Grade 09
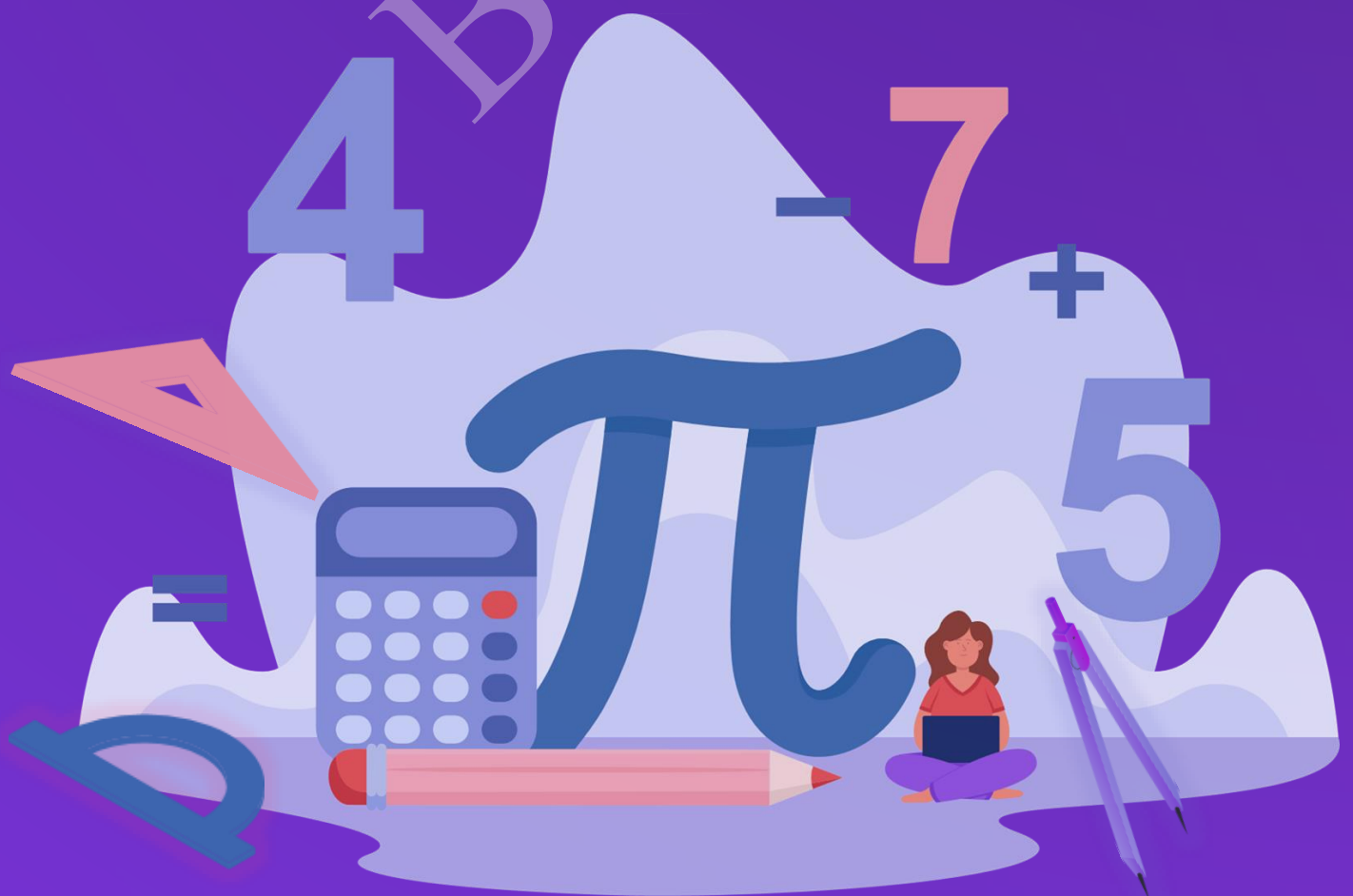# Mathematics Chapter Notes

BYJU'S Classes

CHAPTER NOTES

Circles

Grade 09

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
