



INVERSE TRIGONOMETRY

Class 12 - Mathematics

Time Allowed: 1 hour and 30 minutes

Maximum Marks: 40

1. The value of $\tan^{-1}(\sqrt{3}) + \cos^{-1}\left(-\frac{1}{2}\right)$ corresponding to principal branches is [1]
a) $-\frac{\pi}{12}$ b) π
c) 0 d) $\frac{\pi}{3}$
2. Range of $\sec^{-1}x$ is [1]
a) $[0, \pi]$ b) $[0, \pi] - \left\{\frac{\pi}{2}\right\}$
c) $\left[0, \frac{\pi}{4}\right]$ d) $\left[0, \frac{\pi}{2}\right]$
3. The value of $\sin(2 \sin^{-1}(0.8))$ is [1]
a) 4.8 b) 0.96
c) 1.6 d) $\sin 1.6$
4. The value of $\sin^{-1}\left(\cos \frac{3\pi}{5}\right)$ is: [1]
a) $-\frac{3\pi}{5}$ b) $-\frac{\pi}{10}$
c) $\frac{\pi}{10}$ d) $\frac{3\pi}{5}$
5. The domain of $f(x) = \frac{\sin^{-1}x}{x}$ is [1]
a) $[-1, 1]$ b) None of these
c) $[-1, 0)$ d) $\{0\}$
6. $\sin^{-1}(\sin 5) > x^2 - 4x$, if [1]
a) $x \in (2 - \sqrt{9 - 2\pi}, 2 + \sqrt{9 - 2\pi})$ b) $x = 2 + \sqrt{9 - 2\pi}$
c) $x > 2 + \sqrt{9 - 2\pi}$ d) $x = 2 - \sqrt{9 - 2\pi}$
7. The domain of the function $\cos^{-1}(2x - 1)$ is [1]
a) $[0, \pi]$ b) $[-1, 1]$
c) $[0, 1]$ d) $(-1, 0)$
8. The value of expression $\tan\left(\frac{\sin^{-1}x + \cos^{-1}x}{2}\right)$, where $x = \frac{\sqrt{3}}{2}$ is equal to [1]
a) 1 b) -1
c) 0 d) ∞
9. The principal value of $\operatorname{cosec}^{-1}(2)$ is [1]
a) $\frac{2\pi}{3}$ b) $\frac{\pi}{3}$

- c) $\frac{5\pi}{6}$ d) $\frac{\pi}{6}$
10. The principal value of $\sin^{-1}\left(\frac{-1}{2}\right)$ is [1]
 a) $\frac{-\pi}{6}$ b) $\frac{7\pi}{6}$
 c) $\frac{5\pi}{6}$ d) $\frac{4\pi}{6}$
11. The value of $\sec^{-1}\left(\sec\frac{4\pi}{3}\right)$ is [1]
 a) $\frac{4\pi}{3}$ b) $\frac{-\pi}{3}$
 c) $\frac{\pi}{3}$ d) $\frac{2\pi}{3}$
12. The principal value of $\operatorname{cosec}^{-1}(-\sqrt{2})$ is [1]
 a) $\frac{-\pi}{4}$ b) $\frac{5\pi}{2}$
 c) $\frac{5\pi}{4}$ d) $\frac{3\pi}{4}$
13. $\sin(\cot^{-1}x)$ is equal to [1]
 a) $x\sqrt{1+x^2}$ b) $\frac{x}{\sqrt{1+x^2}}$
 c) $\frac{1}{\sqrt{1+x^2}}$ d) $\sqrt{1+x^2}$
14. The domain of the function $f(x) = \sin^{-1}(2x)$ is [1]
 a) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ b) $[-1, 1]$
 c) $[-2, 2]$ d) $[0, 1]$
15. Find the value of $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ [1]
16. Write the principal value of $\tan^{-1}(\sqrt{3}) - \cot^{-1}(-\sqrt{3})$. [1]
17. Write the value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$. [1]
18. Write the principal value of $\tan^{-1}\left[\sin\left(\frac{-\pi}{2}\right)\right]$. [1]
19. Evaluate $\tan^{-1}\left(\sin\left(\frac{-\pi}{2}\right)\right)$. [1]
20. Write the value of $\sec^{-1}\left(\frac{1}{2}\right)$ [1]
21. Write the value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)$ [1]
22. Draw the graph of the principal branch of the function $f(x) = \cos^{-1}x$. [1]
23. Find the principal value of $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$. [1]
24. Find the principal value of $\tan^{-1}(-\sqrt{3})$. [1]
25. **Assertion (A):** Principal value of $\tan^{-1}(-\sqrt{3})$ is $-\frac{\pi}{3}$. [1]

