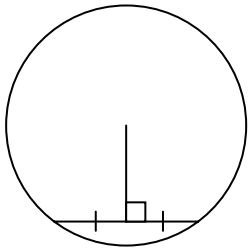
Circle Geometry (Mathematics)

Definitions

- A **circle** is the set of points that are equidistant from a fixed point called the **centre**.
- The **circumference** of the circle is the distance around the edge of the circle.
- The **radius** is an interval joining the centre of the circle to a point on the circumference. Radii of the same circle are equal.
- A **chord** joins two points of a circle.
- A **diameter** is a chord that passes through the centre. It is the longest chord and is equal to twice the radius.
- An *arc* is part of the circumference.
- A **semi-circle** is half the circle.
- A **sector** is the plane bounded by two radii and the arc joining them.
- A **segment** is the plane bounded by a chord at the arc joining the ends of the chord.
- A **secant** is a line that intersects the circle in two distinct points.
- A **tangent** is a line that will only ever intersect the circle in one place.
- **Concyclic points** are points that lie on the circumference of a circle. Three points are always concyclic.
- **Cyclic quadrilaterals** have all their vertices on the circumference of a circle.
- **Concentric circles** share the same centre, but do not necessarily have the same radius.
- **Two circles** touch if they have a common tangent at their point of contact.

Chord Properties

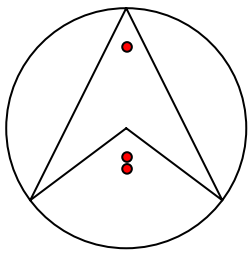
1. The line joining the centre of a circle to the midpoint of a chord is perpendicular to it.
2. Conversely, the centre of a circle, perpendicular to a chord, bisects it.



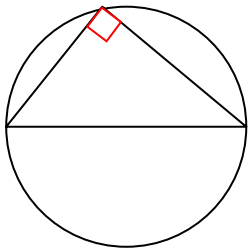
3. In the same or equal circles, equal chords are equidistant from the centre.
4. Conversely, chords that are equidistant from the centre of the circle are equal.

Angle Properties

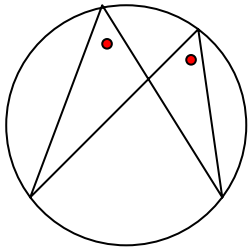
1. Equal angles at the centre of a circle stand on equal chords.
2. The angle that an arc of a circle subtends at the centre is twice the angle it subtends at the circumference.



3. An angle in a semicircle is a right angle.

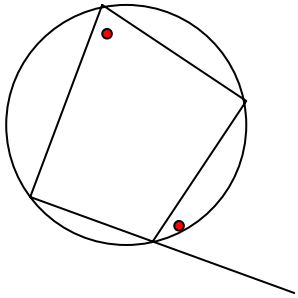


4. Angles in the same segment are equal *OR* Angles subtended at the circumference by the same arc are equal.



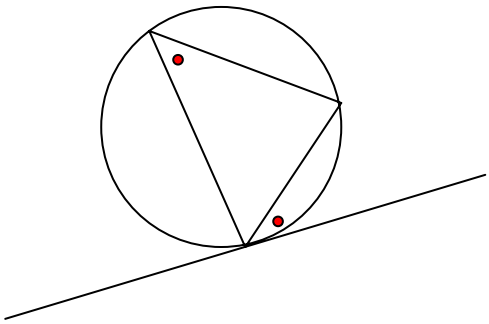
Cyclic Quadrilaterals

1. The opposite angles of a cyclic quadrilateral are supplementary.
2. The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle.



Tangent Properties

1. The tangent is perpendicular to the radius drawn at the point of contact.
2. Tangents drawn from an external point are equal in length.
3. The angle between a tangent and a chord through the point of contact is equal to the angle in the alternate segment.



Touching Circles

If two circles touch each other, the line joining their centres passes through the point of contact.