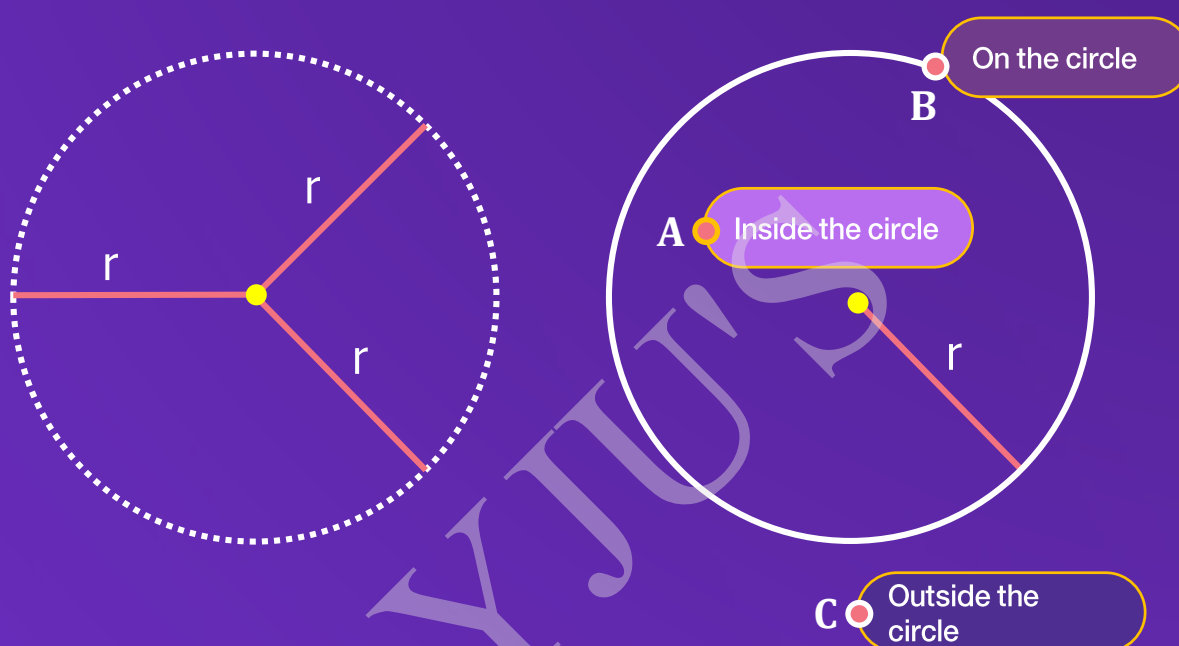- 3.3 Concyclic Points.

4 .Cyclic Quadrilateral
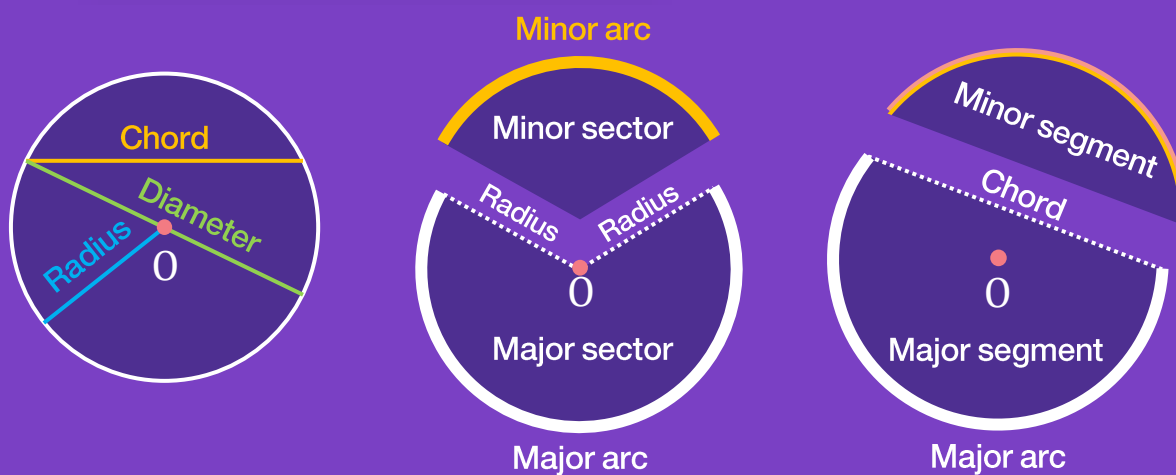
- 4.1 Cyclic Quadrilateral

