# Chapter 10
# CIRCLES

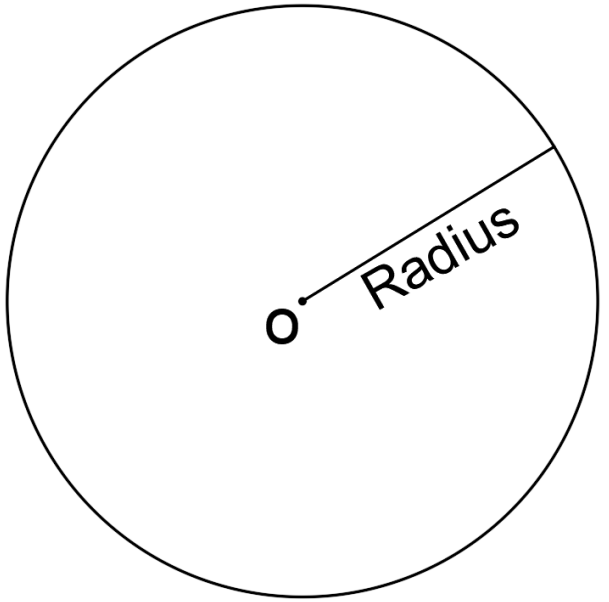
MODULE - 1/3

# CIRCLES

Introduction

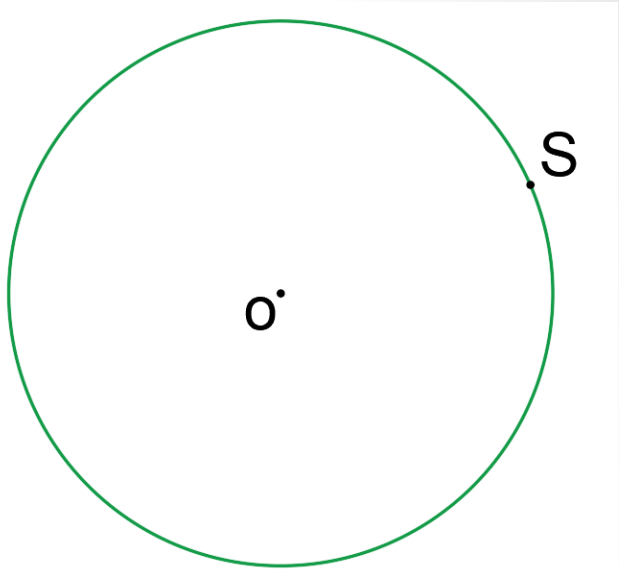
We come across many objects in our daily life which are round in shape, such as 1 rupee coin, wheels of vehicles , bangles etc. How can we define a circle?

A **circle** is a closed figure in a plane and it is the collection of all the points in the plane which are at a constant distance from a fixed point in the plane. The fixed point is the centre of the circle and the constant distance is the radius of the circle.

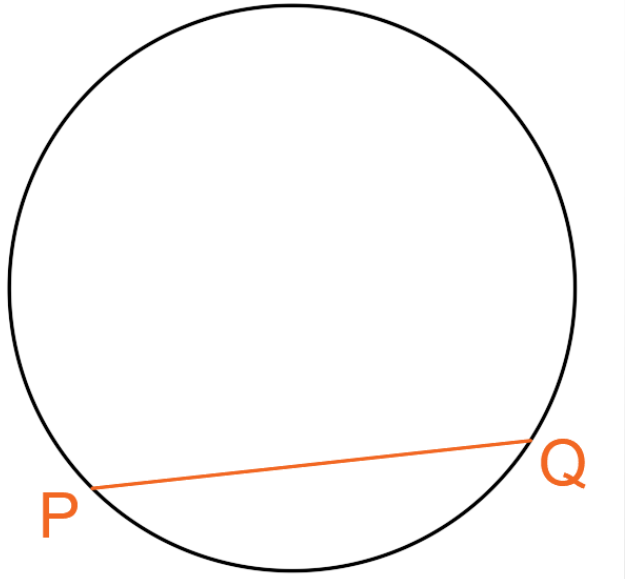


# Circles and its related terms

Circumference of a circle is the length of the complete circular curve constituting the circle.



