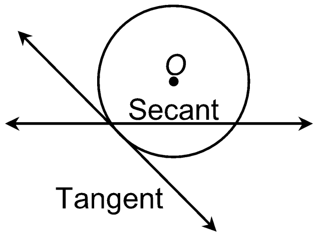
Secant: A line, which intersects a circle in two distinct points, is called a secant.

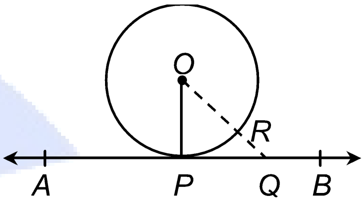
Tangent: A line meeting a circle only in one point is called a tangent to the circle at that point.

The point at which the tangent line meets the circle is called the point of contact.



Length of tangent: The length of the line segment of the tangent between a given point and the given point of contact with the circle is called the length of the tangent from the point to the circle.

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



Given : A circle with centre *O* and a tangent *AB* at a point *P* of the circle.

To prove : $OP \perp AB$

Construction : Take a point Q on *AB*. Join *OQ*.

Proof : *Q* is a point on the tangent *AB*, other than the point of contact *P*.

∴ *Q* lies outside the circle.

Let *OQ* intersect the circle at *R*.

Then, $OR < OQ$ ..... (i)

But, $OP = OR$ [radii of the same circle]. ..... (ii)

From (i) and (ii)

∴ $OP < OQ$

OP is the shortest distance between the point *O* and the line *AB*.

But, the shortest distance between a point and a line is the perpendicular distance.

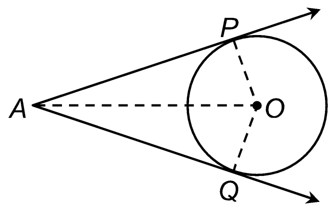
∴ $OP \perp AB$.

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

Given : Two tangents *AP* and *AQ* are drawn from a point *A* to a circle with centre *O*.

To prove : $AP = AQ$

Construction : Join *OP*, *OQ* and *OA*.



Proof : *AP* is a tangent at *P* and *OP* is the radius through *P*.

∴ $OP \perp AP$

Similarly, $OQ \perp AQ$

In the right ΔOPA and OQA, we have

$OP = OQ$ [radii of the same circle]

$OA = OA$ [common]

$\angle OPA = \angle OQA$ [both 90°]

∴ $\Delta OPA \cong \Delta OQA$ [by RHS-congruence]

Hence, $AP = AQ$. [cpct]

Also $\angle OAP = \angle OAQ$ [cpct]

$\therefore$ OA is the angle bisector of $\angle PAQ$.