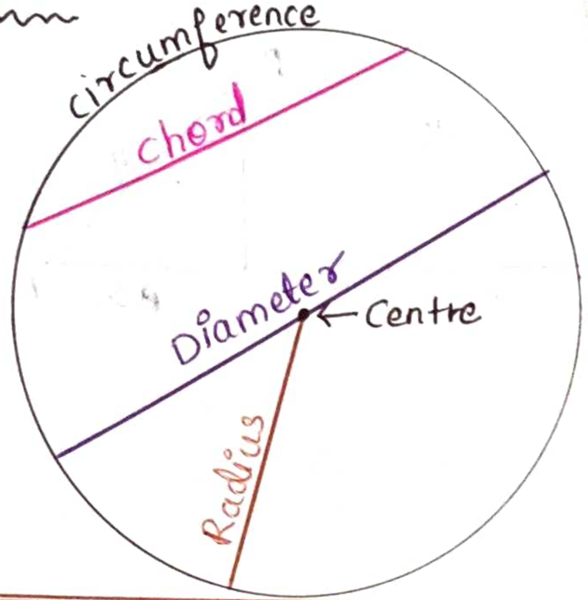
Recall :

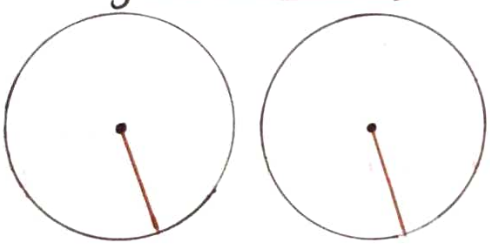


1] Radius = $\frac{\text{Diameter}}{2}$

2] Diameter = 2 X Radius.

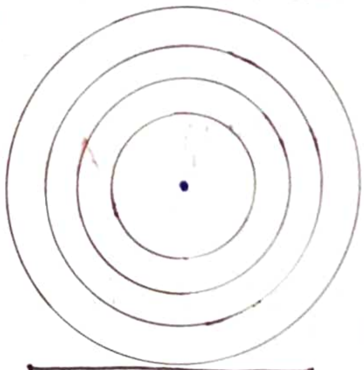
3] Diameter is the longest chord of the circle

Congruent circles



Radius same

Concentric Circles

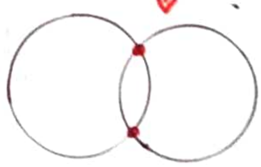


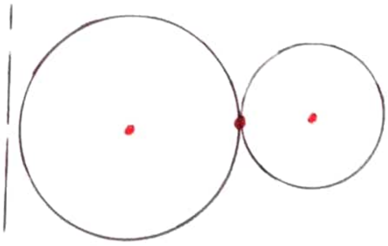
Centre same

Intersecting circles

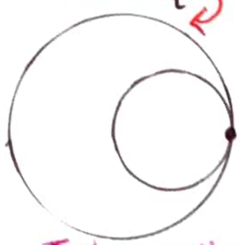
Two types

- Circles Intersecting in one point
  - Externally touching circles
  - Internally touching circles
- Circles Intersecting in two points





Externally touching circles



Internally touching Circles

Def^n

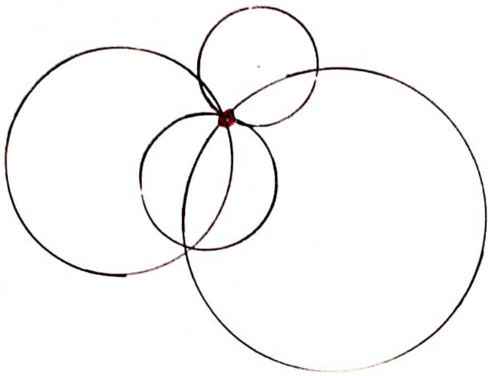
1] Congruent circles : Circles having same radii then they are called congruent circles.

2] Concentric circles : Circles which are having same centre then they are called Concentric circles.

Basic concept of Practice set 3.1

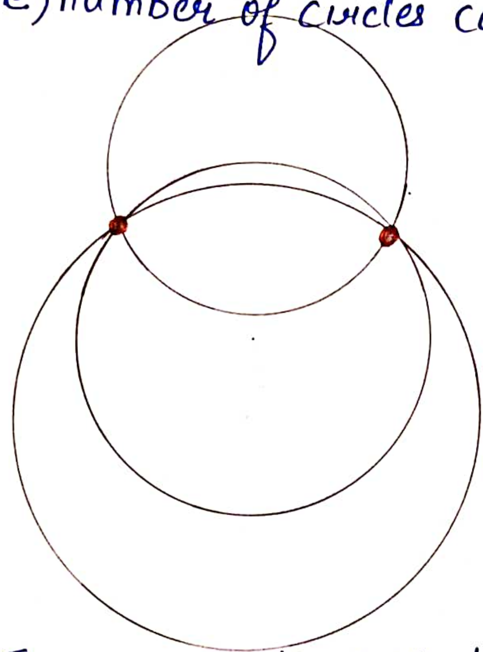
1] Circles passing through one, two, three points.