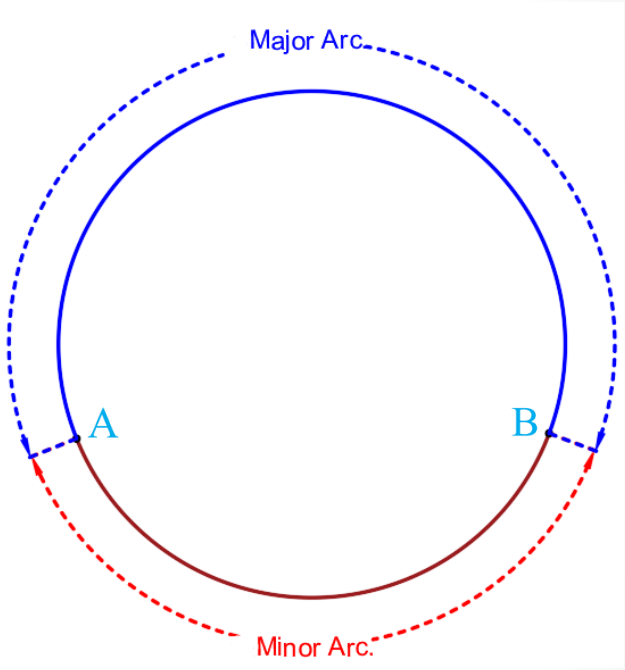

Chord of a circle is a line segment joining any two points on the circle.




PQ is a chord.

Arc of a circle is a part of the circle.

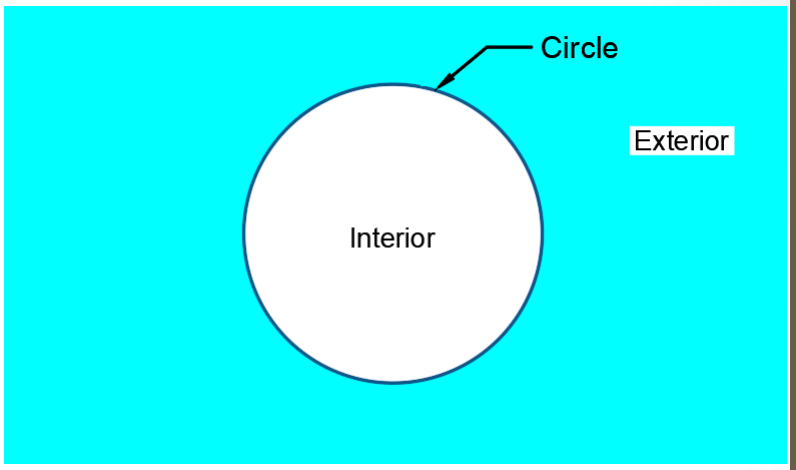
Any two points A and B of a circle divide the circle into two parts. The smaller part is called the minor arc and the larger part is called the major arc of the circle. If the two parts are equal, AB is a diameter of the circle and each part is called a semi circle.

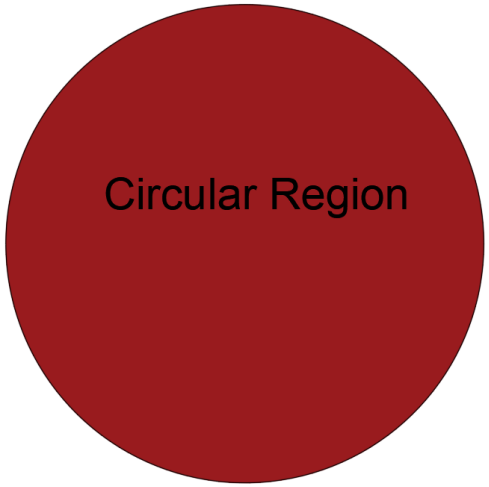


## Interior, Exterior and circular region.

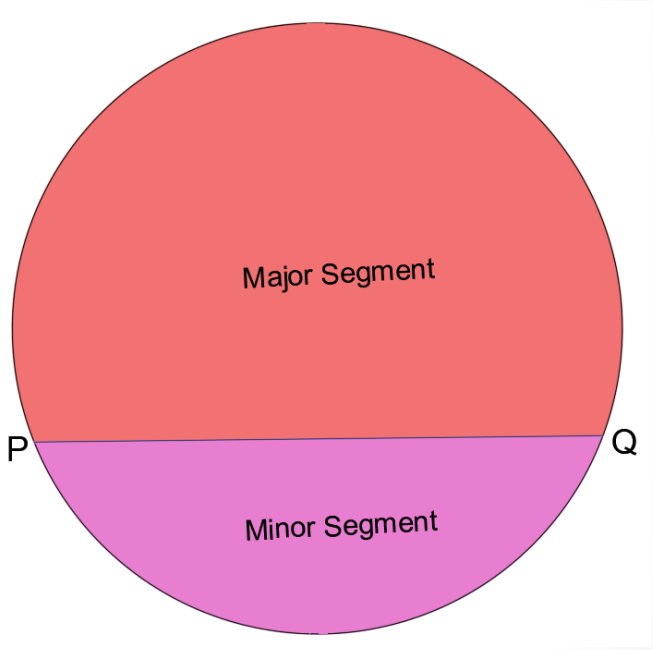
The plane region lying inside the circle is called the interior of the circle.
The circle together with its interior is called circular region.

