NCERT – GRADE 10 CHEAT SHEET

CIRCLES
(TANGENTS TO A CIRCLE)

Pumpa

1 CHAPTER SNAPSHOT

This chapter introduces tangents to a circle and their important properties.
It helps us solve real-life and exam-level problems using theorems.

Key Ideas:

- Tangent touches the circle at exactly one point.
- Radius is perpendicular to the tangent at the point of contact.
- Lengths of tangents drawn from an external point are equal.
- Tangents and circles form many useful theorems.

2 HIGH-YIELD CONCEPTS

- **Tangent:** A line that touches a circle at exactly one point.
- **Point of Contact:** The point where the tangent touches the circle.
- **Radius–Tangent Property:** The radius through the point of contact is perpendicular to the tangent.
- **Tangent from an External Point:** Tangents drawn from an external point to a circle are equal in length.
- **Converse:** If a line is perpendicular to a radius at the endpoint on the circle, then the line is a tangent.

3 FORMULA BANK

★ Length of tangent from an external point P

$$PA = PB$$

(If PA and PB are tangents)

★ Radius ⊥ Tangent

$OP \perp PT$ (Here, PT is tangent at T)

★ If $PT \perp OR$ at T

Then PT is a tangent.

★ In ΔOPT (right angled at T)

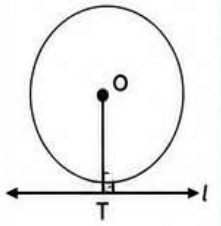
$$OP^2 = OT^2 + PT^2$$

★ Length of tangent

$$PT = \sqrt{OP^2 - OT^2}$$

4 THEOREM BOX

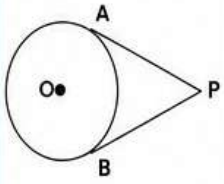
Theorem 1
(Tangent ⊥ Radius)



If a line is a tangent to a circle, then the radius through the point of contact is perpendicular to the tangent.

$\underline{OT} \perp l$ at T

Theorem 2
(Equal Tangents from External Point)



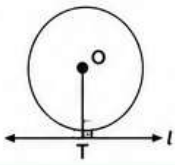
The lengths of tangents drawn from an external point to a circle are equal.

$\underline{PA} = PB$

5 BOARD EXAM FOCUS & QUESTION HOTSPOTS

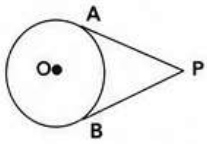
1 PROCESS_STEP: Identify the Tangent Property.

Step 1: Mark the point of contact.
Step 2: Draw the radius to the point of contact.
Step 3: Apply Radius ⊥ Tangent wherever required.



2 PROCESS_STEP: Equal Tangents Strategy.

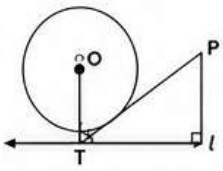
- When two tangents are drawn from the same external point:
- Use PA = PB.
- Form the required equation.
- Simplify to find the unknown length.



3 EXAMPLE: Numerical Applications.

Most CBSE numerical problems involve:

- Applying Pythagoras' Theorem in the right triangle formed by the radius and tangent.
- Using PA = PB to solve for unknown lengths.
- Finding angles using the radius–tangent property.



4 KEY_FINDING: High-Frequency Board Theorems.

The most repeated board questions are based on:

- Proving Radius ⊥ Tangent.
- Proving Equal Tangents from an External Point.
- Applying the Converse of the Tangent Theorem.
- Solving 3–5 mark theorem-based numerical problems.

6 SMART REVISION TIPS

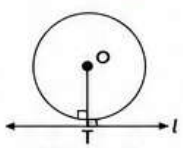
- Always identify the point of contact first.
- Draw a neat diagram – it solves half the problem!
- Use the Radius–Tangent property wherever possible.
- Remember: Tangents from the same external point are equal.
- Use Pythagoras theorem in ΔOPT (right angled at T) for length calculations.

7 COMMON MISTAKES

- Assuming any line touching the circle at two points is a tangent.
- Forgetting to prove radius ⊥ tangent.
- Using diameter instead of radius in formulas.
- Not identifying the right-angled triangle in problems.
- Mixing up external point and point on the circle.

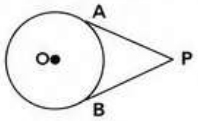
8 VISUAL MEMORY AID

Radius ⊥ Tangent



$OT \perp l$ at T

Equal Tangents from External Point



$PA = PB$

9 30 SECOND RAPID REVISION

- Tangent touches a circle at exactly one point.
- Radius through the point of contact is perpendicular to the tangent.
- Tangents drawn from the same external point are equal.
- If a line is ⊥ to radius at the endpoint on the circle, it is a tangent.
- Use Pythagoras in ΔOPT for length of tangent.
- Neat diagram + theorems = Full marks!

10 KEY TAKEAWAY

- A tangent touches a circle at exactly one point, called the point of contact.
- The radius through the point of contact is always perpendicular to the tangent.
- Tangents drawn from the same external point to a circle are always equal in length.
- If a line is perpendicular to the radius at its endpoint on the circle, then the line is a tangent.
- In tangent problems, first identify the right triangle formed by the radius and tangent, then apply Pythagoras theorem.
- Most CBSE proof questions are based on radius ⊥ tangent and equal tangents from an external point.