(A) Infinite (Uncountable) number of circles pass through one point.
(MCQ)



One point

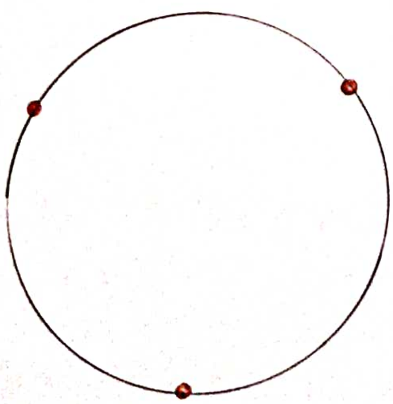
(B) Infinite (Uncountable) number of circles can pass through two distinct points.
(MCQ)



Two points

(C) Three points
(MCQ)
- Three non-collinear points
- Collinear points

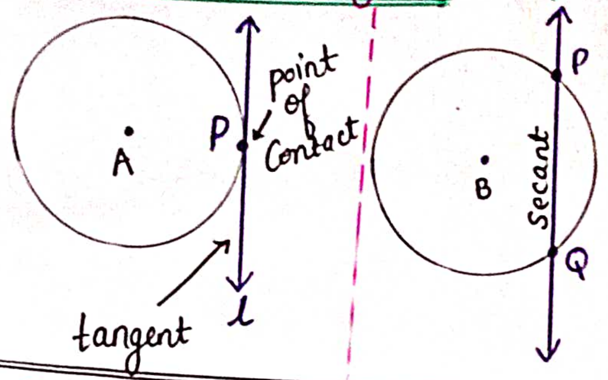
Three points



Only one circle can pass through three non-collinear points

No circle can pass through 3 collinear points

2] Secant and tangent (Defⁿ)



Definition:

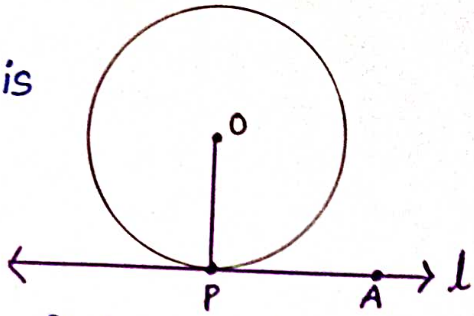
1] A tangent is a line to a circle that touches the circle at excatly one point.

2] A secant is a line to a circle that intersect the circle at two distinct points.

3] Tangent theorem (Imp)

Theorem: A tangent at any point of a circle is perpendicular to the radius at the point of contact.

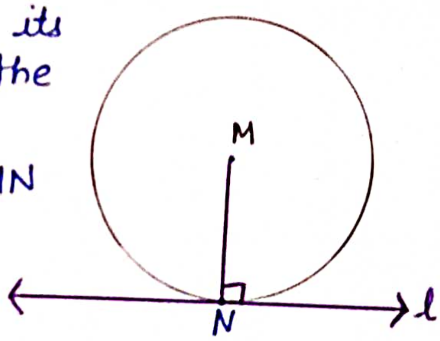
→ tangent ⊥ radius [at the point of contact]



Given: line l is tangent and seg OP is radius } ⟹ Result By tangent theorem line l ⊥ radius OP or ∠OPA = 90°

4] Converse of tangent theorem

Theorem: A line perpendicular to a radius at its point on the circle is a tangent to the circle.



Given: line l is perpendicular to a radius MN
line l ⊥ radius MN

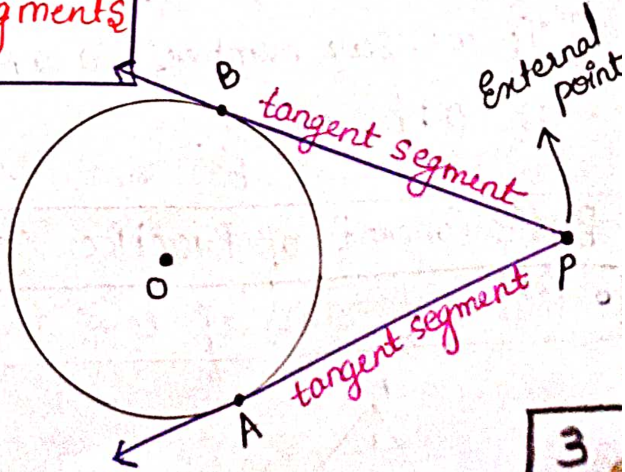
Result: line l is tangent to the circle.

5] Tangent segment theorem (Imp)

Theorem: Tangent segments drawn from an external point to a circle are congruent.