The part of the plane region out side the circular region is called the exterior of the circle.

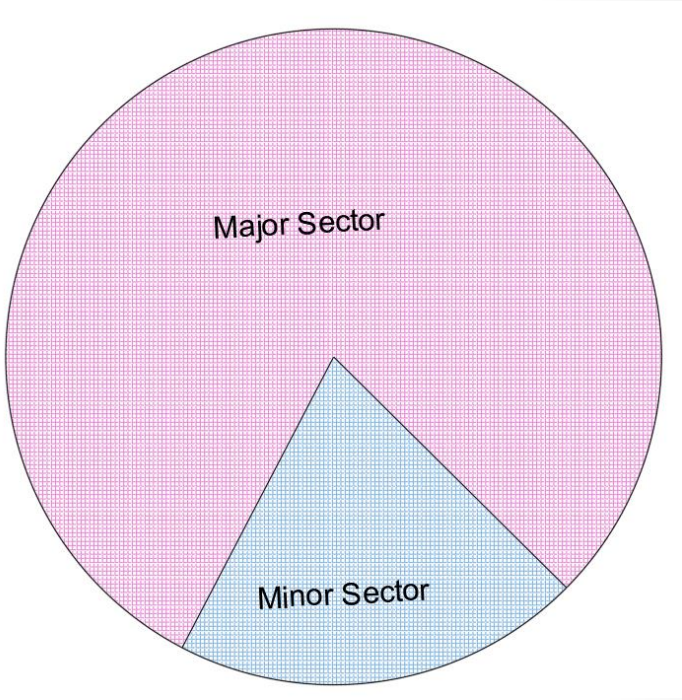


Segment of a circular region.
A chord of a circle divides the circular region into two parts. The smaller part is known as the minor segment and the larger part is known as the major segment .
If the chord is a diameter, then the two segments are equal and each part is called a semi circular region.



**Sector** of a circular region. The region between an arc and two radii joining the centre to the end points of the arc is called a sector. Two radii of a circle divide the circular region into two parts. The smaller part is known as the minor sector and the larger part is known as the major sector.

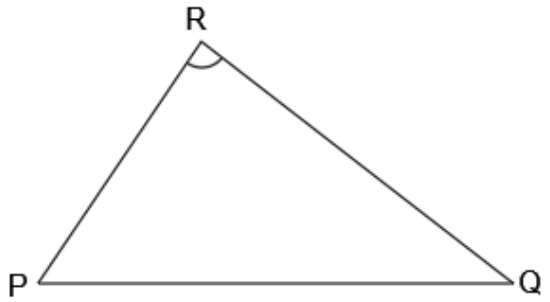


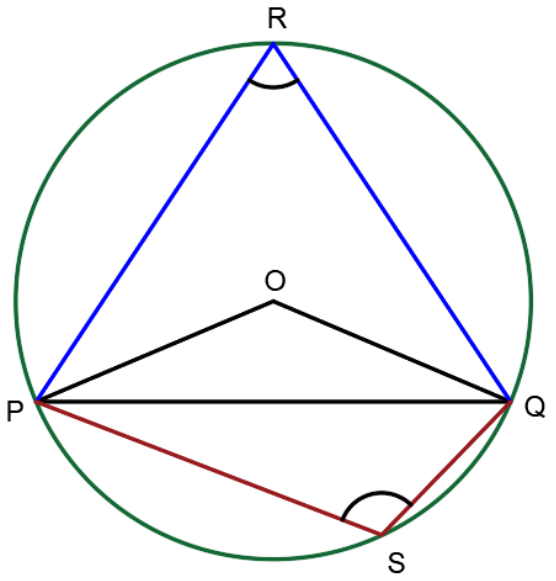
## Angle subtended by a chord at a point.

