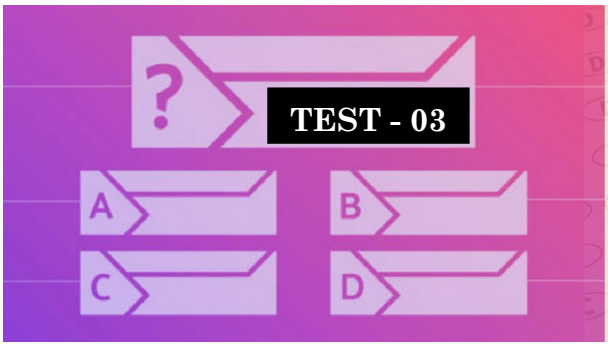


By O.P. GUPTA

MULTIPLE CHOICE TYPE QUESTIONS

For CBSE 2025 Exams - Mathematics (041) - Class 12

Topics : Inverse Trig. Functions **Max. Marks : 50**

☑ ***Select the correct option in the followings. Each question carries 1 mark.***

Q01. The value of $\sin^{-1}\left(\cos\frac{3\pi}{5}\right)$ is

(a) $\frac{\pi}{10}$ (b) $\frac{3\pi}{5}$ (c) $-\frac{\pi}{10}$ (d) $-\frac{3\pi}{5}$

Q02. The value of $\tan\left[\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)\right]$ is

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1-\sqrt{2}}{2}$ (c) $\frac{1+\sqrt{2}}{2}$ (d) 1

Q03. The value of $\tan\left[\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right]$ is

(a) $\frac{3-\sqrt{5}}{2}$ (b) $\frac{3+\sqrt{5}}{2}$ (c) $\frac{-3+\sqrt{5}}{2}$ (d) $\frac{-3-\sqrt{5}}{2}$

Q04. The principal value of $\cot^{-1}(-\sqrt{3})$ is

(a) $-\frac{\pi}{6}$ (b) $\frac{5\pi}{6}$ (c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{6}$

Q05. The domain of the function $f(x)=\sin^{-1}(2x)$ is

(a) [0, 1] (b) [–1, 1] (c) $\left[-\frac{1}{2},\frac{1}{2}\right]$ (d) [–2, 2]

Q06. The principal value of $\tan^{-1}\left(\tan\frac{3\pi}{5}\right)$ is

(a) $\frac{2\pi}{5}$ (b) $-\frac{3\pi}{5}$ (c) $\frac{3\pi}{5}$ (d) $-\frac{2\pi}{5}$

Q07. The principal value of $\sin^{-1}\left(\sin\frac{13\pi}{6}\right)$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{13\pi}{6}$

Q08. The value of $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{3}$ (d) $\frac{7\pi}{6}$

Q09. If $\cos\left(\sin^{-1}\frac{1}{\sqrt{3}}+\cos^{-1}x\right)=0$, then x is equal to

(a) $-\frac{1}{\sqrt{3}}$ (b) $\frac{2}{\sqrt{3}}$ (c) $\frac{1}{\sqrt{3}}$ (d) $-\frac{2}{\sqrt{3}}$

Q10. If $\cos^{-1}x+\cos^{-1}y=\frac{\pi}{3}$, then the value of $\sin^{-1}x+\sin^{-1}y$ is

(a) π (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\frac{2\pi}{3}$

Q11. $\sin\left(\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{3}\right)$ is equal to

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

Q12. $\cot\left(\tan^{-1}\frac{7}{9}+\tan^{-1}\frac{1}{8}\right)=$

(a) $\frac{\pi}{4}$ (b) 1 (c) $\tan^{-1}\left(\frac{65}{72}\right)$ (d) $\tan^{-1}\left(\frac{63}{65}\right)$

Q13. $\cot\left(\frac{\pi}{4}-2\cot^{-1}3\right)$ is equal to

(a) 1 (b) 0 (c) 7 (d) $\frac{\pi}{2}$

Q14. If $\lambda=\tan\tan^{-1}\sqrt{3}$, then $\frac{\lambda}{\sqrt{3}}=$

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\frac{1}{3}$ (d) 1

Q15. The range of the principal value branch of the function $y=\sec^{-1}x$ is

(a) $[0,\pi]-\frac{\pi}{2}$ (b) $(0,\pi)-\frac{\pi}{2}$ (c) $R-(-1,1)$ (d) $R-[-1,1]$

Q16. Let $\cos^{-1}:[-1,1]\to[-2\pi,-\pi]$. Then the value of $\cos^{-1}\left(-\frac{1}{2}\right)$ is

(a) $\frac{2\pi}{3}$ (b) $-\frac{4\pi}{3}$ (c) $-\frac{2\pi}{3}$ (d) $\frac{\pi}{3}$

Q17. Two angles of a triangle are $\tan^{-1}2$ and $\tan^{-1}3$. The third angle of the triangle is