Note: From one external point two tangent segments can be drawn [MCQ]

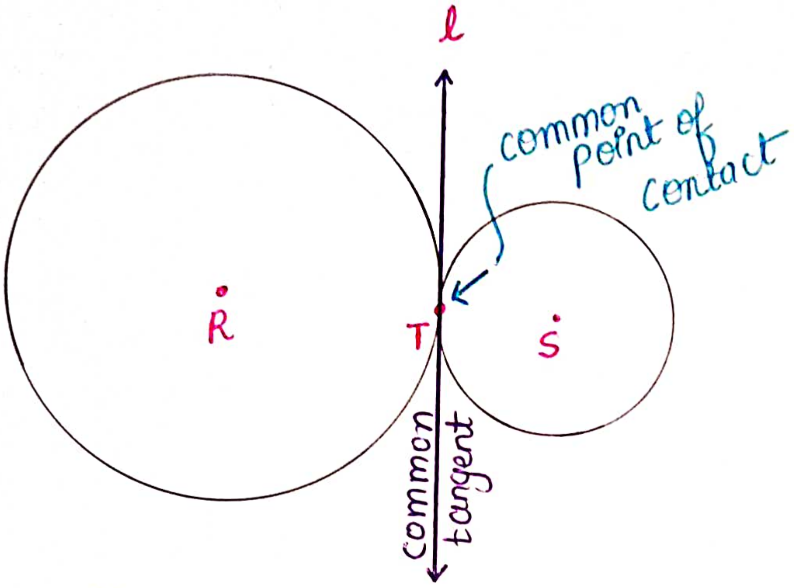
Given: Point 'P' is External point of a circle



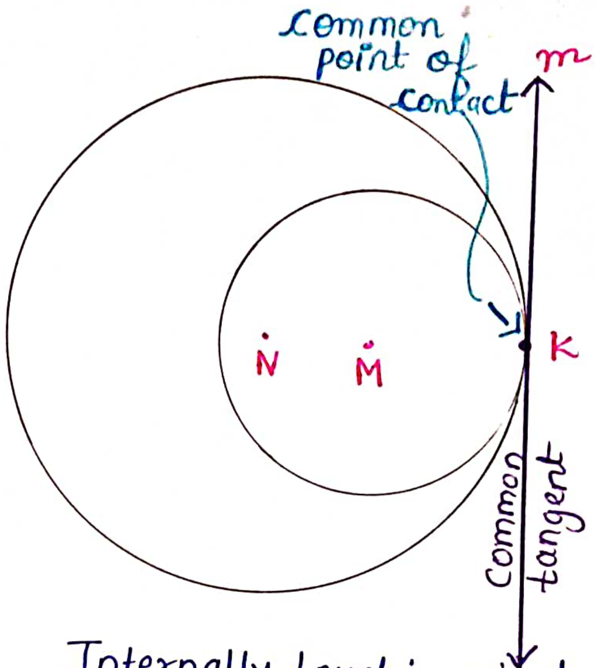
Result: By tangent segment theorem
seg PB ≅ seg PA

Basic Concept of Practice Set 3.2

1] Touching circles [Defn]



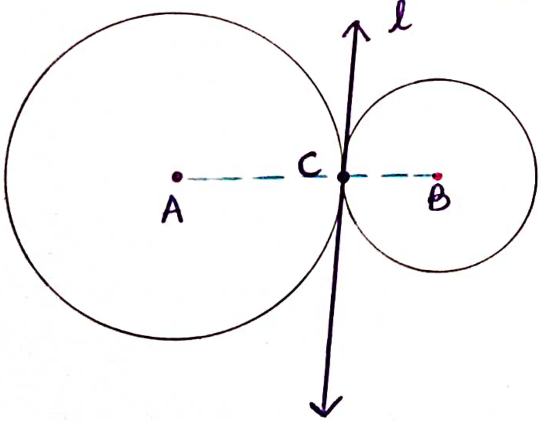
Externally touching circles



Internally touching circles

2] Theorem of touching circles.

Theorem: If two circles touch each other, their point of contact lies on the line joining their centres.

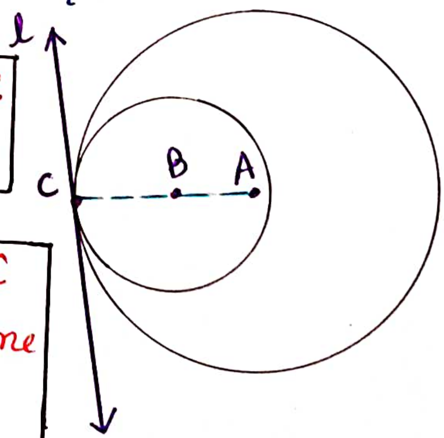


Result

Points A, B and C are Collinear

or

Points A, B and C lies on the same line.

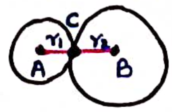


Hindi

Circles ke centres and unka point of contact same line k upar lie karte hai.

3] If the circles touch each other externally, distance between their centres is equal to sum of the radii

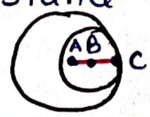
Imp



$d(A,B) = \underbrace{r_1 + r_2}_{\text{sum of the radii}}$

4] If the circles touch each other internally, distance between their centres is equal to the difference of their radii.

