## 1. What is a Circle?

A circle is a set of all points in a plane that are at a fixed distance (called the radius) from a fixed point (called the centre).

- Radius (r): Distance from center to any point on the circle
- Diameter (d): Twice the radius, d = 2r
- Circumference: Perimeter of a circle, C = 2πr
- π (Pi): A constant approximately equal to 3.14159 or 22/7

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## 2. Basic Terms

| Term | Description |
| --- | --- |
| Chord | A line segment joining any two points on the circle. |
| Diameter | Longest chord passing through the center. |
| Arc | A part of the circumference of the circle. |
| Segment | Region between a chord and an arc. |
| Sector | Region between two radii and the arc. |
| Tangent | A line that touches the circle at exactly one point. |
| Secant | A line that intersects the circle at two points. |

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## 3. Angle in a Semi-Circle

- The angle formed in a semi-circle is always a right angle (90°).

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## □ 4. Properties of Chords

1. Equal chords are equidistant from the centre.

2. Chords equidistant from the centre are equal in length.

3. A perpendicular drawn from the center to a chord bisects the chord.

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## □ 5. Perpendicular from Centre to Chord

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

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## □ 6. Cyclic Quadrilateral

A quadrilateral is called cyclic if all its vertices lie on a circle.

□ In a cyclic quadrilateral:
Sum of opposite angles = 180°

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## □ 7. Tangents to a Circle

- A tangent touches the circle at exactly one point.
- The radius drawn to the point of contact is perpendicular to the tangent.

## Properties:

- Only one tangent can be drawn to a circle at a point.
- From an external point, two tangents can be drawn to a circle.
- Lengths of tangents from an external point are equal.

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## 8. Common Theorems (For Proof-Based Questions)

1. The angle subtended by an arc at the center is twice the angle at the remaining part of the circle.
2. Angles in the same segment of a circle are equal.

3.

Opposite angles of a cyclic quadrilateral are supplementary.

4.

Equal chords subtend equal angles at the center.

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## 9. Important Formulas

- Circumference: $2\pi r$
- Area of circle: $\pi r^2$
- Length of arc: $(\theta/360) \times 2\pi r$
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Area of sector: $(\theta/360) \times \pi r^2$

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## 10. Common Exam Questions

- Prove properties of tangents, chords, and cyclic quadrilaterals.
- Find missing angles using circle theorems.
- Use formulas to calculate area, arc length, or radius.
- Geometry-based reasoning and constructions involving circles.