(a) $\frac{3\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$

Q18. The value of $\sin^{-1}\left[\sin\left(-\frac{17\pi}{8}\right)\right]$ is

(a) $-\frac{17\pi}{8}$ (b) $\frac{17\pi}{8}$ (c) $\frac{\pi}{8}$ (d) $-\frac{\pi}{8}$

Q19. $\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]=$

(a) 1 (b) -1 (c) 0 (d) $\frac{\pi}{2}$

Q20. Simplest form of $\sin^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)$, where $-\frac{\pi}{4}<x<\frac{\pi}{4}$, will be

(a) x (b) $\frac{\pi}{4}+x$ (c) $\frac{\pi}{4}-x$ (d) $x-\frac{\pi}{4}$

Q21. Simplest form of $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right)$, $-\frac{3\pi}{2}<x<\frac{\pi}{2}$ is

(a) $\frac{x}{2}$ (b) $\frac{\pi}{4}-\frac{x}{2}$ (c) $\frac{\pi}{4}+\frac{x}{2}$ (d) $\frac{\pi}{4}+x$

Q22. If $0<x<\frac{1}{\sqrt{2}}$, then $\sec^{-1}\left(\frac{1}{2x^2-1}\right)=$

(a) $\cos^{-1}x$ (b) $2\sec^{-1}x$ (c) $\sec^{-1}x$ (d) $2\cos^{-1}x$

Q23. If $\frac{1}{\sqrt{2}}\le x\le 1$, then $\sin^{-1}(2x\sqrt{1-x^2})=$

(a) $2\cos^{-1}x$ (b) $\cos^{-1}x$ (c) $\sin^{-1}x$ (d) $-2\cos^{-1}x$

Q24. For $\sin^{-1}(1-x)-2\sin^{-1}x=\frac{\pi}{2}$, the value of x will be

(a) $0,\frac{1}{2}$ (b) 0 (c) $\frac{1}{2}$ (d) -1

Q25. Let $\frac{9}{4}\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)+\frac{9}{4}\sin^{-1}\left(\frac{1}{3}\right)=\lambda$. Then $(8\lambda)=$

(a) $\frac{9\pi}{8}$ (b) $\frac{9\pi}{4}$ (c) 9π (d) $\frac{\pi}{2}$

Q26. If $y=\cot^{-1}x$, $x<0$, then

(a) $0<y<\pi$ (b) $-\frac{\pi}{2}\le y<0$ (c) $0<y<\frac{\pi}{2}$ (d) $\frac{\pi}{2}<y<\pi$

Q27. If $\sin^{-1}x>\cos^{-1}x$, then x should lie in the interval

(a) $\left(\frac{1}{\sqrt{2}},1\right]$ (b) $\left(\frac{1}{\sqrt{2}},1\right)$ (c) $[-1,1]$ (d) $\left[-1,\frac{1}{\sqrt{2}}\right)$

Q28. The principal value of $\cos^{-1}\left(\frac{1}{2}\right)+\sin^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ is

(a) π (b) $\frac{\pi}{12}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

Q29. What is the domain of the function $\cos^{-1}(2x-3)$?

(a) $[-1, 1]$ (b) $[0, \pi]$ (c) $[1, 2]$ (d) $(-1, 1)$

Q30. The simplest form of $\tan^{-1}\left[\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right]$, $0 < x < 1$ is

(a) $\frac{\pi}{4}-\frac{x}{2}$ (b) $\frac{\pi}{4}+\frac{x}{2}$ (c) $\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x$ (d) $\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x$

Q31. The principal value of $\left[\tan^{-1}\sqrt{3}-\cot^{-1}\left(-\sqrt{3}\right)\right]$ is

(a) $-\frac{\pi}{2}$ (b) π (c) 0 (d) $2\sqrt{3}$

Q32. If $y = 2\tan^{-1}x$, then

(a) $-\frac{\pi}{2} < y < \frac{\pi}{2}$ (b) $-\pi < y < \pi$ (c) $0 < y < \frac{\pi}{2}$ (d) $\frac{\pi}{2} < y < \pi$

Q33. If $y = \sin^{-1}x$, then $x \in$

(a) $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$ (b) $(-1, 1)$ (c) $[-1, 1]$ (d) $-\frac{\pi}{2} < y < \frac{\pi}{2}$

Q34. One branch of cosec^{-1} other than the principal value branch corresponds to

(a) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]-0$ (b) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (c) $\left[-\frac{3\pi}{2}, -\frac{\pi}{2}\right]$ (d) $\left[-\frac{3\pi}{2}, -\frac{\pi}{2}\right]-\{-\pi\}$

Q35. $\cos^{-1}x =$

(a) $\sin^{-1}\sqrt{1-x^2}$ (b) $\sin^{-1}x$ (c) $\pi-\sin^{-1}x$ (d) $-\sin^{-1}\sqrt{1-x^2}$

