Topics to be Covered

1. Introduction to Circles
   - 1.1 Definition.
   - 1.2 Parts of a circle.
   - 1.3 Three points that describe a circle.

2. Chords and their properties
   - 2.1 Angle subtended by a chord at the centre.
   - 2.2 Perpendicular bisector of a chord.
   - 2.3 Chords and their distances.

3. Angle subtended by an arc.
   - 3.1 Angle subtended by an arc of a circle.
   - 3.2 Angle subtended in the same segment
   - 3.3 Concyclic Points.

4. Cyclic Quadrilateral
   - 4.1 Cyclic Quadrilateral
1. Introduction to Circles

1.1 Definition

A circle is a collection of all points in a plane which are at a constant distance (radius) from a fixed point (centre).

1.2 Parts of a Circle

- Chord
- Diameter
- Radius
- Minor arc
- Minor sector
- Major sector
- Minor segment
- Major segment
- On the circle
- Inside the circle
- Outside the circle
1. Introduction to Circles

1.3 Three points that describe a circle

There is one and only one circle that passes through three non-collinear points.

2. Chords and their properties

2.1 Angle subtended by a chord at the centre.

**Theorem:** Equal chords of a circle subtend equal angles at the centre.

**Converse:** If the angles subtended by the chords of a circle at the centre are equal, then the chords are equal.

\[ PQ = RS \iff \angle POQ = \angle ROS \]
2. Chords and their properties

2.2 Perpendicular Bisector of a Chord.

**Theorem:** The perpendicular from the centre of a circle to a chord bisects the chord.

**Converse:** If a line drawn from the centre of a circle bisects the chord, then the line is perpendicular to that chord.

\[ OC \perp AB \iff AC = BC \]

2.3 Chords and their distances

**Theorem:** Chords of equal length are at equal distance from the centre of the circle.

**Converse:** Chords equidistant from the centre of a circle are equal in length.

\[ OP = OQ \iff AB = CD \]
3. Angle Subtended by an Arc

3.1 Angle Subtended by an Arc of a Circle.

The angle subtended by an arc at the centre ‘O’ is twice angle subtended by it on the remaining arc of the circle.

\[ \angle BOC = 2 \times \angle BAC \]

3.2 Angle Subtended in the Same Segment of a Circle

Angles subtended by an arc in the same segment are equal.

\[ \angle BAC = \angle BDC \]

3.3 Concyclic Points.

If a line segment BC, joining two points, subtends equal angles at two other points A & D, lying on the same side of the line then these, the four points lie on a circle (i.e. they are concyclic).

The points A, B, C and D lie on the circle.
4. Cyclic Quadrilateral

Theorem:

The pairs of opposite angles of a cyclic quadrilateral are supplementary.

\[ \angle ABC + \angle ADC = 180^\circ \]

\[ \angle BCD + \angle BAD = 180^\circ \]
Mind Map

Definition

Parts of a Circle

Three points that describe a circle

Introduction

Circles

Chords and their properties

Perpendicular bisector of a chord

Cyclic Quadrilateral

Angle subtended by a chord at the centre.

Angle subtended by an arc

Angle subtended by an arc of a circle.

Angle subtended in the same segment

Conyclic Points