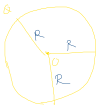
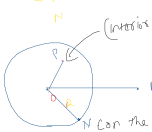
Ch - 10 Circles

The collection of all the points in a plane, which are at a fixed distance from a fixed point in the plane, is called a circle.

O - Fixed point
OP, OB ... - Constant distance

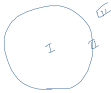


O - Fixed point (Centre)
OP - Radius.

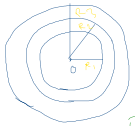


M (exterior point)
N (on the circle).

OM > R
ON = R
OP < R.

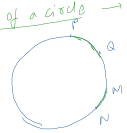


→ A circle divides a plane into 3 parts : - Interior, on the circle & exterior.

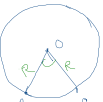


Concentric circles
→ Radius different
→ Centre same.

Arc of a circle → continuous curves



PQ arc
MN arc.



→ Arc containing central angle Minor arc.

→ Arc excluding central angle are called Major arc.

Central angle

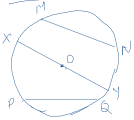
Sector
→ Two radii
→ One arc.

central angle
minor arc

← major sector

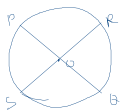
minor sector

→ chord

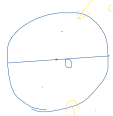


→ line joining any two points in a circle is called chord.

Diameter - chord passing through centre.



→ Semi Circle



Semi circle

→ Diameter divides circle into two equal parts.
→ Each part is called semi circle.
→ Semi circle's end is diameter end.

→ Segment → chord + arc

Major Segment
Minor Segment

EXERCISE 10.1

1. Fill in the blanks:
   (i) The centre of a circle lies in ___ (exterior/ interior) of the circle. (exterior/ interior)
   (ii) A point, whose distance from the centre of a circle is greater than its radius lies in ___ (exterior/ interior) of the circle. (exterior/ interior)
   (iii) The longest chord of a circle is a ___ (diameter/ arc) of the circle.
   (iv) An arc is a ___ (chord/ part) between its ends are the ends of a diameter.
   (v) Segment of a circle is the region between an arc and ___ (chord/ arc) of the circle.
   (vi) A circle divides the plane, on which it lies, in ___ parts.

2. Write True or False: Give reasons for your answers.
   (i) Line segment joining the centre to any point on the circle is a radius of the circle. ✓
   (ii) A circle has only finite number of equal chords. ✗
   (iii) If a circle is divided into three equal arcs, each is a major arc. ✗
   (iv) A chord of a circle, which is twice as long as its radius is a diameter of the circle. ✓
   (v) Sector is the region between the chord and its corresponding arc. ✗
   (vi) A circle is a plane figure. ✓

EXERCISE 10.2

1. Recall that two circles are congruent if they have the same radii. Prove that equal chords of congruent circles subtend equal angles at their centres.

Given - BC = QR
AB = PQ
AC = PR
(Radii of congruent circles)

To prove: ∠A = ∠P

Proof: In ΔABC and ΔPQR
AB = PQ (Given) (Radii of congruent circles)
AC = PR (given)
BC = QR (given)
ΔABC ≅ ΔPQR (SSS rule)
∠BAC = ∠QPR (CPCT)
∠A = ∠P

2. Prove that if chords of congruent circles subtend equal angles at their centres, then the chords are equal.

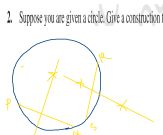
To prove: BC = QR
Given - ∠A = ∠P
Proof - In ΔABC and ΔPQR
AB = PQ
AC = PR (Radii of congruent circles)
∠BAC = ∠QPR (given)
ΔABC ≅ ΔPQR (SAS rule)
BC = QR (CPCT)

EXERCISE 10.3

1. Draw different pairs of circles. How many points does each pair have in common? What is the maximum number of common points?

— No point in common
— 1 point in common
— 2 point in common.
— Maximum

2. Suppose you are given a circle. Give a construction to find its centre.



- Take two chords PQ and RS on the circle.
- Draw ⊥r bisector of PQ and RS.
- Intersection point of ⊥r bisector of PQ and RS gives required centre.