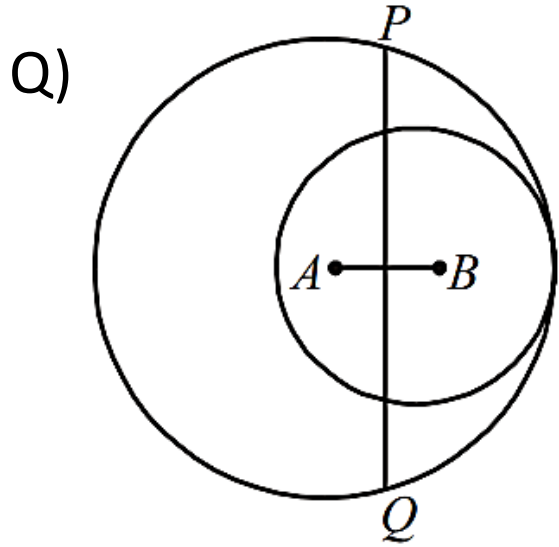
- | | |
|----------------|----------------|
| (a) 19° | (b) 20° |
| (c) 22° | (d) 27° |

Ans: (c)



Two circles with centres A and B touch each other internally, as shown in the figure given above. Their radii are 5 and 3 units, respectively. Perpendicular bisector of AB meets the bigger circle in P and Q . What is the length of PQ ?

- (a) $2\sqrt{6}$ (b) $\sqrt{34}$
(c) $4\sqrt{6}$ (d) $6\sqrt{2}$

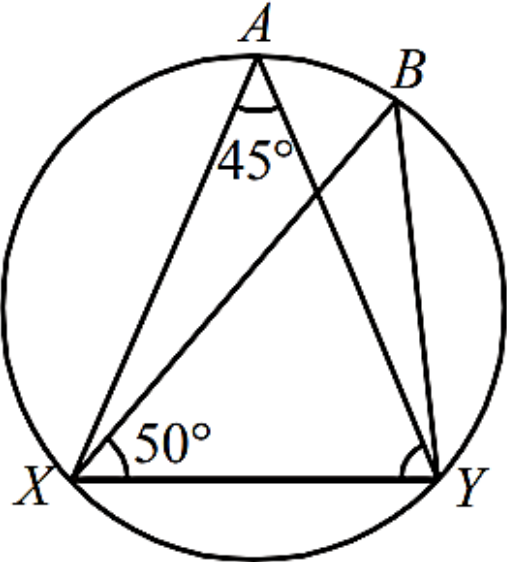


Two circles with centres A and B touch each other internally, as shown in the figure given above. Their radii are 5 and 3 units, respectively. Perpendicular bisector of AB meets the bigger circle in P and Q . What is the length of PQ ?

- (a) $2\sqrt{6}$ (b) $\sqrt{34}$
(c) $4\sqrt{6}$ (d) $6\sqrt{2}$

Ans: (c)

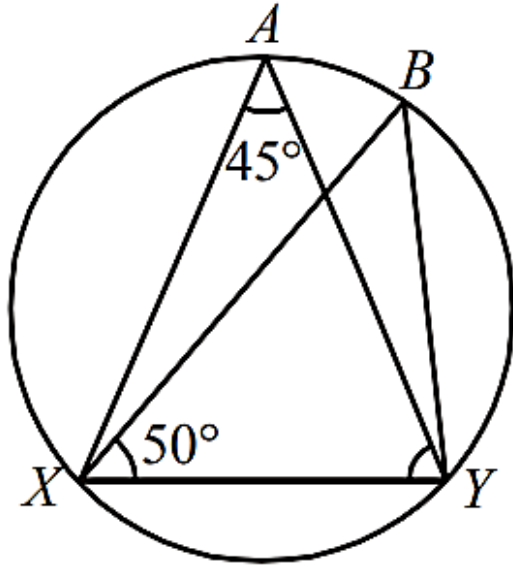
Q)



In the figure given above, what is $\angle BYX$ equal to?

- (a) 85°
- (b) 50°
- (c) 45°
- (d) 90°

Q)

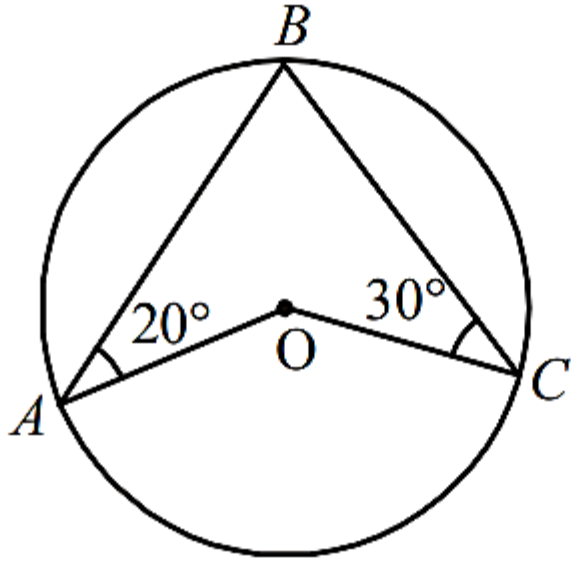


In the figure given above, what is $\angle BYX$ equal to?

- (a) 85°
- (b) 50°
- (c) 45°
- (d) 90°

Ans: (a)

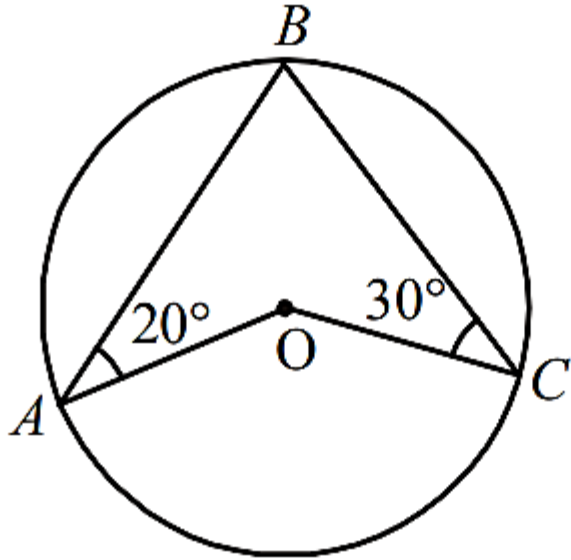
Q)



In the figure given above, O is the centre of the circle.
What is $\angle AOC$?

- (a) 160° (b) 150°
(c) 120° (d) 100°

Q)



In the figure given above, O is the centre of the circle.
What is $\angle AOC$?

- (a) 160° (b) 150°
(c) 120° (d) 100°

Ans: (d)

CDS-AFCAT 2 2024

SSBCrack
EXAMS

LIVE

MATHS

GEOMETRY

CLASS 3



NAVJYOTI SIR