Imp



$d(A,B) = r_1 - r_2$

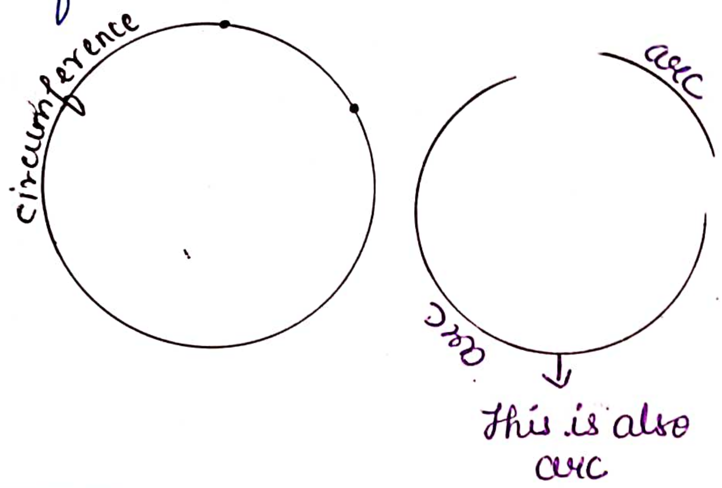
$r_1 > r_2$

Basic Concept of Practice Set 3.3

1] Arc and Angle (Defn)

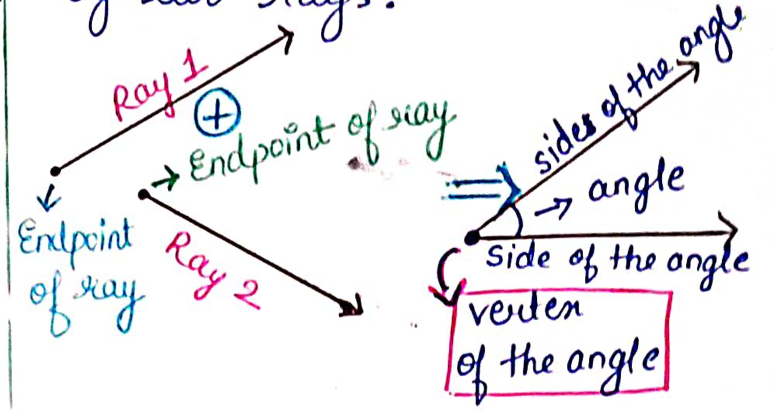
Arc

→ The arc of a circle is defined as the part of the circumference of a circle.

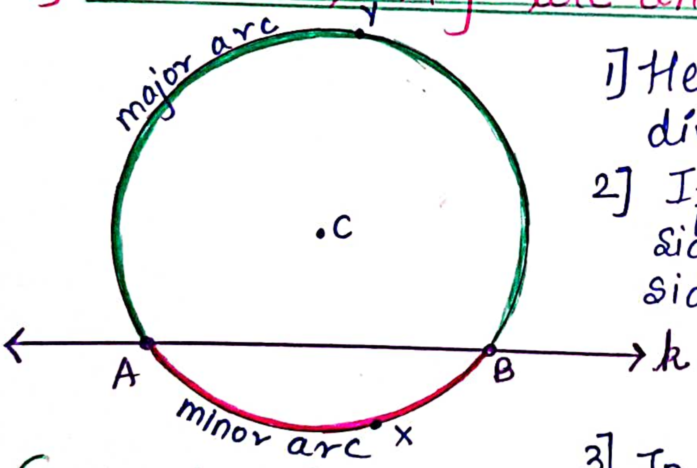


Angle

→ An angle is the figure formed by two rays.



2] Minor arc, Major arc and Semicircular arc.



Green → major arc
Pink → minor arc

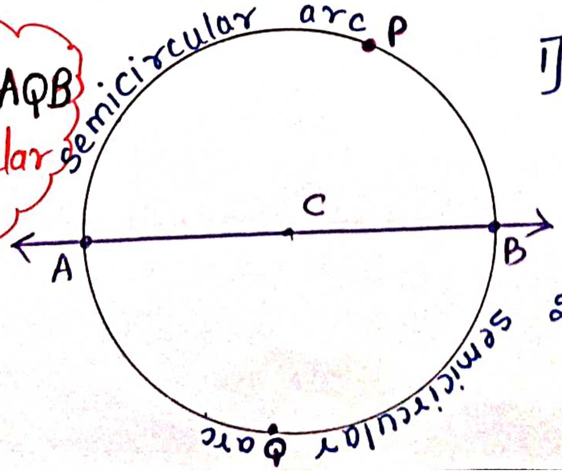
1] Here, line 'k' is secant and secant divides a circle in two parts/sides

2] If the centre of a circle is on one side of the secant then the arc on the side of the centre is called 'major arc'. and the arc which is on the other side of the centre is called 'minor arc'.

3] In fig(↔) arc AYB is a major arc & arc AXB is a minor arc

---

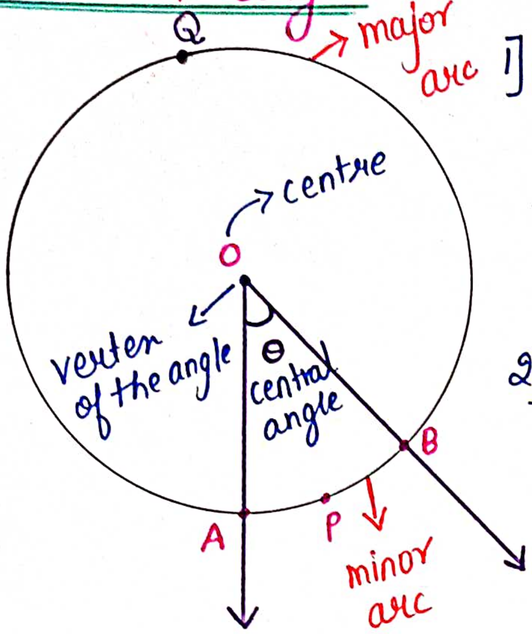
arc APB and arc AQB are semicircular arc



1] If secant passes through Centre of the circle it divides the circle into two parts.