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).
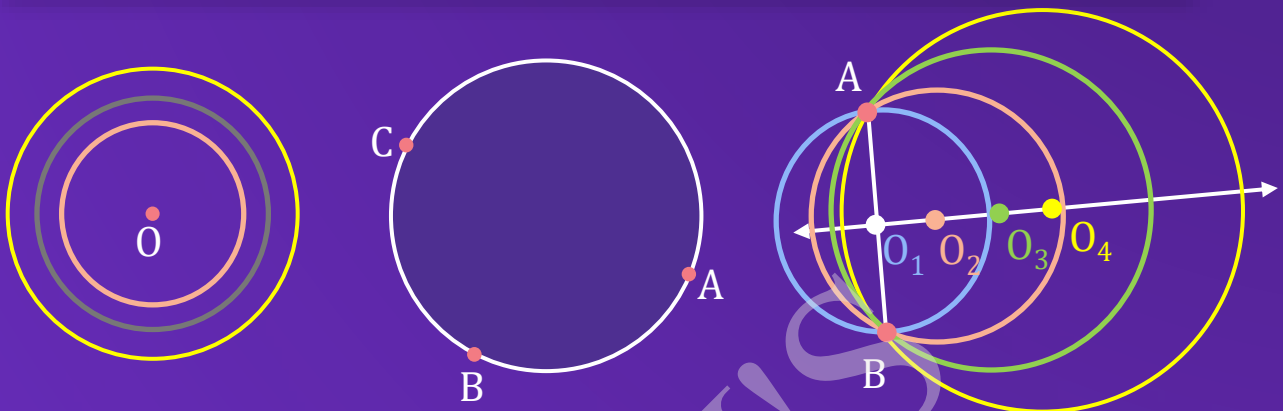
On the circle
B

A Inside the circle

r

C Outside the circle

r

r

r

1.2 Parts of a Circle

Minor arc

Chord

Diameter

Radius

0

Minor sector

Radius   Radius

0

Major sector

Major arc

Minor segment

Chord

0

Major segment

Major arc

1.3 Three points that describe a circle

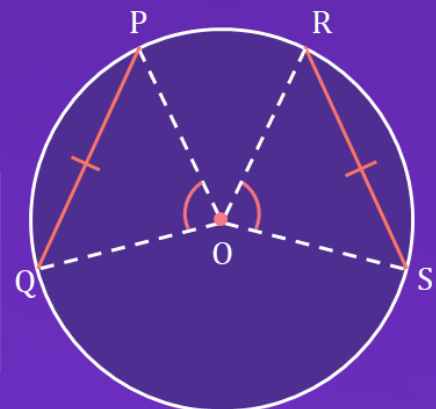There is one and only one circle that passes through three non-collinear points.

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.
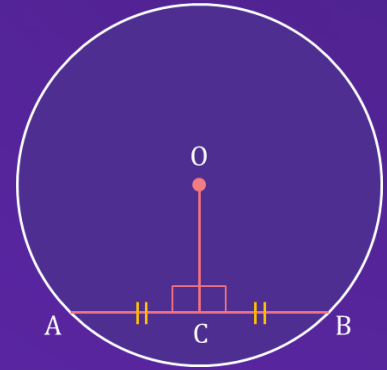

