Revision Notes

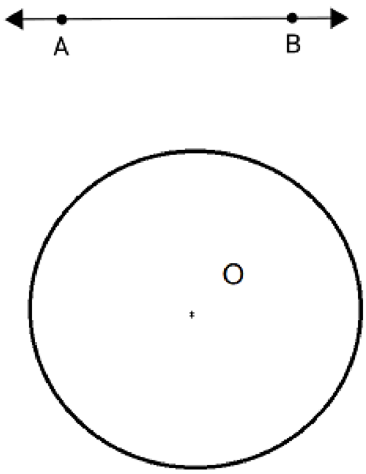
Class 10 Maths

Chapter 10 – Circles

1. Tangent to a Circle

A tangent to a circle is a straight line that only touches the circle once. The point of tangency is the name given to this location. At the point of tangency, the tangent to a circle is perpendicular to the radius.

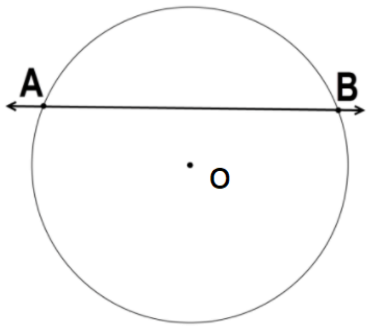
2. Non-intersecting lines are made up of two or more lines that do not intersect, fig (i): the circle and the line AB have no common point. It's worth noting that:



(i)

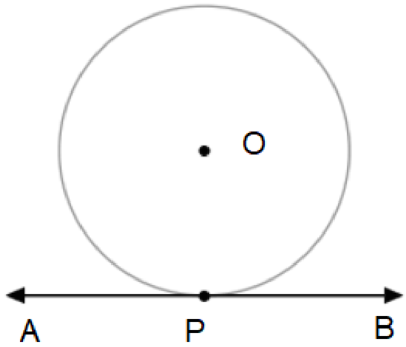
i. Lines that do not intersect can never meet.
ii. The parallel lines are another name for them.
iii. They stay at the same distance from one another at all times.

3. A **secant** is a line that crosses a curve at two or more separate locations. A secant intersects a circle at exactly two locations in the case of a circle, in fig (ii): the line AB intersects the circle at two points A and B. AB is the secant of the circle.



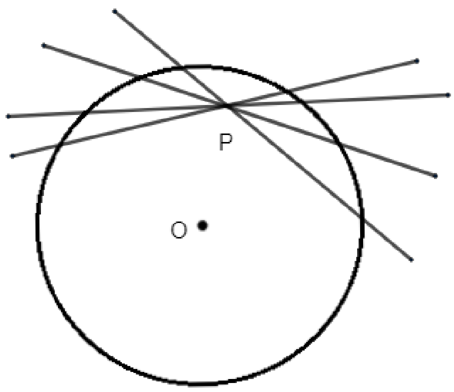
(ii)

4. Figure (iii): The line AB only touches the circle at one place. P denotes a point on a line and a point on a circle. The point of contact is denoted by the letter P. The **tangent** to the circle at P is AB.

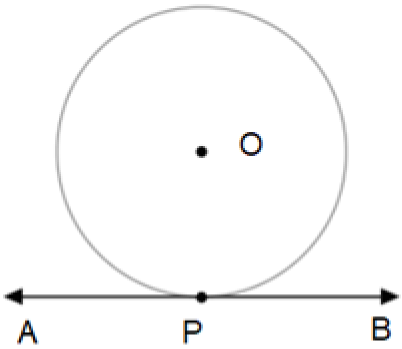


(iii)

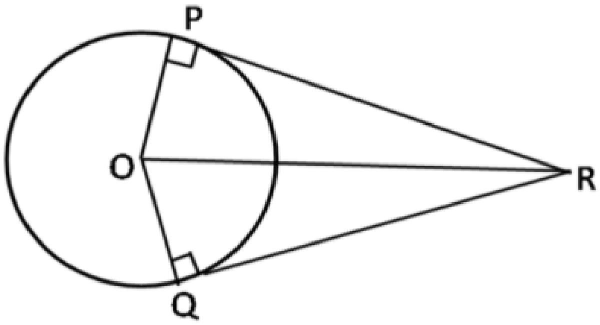
5. Number of Tangents from a Point on a Circle



There are no tangents to the circle that can be made from a point inside the circle.

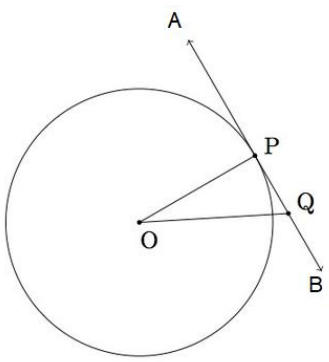


Only one tangent to a circle can be traced from a point on the circle.
P is a point on the circle in this illustration. At P, there is just one tangent. The point of contact is denoted by the letter P.



Two tangents to a circle can be made from a point outside the circle. P is the exterior point in this diagram. The tangents to the circle at points Q and R are PQ and PR, respectively. The length of a tangent is the distance between the exterior point and the point of contact of the tangent's segment. PQ and PR are the lengths of the two tangents in this diagram.

1. Theorem 1:
The tangent at any point of a circle is perpendicular to the radius through the point of contact.



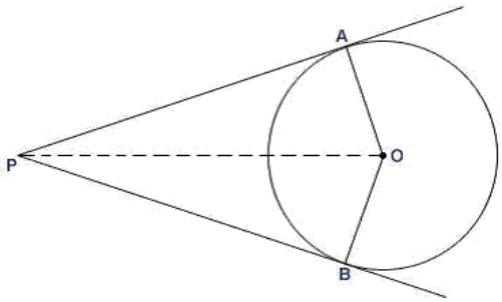
Given:
A tangent to the circle with centre O is AB. The point of contact is denoted by the letter P. The radius of the circle is denoted by OP.

To prove:

$OP \perp AB$

Proof:
Let Q be any point on the tangent AB other than P, outside the circle.
For any tangent point Q that is not P.
The shortest distance between point O and line AB is OP.
The theorem is therefore proved by
$OP \perp AB$
(The shortest line segment drawn from a point to a given line is perpendicular to the line).
As a result of the preceding theorem,
I. The point of contact is crossed by the perpendicular drawn from the centre to the tangent of a circle.
II. OP is the radius of the circle with centre O. The tangent to the circle at P is the perpendicular OP which is drawn at P.

2. Theorem2:
The lengths of tangents drawn from an external point to a circle are equal.



Given:
P is the outermost point of a circle with the centre O. The tangents from P to the circle are PA and PB. The points of contact are A and B.
To prove:

$PA=PB$

Construction:

Join OA, OB, OP.

Proof:

In

ΔAPO and ΔBPO,

$OA = OB$, radius of the same circle.

$OP = OP$, common side

$PA = PB$

by CPCT theorem, third side of the triangles

According to the following theorem,

i. (CPCT) This indicates that near the circle's centre, the two tangents subtend equal angles.

ii. (CPCT) The tangents to the line connecting the point and the circle's centre are both equally inclined.

Alternatively, the circle's centre can be found on the angle bisector of ΔAPB, hence, $PA = PB$.