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ANGLES IN A CIRCLE AND CYCLIC QUADRILATERAL

- **Central Angle:** Angle subtended by an arc at the centre of circle.

In figure it is $\angle AOB$.

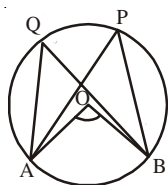


Fig. (i)

Length of an Arc =

$$\text{circumference} \times \frac{\text{degree measure of the arc}}{360^\circ}$$

- **Inscribed Angle :** The angle subtended by an arc or chord on any point on the remaining part of circle . In figure (i) it is $\angle APB$.

The angle subtended at the centre of a circle by an arc is double the angle subtended by it on any point on the remaining part of the circle. In fig. (i) $\angle AOB = 2 \angle APB$.

Angles in the same segment of a circle are equal . In fig. (i) $\angle APB = \angle AQB$.

- Angle in a semi circle is a right angle.

In Fig. (ii) $\angle PBQ = 90^\circ$

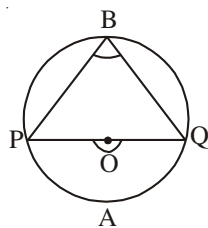


Fig. (ii)

- **Concyclic Points:** Points which lie on a circle

Three non collinear points are always concyclic and a unique circle passes through them

- **Cyclic Quadrilateral :** A quadrilateral in which all four vertices lie on a circle. In fig. (iii) PQRS is a cyclic quadrilateral.

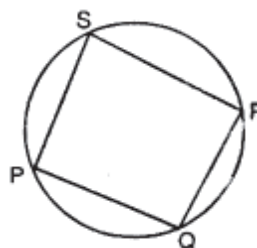


Fig. (iii)

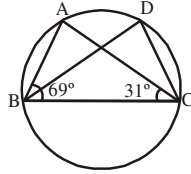
If a pair of opposite angles of a quadrilateral is supplementary then the quadrilateral is cyclic i.e. $\angle P + \angle R = 180^\circ$ or

$$\angle Q + \angle S = 180^\circ \Rightarrow PQRS \text{ is cyclic.}$$

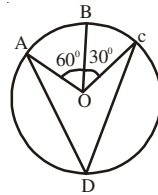
- If PQRS is a cyclic parallelogram then it is a rectangle.

CHECK YOUR PROGRESS:

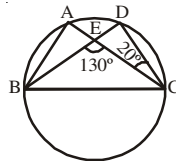
1. In given figure if $\angle ABC = 69^\circ$ and $\angle ACB = 31^\circ$ then $\angle BDC$ is:



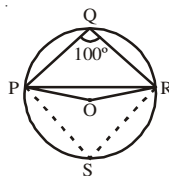
- (A) 80° (B) 69° (C) 59° (D) 31°
2. In figure given below A, B and C are three points on a circle with centre O such that $\angle BOC = 30^\circ$ and $\angle AOB = 60^\circ$. If D is a point on the circle other than the arc ABC, then $\angle ADC$ is:



- (A) 30° (B) 60° (C) 45° (D) 90°
3. A chord of a circle is equal to the radius of the circle. The angle subtended by the chord at a point on the minor arc is :
- (A) 15° (B) 150° (C) 45° (D) 60°
4. In figure given below A, B, C and D are four points on a circle. AC and BD intersect at a point E such that $\angle BEC = 130^\circ$ and $\angle ECD = 20^\circ$. $\angle BAC$ is :

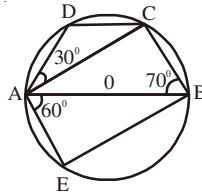


- (A) 110° (B) 60° (C) 120° (D) 90°
5. ABCD is a cyclic quadrilateral whose diagonals intersect at a point E. If $\angle DBC = 70^\circ$, $\angle BAC = 30^\circ$, find $\angle BCD$. Further if $AB = BC$, find $\angle ECD$.
- (A) 30° (B) 60° (C) 50° (D) 110°
6. In given figure $\angle PQR = 100^\circ$, where P, Q and R are the points on a circle with centre O. $\angle OPR$ is :

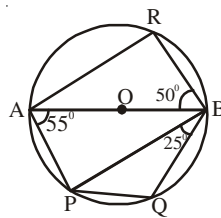


- (A) 70° (B) 80° (C) 10° (D) 20°

7. In given figure AB is a diameter of a circle with centre O. If $\angle ABC = 70^\circ$, $\angle CAD = 30^\circ$ and $\angle BAE = 60^\circ$, find $\angle BAC$, $\angle ACD$ and $\angle ABE$.

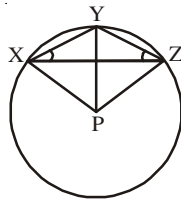


8. In figure AB is the diameter of a circle with centre O. If $\angle PAB = 55^\circ$, $\angle PBQ = 25^\circ$ and $\angle ABR = 50^\circ$, then find $\angle PBA$, $\angle BPQ$ and $\angle BAR$



STRETCH YOURSELF

1. In figure given below P is the centre of a circle. Prove that $\angle XPZ = 2(\angle XZY + \angle YXZ)$.



2. Two circles intersect at A and B. AC and AD are diameters of the circles. Prove that C, B and D are collinear.

ANSWERS

CHECK YOUR PROGRESS :

1. A
2. C
3. B
4. A
5. C
6. C
7. $20^\circ, 40^\circ, 30^\circ$
8. $35^\circ, 30^\circ, 40^\circ$