$$PQ = RS \iff \angle POQ = \angle ROS$$

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.
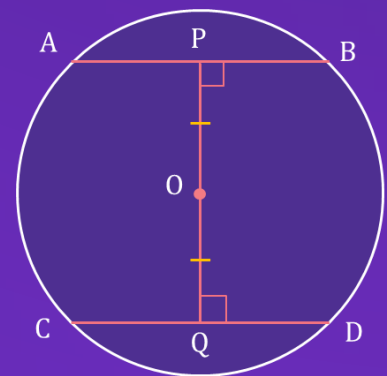

$$OC \perp AB \quad \Longleftrightarrow \quad AC = BC$$

2.3 Chords and their distances

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

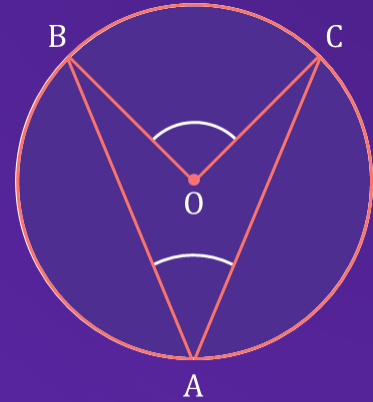**Converse:** Chords equidistant from the centre of a circle are equal in length.

$$OP = OQ \quad \Longleftrightarrow \quad AB = CD$$

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.
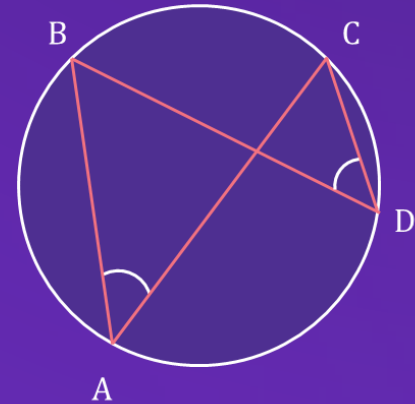

$$\boxed{\angle BOC} = \boxed{2} \times \boxed{\angle BAC}$$

3.2 Angle Subtended in the Same Segment of a Circle
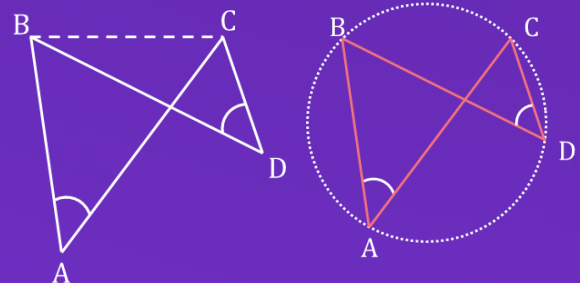
Angles subtended by an arc in the same segment are equal.

$$\boxed{\angle BAC} = \boxed{\angle BDC}$$

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).

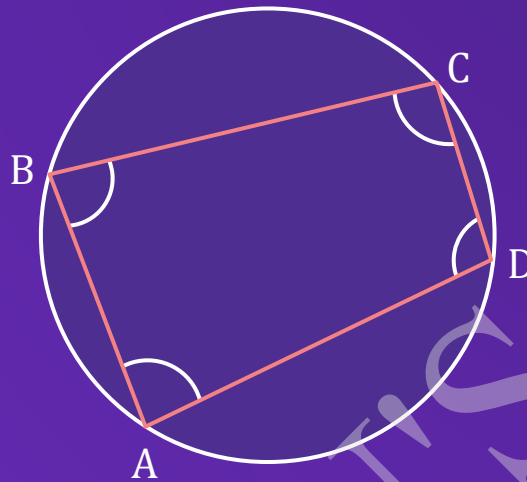The points A, B, C and D lie on the circle.

4. Cyclic Quadrilateral

Theorem:

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

$\angle ABC$ **+** $\angle ADC$ **=** $180º$

$\angle BCD$ **+** $\angle BAD$ **=** $180º$

Mind Map

Definition

Parts of a Circle

Three points that describe a circle

Angle subtended by a chord at the centre.

Introduction

Chords and their properties

Circles

Cyclic Quadrilateral

Perpendicular bisector of a chord

Angle subtended by an arc

Angle subtended by an arc of a circle.

Angle subtended in the same segment

Concyclic Points