



GRADE X • MATHEMATICS • QUESTION BANK

Chapter 8

TRIGONOMETRY

29

1-Mark (MCQ + A/R)

21

2-Mark Questions

27

3-Mark Questions

10

5-Mark Questions

★ **Important PYQ** = Previous Year Board / Compartment Question (2023 & 2024). 66 of 87 questions in this bank are marked.

SECTION A • 1 Mark Questions

- If $\frac{x}{3} = 2 \sin A$, $\frac{y}{3} = 2 \cos A$ then the value of $x^2 + y^2$ is ★ **Important PYQ [BOARD 2024]**
 a) 36 b) 9 c) 6 d) 18
- Which of the following is true for all values of θ ($0^\circ \leq \theta \leq 90^\circ$)? ★ **Important PYQ [BOARD 2023]**
 a) $\cos^2 \theta - \sin^2 \theta = 1$ b) $\sec^2 \theta - \tan^2 \theta = 1$
 c) $\operatorname{cosec}^2 \theta - \sec^2 \theta = 1$ d) $\cot^2 \theta - \tan^2 \theta = 1$
- $(\sec^2 \theta - 1)(\operatorname{cosec}^2 \theta - 1)$ is equal to ★ **Important PYQ [BOARD 2023]**
 a) -1 b) 1 c) 0 d) 2
- If $\sec \theta - \tan \theta = \frac{1}{3}$, then the value of $(\sec \theta + \tan \theta)$ is ★ **Important PYQ [BOARD 2023]**
 a) $\frac{4}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) 3
- If $\triangle ABC$ is a right triangle at C, then the value of $\cos(A + B)$ is
 a) 0 b) 1 c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$
- If $x = a \cos \theta$ and $y = b \sin \theta$ then the value of $b^2 x^2 + a^2 y^2$ is ★ **Important PYQ [BOARD 2024]**
 a) $a^2 b^2$ b) ab c) $a^4 b^4$ d) $a^2 + b^2$
- If $x \tan 60^\circ \cos 60^\circ = \sin 60^\circ \cot 60^\circ$, then x is
 a) $\cos 30^\circ$ b) $\tan 30^\circ$ c) $\sin 30^\circ$ d) $\cot 30^\circ$
- Simplified form of $(\cos^4 A - \sin^4 A)$ is ★ **Important PYQ [BOARD 2023]**
 a) $2 \sin^2 A - 1$ b) $2 \sin^2 A + 1$ c) $2 \cos^2 A + 1$ d) $2 \cos^2 A - 1$
- If $\sin \theta = \cos \theta$, ($0^\circ < \theta < 90^\circ$) then the value of $\sec \theta \sin \theta$ is ★ **Important PYQ [BOARD 2024]**
 a) $\frac{1}{\sqrt{2}}$ b) $\sqrt{2}$ c) 1 d) 0
- If θ is an acute angle of a right angled triangle, then which of the following equation is not true? ★ **Important PYQ [BOARD 2023]**
 a) $\sin \theta \cot \theta = \cos \theta$ b) $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$
 c) $\cos \theta \tan \theta = \sin \theta$ d) $\tan^2 \theta - \sec^2 \theta = 1$