Reason (R): $\tan^{-1}: \mathbb{R} \rightarrow \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ so for any $x \in \mathbb{R}$, $\tan^{-1}(x)$ represent an angle in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$.

- 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.
26. **Assertion (A):** The domain of $\sin^{-1}5x$ is $\left[-\frac{1}{5}, \frac{1}{5}\right]$. [1]
Reason (R): The domain of $\sin^{-1}5x$ is $[-1, 1]$.
 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.
27. **Assertion (A):** Domain of $f(x) = \sin^{-1}x + \cos x$ is $[-1, 1]$. [1]
Reason (R): Domain of a function is the set of all possible values for which function will be defined.
- 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.
28. **Assertion (A):** Function $f : \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = \sin x$ is not a bijection. [1]
Reason (R): A function $f : A \rightarrow B$ is said to be bijection if it is one-one and onto.
- 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.
29. **Assertion (A):** We can write $\sin^{-1}x = (\sin x^{-1})$. [1]
Reason (R): Any value in the range of principal value branch is called principal value of that inverse trigonometric function.
- 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.
30. **Assertion (A):** The domain of the function $\sec^{-1} 2x$ is $(-\infty, -\frac{1}{2}] \cup [\frac{1}{2}, \infty)$ [1]
Reason (R): $\sec^{-1}(-2) = -\frac{\pi}{4}$
- 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.
31. **Assertion (A):** The range of the function $f(x) = 2 \sin^{-1} x + \frac{3\pi}{2}$, where $x \in [-1, 1]$, is $[\frac{\pi}{2}, \frac{5\pi}{2}]$. [1]
Reason (R): The range of the principal value branch of $\sin^{-1}(x)$ is $[0, \pi]$.
- 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.
32. **Assertion (A):** Maximum value of $(\cos^{-1} x)^2$ is π^2 . [1]
Reason (R): Range of the principal value branch of $\cos^{-1}x$ is $[\frac{-\pi}{2}, \frac{\pi}{2}]$.
- 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.
33. **Assertion (A):** All trigonometric functions have their inverses over their respective domains. [1]
Reason (R): The inverse of $\tan^{-1} x$ exists for some $x \in \mathbb{R}$.
- 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.

34. **State whether the given statement is True or False:** [7]
- (a) The minimum value of n for which $\tan^{-1} \frac{n}{\pi} > \frac{\pi}{4}$, $n \in \mathbb{N}$, is valid is 5. [1]
 - (b) The domain of trigonometric functions can be restricted to any one of their branch (not necessarily principal value) in order to obtain their inverse functions. [1]
 - (c) The domain of the function defined by $f(x) = \sin^{-1}x + \cos x$ is $[-1, 1]$ [1]
 - (d) The graph of inverse trigonometric function can be obtained from the graph of their corresponding trigonometric function by interchanging x and y axes. [1]
 - (e) The least numerical value, either positive or negative of angle θ is called principal value of the inverse trigonometric function. [1]
 - (f) All trigonometric functions have inverse over their respective domains. [1]
 - (g) The domain of $\sin^{-1} 2x$ is $[0, 1]$ [1]

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