

Trigonometric Functions — CBSE Pattern Test 1

Class 11 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Maths · Trigonometric Functions · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. 180° is equal to
 - (A) π radians
 - (B) 2π radians
 - (C) $\pi/2$ radians
 - (D) $\pi/4$ radians
2. The radian measure of 45° is
 - (A) $\pi/4$
 - (B) $\pi/3$
 - (C) $\pi/6$
 - (D) $\pi/2$
3. The value of $\sin 30^\circ$ is
 - (A) $1/2$
 - (B) $\sqrt{3}/2$
 - (C) 1
 - (D) $1/\sqrt{2}$
4. The identity $\sin^2 x + \cos^2 x$ equals
 - (A) 1
 - (B) 0
 - (C) 2
 - (D) $\tan^2 x$
5. $1 + \tan^2 x$ is equal to
 - (A) $\sec^2 x$
 - (B) $\operatorname{cosec}^2 x$
 - (C) $\cot^2 x$
 - (D) $\cos^2 x$
6. $\sin(A + B)$ is equal to
 - (A) $\sin A \cos B + \cos A \sin B$
 - (B) $\sin A \cos B - \cos A \sin B$
 - (C) $\cos A \cos B + \sin A \sin B$
 - (D) $\cos A \cos B - \sin A \sin B$
7. $\sin 2A$ is equal to
 - (A) $2 \sin A \cos A$

(B) $\sin^2 A - \cos^2 A$

(C) $1 - 2\sin^2 A$

(D) $2\cos^2 A - 1$

8. The general solution of $\sin x = 0$ is

(A) $x = n\pi, n \in \mathbb{Z}$

(B) $x = (2n+1)\pi/2$

(C) $x = n\pi/2$

(D) $x = 2n\pi$

9. Convert 180° into radians.

10. State the identity $\sin^2 x + \cos^2 x = 1$.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. Convert $\pi/6$ radians into degrees.

12. Which trigonometric ratios are positive in the second quadrant?

13. Find the value of $1 + \tan^2 x$.

14. Write the formula for $\sin(A + B)$.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Convert $40^\circ 20'$ into radian measure.

16. Prove that $\sin^2 x + \cos^2 x = 1$ using a right triangle.

17. Find the value of $\sin 75^\circ$ using $\sin(A + B)$.

18. Express $\sin 5x + \sin 3x$ as a product.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Prove the three Pythagorean identities: $\sin^2 x + \cos^2 x = 1$, $1 + \tan^2 x = \sec^2 x$, and $1 + \cot^2 x = \operatorname{cosec}^2 x$.

20. Prove that $(\sin 5x + \sin 3x)/(\cos 5x + \cos 3x) = \tan 4x$. Find the general solution of $\sin x = 1/2$.

Answer Key (Marking Scheme)

Q1 — (A) π radians. Q2 — (A) $\pi/4$. Q3 — (A) $1/2$. Q4 — (A) 1.

Q5 — (A) $\sec^2 x$. Q6 — (A) $\sin A \cos B + \cos A \sin B$. Q7 — (A) $2 \sin A \cos A$. Q8 — (A) $x = n\pi, n \in \mathbb{Z}$.

Q9 — π radians.

Q10 — True for all x ; it is a Pythagorean identity.

Q11 — 30° .

Q12 — $\sin$ and cosec .

Q13 — $\sec^2 x$.

Q14 — $\sin A \cos B + \cos A \sin B$.

Q15 — $121\pi/540$ radians.

Q16 — Using $\sin = \text{opp}/\text{hyp}$, $\cos = \text{adj}/\text{hyp}$; $\text{opp}^2 + \text{adj}^2 = \text{hyp}^2 \Rightarrow \sin^2 + \cos^2 = 1$.

Q17 — $(\sqrt{6} + \sqrt{2})/4$.

Q18 — $2 \sin 4x \cos x$.

Q19 — Standard proofs as in notes.

Q20 — Ratio = $\tan 4x$; $x = n\pi + (-1)^n \pi/6$, $n \in \mathbb{Z}$.