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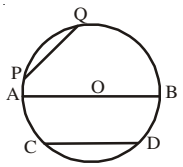
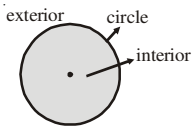
CIRCLE

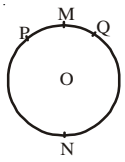
- A circle is a collection of all points in a plane which are at a constant distance from a fixed point. The fixed point is called the centre of the circle.
- A line segment joining centre of the circle to a point on the circle is called radius of the circle. The circle has infinite no. of radii. All radii of a circle are equal.
- A line segment joining any two points on the circle is called a chord. Chord passing through the centre of circle is called its diameter. Diameter is the longest chord of the circle.



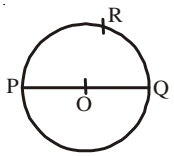
- Shaded region is interior, the boundary is circle and unshaded region is exterior of the circle.



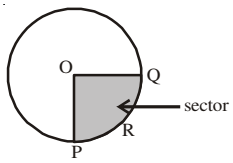
- **Arc:** A part of a circle. Here PMQ is an arc denoted by $\overset{\frown}{PMQ}$.



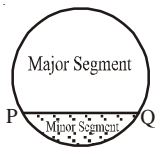
- **Minor arc:** An arc of a circle whose length is less than that of a semi-circle of the same circle. PMQ is a minor arc.
- **Major arc:** An arc of a circle whose length is greater than that of a semi circle of the same circle is called a major arc. PNQ is a major arc.
- Diameter of a circle divides a circle into two equal arcs, each of which is called a semi circle. In figure $\overset{\frown}{PRQ}$ is semi-circle.



- **Sector:** The region bounded by an arc of a circle and two radii.



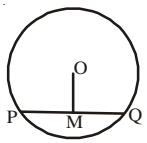
- **Segment:** A chord divides the interior of a circle into two parts. Each of which is called a segment.



- **Circumference:** The length of the boundary of a circle is the circumference of the circle. The ratio of the circumference of circle to its diameter is always a constant, which is denoted by Greek letter π.
- Two arcs of a circle are congruent if and only if the angles subtended by them at the centre are equal, arc PMQ $\cong$ arc SNR $\Leftrightarrow$ $\angle POQ = \angle SOR$.

- Two arcs of a circle are congruent if and only if their corresponding chords are equal, arc QMP $\cong$ arc SNR $\Leftrightarrow$ PQ = RS.

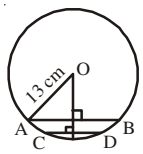
- Equal chords of a circle subtend equal angles at the centre and conversely if the angles subtended by the chords at the centre of a circle are equal, then the chords are equal.
- The perpendicular drawn from the centre of a circle to a chord bisects the chord. OM $\perp$ PQ $\Rightarrow$ PM = MQ.



- Conversely the line joinning the centre of a circle to the mid-point of a chord is perpendicular to the chord.
- There is one and only one circle passing through three non-collinear points.
- Equal chords of a circle are equidistant from the centre, conversely chords that are equidistant from the centre of a circle are equal.

CHECK YOUR PROGRESS:

1. In figure given below, AB = 8cm and CD = 6 cm are two parallel chords of a circle with centre O. Distance between the chords is

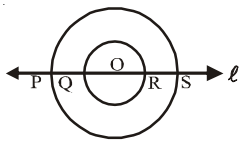


(A) 2 cm (B) 1 cm (C) 1.5 cm (D) 3 cm

2. A regular octagon is inscribed in a circle. The angle subtended by each side of octagon at the centre of circle is

(A) 72° (B) 45° (C) 74° (D) 66°

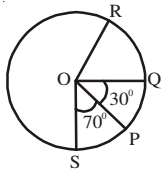
3. In figure a line l intersects the two concentric circles with centre O at points P, Q, R and S then



(A) PQ + RS = OQ + OR (B) OP = 2OQ

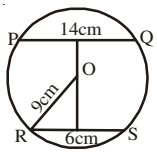
(C) OS – RS = OP – OQ (D) PQ = RS

4. In figure given below arc PQ $\cong$ arc QR, $\angle POQ = 30°$ and $\angle POS = 70°$ then $\angle ROS$ is



(A) 200° (B) 150° (C) 230° (D) 120°

5. In figure PQ = 14cm and RS = 6cm are two parallel chords of a circle with centre O. Distance between the chords PQ and RS is

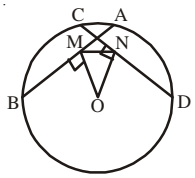


(A) $6\sqrt{2}$ cm (B) $10\sqrt{2}$ cm (C) $4\sqrt{2}$ cm (D) $2\sqrt{2}$ cm

6. Two circles with centres O and O' intersect at the points A and B. Prove that $\angle OAO' = \angle OBO'$.
7. If two equal chords of a cricle intersect inside the circle, then, prove that the line joining the point of intersection to the centre makes equal angles with the chords.
8. Two chords AB and AC of a circle are equal. Prove that the centre of the circle is on the angle bisector of $\angle BAC$.
9. If two circles intersect at two points. Prove that their centres are on the perpendicular bisector of the common chord.
10. AB and CD are two parallel chords of a circle which are on opposite sides of the centre such that AB= 10cm, CD= 24cm and the distance between AB and CD is 17cm. Find the radius of the circle.

STRETCH YOURSELF

1. In figure given below AB and CD are two equal chords of a circle whose centre is O. OM $\perp$ AB and ON $\perp$ CD. Prove that $\angle OMN = \angle ONM$.



2. A circle with centre O has chords AB and AC such that AB= AC=6cm. If radius of circle is 5cm, then find the length of chord BC.
3. Two circles with centres O and O' intersect at point P. A line l is drawn through point P parallel to OO' which intersects them at the points C and D. Prove that CD = 2 × OO'.

ANSWERS:

CHECK YOUR PROGRESS :

1. B
2. B
3. D
4. D
5. B
10. 5.13cm

STRETCH YOURSELF :

2. 9.6cm