11. Simplified form of $\frac{\cos^2 \theta}{\sin^2 \theta} - \frac{1}{\sin^2 \theta}$ is ★ Important PYQ [BOARD 2023]
 a) $\tan^2 \theta$ b) $\sec^2 \theta$ c) 1 d) -1
12. $\sec \theta$ when expressed in terms of $\cot \theta$ is equal to ★ Important PYQ [BOARD 2023]
 a) $\frac{1+\cot^2 \theta}{\cot \theta}$ b) $\frac{\sqrt{1+\cot^2 \theta}}{\cot \theta}$ c) $\sqrt{1+\cot^2 \theta}$ d) $\frac{\sqrt{1-\cot^2 \theta}}{\cot \theta}$
13. If $\tan \theta = \frac{x}{y}$ then $\cos \theta$ is ★ Important PYQ [BOARD 2023]
 a) $\frac{x}{\sqrt{x^2+y^2}}$ b) $\frac{x}{\sqrt{x^2-y^2}}$ c) $\frac{y}{\sqrt{x^2+y^2}}$ d) $\frac{y}{\sqrt{x^2-y^2}}$
14. If $\tan \theta = \frac{5}{12}$ then the value of $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$ is ★ Important PYQ [BOARD 2023]
 a) $\frac{-17}{7}$ b) $\frac{17}{7}$ c) $\frac{17}{13}$ d) $\frac{-7}{13}$
15. $\left[\frac{3}{4} \tan^2 30^\circ - \sec^2 45^\circ + \sin^2 60^\circ \right]$ is equal to ★ Important PYQ [BOARD 2023]
 a) -1 b) $\frac{5}{6}$ c) $\frac{-3}{2}$ d) $\frac{1}{6}$
16. If $x = p \sec \theta$ and $y = q \tan \theta$ then
 a) $x^2 - y^2 = p^2 q^2$ b) $x^2 q^2 - y^2 p^2 = \frac{1}{p^2 q^2}$
 c) $x^2 q^2 - y^2 p^2 = pq$ d) $x^2 q^2 - y^2 p^2 = p^2 q^2$
17. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$ then $x^2 + y^2$ is
 a) 0 b) $\frac{1}{2}$ c) 1 d) $\frac{3}{2}$
18. $\left[\frac{5}{8} \sec^2 60^\circ - \tan^2 60^\circ + \cos^2 45^\circ \right]$ is equal to ★ Important PYQ [BOARD 2023]
 a) 0 b) $\frac{-5}{3}$ c) $\frac{-1}{2}$ d) $\frac{-1}{4}$
19. If $\cos(\alpha + \beta) = 0$ then the value of $\cos\left(\frac{\alpha+\beta}{2}\right)$ is ★ Important PYQ [BOARD 2024]
 a) $\frac{1}{\sqrt{2}}$ b) $\frac{1}{2}$ c) 0 d) $\sqrt{2}$
20. If $2 \tan A = 3$, then the value of $\frac{4 \sin A + 3 \cos A}{4 \sin A - 3 \cos A}$ is ★ Important PYQ [BOARD 2023]
 a) $\frac{7}{\sqrt{13}}$ b) $\frac{1}{\sqrt{13}}$ c) 3 d) doesn't exist
21. If $\sin \theta + \cos \theta = \sqrt{2}$ then $\tan \theta + \cot \theta =$
 a) 1 b) 2 c) 3 d) 4
22. If $\cos \theta = \frac{\sqrt{3}}{2}$ and $\sin \varphi = \frac{1}{2}$ then $\tan(\theta + \varphi)$ is ★ Important PYQ [BOARD 2024]
 a) $\sqrt{3}$ b) $\frac{1}{\sqrt{3}}$ c) 1 d) not defined
23. If $\sin A = \frac{2}{3}$ then value of $\cot A$ is ★ Important PYQ [BOARD 2024]
 a) $\frac{\sqrt{5}}{2}$ b) $\frac{3}{2}$ c) $\frac{5}{4}$ d) $\frac{2}{3}$
24. If $\sec \theta - \tan \theta = m$, then the value of $(\sec \theta + \tan \theta)$ is ★ Important PYQ [BOARD 2024]
 a) $1 - \frac{1}{m}$ b) $m^2 - 1$ c) $\frac{1}{m}$ d) $-m$



25. $2 \cos^2 \theta (1 + \tan^2 \theta)$ is equal to ★ Important PYQ [COMPARTMENT 2023]
 a) 0 b) 1 c) 2 d) 3
26. $\left(\frac{2 \tan 30^\circ}{1 + \tan^2 30^\circ}\right)$ is equal to ★ Important PYQ [BOARD 2023]
 a) $\sin 60^\circ$ b) $\cos 60^\circ$ c) $\tan 60^\circ$ d) $\sin 30^\circ$
27. $\left(\frac{1 - \tan^2 30^\circ}{1 + \tan^2 30^\circ}\right)$ is equal to ★ Important PYQ [BOARD 2023]
 a) $\sin 60^\circ$ b) $\cos 60^\circ$ c) $\tan 60^\circ$ d) $\cos 30^\circ$

Options for Assertion and Reasoning Questions:

- 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
28. **Assertion (A):** If $\sin A = \frac{1}{3}$ ($0^\circ < A < 90^\circ$) then the value of $\cos A$ is $\frac{2\sqrt{2}}{3}$.
Reason (R): For every angle θ , $\sin^2 \theta + \cos^2 \theta = 1$. ★ Important PYQ [BOARD 2024]
29. **Assertion (A):** For $0 < \theta \leq 90^\circ$, $\operatorname{cosec} \theta - \cot \theta$ and $\operatorname{cosec} \theta + \cot \theta$ are reciprocal of each other.
Reason (R): $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$. ★ Important PYQ [BOARD 2023]

