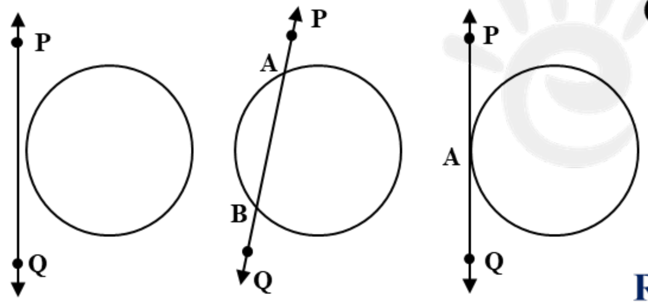
CIRCLES

MIND MAP

Circles

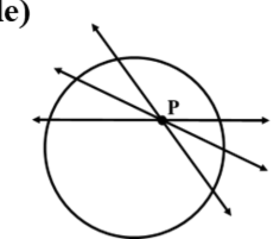
1. Circle: A circle is a collection of all points in a plane which are at a constant distance (radius) from a fixed point (centre).

2. Tangent to a Circle:
It is a line that intersects the circle at only one point. There is only one tangent at a point of the circle. The tangent to a circle is a special case of the secant, when the two end points of its corresponding chord coincide.

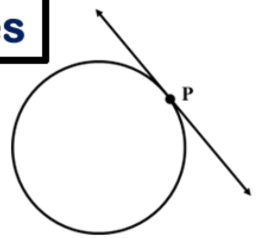


3. Number of tangents from a point on a circle.

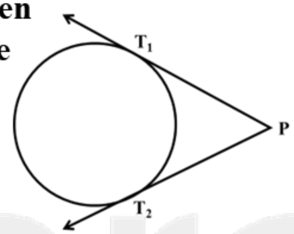
(i) No tangent (when a point lying inside the circle)



(ii) One tangent (when point lying on the circle)

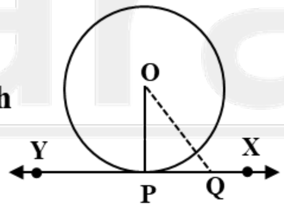


(iii) Two tangent (when point lying outside the circle)



4. Theorems:

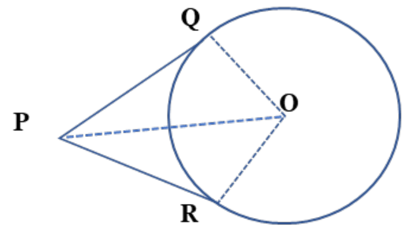
(i). The tangent at any point of a circle is perpendicular to the radius through the point of contact.



Remarks :

1. By theorem above, we can also conclude that at any point on a circle there can be one and only one tangent.
2. The line containing the radius through the point of contact is also sometimes called the normal to the circle at the point.

(ii) The lengths of tangents drawn from an external point to circle are equal.



OQ = OR	(Radii of the same circle)
OP = OP	(Common)
Δ OQP $\cong$ Δ ORP	(RHS)
PQ = PR	(CPCT)

Remarks :

1. The theorem can also be proved by using the Pythagoras Theorem as follow:
$PQ^2 = OP^2 - OQ^2 = OP^2 - OR^2 = PR^2$
(As OQ = OR)
Which gives PQ = PR.

2. Note also that $\angle OPQ = \angle OPR$.
Therefore, OP is the angle bisector of $\angle QPR$, i.e., the centre lies on the the bisector of the abngle between the tow tangents.

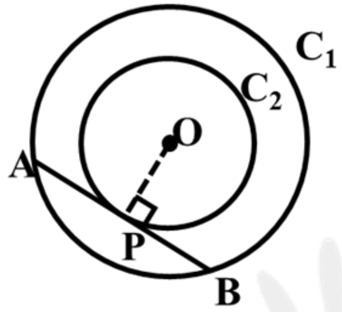
MIND MAP

Circles

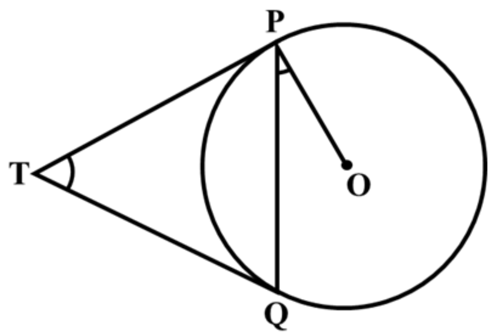
Extra Points

1. In two concentric circles, the chord of the larger circle, which touches the smaller circle, is bisected at the point of contact.

AP = BP

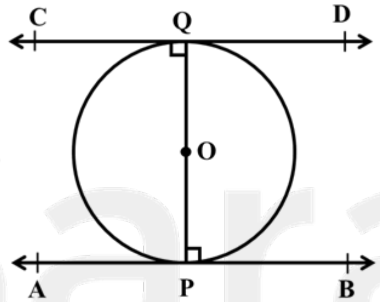


2. Two tangents TP and TQ are drawn to a circle with centre O from an external point T than ∠ PTQ = 2 ∠ OPQ.



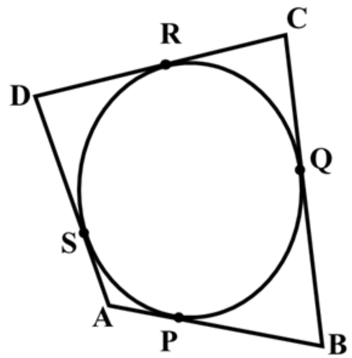
3. The tangents drawn at the ends of a diameter of a circle are parallel.

AB || CD.

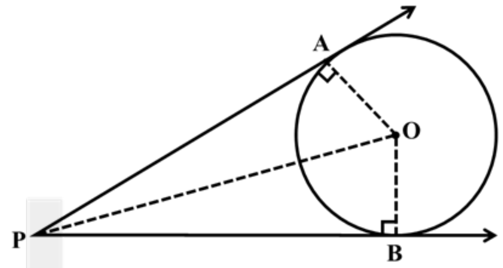


4. A quadrilateral ABCD is drawn to circumscribe a circle, then

AB + CD = AD + BC



5. An angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre. $\angle AOB + \angle APB = 180^0$



6. A parallelogram circumscribing a circle is a rhombus.

AP = AS [Tangents from an external point are equal]

BP = BQ CR = CQ DR = DS

⇒ AB = BC = CD = DA

⇒ ABCD is a rhombus.