Take a line segment PQ and a point R not on the line containing PQ. Then ∠PRQ is called the angle subtended by the line segment at R.

∠POQ is the angle subtended by the chord PQ at the centre.

∠PRQ and ∠PSQ are respectively the angles subtended by PQ at points R and S.



## Theorem 10.1

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

Given:- AB and CD are two equal chords.

To prove:- $\angle AOB = \angle COD$

Proof:- in triangles AOB and COD,

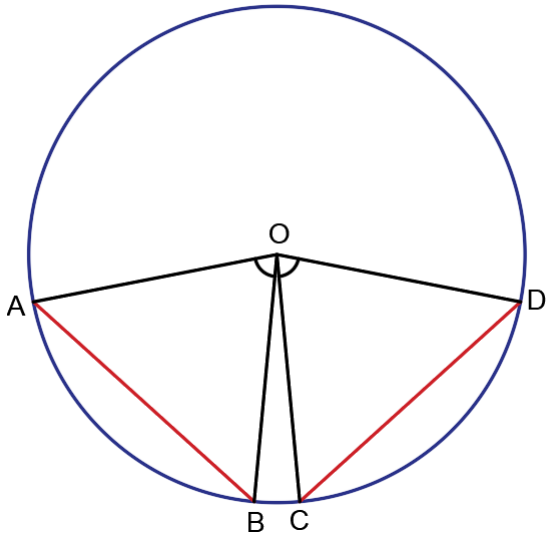
$OA = OC$ (radii of a circle )

$OB = OD$ (radii)

$AB = CD$ (given)

Therefore $\Delta AOB \cong \Delta COD$.

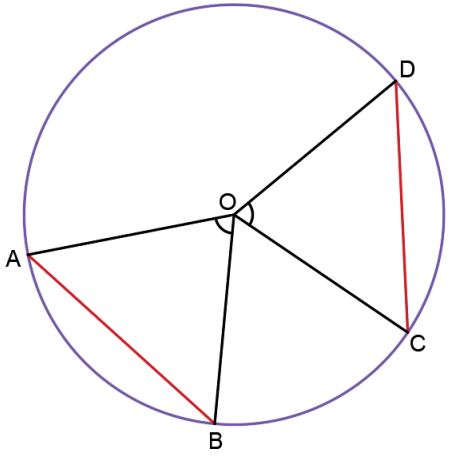
This gives $\angle AOB = \angle COD$.




## Theorem 10.2

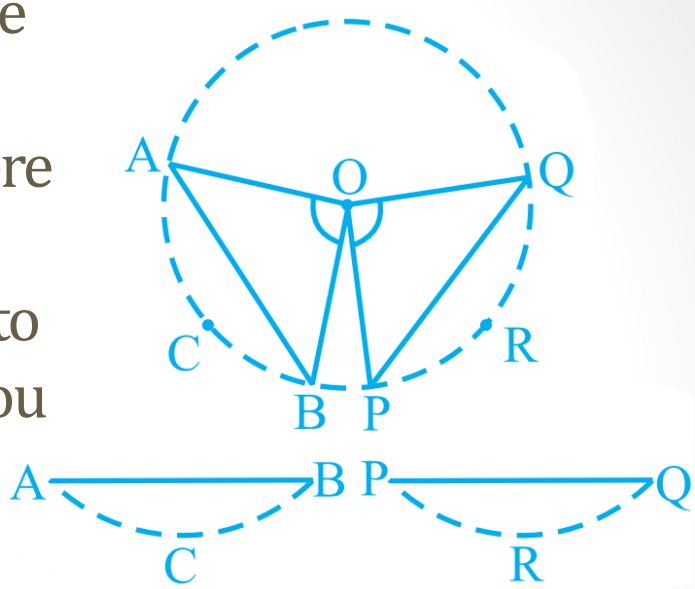
If the angles subtended by the chords of a circle at the centre are equal, then the chords are equal.

If $\angle AOB = \angle COD$, then $AB = CD$.



Activity

1. Take a tracing paper and trace a circle on it. Cut it along the circle to get a disc. At its centre O, draw an angle AOB where A and B are points on the circle. Make another angle POQ at the centre equal to ∠AOB. Cut the disc along AB and PQ. You get two segments ACB and PRQ of the circle. If you put one on the other, what do you observe?




2. Draw a circle with centre O and any radius. Draw two or more equal chords of the circle and measure the angle subtended by them at the centre of the circle.

Write your observation.

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