2] Both parts constitude semicircular arc.

3] Central angle



1] Central angle (Def^n): If vertex of an angle is the centre of a circle, then that angle is called a 'Central angle'
In fig, $\angle AOB$ is a central angle

2] Central angle also divides a circle into two arcs i.e Minor arc (arc APB) and Major arc (arc AQB).

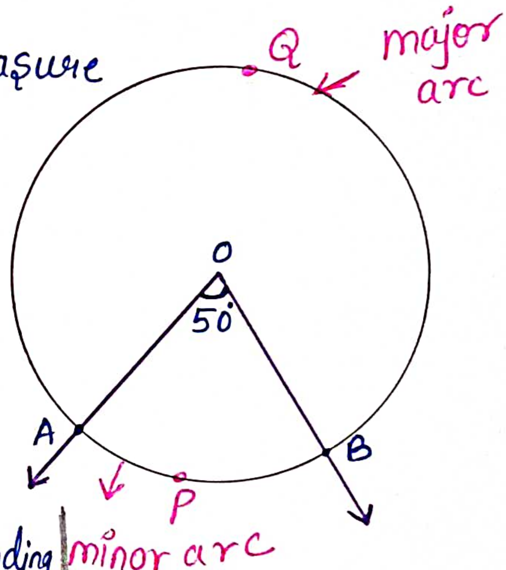
4] Measure of an arc. [is given in degree °]

1] Measure of a minor arc is equal to the measure of its corresponding central angle.

In fig → $\angle AOB$ [central angle] = 50°

$\therefore$ measure of minor arc APB = 50°

$\therefore$ m(arc APB) = 50°



2] Measure of major arc = 360° − measure of corresponding minor arc.

From Fig

m(arc AQB) = 360° − m(arc APB)

m(arc AQB) = $360^\circ - 50^\circ$

m(arc AQB) = 210°

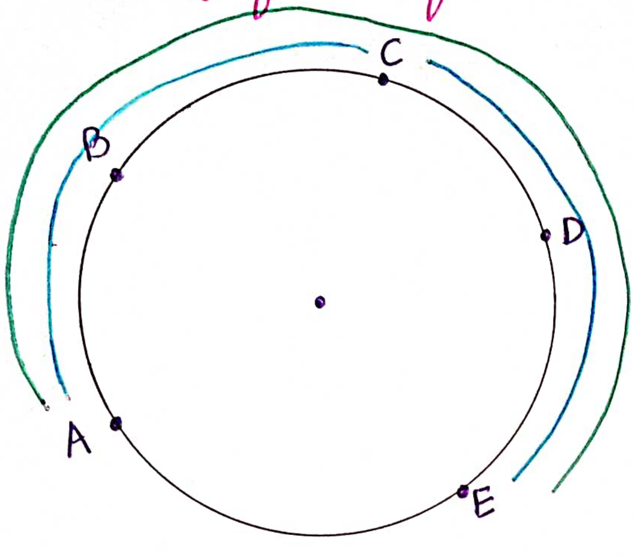
3] Measure of a semicircular arc, that is of a semicircle is 180° [MCQ]

4] Measure of a complete circle is 360° [MCQ]

4] Congruence of arcs

Two arcs are congruent if their measures and radii are equal.

5] Property of sum of measures of arcs [How to add measure of the arcs correctly]



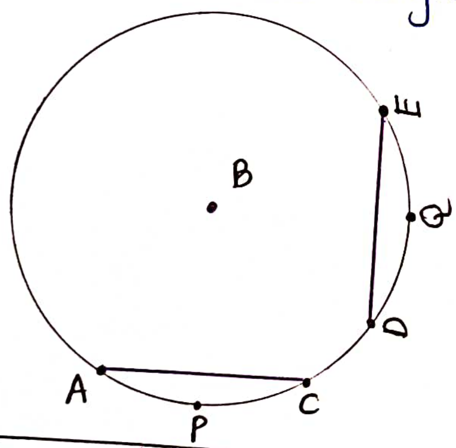
Right way:

$$m(\text{arc } ABC) + m(\text{arc } CDE) = m(\text{arc } ACE)$$

[Jaha pe hamara first arc khatam ho rha hai wahase hamara second arc start hona chahye Tab jaak hi hum ussko add karege]

6] Page no. 61 [Textbook]

Theorem: The chords corresponding to congruent arcs of a circle are congruent.



