

Class 10 Maths

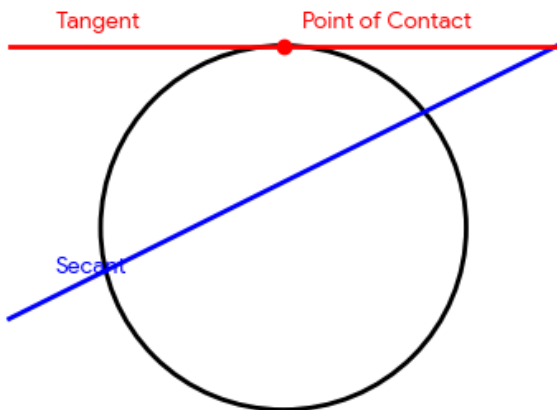
Chapter 10: Circles

1. Introduction

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

- Secant: A line that intersects the circle at two distinct points.
- Tangent: A line that touches the circle at exactly one point. The common point of the tangent and the circle is called the point of contact.

Tangent and Secant to a Circle



2. Theorem 10.1: Radius and Tangent

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

Meaning: If you draw a radius from the center to the point where the tangent touches the circle, the angle between the tangent and the radius is exactly 90° .

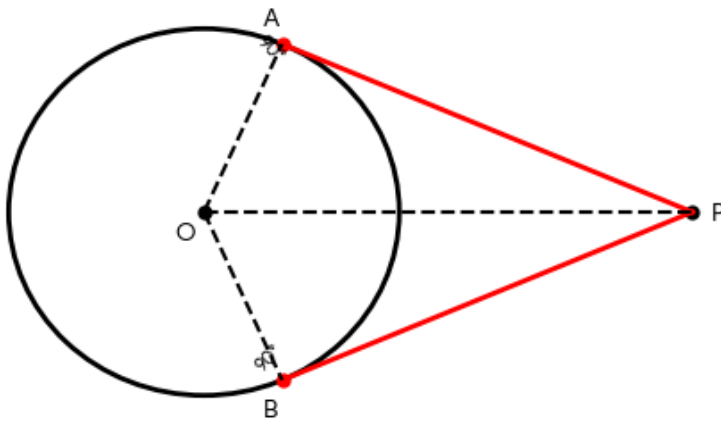
3. Number of Tangents from a Point

1. Point Inside the Circle: No tangent can be drawn.
2. Point On the Circle: Exactly one tangent can be drawn.
3. Point Outside the Circle: Exactly two tangents can be drawn.

4. Theorem 10.2: Length of Tangents

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

Tangents from an External Point ($PA = PB$)



In the figure above, PA and PB are two tangents drawn from an external point P to the circle with center O. According to the theorem, $PA = PB$.

Key Properties derived from this theorem:

- $\triangle OAP \cong \triangle OBP$ (By Right-Angle Hypotenuse Side (RHS) congruence criterion, since $OA = OB = \text{radius}$, OP is common, and angles OAP and OBP are 90°).
- $\angle OPA = \angle OPB$ (The center lies on the angle bisector of the angle between the two tangents).
- $\angle AOB + \angle APB = 180^\circ$ (The angle between the two tangents and the angle subtended by the line segments joining the points of contact at the center are supplementary).

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