



LENGTH OF TANGENTS FROM AN EXTERNAL POINT

Chapter: Circles

Topic: Length of Tangents from an External Point



1. CHAPTER SNAPSHOT



Definition: Tangents drawn from the same external point to a circle are called pair of tangents.



Big Idea: Learn the relationship between the two tangents drawn from an external point and apply it to solve proofs and numerical problems.



Real-Life Connection: Supporting cables, road junctions around circular parks, and belt drives touching wheels are examples of tangents from an external point.



Why It Matters: This concept helps in finding unknown lengths, proving equal lengths, and solving geometry questions involving tangents.

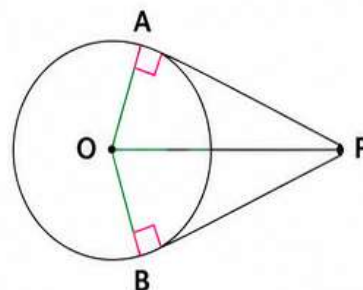


Key Vocabulary: External Point, Tangent, Point of Contact, Pair of Tangents, Radius, Centre, Equal Tangents.



2. HIGH-YIELD CONCEPTS

- **Pair of Tangents:** Two tangents can be drawn from an external point to a circle.
- **Equal Lengths:** Tangents drawn from the same external point are equal in length.
- **Radius $\perp$ Tangent:** The radius is perpendicular to the tangent at the point of contact.
- **Congruent Triangles:** Equal tangents are usually proved using RHS Congruence.
- **Right Triangle:** Radius and tangent form a right triangle; use Pythagoras Theorem when needed.
- **Problem-Solving Tip:** Join the centre to the external point before solving.



3. THEOREM BOX

Theorem 2

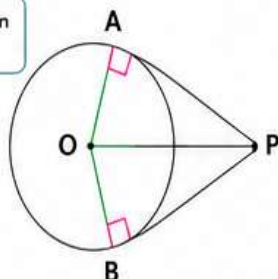
Statement

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

Mathematical Representation

$$PA = PB$$

If PA and PB are tangents from an external point P, then $PA = PB$.



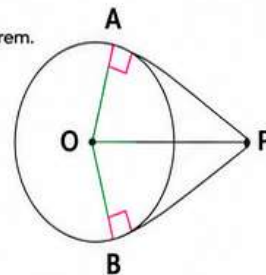
4. BOARD EXAM FOCUS (HOTSPOTS)

Frequently Asked Questions

- State the theorem on equal tangents.
- Prove that tangents from an external point are equal.
- Find the length of one tangent when the other is given.
- Use RHS Congruence to prove equal lengths.
- Find unknown lengths using the Pythagoras Theorem.

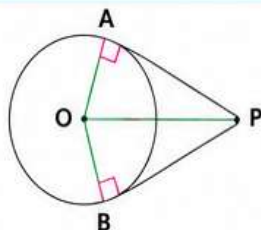
Quick Exam Tips

- ✓ Join the centre to the external point first.
- ✓ Mark both radii equal.
- ✓ Mark both right angles at the points of contact.
- ✓ Use RHS Congruence before concluding the tangents are equal.
- ✓ Use Pythagoras Theorem whenever a right triangle is formed.



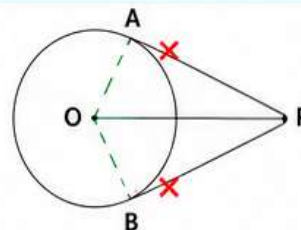
5. SMART REVISION TIPS

- ✓ Remember "Same External Point $\rightarrow$ Equal Tangents."
- ✓ Radius always meets the tangent at 90° .
- ✓ Draw all radii before starting the proof.
- ✓ Identify the right triangle before applying Pythagoras.



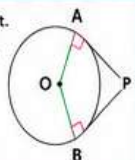
6. COMMON MISTAKES

- ✗ Confusing the external point with the centre.
- ✗ Forgetting to mark the right angles.
- ✗ Assuming tangents are equal without proving them.
- ✗ Applying Pythagoras to a non-right triangle.
- ✗ Forgetting that both radii are equal.



7. MUST REMEMBER (RAPID SUMMARY)

- ✓ Two tangents can be drawn from an external point.
- ✓ Tangents from the same external point are equal.
- ✓ Radius $\perp$ Tangent.
- ✓ Use RHS Congruence in proofs.
- ✓ Use Pythagoras for right triangles.



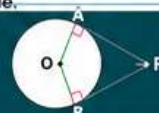
8. RAPID REVISION (30 SECONDS)

Theorem	$\rightarrow$ Tangents drawn from the same external point are equal ($PA = PB$)
Radius	$\rightarrow$ Perpendicular to the tangent
Proof Method	$\rightarrow$ RHS Congruence
Application	$\rightarrow$ Pythagoras Theorem



9. QUICK FACTS

- ★ Radius and tangent meet at 90° .
- ★ Tangents from the same external point are always equal.
- ★ Join the centre before beginning any proof.
- ★ RHS Congruence is the key proof technique.



10. KEY TAKEAWAY

Tangents drawn from the same external point are always equal in length. Together with the property that the radius is perpendicular to the tangent at the point of contact, these results form the foundation for solving most CBSE Class 10 tangent problems.