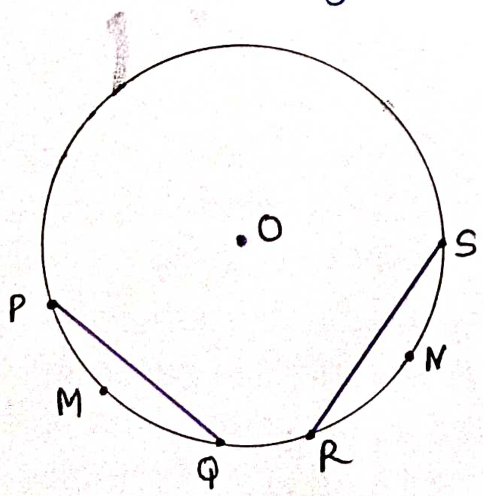
Given: arc APC $\cong$ arc DQE

Result: chord AC $\cong$ chord DE

[If arcs are congruent then chords are congruent]

7] Page no. 61 [Textbook]

Theorem: Corresponding arcs of congruent chords of a circle are congruent.



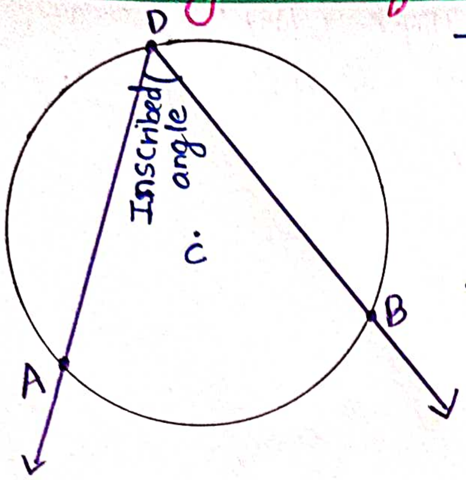
Given: Chord PQ $\cong$ chord RS

Result: arc PMQ $\cong$ arc RNS

[If chords are congruent then arcs are congruent]

Basic concept of Practice set 3.4

1] Inscribed angle (Defⁿ)

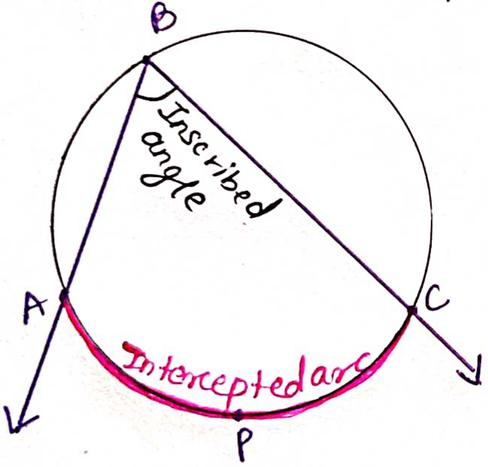


→ If the vertex of the angle lies on the circle and arms of the angle are chords of the circle then that angle is inscribed angle.

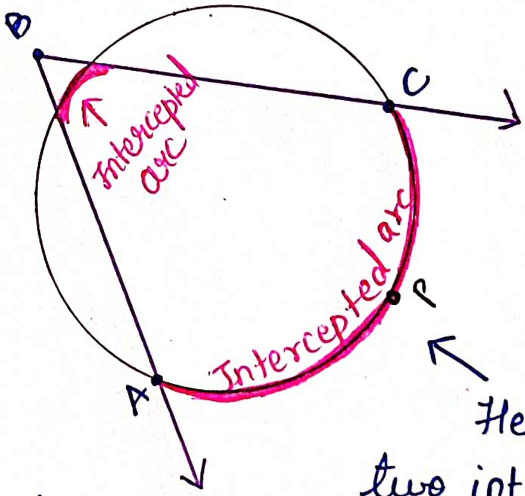
→ $\boxed{\angle ADB = \text{Inscribed angle}}$

2] Intercepted arc (Defⁿ)

→ The arc of a circle that lies in the interior of the angle is an arc intercepted by the angle



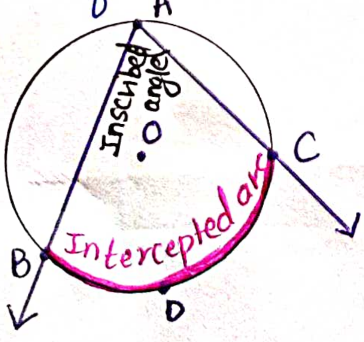
Here, arc APC is intercepted arc of ∠ABC



Here there are two intercepted arc of ∠ABC.

3] Inscribed angle theorem (Imp)

Theorem : The measure of an inscribed angle is half of the measure of the arc intercepted by it.



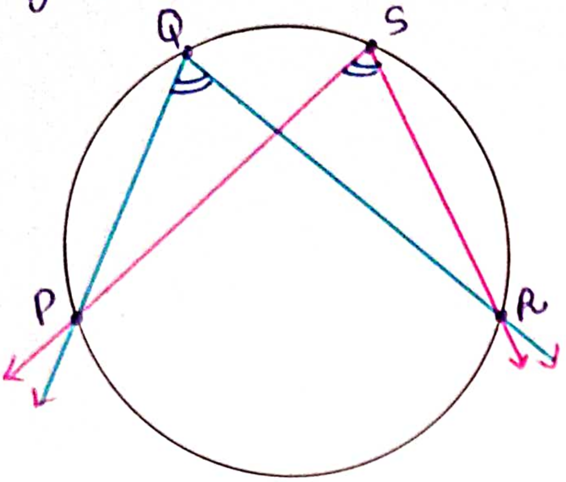
Given : arc BDC is intercepted arc of inscribed angle BAC

