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Introduction to Trigonometry — CBSE Class 10 Mathematics Chapter Test

FREE CHAPTER TEST · CLASS X · MATHEMATICS (041) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	19 (A 10 · B 3 · C 2 · D 2 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 19 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–13 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q14–15 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q16–17 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q18–19 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Mathematics (Standard, 041) Sample Question Paper 2026-27, at half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Introduction to Trigonometry · **Topics:** Trigonometric ratios · Ratios of 30°, 45° and 60° · Relations between ratios · Identities · Ratios in right triangles

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. If $\sin A = \frac{3}{5}$, where A is acute, then cos A is 1

(A) $\frac{4}{5}$ (B) $\frac{3}{4}$

(C) $\frac{5}{4}$ (D) $\frac{5}{3}$

2. The value of $\sin 30° + \cos 60°$ is 1

(A) $\frac{1}{2}$ (B) 1

(C) $\sqrt{3}$ (D) 0

3. The value of $\frac{2 \tan 60°}{1 + \tan^2 60°}$ is 1

(A) $\frac{1}{2}$ (B) 1

(C) $\frac{\sqrt{3}}{2}$ (D) $\sqrt{3}$

4. If $\tan A = 1$, where A is acute, then A is 1

(A) 30° (B) 60°

(C) 90° (D) 45°

5. $1 + \tan^2 A$ is equal to 1

(A) $\text{cosec}^2 A$ (B) $\sec^2 A$

(C) $\cot^2 A$ (D) 1

6. The value of $\sin^2 60° + \cos^2 30°$ is 1

(A) 1 (B) $\frac{3}{4}$

(C) $\frac{3}{2}$ (D) 2

7. If $\tan \theta = \frac{3}{4}$, then $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$ is 1

(A) $\frac{16}{9}$ (B) $\frac{9}{16}$

(C) $\frac{4}{3}$ (D) $\frac{3}{4}$

8. $4 \text{cosec}^2 A - 4 \cot^2 A$ is equal to 1

(A) 1 (B) 0

(C) 3 (D) 4

9. **Assertion (A):** The value of $\sin\theta$ cannot be $\frac{4}{3}$. 1

Reason (R): In a right triangle the hypotenuse is the longest side, so $\sin\theta$ = opposite/hypotenuse is less than 1 for an acute angle.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

10. **Assertion (A):** $\tan 45° + \cot 45° = 1$. 1

Reason (R): $\tan 45° = 1$.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

SECTION B

This section comprises 3 very short answer (VSA) type questions of 2 marks each.

11. (a) If $\sin A = \frac{5}{13}$, where A is acute, find $\cos A$ and $\tan A$. 2

OR

(b) Evaluate $3\tan^2 30° + 2\sin^2 45° - \cot^2 45°$.

12. If $\cos(A + B) = 0$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, with $0° < A + B \le 90°$ and $A > B$, find A and B. 2

13. Prove that $\operatorname{cosec} A\,(1 - \cos A)(\operatorname{cosec} A + \cot A) = 1$. 2

SECTION C

This section comprises 2 short answer (SA) type questions of 3 marks each.

14. (a) Prove that $\frac{1 + \cot^2 A}{1 + \tan^2 A} = \cot^2 A$. 3

OR

(b) If $\operatorname{cosec}\theta = \frac{17}{8}$, θ acute, find the other five trigonometric ratios of θ.

15. Evaluate $\frac{6\cos^2 45° + 3\sec^2 60° - 2\tan^2 60°}{\sin^2 45° + \cos^2 45°}$. 3

SECTION D

This section comprises 2 long answer (LA) type questions of 5 marks each.

16. (a) Prove that $\frac{\tan A - \sin A}{\tan A + \sin A} = \frac{\sec A - 1}{\sec A + 1}$. 5

OR

(b) Prove that $\frac{1 - \sin \theta}{1 + \sin \theta} = (\sec \theta - \tan \theta)^2$.

17. In ΔPQR, right-angled at Q, PQ = 15 cm and QR = 8 cm. Find sin P, cos P, sin R and cos R, and verify that $\sin^2 P + \cos^2 P = 1$. 5

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

18. A ladder 13 m long rests against a vertical wall. Its foot is 5 m from the wall on level ground. Let θ be the angle the ladder makes with the ground.

(i) Find the height at which the ladder touches the wall. [1]

(ii) Find $\cos \theta$. [1]

(iii) Find $\tan \theta$. [2]

OR

(iii) Verify that $\sin^2 \theta + \cos^2 \theta = 1$ for this angle. [2]

19. A ramp 10 m long is built to a stage and makes an angle of 30° with the level ground.

(i) Find the height of the stage. [1]

(ii) Find the horizontal distance covered by the ramp. [1]

(iii) Find the value of tan 30° from the ramp's dimensions. [2]

OR

(iii) Find the value of sec 30°. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(A)	(B)	(C)	(D)	(B)	(C)	(A)	(D)	(A)	(D)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (A). $\cos A = \sqrt{(1 - 9/25)} = 4/5$.

Q2. Answer (B). $1/2 + 1/2 = 1$.

Q3. Answer (C). $(2\sqrt{3})/(1 + 3) = 2\sqrt{3}/4 = \sqrt{3}/2$.

Q4. Answer (D). $\tan 45° = 1$.

Q5. Answer (B). Divide $\sin^2 A + \cos^2 A = 1$ by $\cos^2 A$.

Q6. Answer (C). $3/4 + 3/4 = 3/2$.

Q7. Answer (A). It equals $\cos^2\theta/\sin^2\theta = \cot^2\theta = (4/3)^2 = 16/9$.

Q8. Answer (D). $4(\text{cosec}^2 A - \cot^2 A) = 4 \times 1$.

Q9. Answer (A). R gives the reason why $\sin\theta$ cannot exceed 1. Answer (A).

Q10. Answer (D). $\tan 45° + \cot 45° = 1 + 1 = 2$: A is false, R is true. Answer (D).

Q11. (2 marks) Answer: (a) 12/13, 5/12; (b) 1.
(a) $\cos A = \sqrt{(1 - 25/169)} = 12/13$. [1] $\tan A = \sin A/\cos A = 5/12$. [1]
OR (b) $3(1/\sqrt{3})^2 + 2(1/\sqrt{2})^2 - (1)^2$ [1] $= 1 + 1 - 1 = 1$. [1]

Q12. (2 marks) Answer: A = 60°, B = 30°.
$A + B = 90°$ and $A - B = 30°$. [1] So A = 60°, B = 30°. [1]

Q13. (2 marks) Answer: proof.
$\text{cosec } A + \cot A = (1 + \cos A)/\sin A$, so the left side $= (1/\sin A)(1 - \cos A)(1 + \cos A)/\sin A$ [1] $= (1 - \cos^2 A)/\sin^2 A = \sin^2 A/\sin^2 A = 1$. [1]

Q14. (3 marks) Answer: (a) proof; (b) sin 8/17, cos 15/17, tan 8/15, cot 15/8, sec 17/15.
(a) $1 + \cot^2 A = \text{cosec}^2 A$ and $1 + \tan^2 A = \sec^2 A$. [1] So the left side $= \text{cosec}^2 A/\sec^2 A = (1/\sin^2 A) \times \cos^2 A$ [1] $= \cot^2 A$. [1]
OR (b) $\text{cosec}\,\theta = 17/8$: $\sin\theta = 8/17$. [½] $\cos\theta = \sqrt{(1 - 64/289)} = 15/17$. [1] $\tan\theta = 8/15$, $\cot\theta = 15/8$, $\sec\theta = 17/15$. [1½]

Q15. (3 marks) Answer: 9.
Numerator $= 6(1/2) + 3(4) - 2(3) = 3 + 12 - 6$ [1] $= 9$. [1] Denominator $= 1/2 + 1/2 = 1$. Value = 9. [1]

Q16. (5 marks) Answer: proofs.
(a) $\tan A = \sin A/\cos A$. [1] Left side $= (\sin A/\cos A - \sin A)/(\sin A/\cos A + \sin A) = \sin A(1/\cos A - 1)/[\sin A(1/\cos A + 1)]$ [2] $= (\sec A - 1)/(\sec A + 1)$. [2]
OR (b) $(\sec\theta - \tan\theta)^2 = ((1 - \sin\theta)/\cos\theta)^2$ [2] $= (1 - \sin\theta)^2/(1 - \sin^2\theta) = (1 - \sin\theta)^2/((1 - \sin\theta)(1 + \sin\theta))$ [2] $= (1 - \sin\theta)/(1 + \sin\theta)$. [1]

Q17. (5 marks) Answer: 8/17, 15/17, 15/17, 8/17.
PR $= \sqrt{(225 + 64)} = 17$ cm. [1] $\sin P = QR/PR = 8/17$, $\cos P = PQ/PR = 15/17$. [1½] $\sin R = PQ/PR = 15/17$, $\cos R = QR/PR = 8/17$. [1½] $\sin^2 P + \cos^2 P = 64/289 + 225/289 = 1$. [1]

Q18. (4 marks) Answer: (i) 12 m; (ii) 5/13; (iii) 12/5, or verified.
(i) $\sqrt{(169 - 25)} = 12$ m. [1]
(ii) $\cos\theta = 5/13$. [1]
(iii)(a) $\tan\theta$ = opposite/adjacent [1] = 12/5. [1]
OR (iii)(b) $\sin\theta = 12/13$: 144/169 + 25/169 [1] = 169/169 = 1. [1]

Q19. (4 marks) Answer: (i) 5 m; (ii) $5\sqrt{3}$ m; (iii) $1/\sqrt{3}$, or $2/\sqrt{3}$.
(i) $h = 10 \sin 30° = 5$ m. [1]
(ii) $10 \cos 30° = 5\sqrt{3}$ m. [1]
(iii)(a) $\tan 30° = 5/(5\sqrt{3})$ [1] = $1/\sqrt{3}$. [1]
OR (iii)(b) $\sec 30° = 1/\cos 30° = 1/(\sqrt{3}/2)$ [1] = $2/\sqrt{3}$. [1]

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