Class 10 Maths Chapter 8: Introduction to Trigonometry - Notes, Important Questions and MCQs (2026-27)

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These Introduction to Trigonometry Class 10 notes cover NCERT Class 10 Maths Chapter 8: the six trigonometric ratios, their values at 0°, 30°, 45°, 60° and 90°, and the three trigonometric identities with proof techniques – plus solved examples, 10 MCQs and a free PDF.

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Chapter Overview

Trigonometry studies the relationships between the sides and angles of a right-angled triangle. For an acute angle A in a right triangle, the side opposite A, the side adjacent to A and the hypotenuse define six ratios: sin, cos, tan, cosec, sec and cot.

The values of these ratios depend only on the angle, not on the size of the triangle. The chapter also proves the identity $\sin^2 A + \cos^2 A = 1$ and its two variants, used to simplify expressions and prove results. (Trigonometric ratios of complementary angles are not in the 2026-27 syllabus.)

Important Topics and Concepts

Trigonometric Ratios

- sin A = opposite/hypotenuse; cos A = adjacent/hypotenuse; tan A = opposite/adjacent.
- cosec A = 1/sin A; sec A = 1/cos A; cot A = 1/tan A.
- tan A = sin A/cos A; cot A = cos A/sin A.
- $0 \le \sin A \le 1$ and $0 \le \cos A \le 1$ for $0° \le A \le 90°$.

Finding All Ratios from One

- Draw a right triangle using the given ratio as sides (e.g. sin A = 3/4 → opposite 3k, hypotenuse 4k).
- Find the third side by Pythagoras.
- Example: sin A = 3/4 → adjacent = √7k, so cos A = √7/4, tan A = 3/√7.
- Example: 15 cot A = 8 → cot A = 8/15, hypotenuse 17 → sin A = 15/17, sec A = 17/8.

Ratios of Specific Angles

- sin 30° = 1/2, sin 45° = 1/√2, sin 60° = √3/2.
- cos 30° = √3/2, cos 45° = 1/√2, cos 60° = 1/2.
- tan 30° = 1/√3, tan 45° = 1, tan 60° = √3.
- sin 0° = 0, cos 0° = 1, sin 90° = 1, cos 90° = 0; tan 90° is not defined.

Trigonometric Identities

- $\sin^2A + \cos^2A = 1$ ($0° \le A \le 90°$).
- $1 + \tan^2A = \sec^2A$ ($0° \le A < 90°$).
- $1 + \cot^2A = \operatorname{cosec}^2A$ ($0° < A \le 90°$).
- Proof tip: convert everything to sin and cos, or work on the more complex side, rationalise, and use identities.

Solved Examples

Board-pattern questions with full working.

- Evaluate $\sin 60° \cos 30° + \sin 30° \cos 60°$. $(\sqrt{3}/2)(\sqrt{3}/2) + (1/2)(1/2) = 3/4 + 1/4 = 1$.
- Evaluate $2\tan^2 45° + \cos^2 30° - \sin^2 60°$. $2(1) + 3/4 - 3/4 = 2$.
- If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = 1/\sqrt{3}$, $0° < A + B \le 90°$, $A > B$, find A and B. $A + B = 60°$, $A - B = 30°$ → $A = 45°$, $B = 15°$.
- Prove $(1 + \tan^2A)/(1 + \cot^2A) = \tan^2A$. LHS = $\sec^2A/\operatorname{cosec}^2A = (1/\cos^2A) \times \sin^2A = \tan^2A$ = RHS.

Memory Trick for the Table

Write sin values as √0/2, √1/2, √2/2, √3/2, √4/2 for 0°, 30°, 45°, 60°, 90°. Cos values are the same list in reverse order. tan = sin/cos.

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

Ratio	0°	30°	45°	60°	90°
sec	1	2/√3	√2	2	not defined
cot	not defined	√3	1	1/√3	0

Key Formulas at a Glance

Type	Formula
Reciprocal	cosec A = 1/sin A; sec A = 1/cos A; cot A = 1/tan A
Quotient	tan A = sin A/cos A; cot A = cos A/sin A
Identity 1	$\sin^2 A + \cos^2 A = 1$
Identity 2	$1 + \tan^2 A = \sec^2 A$
Identity 3	$1 + \cot^2 A = \text{cosec}^2 A$

Important Formulas and Definitions

Formula / Term	Meaning / Use
Hypotenuse	Side opposite the right angle
Opposite side	Side facing the angle under study
Adjacent side	Side next to the angle (not the hypotenuse)
Trigonometric ratio	Ratio of two sides of a right triangle
Trigonometric identity	Equation true for all values of the angle where defined
Acute angle	Angle between 0° and 90°

Short Answer Questions

Q1. If sin A = 3/4, find cos A and tan A.

Opposite 3k, hypotenuse 4k, adjacent √7k. cos A = √7/4, tan A = 3/√7.

Q2. If 15 cot A = 8, find sin A and sec A.

cot A = 8/15 → adjacent 8k, opposite 15k, hypotenuse 17k. sin A = 15/17, sec A = 17/8.

Q3. Evaluate (sin 30° + tan 45° − cosec 60°)/(sec 30° + cos 60° + cot 45°).