Result : Inscribed angle $= \frac{1}{2} \times$ Intercepted arc

ie $\angle BAC = \frac{1}{2} \times m(\text{arc } BDC)$

4] Corollaries of inscribed angle theorem [Imp]

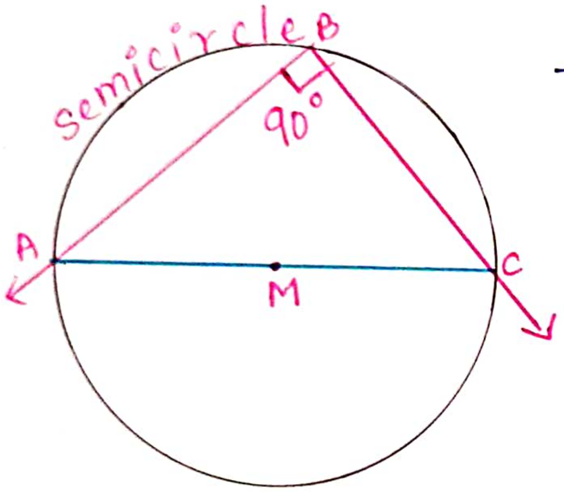
(A) Angles inscribed in the same arc are congruent



→ $\angle PQR$ and $\angle PSR$ are inscribed angle and they are inscribed in same arc [arc PQR]

∴ $\boxed{\angle PQR \cong \angle PSR}$

(B) Angle inscribed in a semicircle is a right angle.



→ $\angle ABC$ is inscribed angle and it is inscribed in semicircle

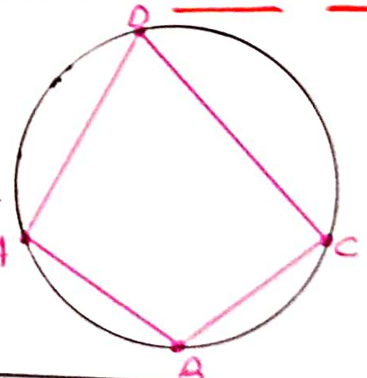
∴ $\angle ABC$ is a right angle

$\boxed{\text{i.e } \angle ABC = 90^\circ}$

5] Cyclic quadrilateral [Defⁿ]

→ If all vertices of a quadrilateral lie on the same circle then it is called a cyclic quadrilateral.

→ All the vertices of □ABCD lie on the $\boxed{\text{same circle}}$ ∴ □ABCD is cyclic quadrilateral

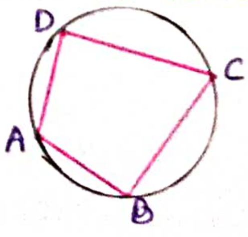


6] Theorem of cyclic quadrilateral (Imp)

Theorem: Opposite angles of a cyclic quadrilateral are supplementary.

Given: □ABCD is cyclic.

Result: $\angle A + \angle C = 180^\circ$ and $\angle D + \angle B = 180^\circ$

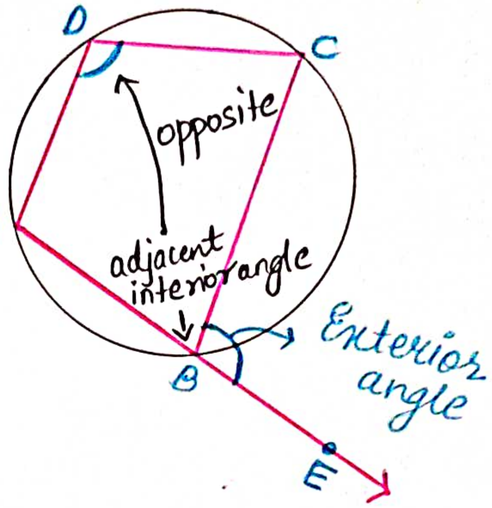


7] Corollary of cyclic quadrilateral theorem.

→ An exterior angle of a cyclic quadrilateral is congruent to the angle opposite to its adjacent interior angle.

Given: □ABCD is cyclic and
$\angle CBE$ is an exterior angle

Result: $\boxed{\angle CBE \cong \angle ADC}$

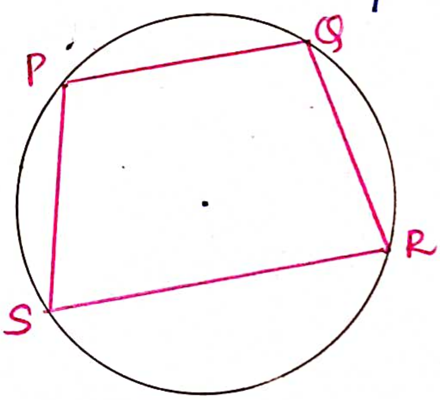


8] Converse of cyclic quadrilateral theorem

Theorem: If a pair of opposite angles of a quadrilateral is supplementary, the quadrilateral is cyclic.