SECTION B • 2 Marks Questions

1. If $\cos A + \cos^2 A = 1$, then find the value of $\sin^2 A + \sin^4 A$. ★ Important PYQ [BOARD 2023]
2. If $4 \cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + p = \frac{3}{4}$, then find the value of p. ★ Important PYQ [BOARD 2023]
3. If $a \cos \theta + b \sin \theta = m$ and $a \sin \theta - b \cos \theta = n$, then prove that $a^2 + b^2 = m^2 + n^2$. ★ Important PYQ [BOARD 2023]
4. If θ is an acute angle and $\sin \theta = \cos \theta$, find the value of $\tan^2 \theta + \cot^2 \theta - 2$. ★ Important PYQ [BOARD 2023]
5. If $\sqrt{3} \sin \theta - \cos \theta = 0$ and $0^\circ < \theta < 90^\circ$, find the value of θ .
6. Find the value of x: $2 \operatorname{cosec}^2 30^\circ + x \sin^2 60^\circ - \frac{3}{4} \tan^2 30^\circ = 10$.
7. Find the value of $\cos 2\theta$ if $2 \sin 2\theta = \sqrt{3}$.
8. If $\sin \alpha = \frac{1}{2}$ and $\cot \beta = \sqrt{3}$, then find the value of $\operatorname{cosec} \alpha + \operatorname{cosec} \beta$. ★ Important PYQ [BOARD 2023]
9. If A and B are acute angles such that $\sin(A - B) = 0$ and $2 \cos(A + B) - 1 = 0$, then find the angles A and B. ★ Important PYQ [BOARD 2023]
10. Find an acute angle θ when $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$.
11. Evaluate: $2 \sec^2 \theta + 3 \operatorname{cosec}^2 \theta - 2 \sin \theta \cos \theta$ if $\theta = 45^\circ$. ★ Important PYQ [BOARD 2023]



12. Prove that $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$. ★ Important PYQ [BOARD 2023]
13. Evaluate: $\frac{5 \cos^2 60^\circ + 4 \sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$. ★ Important PYQ [BOARD 2023 & BOARD 2024]
14. Evaluate: $2\sqrt{2} \cos 45^\circ \sin 30^\circ + 2\sqrt{3} \cos 30^\circ$. ★ Important PYQ [BOARD 2024]
15. If $A = 60^\circ$ and $B = 30^\circ$, verify that $\sin(A + B) = \sin A \cos B + \cos A \sin B$. ★ Important PYQ [BOARD 2024]
16. If $\sin \theta - \cos \theta = 0$ then find the value of $\sin^4 \theta + \cos^4 \theta$. ★ Important PYQ [BOARD 2023]
17. If $\sin \theta + \sin^2 \theta = 1$, then prove that $\cos^2 \theta + \cos^4 \theta = 1$. ★ Important PYQ [BOARD 2023]
18. If $\tan \theta = \frac{1}{\sqrt{7}}$ then show that $\frac{\operatorname{cosec}^2 \theta - \sec^2 \theta}{\operatorname{cosec}^2 \theta + \sec^2 \theta} = \frac{3}{4}$. ★ Important PYQ [BOARD 2023]
19. Evaluate: $\frac{5}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cot^2 45^\circ + 2 \sin^2 90^\circ$. ★ Important PYQ [BOARD 2023]
20. If $\sin \theta + \cos \theta = \sqrt{3}$, then find the value of $\sin \theta \cos \theta$. ★ Important PYQ [BOARD 2023]
21. If $2 \sin(A + B) = \sqrt{3}$ and $\cos(A - B) = 1$ then find A and B. ★ Important PYQ [BOARD 2024]

SECTION C • 3 Marks Questions

1. Prove that $\frac{\operatorname{cosec}^2 \theta - \sec^2 \theta}{\operatorname{cosec}^2 \theta + \sec^2 \theta} = \frac{3}{4}$ if $\tan \theta = \frac{1}{\sqrt{7}}$. ★ Important PYQ [BOARD 2024]
2. Prove that $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0$. ★ Important PYQ [BOARD 2023]
3. If $1 + \sin^2 \theta = 3 \sin \theta \cos \theta$, then prove that $\tan \theta = 1$ or $\frac{1}{2}$.
4. If $\sin \theta + \cos \theta = \sqrt{2}$ then prove that $\tan \theta + \cot \theta = 2$.
5. Prove that $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$. ★ Important PYQ [BOARD 2023 & BOARD 2024]
6. Prove that $\left(\frac{1}{\cos \theta} - \cos \theta\right)\left(\frac{1}{\sin \theta} - \sin \theta\right) = \frac{1}{\tan \theta + \cot \theta}$. ★ Important PYQ [BOARD 2023]
7. Prove that $\frac{\cos^2 \theta}{1 - \tan \theta} + \frac{\sin^3 \theta}{\sin \theta - \cos \theta} = 1 + \sin \theta \cos \theta$. ★ Important PYQ [BOARD 2023]
8. Prove that $(\sin \theta + \cos \theta)(\tan \theta + \cot \theta) = \sec \theta + \operatorname{cosec} \theta$. ★ Important PYQ [BOARD 2023]
9. Prove that $\sec A(1 - \sin A)(\sec A + \tan A) = 1$. ★ Important PYQ [BOARD 2023]
10. Prove that $\frac{\sin A - 2 \sin^3 A}{2 \cos^3 A - \cos A} = \tan A$. ★ Important PYQ [BOARD 2023 & BOARD 2024]
11. Prove that $\frac{\tan \theta - \cot \theta}{\sin \theta \cos \theta} = \sec^2 \theta - \operatorname{cosec}^2 \theta$. ★ Important PYQ [BOARD 2024]
12. Prove that $\frac{\tan^3 \theta}{1 + \tan^2 \theta} + \frac{\cot^3 \theta}{1 + \cot^2 \theta} = \sec \theta \operatorname{cosec} \theta - 2 \sin \theta \cos \theta$.
13. Prove that $\frac{1 + \sec A}{\sec A} = \frac{\sin^2 A}{1 - \cos A}$. ★ Important PYQ [BOARD 2023]
14. Prove that $\frac{\cot \theta + \operatorname{cosec} \theta - 1}{\cot \theta - \operatorname{cosec} \theta + 1} = \frac{1 + \cos \theta}{\sin \theta}$.
15. Prove that $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$. ★ Important PYQ [BOARD 2023]



