

Tangent and Secant of a Circle — Class 10

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A line and a circle meet in **0, 1 or 2** points — nothing else. $d > r$ miss · $d = r$ tangent · $d < r$ secant

The three positions — and the words for them

The line	Common points	Its name	What it creates
Passes by, never meets the circle	0	Non-intersecting line	Nothing
Cuts across at A and B	2	Secant	A chord AB inside the circle
Just grazes it at one point	1	Tangent	The point of contact

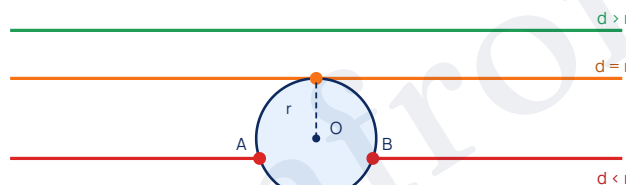
Secant cuts (two points). **Tangent touches** (one point). A chord is the *segment* inside; the secant is the *whole line* carrying it — that is the pair students swap most.

Why a tangent is only a secant in disguise

Push a secant outward, keeping its direction. Its two crossing points **A and B** slide towards each other and the chord shortens. At the instant they coincide, the line stops cutting and starts touching: the secant has become a **tangent**, and the merged point is the **point of contact**.

Two consequences worth memorising: a **tangent forms no chord** (the chord has shrunk to zero), and at any single point of a circle there is **one and only one** tangent. A straight line meets a circle in **at most 2** points — never three.

The distance test — name any line without drawing it



Non-intersecting line (0 points) · tangent (1 point) · secant (2 points). Not to scale.

Let **d** be the perpendicular distance from the centre to the line and **r** the radius. The perpendicular distance is the *shortest* gap there is: if even that exceeds the radius, no point of the line can reach the circle ($d > r$, miss). If it equals the radius, the foot of the perpendicular lands exactly on the circle ($d = r$, tangent). If it is smaller, the line dips inside and comes back out ($d < r$, secant).

Where this sits in NCERT and CBSE

Question	Answer
Which chapter and section?	NCERT Ch. 10 Circles , Section 10.1 (the introduction)
Which exercise tests it?	Exercise 10.1 — 4 questions (Ex 10.2 has 13; 17 in all)
How much is the unit worth?	Unit IV Geometry = 15 of 80 , shared with Triangles
How is it asked?	A 1-mark MCQ or fill-in-the-blank; sometimes the first line of a 2-mark VSA

Scope check. Rationalised Class 10 Circles has exactly **two theorems** — tangent $\perp$ radius at the point of contact, and equal tangents from an external point. Angles in the same segment and cyclic quadrilaterals are **Class 9**; if a worksheet sends you there, it is an older book. CBSE also sets marks **by unit, not by chapter** — chapter percentage tables online are unofficial.

Key takeaways

- ▶ Only **three** positions exist: non-intersecting (0), tangent (1), secant (2).
- ▶ A **secant cuts** and forms a chord; a **tangent touches** at the point of contact and forms none.
- ▶ A tangent is the **limiting case** of a secant — the two crossings merged into one.
- ▶ Decide it by arithmetic: $d > r$ miss · $d = r$ tangent · $d < r$ secant.
- ▶ One tangent at each point of the circle; a line meets a circle in **at most 2** points.
- ▶ NCERT Ch. **10 §10.1**, tested by Ex 10.1; CBSE Unit IV Geometry, **15 of 80**.

Worked from NCERT

Exercise 10.1

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NCERT EX 10.1 Q3 · 1 MARK

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

Step	What you write	Why it earns the mark
1. Name the line	PQ is a tangent , P is the point of contact	Fixes which theorem applies
2. Use tangent $\perp$ radius	$OP \perp PQ$, so $\angle OPQ = 90^\circ$	This is the only reason a right angle exists
3. Spot the hypotenuse	$OQ = 12$ is opposite the right angle $\Rightarrow$ hypotenuse	Where the marks are actually lost
4. Pythagoras	$PQ = \sqrt{(12^2 - 5^2)} = \sqrt{(144 - 25)} = \sqrt{119}$ cm	Subtract, do not add

Check. $\sqrt{119} \approx 10.9$, comfortably less than $OQ = 12$ — a leg must be shorter than the hypotenuse. The tempting wrong answer is **13 cm**, which is what you get from $\sqrt{(12^2 + 5^2)}$ if you treat OQ as a leg.

NCERT EX 10.1 Q2 · FILL IN THE BLANKS

The blank	Answer	Because
A tangent to a circle intersects it in ____ point(s).	one	Touching can only happen at a single point
A line intersecting a circle in two points is called a ____.	secant	Two common points, and it cuts a chord
A circle can have ____ parallel tangents at the most.	two	One at each end of a diameter, and no more
The common point of a tangent and the circle is called ____.	point of contact	The name for the single shared point

Where the marks actually go

Naming without justifying. "Tangent" alone answers the question; " $d = r$, so the line touches at one point — tangent" answers it the way the scheme is written.

Reversing the distance rule. A bigger d means the line is *farther* away, so it misses. Only $d < r$ cuts.

Writing "chord" for "secant". The chord is the piece inside; the secant is the whole line.

Claiming two tangents at one point. Two tangents need an **external** point — that is the next section.

NOW TRY THESE

1. A circle has centre O and radius 7 cm. Three lines lie at perpendicular distances 9 cm, 7 cm and 4 cm from O. Name each line and state how many points it shares with the circle.

2. (NCERT Ex 10.1 Q4) Draw a circle and two lines parallel to a given line, one a tangent and the other a secant. *Hint:* the tangent is the parallel line exactly **r** from the centre; the secant is any parallel line closer than **r**.

Answers: 1 — non-intersecting (0), tangent (1), secant (2).

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