



CIRCUMSCRIBING QUADRILATERALS

Chapter: Circles

Topic: Circumscribing Quadrilaterals

1. CHAPTER SNAPSHOT



Definition: A quadrilateral is said to circumscribe a circle if all its four sides touch the circle.



Big Idea: Learn the relationship between the sides of a quadrilateral that circumscribes a circle using the equal tangents property.



Real-Life Connection: Seen in park boundaries around circular fountains, circular gardens inside square compounds, and machine components.



Why It Matters: Helps solve proofs, find unknown side lengths, and answer case-based and theorem-based questions in CBSE Class 10.

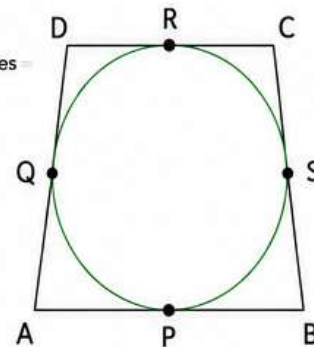


Key Vocabulary: Circumscribed Quadrilateral, Incircle, Tangent, Point of Contact, Equal Tangents, Opposite Sides.



2. HIGH-YIELD CONCEPTS

- **Circumscribing Quadrilateral:** All four sides touch the circle.
- **Equal Tangents:** Tangents drawn from the same external point are equal.
- **Key Property:** Sum of one pair of opposite sides = Sum of the other pair of opposite sides.
- **Formula:** $AB + CD = BC + AD$
- **Problem-Solving Tip:** Divide each side into equal tangent segments before forming equations.
- **Application:** Use the property to find unknown side lengths quickly.



4. BOARD EXAM FOCUS (HOTSPOTS)

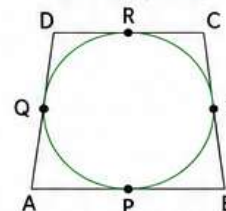
Frequently Asked Questions

- State the theorem on circumscribing quadrilaterals.
- Prove that $AB + CD = BC + AD$.
- Find an unknown side using the theorem.
- Apply the equal tangents property to solve problems.
- Solve competency-based questions involving an incircle.

Quick Exam Tips

- ✓ Mark equal tangent segments from every vertex.
- ✓ Write the equal tangent pairs before forming equations.
- ✓ Use $AB + CD = BC + AD$ only for a quadrilateral that circumscribes a circle.
- ✓ Read the figure carefully to identify the points of contact.

PROOF IDEA (Sketch)



From A: $AP = AQ$
From B: $BP = BS$
From C: $CR = CS$
From D: $DR = DQ$

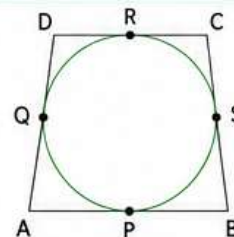
$AB = AP + PB$ $BC = BS + SC$
 $CD = CR + RD$ $AD = DQ + QA$

Adding,
 $(AP + PB) + (CR + RD) = (BS + SC) + (DQ + QA)$
 $AB + CD = BC + AD$



6. COMMON MISTAKES

- ✗ Confusing an inscribed quadrilateral with a circumscribing quadrilateral.
- ✗ Applying $AB + CD = BC + AD$ to an ordinary quadrilateral.
- ✗ Forgetting to mark equal tangent segments.
- ✗ Mixing up opposite sides and adjacent sides.
- ✗ Writing the theorem incorrectly.



3. THEOREM BOX

Theorem 3

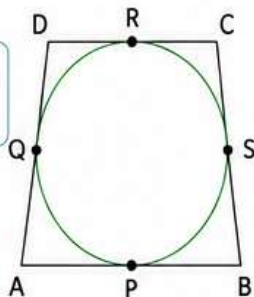
Statement

In a quadrilateral circumscribing a circle, the sums of the lengths of opposite sides are equal.

Mathematical Representation

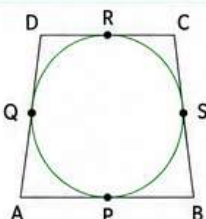
$$AB + CD = BC + AD$$

where ABCD is a quadrilateral circumscribing a circle.



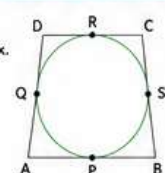
5. SMART REVISION TIPS

- ✓ Remember "Circle inside → Opposite sides add equally."
- ✓ Mark equal tangent lengths from each vertex first.
- ✓ Convert the figure into simple equations.
- ✓ Verify that the circle touches all four sides before applying the theorem.



7. MUST REMEMBER (RAPID SUMMARY)

- ✓ Circle touches all four sides.
- ✓ Equal tangents from the same vertex.
- ✓ $AB + CD = BC + AD$
- ✓ Use equal tangent lengths before solving.
- ✓ Commonly asked in proof and application questions.



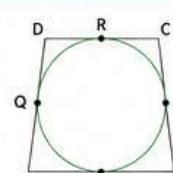
8. RAPID REVISION (30 SECONDS)

- Theorem** → $AB + CD = BC + AD$
- Key Idea** → Equal tangents from the same external point
- Application** → Find unknown side lengths
- Proof Method** → Equal tangent property



9. KEY TAKEAWAY

A quadrilateral that circumscribes a circle satisfies one important property: the sum of one pair of opposite sides is equal to the sum of the other pair of opposite sides ($AB + CD = BC + AD$). This theorem, together with the equal tangents property, forms the basis for solving most CBSE circumscribing quadrilaterals.



10. KEY TAKEAWAY

A quadrilateral that circumscribes a circle satisfies one important property: the sum of one pair of opposite sides is equal to the sum of the other pair of opposite sides ($AB + CD = BC + AD$). This theorem, together with the equal tangents property, forms the basis for solving most CBSE Class 10 questions on circumscribing quadrilaterals.

