Class 10 Trigonometry Formula Sheet

CBSE 2026-27 · Unit V Trigonometry · 12 of 80 board marks (Standard) · NCERT Chapters 8 and 9

1. The six ratios (right triangle ABC, right-angled at B, angle A)

Ratio	Definition	Reciprocal
sin A	perpendicular / hypotenuse = BC/AC	cosec A = 1/sin A
cos A	base / hypotenuse = AB/AC	sec A = 1/cos A
tan A	perpendicular / base = BC/AB = sin A/cos A	cot A = 1/tan A = cos A/sin A

2. Values table

Ratio	0°	30°	45°	60°	90°
sin	0	1/2	1/√2	√3/2	1
cos	1	√3/2	1/√2	1/2	0
tan	0	1/√3	1	√3	Not defined
cosec	Not defined	2	√2	2/√3	1
sec	1	2/√3	√2	2	Not defined
cot	Not defined	√3	1	1/√3	0

Memory trick: sin row = √0/2, √1/2, √2/2, √3/2, √4/2. cos row = sin row reversed. tan = sin ÷ cos. Useful decimals: √2 ≈ 1.414, √3 ≈ 1.732.

3. Identities

Identity	Rearranged forms	Valid for
$\sin^2 A + \cos^2 A = 1$	$\sin^2 A = 1 - \cos^2 A$; $\cos^2 A = 1 - \sin^2 A$	all A from 0° to 90°
$1 + \tan^2 A = \sec^2 A$	$\sec^2 A - \tan^2 A = 1$; $(\sec A - \tan A)(\sec A + \tan A) = 1$	$0° \le A < 90°$
$1 + \cot^2 A = \operatorname{cosec}^2 A$	$\operatorname{cosec}^2 A - \cot^2 A = 1$; $(\operatorname{cosec} A - \cot A)(\operatorname{cosec} A + \cot A) = 1$	$0° < A \le 90°$

4. Proving identities — the method

- Start from the more complicated side (usually LHS). Never work on both sides or cross-multiply.
- If stuck, convert everything to sin and cos.
- Substitute an identity or factorise: $a^2 - b^2 = (a - b)(a + b)$; $1 - \cos^2\theta = (1 - \cos\theta)(1 + \cos\theta)$.
- One step per line; finish with "= RHS".

5. Heights and distances

Term	Meaning
Line of sight	Line from the observer’s eye to the object
Angle of elevation	Measured UP from the horizontal to an object above eye level
Angle of depression	Measured DOWN from the horizontal to an object below eye level
Key fact	Angle of depression from A to B = angle of elevation from B to A (alternate angles)

6. Which ratio to use

You know / want	Use	Typical problem
Height and horizontal distance	$\tan\theta$ = height / distance	Tower, building, shadow, lighthouse and ship
Height and slant length	$\sin\theta$ = height / slant	Kite string, rope, ramp
Horizontal distance and slant length	$\cos\theta$ = distance / slant	Ladder against a wall

7. Two-triangle patterns

Pattern	Set-up	Result
Two objects, same side	Distances $h\cdot\cot\theta_1$ and $h\cdot\cot\theta_2$ from the foot	Gap = $h(\cot\theta_1 - \cot\theta_2)$
Two objects, opposite sides	Distances on either side of the foot	Gap = $h(\cot\theta_1 + \cot\theta_2)$
Observer walks d towards a tower	Angle rises from θ_1 to θ_2	$h(\cot\theta_1 - \cot\theta_2) = d$
Building and tower	Elevation of top and depression of foot from the building’s top	Tower = building + building × tan(elevation) ÷ tan(depression)

Syllabus limits (2026-27): only 30°, 45°, 60° for elevation/depression; no more than two right triangles; only simple identities.

8. Mistakes to avoid

- sin A is one value — never cancel “sin” or treat it as sin × A.
- $\sin^2 A = (\sin A)^2$; $\cos^2 30° = 3/4$.
- Perpendicular and base swap when you change the angle.
- Measure depression from the horizontal, not the vertical.
- Always draw and label the diagram; give units (m).

Sources: Delhi DoE Class X Mathematics syllabus 2026-27 (based on the CBSE curriculum); NCERT Class 10 Mathematics, Chapters 8 and 9.