Class 10 Maths Chapter 10: Circles - Notes, Important Questions and MCQs (2026-27)

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These Circles Class 10 notes cover NCERT Class 10 Maths Chapter 10: tangents and secants, the theorem that a tangent is perpendicular to the radius, and the theorem that tangents from an external point are equal – with step-wise proofs, solved examples, 10 MCQs and a free PDF.

Use the table of contents below to jump to the part you need, or read top to bottom for a complete revision of the chapter.

Table of Contents

- Chapter Overview
- Important Topics and Concepts
- Solved Examples
- Important Results
- Key Facts at a Glance
- Important Formulas and Definitions
- Short Answer Questions
- Long Answer Questions
- MCQs with Answers
- Quick Revision Points
- Chapter Summary
- Exam Tips and PYQ Pattern
- Frequently Asked Questions
- Conclusion

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Chapter Overview

A line can relate to a circle in three ways: it may not meet the circle, it may cut it at two points (a secant), or it may touch it at exactly one point (a tangent). The common point of a tangent and the circle is the point of contact.

This chapter proves two theorems about tangents and uses them to solve problems on lengths of tangents, angles between tangents and quadrilaterals or triangles drawn around a circle.

Important Topics and Concepts

Tangent and Secant

- Non-intersecting line: no common point with the circle.
- Secant: a line meeting the circle at two points.
- Tangent: a line meeting the circle at exactly one point.
- A tangent is the limiting case of a secant when its two points of intersection coincide.

Number of Tangents from a Point

- Point inside the circle: no tangent.
- Point on the circle: exactly one tangent.
- Point outside the circle: exactly two tangents.
- A circle can have infinitely many tangents (one at every point).

Theorem 10.1: Tangent ⊥ Radius

- The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- Proof idea: every point Q on the tangent other than P lies outside the circle, so OQ > OP; hence OP is the shortest distance from O to the line, and the shortest segment is the perpendicular.
- The line through the point of contact perpendicular to the tangent passes through the centre.

Theorem 10.2: Equal Tangents

- The lengths of tangents drawn from an external point to a circle are equal.
- Proof: In right triangles OQP and ORP, OQ = OR (radii), OP is common, ∠OQP = ∠ORP = 90°. So △OQP ≅ △ORP (RHS) and PQ = PR.
- Also the tangents are equally inclined to OP, and OP bisects the angle between the radii.

Solved Examples

Board-pattern questions with full working.

- From a point Q, the tangent to a circle is 24 cm and Q is 25 cm from the centre. Find the radius. $r = \sqrt{(25^2 - 24^2)} = \sqrt{49} = 7$ cm.
- Two concentric circles have radii 5 cm and 3 cm. Find the chord of the larger circle that touches the smaller one. Half chord $= \sqrt{(25 - 9)} = 4$ cm, so chord = 8 cm.
- PA and PB are tangents from P with ∠APB = 80°. Find ∠POA. ∠AOB = 180° − 80° = 100°; OP bisects it, so ∠POA = 50°.
- A quadrilateral ABCD is drawn to circumscribe a circle. Prove AB + CD = AD + BC. Using equal tangents from A, B, C, D: AB + CD = (AP + PB) + (CR + RD) = (AS + BQ) + (CQ + DS) = AD + BC.

Important Results

Use these as reasons in proofs.

- Tangent ⊥ radius at the point of contact.
- Tangents from an external point are equal.
- Angle between two tangents + angle subtended by the radii at the centre = 180°.
- A parallelogram circumscribing a circle is a rhombus.
- For a quadrilateral circumscribing a circle, sums of opposite sides are equal.

Key Facts at a Glance

Situation	Result
Point inside circle	0 tangents
Point on circle	1 tangent
Point outside circle	2 equal tangents
Radius at point of contact	⊥ tangent
Tangent length from P	$\sqrt{(OP^2 - r^2)}$
Angle between tangents ∠APB	$180° - ∠AOB$

Important Formulas and Definitions

Formula / Term	Meaning / Use
Tangent	Line touching a circle at exactly one point
Secant	Line cutting a circle at two points
Point of contact	Common point of a tangent and the circle
Length of tangent	Distance from the external point to the point of contact
Concentric circles	Circles with the same centre
Circumscribe	Draw a figure around a circle so that every side touches it

Short Answer Questions

Q1. How many tangents can a circle have?

Infinitely many – one at each point of the circle.

Q2. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at Q so that OQ = 12 cm. Find PQ.

PQ = $\sqrt{(144 - 25)} = \sqrt{119}$ cm.

Q3. Prove that tangents drawn at the ends of a diameter are parallel.

Each tangent is perpendicular to the same diameter, so both make 90° with it; lines perpendicular to the same line are parallel.

Q4. If TP and TQ are tangents from T to a circle with centre O, prove ∠PTQ = 2∠OPQ.

TP = TQ, so ∠TPQ = ∠TQP = $(180° - ∠PTQ)/2$. Also ∠OPT = 90°, so ∠OPQ = $90° - ∠TPQ = ∠PTQ/2$.

Q5. The length of a tangent from a point 13 cm from the centre is 12 cm. Find the radius.

r = $\sqrt{(169 - 144)} = 5$ cm.

