

Trigonometric Functions — CBSE Pattern Test 2

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

Test 2 — 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 radian is approximately equal to
 - (A) $57^\circ 16'$
 - (B) 90°
 - (C) 45°
 - (D) 60°
2. In the second quadrant, which ratios are positive?
 - (A) sin and cosec
 - (B) cos and sec
 - (C) tan and cot
 - (D) all
3. The value of $\cos 60^\circ$ is
 - (A) $1/2$
 - (B) $\sqrt{3}/2$
 - (C) 0
 - (D) 1
4. $1 + \cot^2 x$ is equal to
 - (A) $\operatorname{cosec}^2 x$
 - (B) $\sec^2 x$
 - (C) $\tan^2 x$
 - (D) $\sin^2 x$
5. $\cos(A - B)$ is equal to
 - (A) $\cos A \cos B + \sin A \sin B$
 - (B) $\cos A \cos B - \sin A \sin B$
 - (C) $\sin A \cos B + \cos A \sin B$
 - (D) $\sin A \sin B$
6. $\cos 2A$ is equal to
 - (A) $\cos^2 A - \sin^2 A$
 - (B) $2 \sin A \cos A$
 - (C) $\sin^2 A - \cos^2 A$
 - (D) $2 \sin A$
7. $\cos C - \cos D$ is equal to
 - (A) $-2 \sin((C+D)/2) \sin((C-D)/2)$

- (B) $2 \sin((C+D)/2) \sin((C-D)/2)$
 (C) $2 \cos((C+D)/2) \cos((C-D)/2)$
 (D) $-2 \cos C \cos D$

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

- (A) $x = n\pi, n \in \mathbb{Z}$
 (B) $x = (2n+1)\pi/2$
 (C) $x = 2n\pi$
 (D) $x = n\pi/2$

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

10. Write the general solution of $\cos x = 0$.

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

11. Convert 45° into radians.
 12. Find the value of $\tan 45^\circ$.
 13. What is the value of $1 + \cot^2 x$?
 14. Express $\sin C + \sin D$ as a product.

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

15. Convert 2 radians into degree measure (use $\pi = 22/7$).
 16. Find the values of $\sin 45^\circ$, $\cos 45^\circ$ and $\tan 45^\circ$.
 17. Find the value of $\cos 15^\circ$ using a compound angle formula.
 18. Prove that $(\sin 5x + \sin 3x)/(\cos 5x + \cos 3x) = \tan 4x$.

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

19. Prove that $\sin 2A = 2 \tan A/(1 + \tan^2 A)$ and $\cos 2A = (1 - \tan^2 A)/(1 + \tan^2 A)$. Find the general solution of $\cos x = -1/2$.
 20. Prove that $\sin 3x + \sin x = 2 \sin 2x \cos x$ using sum-to-product formulas. Find the general solution of $\sin 2x - \sin 4x + \sin 6x = 0$.

Answer Key (Marking Scheme)

- Q1 — (A) $57^\circ 16'$. Q2 — (A) $\sin$ and cosec . Q3 — (A) $1/2$. Q4 — (A) $\operatorname{cosec}^2 x$.
 Q5 — (A) $\cos A \cos B + \sin A \sin B$. Q6 — (A) $\cos^2 A - \sin^2 A$. Q7 — (A) $-2 \sin((C+D)/2) \sin((C-D)/2)$. Q8 — (A) $x = n\pi, n \in \mathbb{Z}$.
 Q9 — 30° .
 Q10 — $x = (2n+1)\pi/2, n \in \mathbb{Z}$.
 Q11 — $\pi/4$.
 Q12 — 1.
 Q13 — $\operatorname{cosec}^2 x$.
 Q14 — $2 \sin((C+D)/2) \cos((C-D)/2)$.
 Q15 — $\approx 114^\circ 35'$.
 Q16 — $1/\sqrt{2}, 1/\sqrt{2}, 1$.

Q17 — $(\sqrt{6} + \sqrt{2})/4$.

Q18 — Ratio = $\tan 4x$.

Q19 — Double-angle proofs; $x = 2n\pi \pm 2\pi/3$.

Q20 — Sum-to-product proof; $x = n\pi/4$ or $x = n\pi \pm \pi/6$.