Q36. $\sin^{-1}\sin 2 =$

(a) 2 (b) $\pi-2$ (c) $\pi+2$ (d) -2

Q37. The domain of the function $y = \sin^{-1}(-x^2)$ is

(a) $[0, 1]$ (b) $(0, 1)$ (c) $[-1, 1]$ (d) ϕ

Q38. The domain of the function defined by $y = \sin^{-1}x + \cos x$ is

(a) $x \in \phi$ (b) $x \in [-1, \pi+1]$ (c) $x \in (-\infty, \infty)$ (d) $x \in [-1, 1]$

Q39. The value of $\sin\left[2\sin^{-1}(.6)\right]$ is

(a) .96 (b) .48 (c) 1.2 (d) sin 1.2

Q40. If $\alpha \le 2\sin^{-1}x + \cos^{-1}x \le \beta$, then

(a) $\alpha = -\frac{\pi}{2}, \beta = \frac{\pi}{2}$ (b) $\alpha = 0, \beta = \pi$ (c) $\alpha = -\frac{\pi}{2}, \beta = \frac{3\pi}{2}$ (d) $\alpha = 0, \beta = 2\pi$

Q41. The value of $\tan^2(\sec^{-1}2) + \cot^2(\text{cosec}^{-1}3)$ is

(a) 5 (b) 13 (c) 11 (d) 15

Q42. The equation $\tan^{-1}x - \cot^{-1}x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ has

(a) no solution (b) infinite no. of solutions

(c) unique solution (d) two solutions

Q43. $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)=$

(a) $\frac{4+\sqrt{7}}{3}$ (b) $\frac{4\pm\sqrt{7}}{3}$ (c) $\frac{\sqrt{7}-4}{3}$ (d) $\frac{4-\sqrt{7}}{3}$

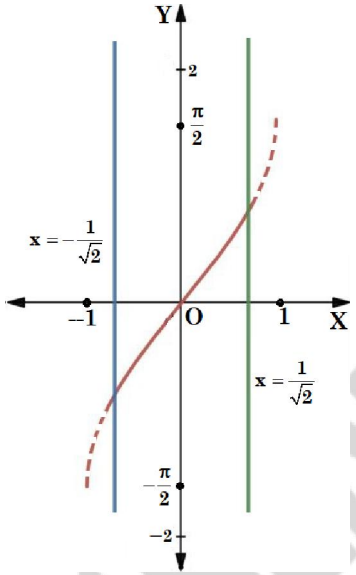
Q44. If $\cos^{-1}\alpha+\cos^{-1}\beta+\cos^{-1}\gamma=3\pi$, then $\alpha(\beta+\gamma)+\beta(\gamma+\alpha)+\gamma(\alpha+\beta)$ equals

(a) 6 (b) 1 (c) 2 (d) 0

Q45. The minimum value of 'n' for which $\tan^{-1}\frac{n}{\pi}>\frac{\pi}{4}$, $n\in N$ is

(a) 1 (b) 4 (c) 5 (d) 0

Q46. Consider the graph shown.



Which one of the following function is represented by the graph shown?

(a) $y=\cos^{-1}x,\ x\in\left[-\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}}\right]$

(b) $y=\sin^{-1}x,\ x\in[-1,1]$

(c) $y=\sin^{-1}x,\ x\in\left[-\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}}\right]$

(d) $y=\cos^{-1}x,\ x\in[-1,1]$

*Question numbers **47** to **50** are Assertion and Reason based questions. Two statements are given, one labelled **Assertion (A)** and the other labelled **Reason (R)**. Select the correct answer from the codes (a), (b), (c) and (d) as given below.*

(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 and 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.

Q47. **Assertion (A) :** Range of $[\sin^{-1}x+2\cos^{-1}x]$ is $[0,\pi]$.

Reason (R) : Principal value branch of $\tan^{-1}x$ has range $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$.

Q48. **Assertion (A) :** Inverse of function $\sin x$ exists when $x\in\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$.

Reason (R) : The domain of trigonometric functions must be restricted in a suitable manner in order to obtain their inverse functions.

Q49. **Assertion (A) :** Domain of $f(x)=\tan^{-1}x$ is $x\in R$.

Reason (R) : The graph of inverse trigonometric function can be obtained from the graph of their corresponding trigonometric function by interchanging x and y axes.

Q50. **Assertion (A) :** $arc\sin\frac{1}{2}=\frac{\pi}{6}$.

Reason (R) : The value of the expression $(\cos^{-1}x)^2$ is equal to $\sec^2 x$.

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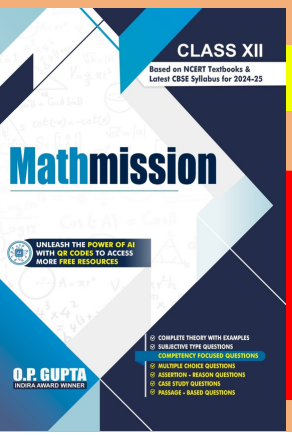

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