Q6. Two tangents TP and TQ are drawn to a circle with centre O such that ∠POQ = 110°. Find ∠PTQ.

∠PTQ = $180° - 110° = 70°$.

Q7. Prove that the parallelogram circumscribing a circle is a rhombus.

AB + CD = AD + BC; in a parallelogram AB = CD and AD = BC, so 2AB = 2AD, AB = AD. All sides equal → rhombus.

No. Every line through an interior point cuts the circle at two points.

Long Answer Questions

Q1. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Given: circle with centre O and tangent XY at P. To prove: OP ⊥ XY.

Take any point Q on XY other than P and join OQ.

Q lies outside the circle (otherwise XY would be a secant), so OQ > OP.

This is true for every point Q on XY except P, so OP is the shortest distance from O to XY.

The shortest distance from a point to a line is the perpendicular, hence OP ⊥ XY.

Q2. Prove that the lengths of tangents drawn from an external point to a circle are equal.

Given: circle with centre O, external point P, tangents PQ and PR. To prove: PQ = PR.

Join OP, OQ and OR. ∠OQP = ∠ORP = 90° (tangent ⊥ radius).

In △OQP and △ORP: OQ = OR (radii), OP = OP (common), right angles at Q and R.

So △OQP ≅ △ORP by RHS congruence.

Hence PQ = PR (CPCT).

Q3. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that BD = 8 cm and DC = 6 cm (D on BC). Find AB and AC.

Let the tangent lengths from A be AE = AF = x. Then AB = x + 8, AC = x + 6, BC = 14.

Semi-perimeter s = x + 14.

Area = r × s = 4(x + 14) and by Heron’s formula area = √[(x + 14)(x)(6)(8)].

Squaring: $16(x + 14)^2 = 48x(x + 14) \rightarrow x + 14 = 3x \rightarrow x = 7$.

AB = 15 cm and AC = 13 cm.

MCQs with Answers

1. A tangent to a circle meets it at(a) two points (b) one point (c) no point (d) infinitely many pointsAnswer: (b) one point

2. Number of tangents from a point outside a circle is(a) 0 (b) 1 (c) 2 (d) infiniteAnswer: (c) 2

3. The angle between a tangent and the radius at the point of contact is(a) 60° (b) 90° (c) 45° (d) 180°Answer: (b) 90°

4. Tangent from a point 5 cm from the centre of a circle of radius 3 cm has length(a) 4 cm (b) 8 cm (c) 2 cm (d) √34 cmAnswer: (a) 4 cm

5. If ∠POQ = 120° between radii to tangent points, the angle between tangents is(a) 60° (b) 120° (c) 90° (d) 30°Answer: (a) 60°

6. A line meeting a circle at two points is a(a) tangent (b) secant (c) chord (d) radiusAnswer: (b) secant

8. A parallelogram circumscribing a circle is a(a) rectangle (b) rhombus (c) trapezium (d) kiteAnswer: (b) rhombus

9. From a point inside a circle, the number of tangents is(a) 0 (b) 1 (c) 2 (d) infiniteAnswer: (a) 0

10. If quadrilateral ABCD circumscribes a circle with AB = 6, BC = 7, CD = 4, then AD =(a) 3 (b) 5 (c) 9 (d) 17Answer: (a) 3 – AB + CD = AD + BC

Quick Revision Points

- Tangent touches at one point; secant cuts at two.
- Inside: 0, on: 1, outside: 2 tangents.
- Tangent ⊥ radius at point of contact.
- Tangents from an external point are equal (RHS proof).
- ∠between tangents = 180° − ∠ at centre.
- Circumscribed quadrilateral: AB + CD = AD + BC.

Chapter Summary

Circles studies tangents – lines touching a circle at exactly one point. The tangent at any point is perpendicular to the radius there, and the two tangents from an external point are equal in length.

These two theorems, proved with the shortest-distance argument and RHS congruence, solve problems on tangent lengths, angles between tangents, concentric circles and quadrilaterals or triangles circumscribing a circle.

Exam Tips and PYQ Pattern

- Both theorem proofs are frequent 3-mark questions – learn them with figures.
- Always write “tangent ⊥ radius” or “tangents from an external point are equal” as reasons.
- Use Pythagoras in tangent-length problems.
- Mark equal tangent segments on the figure first in circumscribed-figure questions.
- Constructions are not in the 2026-27 syllabus.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 10 Mathematics textbook and the rationalised CBSE syllabus for 2026-27.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

What are the two theorems in Class 10 Circles?

The tangent at any point is perpendicular to the radius through the point of contact, and

How many tangents can be drawn from an external point?

Exactly two, and they are equal in length.

Conclusion

Circles is a short chapter with two key theorems. Learn the proofs, practise the solved tangent problems here, and save the free PDF for quick revision.

More Notes: Class 10 Maths Chapter 9: Some Applications of Trigonometry notes | Class 10 Maths Chapter 11: Areas Related to Circles notes | All Class 10 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE mathematics educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 10 Maths textbook, Mathematics (Reprint 2026-27), and the CBSE syllabus for the 2026-27 session. Last checked on 16 November 2026.