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SECANTS, TANGENTS AND THEIR PROPERTIES

- **Secant :** A line which interesects circle at two distinct points. Here PAB is a secant.

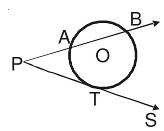


Fig. (i)

- **Tangent :** A line which touches a circle at exactly one point and the point where it touches the circle is called point of contact. Here PTS is tangent and T is point of contact.

  When two points of intersection of secant and circle coincide it becomes a tangent.

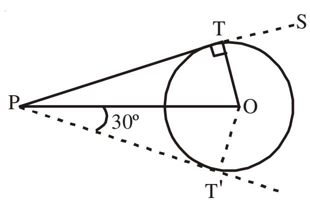


Fig. (ii)

- From an external point only two tangents can be drawn to a circle e. g. PT & PT′.
- The lengths of two tangents from an external point are equal. Here PT = PT′, [Fig. (ii)]
- A radius through the point of contact is perpendicular to the tangent at the point. Here ∠PT′ O = ∠PTO = 90º. [Fig. (ii)]
- The tangents drawn from an external point to a circle are equally inclined to the line joining the point to the centre of circle. Here ∠TPO = ∠T′PO. [Fig. (ii)]

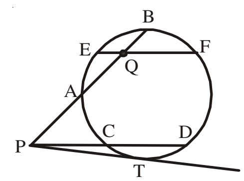


Fig. (iii)

If two chords AB and CD or AB and EF of a circle intersect at a point P or Q outside or inside the circle, then PA × PB = PC × PD or QA × QB = QE × QF.

If PAB is a secant to a circle intersecting the circle at A and B and PT is a tangent to the circle at T, then PA × PB = PT^2. [Fig. (i)]

The angles made by a chord in alternate segment through the point of contact of a tangent is equal to the angle between chord and tangent. Here ∠QP X = ∠QSP and ∠PRQ = ∠QPY. [Fig. (iv)]

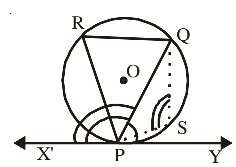


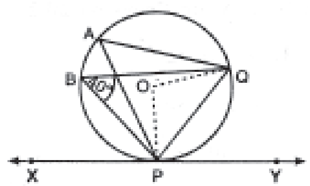
Fig. (iv)

CHECK YOUR PROGRESS:

1. A circle touches all the four sides of a quadrilateral ABCD. Prove that AB + CD = BC + DA.
2. Prove that a parallelogram circumscribing a circle is a rhombus.
3. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ.

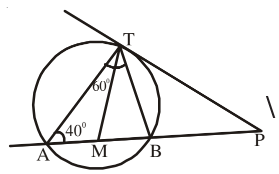
4. Two tangent segments PA and PB are drawn to a circle with centre O such that $\angle APB = 120^0$. Prove that $AP = \frac{1}{2}$ OP.

5. In given figure O is centre of circle and $\angle PBQ = 40^0$, find



(i) $\angle QPY$ (ii) $\angle POQ$ (iii) $\angle OPQ$

6. In figure if $\angle PAT = 40^0$ and $\angle ATB = 60^0$, Show tha PM = PT.



STRETCH YOURSELF

1. With the help of an activity Show that a tangent is a line perpendicular to the radius through the point of contact.
2. A point O in the interior of a rectangle ABCD is joined to each of the vertices A, B, C and D, Prove that $OA^2 + OC^2 = OB^2 + OD^2$.

ANSWERS

CHECK YOUR PROGRESS :

5. (i) 40^0 (ii) 80^0 (iii) 50^0