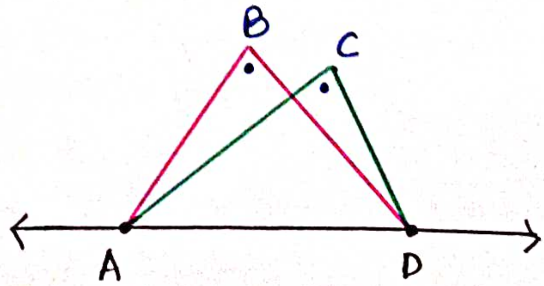
Given: If $\angle P + \angle R = 180^\circ$
$\angle Q + \angle S = 180^\circ$

Result: □PQRS is cyclic



9] Textbook page no: 70

Theorem: If two points (A, D) on a given line subtend equal angles at two distinct points (B, C) which lie on the same side of the line, then the four points are concyclic.



Result: Points A, B, C, D are concyclic [Points lies on the same circle].

Extra Gyaan [Imp]

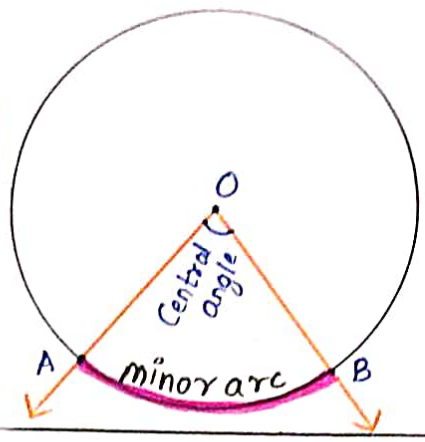
Types of angles in circle and their measure

1] Central angle :

$$\boxed{\angle AOB = m(\text{arc}AB)}$$

↓

Imp



→ $\angle AOB$ = Central angle

→ arc AB = minor arc

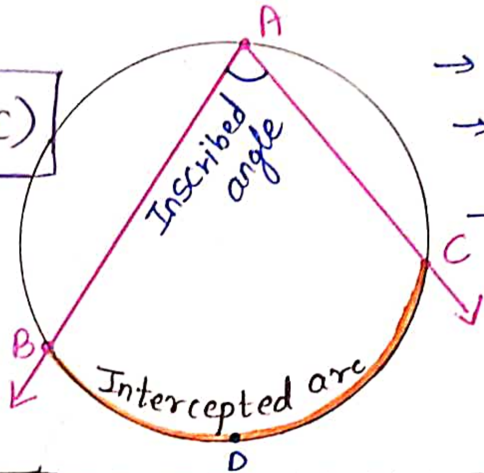
→ The measure of central angle is equal to measure of its corresponding minor arc

2] Inscribed angle :

$$\boxed{\angle BAC = \frac{1}{2} \times m(\text{arc } BDC)}$$

↓

Imp



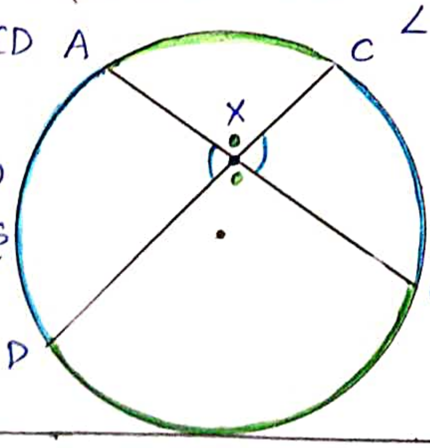
→ $\angle BAC$ = Inscribed angle

→ arc BDC is Intercepted arc

→ The measure of Inscribed angle is $\frac{1}{2}$ the measure of intercepted arc

3] Interior angle :

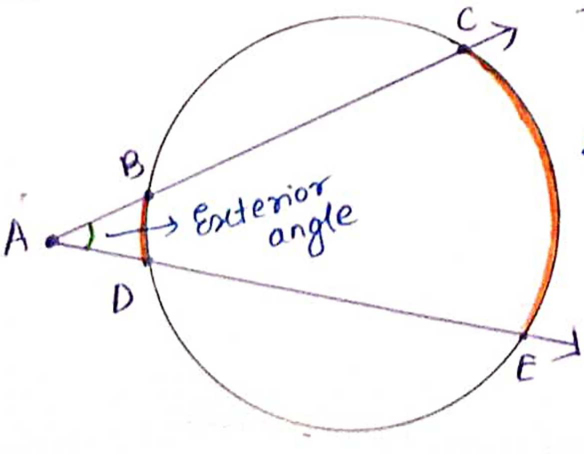
→ Chord AB and chord CD Intersect inside the circle at point X. Then 4(four) Interior angles are formed.



$\underbrace{\angle AXC = \angle DXB}_{\text{Interior angles}} = \frac{1}{2}[m(\text{arc } AC) + m(\text{arc } DB)]$

$\underbrace{\angle AXD = \angle CXB}_{\text{Interior angles}} = \frac{1}{2}[m(\text{arc } AD) + m(\text{arc } CB)]$

4] Exterior angle :



Here, $\angle CAE$ is Exterior angle

$\angle CAE = \frac{1}{2}[m(\text{arc } CE) - m(\text{arc } BD)]$