Circles: Arc and Cyclic Properties

Some terms associated with circle

1. Circles having the same centre but with different radii are said to be concentric circles.
2. Two circles are said to be equal or congruent if they have equal radii.
3. A circle passing through all the vertices of a polygon is called circumscribed circle of the polygon and its centre is called circumcentre.
   The polygon is called inscribed polygon.
4. A circle touching all the sides of a polygon is called an inscribed circle of the polygon and its centre is called incentre.
5. The line segment joining any two points on the circumference of the circle is called a chord of the circle.
6. A chord of a circle passing through its centre is called a diameter of the circle
7. A straight line drawn from the centre of a circle to bisect a chord which is not a diameter is at right angles to chord.
8. Perpendicular drawn to a chord from the centre of a circle bisects the chord.
9. One and only one circle passes through three given points not in a straight line.
10. Equal chords are equidistant from centre.
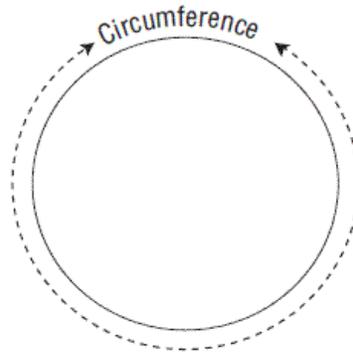11. Chords which are equidistant from the centre are equal in lengths.

Arc
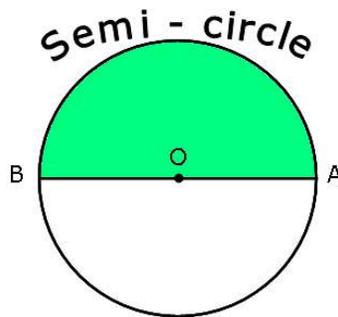
An arc is a part of the circumference of a circle.

An arc less than one-half of the whole arc of a circle is called a **minor arc** of the circle, and an arc greater than one-half of the whole arc of a circle is called a **major arc** of the circle.
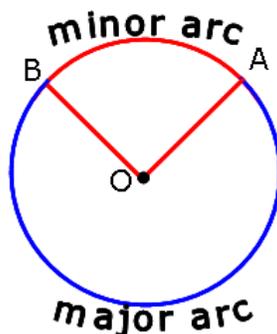
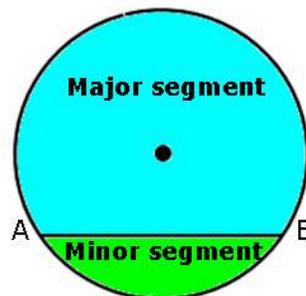The whole arc of a circle is called the **circumference** of the circle.

One-half of the whole arc of a circle is called a **semi-circle** of the circle.

Segment of a Circle

A chord of a circle divides it into two parts. Each part is called a **segment**.

The part containing the minor arc is called the **minor segment**, and the part containing the major arc is called the **major segment**.

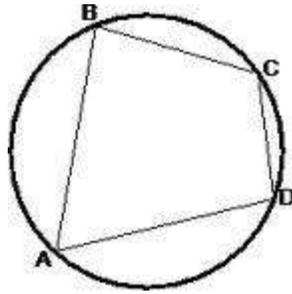## Relation between Arcs and Segments

The angle which, an arc of a circle subtends at the centre is double that which it subtends at any point on the remaining part of the circumference.

Angles in the same segment of a circle are equal.

The angle in a semi-circle is a right angle.

Cyclic Properties

A quadrilateral inscribed in a circle is called a cyclic quadrilateral.

The opposite angles of a cyclic quadrilateral are supplementary.

If a pair of opposite angles of a quadrilateral are supplementary, then the quadrilateral is cyclic.

The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle.