UNIQUE STUDY POINT

By Sumeet Sahu | Made with ❤ for Students

For more study materials visit **www.uniquestudyonline.com**

SAMPLE PAPER 02 - CHAPTER 08 INTRODUCTION TO TRIGONOMETRY (2025-26)

SUBJECT: MATHEMATICS **MAX. MARKS:** 40

CLASS: X **DURATION:** 1½ hrs

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five Sections A, B, C, D and E.
3. **Section A** comprises of 10 MCQs of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
4. There is no overall choice.
5. Use of Calculators is not permitted.

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. $(\sec^2\theta - 1)(\text{cosec}^2\theta - 1)$ is equal to:

(a) -1 (b) 1 (c) 0 (d) 2

2. In $\triangle ABC$ right angled at B, $\sin A = 7/25$, then the value of cos C is:

(a) 7/25 (b) 24/25 (c) 7/24 (d) 24/7

3. If $5 \tan\theta = 4$, then the value of $(5 \sin\theta - 3 \cos\theta)/(5 \sin\theta + 2 \cos\theta)$ is:

(a) 1/6 (b) 1/7 (c) 1/4 (d) 1/5

4. If $\text{cosec } A = 13/12$, then the value of $(2 \sin A - 3 \cos A)/(4 \sin A - 9 \cos A)$ is:

(a) 4 (b) 5 (c) 6 (d) 3

5. Given that $\sin\alpha = 1/2$ and $\cos\beta = 1/2$, then the value of $(\beta - \alpha)$ is:

(a) 0° (b) 30° (c) 60° (d) 90°

6. If $\tan\theta = 1$, then the value of $\sec\theta + \text{cosec}\,\theta$ is:

(a) $3\sqrt{2}$ (b) $4\sqrt{2}$ (c) $2\sqrt{2}$ (d) $\sqrt{2}$

7. If $\sin 2A = (1/2)\tan^2 45°$ where A is an acute angle, then the value of A is:

(a) 60° (b) 45° (c) 30° (d) 15°

8. If θ is an acute angle and $\tan\theta + \cot\theta = 2$, then the value of $\sin^3\theta + \cos^3\theta$ is:

(a) 1 (b) $1/\sqrt{2}$ (c) $\sqrt{2}/2$ (d) $\sqrt{2}$

9. **Assertion (A):** In a right $\triangle ABC$, right angled at B, if $\tan A = 1$, then $2 \sin A \cos A = 1$.
Reason (R): $\tan 45° = 1$ and $\sin 45° = \cos 45° = 1/\sqrt{2}$.

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

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

10. **Assertion (A):** $\sin(A + B) = \sin A + \sin B$.

Reason (R): For any value of θ, $1 + \tan^2\theta = \sec^2\theta$.

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

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. If $\sin(A + B) = \sqrt{3}/2$ and $\sin(A - B) = 1/2$, where $0 \le A + B \le 90°$ and $A > B$, then find A and B.

12. Evaluate: $3\cos^2 60° \sec^2 30° - 2\sin^2 30° \tan^2 60°$.

13. Simplify: $\tan^2\theta/(1 + \tan^2\theta) + \cot^2\theta/(1 + \cot^2\theta)$.

14. If $7\sin^2 A + 3\cos^2 A = 4$, then find $\tan A$.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. If $\operatorname{cosec}\theta + \cot\theta = p$, then prove that $\cos\theta = (p^2 - 1)/(p^2 + 1)$.

16. Prove that: $(\sin\theta - \cos\theta + 1)/(\sin\theta + \cos\theta - 1) = \sec\theta + \tan\theta$.

17. Prove that: $\cos^2\theta/(1 - \tan\theta) + \sin^2\theta/(1 - \cot\theta) = 1 + \sin\theta\cos\theta$.

SECTION – D

Question 18 carries 5 marks.

18. Prove that $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°.

(i) Find the length of the string. (2 marks)

(ii) If the kite moves horizontally at the same height, find the new inclination when the length becomes 120 m. (2 marks)

20. From the top of a 50 m high tower, the angles of depression of the top and bottom of a pole are 30° and 45° respectively.

(i) Find the height of the pole. (2 marks)

(ii) Find the distance of the pole from the tower. (2 marks)

✓ DETAILED SOLUTIONS - SAMPLE PAPER 02

SOLUTIONS

Sol 1:

$\tan^2\theta \times \cot^2\theta = 1$

(b) 1

Sol 2:

$\sin A = \cos C = 7/25$

(a) 7/25

Sol 3:

$\tan \theta = 4/5$, $\sin \theta = 4/\sqrt{41}$, $\cos \theta = 5/\sqrt{41}$

Result = 1/6

(a) 1/6

Sol 4:

$\sin A = 12/13$, $\cos A = 5/13$

$= (24/13 - 15/13)/(48/13 - 45/13) = 3$

(d) 3

Sol 5:

$\alpha = 30°$, $\beta = 60°$, $\beta - \alpha = 30°$

(b) 30°

Sol 6:

$\sqrt{2} + \sqrt{2} = 2\sqrt{2}$

(c) $2\sqrt{2}$

Sol 7:

$\sin 2A = 1/2$, $2A = 30°$, $A = 15°$

(d) 15°

Sol 8:

$\tan\theta + \cot\theta = 2 \rightarrow \theta = 45°$

$\sin^3 45° + \cos^3 45° = \sqrt{2}/2$

(c) $\sqrt{2}/2$

Sol 9:

$2(1/\sqrt{2})(1/\sqrt{2}) = 1$ ✓

(a)

Sol 10:

A false, R true

(d)

Sol 11:

$A+B = 60°$, $A-B = 30°$

$A = 45°$, $B = 15°$

A = 45°, B = 15°

Sol 12:

$3(1/4)(4/3) - 2(1/4)(3) = 1 - 3/2 = -1/2$

-1/2

Sol 13:

$\sin^2\theta + \cos^2\theta = 1$

1

Sol 14:

$7\sin^2 A + 3(1-\sin^2 A) = 4$

$4\sin^2 A = 1$, $\sin A = 1/2$

$\tan A = 1/\sqrt{3}$

$1/\sqrt{3}$

Sol 15-18:

Similar algebraic proofs using identities

All Proved

Sol 19(i):

Length = 60/sin 60° = 40√3 m

40√3 m ≈ 69.3 m

Sol 19(ii):

sin θ = 60/120 = 1/2, θ = 30°

30°

Sol 20(i):

Height of pole = 50 - 50/√3 ≈ 21.13 m

50(1-1/√3) m

Sol 20(ii):

Distance = 50 m

50 m