

CLASS 10 – CBSE | MATHEMATICS
Introduction to Trigonometry

SECTION -A (Multiple Choice Questions)

1. If $\tan \alpha + \cot \alpha = 2$, then value of $\sin^3 \alpha + \cos^3 \alpha$
(a) $\frac{1}{2}$ (b) 1 (c) $\sqrt{2}$ (d) $\frac{\sqrt{2}}{2}$
2. If $4 \tan \theta - 3 = 0$, Find the value of : $\frac{4 \sin \theta - 3 \cos \theta}{4 \sin \theta + 3 \cos \theta}$.
(a) 0 (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{3}{4}$
3. If $\sin \theta + \cos \theta = \sqrt{2}$, then $\tan \theta + \cot \theta =$
(a) 1 (b) 2 (c) 3 (d) 4
4. If $1 + \sin^2 \alpha = 3 \sin \alpha \cos \alpha$, then values of $\cot \alpha$ are
(a) -1,1 (b) 0,1 (c) 1,2 (d) -1,-1
5. If $\tan \alpha + \cot \alpha = 2$, then $\tan^4 \alpha + \cot^4 \alpha =$
(a) 0 (b) 2 (c) 20 (d) NOT
6. If $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$, Evaluate $\cot \theta$
(a) $\sqrt{2}-1$ (b) $\sqrt{2}+1$ (c) $\sqrt{2}$ (d) N.O.T
7. If $a \cot \theta + b \operatorname{cosec} \theta = p$ and $b \cot \theta + a \operatorname{cosec} \theta = q$, then $p^2 - q^2 =$
(a) $a^2 - b^2$ (b) $b^2 - a^2$ (c) $a^2 + b^2$ (d) $b-a$
8. If $\cos(\alpha + \beta) = 0$, then value of $\cos\left(\frac{\alpha + \beta}{2}\right)$ is equal to :
(a) 0 (b) $\frac{1}{2}$ (c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$
9. Evaluate: $(1 + \cot \theta - \operatorname{cosec} \theta)(1 + \tan \theta + \sec \theta)$
(a) 0 (b) 1 (c) 2 (d) N.O.T
10. If $\sin A + \sin^2 A = 1$, then the value of the expression $(\cos^2 A + \cos^4 A)$ is
(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) 3
11. Maximum value of $\frac{1}{\sec \theta}$ is
(a) 1 (b) 0 (c) not defined (d) none of these

12. If $\sin \theta - \cos \theta = 0$, then the value of $(\sin^4 \theta + \cos^4 \theta)$ is

- (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

SECTION -B (Long Answer Questions)

13. If $\angle B$ & $\angle Q$ are acute angles such that $\sin B = \sin Q$, Prove that $\angle B = \angle Q$.

14. Prove that : $\frac{\sin \theta - 2\sin^3 \theta}{2\cos^3 \theta - \cos \theta} = \tan \theta$

15. Evaluate : $(\sin^4 \theta - \cos^4 \theta + 1) \operatorname{cosec}^2 \theta$.

16. Prove that : $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{2\sin^2 A - 1}$.

17. Prove that : $\sqrt{\frac{\sec \theta - 1}{\sec \theta + 1}} + \sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} = 2 \operatorname{cosec} \theta$.

18. Prove that : $\frac{(\tan \theta + \sec \theta - 1)}{(\tan \theta - \sec \theta + 1)} = \frac{1 + \sin \theta}{\cos \theta}$.

19. Prove that : $\frac{\tan^3 \alpha}{1 + \tan^2 \alpha} + \frac{\cot^3 \alpha}{1 + \cot^2 \alpha} = \sec \alpha \operatorname{cosec} \alpha - 2 \sin \alpha \cos \alpha$.

20. Prove that : $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$.

21. Prove that : $\frac{(\sin \theta - \cos \theta + 1)}{(\sin \theta + \cos \theta - 1)} = \frac{1}{(\sec \theta - \tan \theta)}$.

22. Prove that $(1 - \sin \theta + \cos \theta)^2 = 2(1 + \cos \theta)(1 - \sin \theta)$.

23. If $1 + \sin^2 \alpha = 3 \sin \alpha \cos \alpha$, then find the values of $\cot \alpha$.

24. If $\sin \theta + \cos \theta = \sqrt{3}$, then prove that $\tan \theta + \cot \theta = 1$.

25. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ & $x \sin \theta = y \cos \theta$, Prove that : $x^2 + y^2 = 1$.

26. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.

27. If $a \sin \theta + b \cos \theta = c$, then prove that $a \cos \theta - b \sin \theta = \pm \sqrt{a^2 + b^2 - c^2}$

28. If $\operatorname{cosec} \theta - \sin \theta = l$ & $\sec \theta - \cos \theta = m$, Prove that : $l^2 m^2 (l^2 + m^2 + 3) = 1$.

29. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then prove that $q(p^2 - 1) = 2p$.

30. If $\tan A = n \tan B$ & $\sin A = m \sin B$, Prove that : $\cos^2 A = \frac{m^2 - 1}{n^2 - 1}$.

31. If $7 \sin^2 \theta + 3 \cos^2 \theta = 4$ then find $\tan \theta$.

32. If $\sec \theta + \tan \theta = p$, Prove that : $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$.

33. If $\tan \theta + \sin \theta = m$ & $\tan \theta - \sin \theta = n$, Show that $m^2 - n^2 = 4 \sqrt{mn}$.

34. Given that $3 \sin \theta - 2 \cos \theta = 4$, then Find the value of $2 \sin \theta + 3 \cos \theta$

35. Prove that : $\left(\frac{1}{\sec^2 \theta - \cos^2 \theta} + \frac{1}{\operatorname{cosec}^2 \theta - \sin^2 \theta} \right) \sin^2 \theta \cos^2 \theta = \frac{1 - \sin^2 \theta \cos^2 \theta}{2 + \sin^2 \theta \cos^2 \theta}$.

36. If $\sin x + \operatorname{cosec} x = 2$, then find the value of $\sin^{19} x + \operatorname{cosec}^{20} x$.
37. Prove that : $\frac{1}{(\sec x - \tan x)} - \frac{1}{\cos x} = \frac{1}{\cos x} - \frac{1}{\sec x + \tan x}$
38. In an acute angled triangle ABC, If $\tan (A + B - C) = 1$ & $\sec (B + C - A) = 2$, Find the values of A, B & C.
39. Find value of $\sin 60^\circ$ geometrically.
40. If $\sqrt{3} \sin \theta - \cos \theta = 0$ and $0^\circ < \theta < 90^\circ$, find the value of $\sin 2\theta$.
41. In ΔPQR , right-angled at Q, $PR + QR = 25$ cm and $PQ = 5$ cm. Determine the values of $\sin P$, $\cos P$ and $\tan P$.
42. If $\sec \theta = x + \frac{1}{4x}$, prove that : $\sec \theta + \tan \theta = 2x$ or $\frac{1}{2x}$.
43. Find θ , if $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$.
44. Find 'x' : $2x \tan^2 60 + 3x \cos^2 60 = \frac{27 \sec^2 45}{4 \cos^2 30}$.
45. If $12 \operatorname{cosec} \theta - 13 = 0$, Find the value of : $\frac{2 \sin \theta - 3 \cos \theta}{4 \sin \theta - 9 \cos \theta}$.
46. If $\frac{\operatorname{cosec} \theta + \cot \theta}{\operatorname{cosec} \theta - \cot \theta} = \frac{81}{49}$, Find $\frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}$.
47. Prove that : $(\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2 = (1 + \sec \theta \operatorname{cosec} \theta)^2$
48. If $\cos (A + 2B) = 0$, $0^\circ \leq (A + 2B) \leq 90^\circ$ and $\cos (B - A) = \frac{\sqrt{3}}{2}$, $0^\circ \leq (B - A) \leq 90^\circ$, then find $\operatorname{cosec} (2A + B)$.
49. If $3 \cot A = 4$, Check whether $\frac{1 - \tan^2 A}{1 + \tan^2 A} = \cos^2 A - \sin^2 A$ or not.
50. Prove that : $\tan^4 \theta + \tan^2 \theta = \sec^4 \theta - \sec^2 \theta$

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CLASS 10 – CBSE | MATHEMATICS

Introduction to Trigonometry- Answer Key

SECTION - A (Multiple Choice Questions)

1. (d) $\frac{\sqrt{2}}{2}$
2. (a) 0
3. (b) 2
4. (c) 1, 2
5. (b) 2
6. (b) $\sqrt{2} + 1$
7. (b) $b^2 - a^2$
8. (d) $\frac{1}{\sqrt{2}}$
9. (c) 2
10. (b) 1
11. (a) 1
12. (b) $\frac{1}{2}$

SECTION -B (Long Answer Questions)

15. 2
23. $\cot \alpha = 1$ or 2
31. $\tan \theta = \frac{1}{\sqrt{3}}$
34. Not possible – no such θ exists
36. 2
38. $A = 60^\circ$, $B = 52.5^\circ$, $C = 67.5^\circ$
39. $\sin 60^\circ = \frac{\sqrt{3}}{2}$
40. $\sqrt{3}/2$
41. $\sin P = \frac{12}{13}$, $\cos P = \frac{5}{13}$, $\tan P = \frac{12}{5}$
43. $\theta = 60^\circ$
44. $x = \frac{8}{3}$
45. 3
46. $\frac{-79}{47}$

48. $\operatorname{cosec} (2A + B) = \frac{2}{\sqrt{3}}$

49. Yes, LHS = RHS (both = $\frac{7}{25}$)