Numerator = 1/2 + 1 − 2/√3 = 3/2 − 2/√3; denominator = 2/√3 + 1/2 + 1 = 3/2 + 2/√3. Value = (3√3 − 4)/(3√3 + 4).

Q4. Show that $(\sin A + \cos A)^2 = 1 + 2 \sin A \cos A$.

LHS = $\sin^2 A + \cos^2 A + 2 \sin A \cos A = 1 + 2 \sin A \cos A$.

Q5. Express sec A in terms of tan A.

sec A = $\sqrt{(1 + \tan^2 A)}$.

Q6. Find the value of $9 \sec^2 A - 9 \tan^2 A$.

$9(\sec^2 A - \tan^2 A) = 9 \times 1 = 9$.

= cos²θ/sin²θ = cot²θ = 49/64.

Q8. State whether true or false: sin A = cos A for some acute A.

True: at A = 45°, sin 45° = cos 45° = 1/√2.

Long Answer Questions

Q1. Prove that (cosec θ − cot θ)² = (1 − cos θ)/(1 + cos θ).

LHS = (1/sin θ − cos θ/sin θ)² = (1 − cos θ)²/sin²θ.

sin²θ = 1 − cos²θ = (1 − cos θ)(1 + cos θ).

LHS = (1 − cos θ)²/[(1 − cos θ)(1 + cos θ)].

= (1 − cos θ)/(1 + cos θ) = RHS.

Hence proved.

Q2. Prove that √[(1 + sin A)/(1 − sin A)] = sec A + tan A.

Multiply numerator and denominator inside the root by (1 + sin A).

= √[(1 + sin A)²/(1 − sin²A)] = √[(1 + sin A)²/cos²A].

= (1 + sin A)/cos A.

= 1/cos A + sin A/cos A = sec A + tan A.

Hence proved.

Q3. Prove that (1 + sec A)/sec A = sin²A/(1 − cos A).

LHS = (1 + 1/cos A)/(1/cos A) = cos A + 1.

RHS = (1 − cos²A)/(1 − cos A) = (1 − cos A)(1 + cos A)/(1 − cos A).

RHS = 1 + cos A.

LHS = RHS.

Hence proved.

MCQs with Answers

1. sin 30° + cos 60° =(a) 0 (b) 1 (c) √3 (d) 1/2Answer: (b) 1

2. tan 45° =(a) 0 (b) 1 (c) √3 (d) 1/√3Answer: (b) 1

3. sin²60° + cos²60° =(a) 0 (b) 1 (c) 2 (d) 1/2Answer: (b) 1

4. If cos A = 4/5, tan A =(a) 3/4 (b) 4/3 (c) 3/5 (d) 5/3Answer: (a) 3/4

5. sec²A − tan²A =(a) 0 (b) 1 (c) −1 (d) 2Answer: (b) 1

6. Which is not defined?(a) sin 90° (b) cos 90° (c) tan 90° (d) cot 90°Answer: (c) tan 90°

7. 2 tan 30°/(1 + tan²30°) =(a) sin 60° (b) cos 60° (c) tan 60° (d) sin 30°Answer: (a) sin 60° – = √3/2

8. If sin A = 1/2, A =(a) 30° (b) 45° (c) 60° (d) 90°Answer: (a) 30°

9. (1 + tan²A)/(1 + cot²A) =(a) sec²A (b) −1 (c) cot²A (d) tan²AAnswer: (d) tan²A

Quick Revision Points

- sin = O/H, cos = A/H, tan = O/A; reciprocals cosec, sec, cot.
- tan = sin/cos.
- Table: sin 0, 1/2, 1/√2, √3/2, 1; cos reverse.
- $\sin^2A + \cos^2A = 1$; $1 + \tan^2A = \sec^2A$; $1 + \cot^2A = \text{cosec}^2A$.
- For proofs: convert to sin/cos or rationalise.
- tan 90° and cot 0° are not defined.

Chapter Summary

Introduction to Trigonometry defines six ratios of an acute angle in a right triangle and shows that each depends only on the angle. Given one ratio you can find all others using Pythagoras.

The values at 0°, 30°, 45°, 60° and 90° must be memorised, and the identities $\sin^2A + \cos^2A = 1$, $1 + \tan^2A = \sec^2A$ and $1 + \cot^2A = \text{cosec}^2A$ are used to evaluate expressions and prove results.

Exam Tips and PYQ Pattern

- Identity-proof questions (3 marks) appear every year – practise converting to sin and cos.
- Evaluation questions with the standard table are easy 2-mark scores.
- Show the triangle with k when finding ratios from one ratio.
- Check that sin and cos values never exceed 1.
- Complementary-angle questions 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 three trigonometric identities in Class 10?

$\sin^2A + \cos^2A = 1$, $1 + \tan^2A = \sec^2A$ and $1 + \cot^2A = \text{cosec}^2A$.

How do I remember the trigonometric table?

Write sin as √0/2, √1/2, √2/2, √3/2, √4/2 for 0° to 90°; cos is the same list reversed; tan = sin/cos.

Conclusion

Trigonometry is the base for heights and distances and for Class 11 maths. Memorise the table, practise the identities and solved proofs here, and save the free PDF for quick revision.

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.