16. Prove that $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$.
17. Prove that $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{2 \sin^2 A - 1}$. ★ Important PYQ [BOARD 2024]
18. Prove that $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\operatorname{cosec}^2 A}{\sec^2 A - \operatorname{cosec}^2 A} = \frac{1}{1 - 2 \cos^2 A}$.
19. Prove that $\frac{1 + \sec \theta - \tan \theta}{1 + \sec \theta + \tan \theta} = \frac{1 - \sin \theta}{\cos \theta}$. ★ Important PYQ [BOARD 2024]
20. Prove that $\sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$. ★ Important PYQ [BOARD 2024]
21. Prove that $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\cot A + \tan A}$. ★ Important PYQ [BOARD 2023 & BOARD 2024]
22. Prove that $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$.
23. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$. ★ Important PYQ [BOARD 2024]
24. Prove that $\frac{\tan A}{1 + \sec A} - \frac{\tan A}{1 - \sec A} = 2 \operatorname{cosec} A$. ★ Important PYQ [BOARD 2023]
25. Prove that $\frac{\sin \theta}{1 + \cos \theta} + \frac{1 + \cos \theta}{\sin \theta} = 2 \operatorname{cosec} \theta$. ★ Important PYQ [BOARD 2023 & BOARD 2024]
26. Prove that $\sqrt{\frac{1 - \cos A}{1 + \cos A}} = \operatorname{cosec} A - \cot A$.
27. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then prove that $q(p^2 - 1) = 2p$. ★ Important PYQ [BOARD 2023]

SECTION D • 5 Marks Questions

1. Evaluate: $\frac{\tan^2 60^\circ + 4 \sin^2 45^\circ + 3 \sec^2 60^\circ + 5 \cos^2 90^\circ}{\operatorname{cosec} 30^\circ + \sec 60^\circ - \cot^2 30^\circ}$. ★ Important PYQ [COMPARTMENT 2023]
2. If $15 \tan^2 \theta + 4 \sec^2 \theta = 23$, then find the value of $(\sec \theta + \operatorname{cosec} \theta)^2 - \sin^2 \theta$.
3. Prove that $\frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} = 2 + \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta}$.
4. If in an acute angle $\triangle ABC$, $\sec(B + C - A) = 2$ and $\tan(C + A - B) = \frac{1}{\sqrt{3}}$ then find the three angles of $\triangle ABC$. ★ Important PYQ [COMPARTMENT 2023]
5. If $\sec \theta = x + \frac{1}{4x}$, $x \neq 0$ then find $(\sec \theta + \tan \theta)$.
6. Prove that $\frac{1 + \sin \theta}{1 - \sin \theta} - \frac{1 - \sin \theta}{1 + \sin \theta} = 4 \tan \theta \sec \theta$. ★ Important PYQ [COMPARTMENT 2023]
7. If $\sqrt{3} \cot^2 \theta - 4 \cot \theta + \sqrt{3} = 0$ then find the value of $\cot^2 \theta + \tan^2 \theta$.
8. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cos \theta$ and $x \sin \theta = y \cos \theta$ then prove that $x^2 + y^2 = 1$. ★ Important PYQ [COMPARTMENT 2023]
9. If $\tan \theta + \sin \theta = m$ and $\tan \theta - \sin \theta = n$, then show that $(m^2 - n^2) = 4\sqrt{mn}$. ★ Important PYQ [COMPARTMENT 2023]
10. (a) Prove that $\sqrt{\sec^2 \theta + \operatorname{cosec}^2 \theta} = \tan \theta + \cot \theta$.
(b) Evaluate: $\frac{\cos 45^\circ}{\sec 30^\circ + \operatorname{cosec} 30^\circ}$. ★ Important PYQ [COMPARTMENT 2023 & BOARD 2024]