RAVI MATHS TUITION & TEST PAPERS , WHATSAPP 8056206308

Inverse Trigonometric Functions PREVIOUSLY ASKED

12th Standard

Maths

Multiple Choice Question 7 x 1 = 7

1) $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to

(a) 1/2 (b) 1/3 (c) 1/4 (d) 1

2) If sin(xy) = 1 then $\frac{dy}{dx}$ is equal to

(a) $\frac{x}{y}$ (b) - $\frac{x}{y}$ (c) $\frac{y}{x}$ (d) - $\frac{y}{x}$

3) If value of $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cot\theta \operatorname{cosec}^2\theta d\theta$ is

(a) $\frac{1}{2}$ (b) - $\frac{1}{2}$ (c) 0 (d) - $\frac{\pi}{8}$

4) $\left[\sin^{-1}\frac{\pi}{3} + \sin^{-1}\left(\frac{1}{2}\right)\right]$ is equal to

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

5) If $\tan^{-1} x = y$, then

(a) $-1 < y < 1$ (b) $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$ (c) $-\frac{\pi}{2} < y < \frac{\pi}{2}$ (d) $y \in \left\{-\frac{\pi}{2}, \frac{\pi}{2}\right\}$

6) $\sin\left(\tan^{-1} x\right)$, where |x| < 1 is equal to

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

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

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

Assertion and reason 6 x 1 = 6

8) **Assertion (A)** Domain of y = $\cos^{-1}$(x) is [-1, 1].

Reason (R) The range of the principal value branch of y = $\cos^{-1}$ (x) is $[0, \pi] - \left\{\frac{\pi}{2}\right\}$

(a) Both Assertion (A) and Reason (R) are true and the Reason (R) is the correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of the Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

9) Assertion (A) : All trigonometric functions have their inverses over their respective domains.

Reason (R) : The inverse of $\tan^{-1} x$ exists for some $x \in R$.

(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

(b) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(c) Assertion is correct but Reason is incorrect.

(d) Assertion is incorrect but Reason is correct.

10) Assertion (A) : Maximum value of $\left(\cos^{-1} x\right)^2$ is π^2

Reason (R) : Range of the principal value branch of $\cos^{-1} x$ is $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$

(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

(b) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(c) Assertion is correct but Reason is incorrect.

(d) Assertion is incorrect but Reason is correct.

11) Assertion (A) : Range of $\left[\sin^{-1} x + 2\cos^{-1} x\right]$ is $[0, \pi]$
Reason (R) : Principal value branch of $\sin^{-1} x$ has range $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Assertion is incorrect but Reason is correct.

12) Assertion (A) : The range of the function $f(x) = 2\sin^{-1} x + \frac{3\pi}{2}$, where $x \in [-1, 1]$, is $\left[\frac{\pi}{2}, \frac{5\pi}{2}\right]$
Reason (R) : The range of the principal value branch of $\sin^{-1}(x)$ is [0, π]
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Assertion is incorrect but Reason is correct.

13) Assertion (A) The domain of the function $\sec^{-1} 2x$ is $\left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{1}{2}, \infty\right)$
Reason (R) : $\sec^{-1}(-2) = -\frac{\pi}{4}$
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Assertion is incorrect but Reason is correct.

2 Marks 34 x 2 = 68

14) Find the principal values of the following: $\text{cosec}^{-1}(-\sqrt{2})$

15) Solve the following equations:
$2 \tan^{-1}(\cos x) = \tan^{-1}(2 \text{ cosec } x)$.

16) Write the principal value of $\tan^{-1}\left[sin\left(-\frac{\pi}{2}\right)\right]$

17) Find the value of the following : $cot\left(\frac{\pi}{2} - 2cot^{-1}\sqrt{3}\right)$

18) Write the value of $cos^{-1}\left(-\frac{1}{2}\right) + 2sin^{-1}\left(\frac{1}{2}\right)$

19) Write the principal value of $\left[cos^{-1}\left(\frac{\sqrt{3}}{2}\right) + cos^{-1}\left(-\frac{1}{2}\right)\right]$

20) Write the principal value of the following : $\left[tan^{-1}\left(-\sqrt{3}\right) + tan^{-1}(1)\right]$

21) Evaluvate : $sin^{-1}\left[sin\left(\frac{3\pi}{5}\right)\right]$

22) Write the principal value of $tan^{-1}(1) + cos^{-1}\left(-\frac{1}{2}\right)$

23) Write the value of $tan\left[2tan^{-1}\left(\frac{1}{5}\right)\right]$

24) Write the value of $tan^{-1}\left[2sin\left(2cos^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)\right]$

25) Write the principal value of $tan^{-1}\left(tan\frac{9\pi}{8}\right)$

26) Write the principal value of $tan^{-1}\left(tan\frac{7\pi}{6}\right)$

27) Find the principal value of $tan^{-1}\sqrt{3} - sec^{-1}(-2)$

28) Write the principal value of $\left[cos^{-1}\left(\frac{1}{2}\right) - 2sin^{-1}\left(-\frac{1}{2}\right)\right]$

29) Write the value of cot ($\tan^{-1}$a + $\cot^{-1}$a).

30) Evaluate : $\sin\left(2\cos^{-1}\left(-\frac{3}{5}\right)\right)$

31) Write the value of the following : $\tan^{-1}\left(\frac{a}{b}\right) - \tan^{-1}\left(\frac{a-b}{a+b}\right)$.

32) Write the value of $sin\left(2sin^{-1}\frac{3}{5}\right)$

33) Show that : $tan^{-1}\frac{3}{4} + tan^{-1}\frac{3}{5} - tan^{-1}\frac{8}{19} = \frac{\pi}{4}$

34) Write the principal value of $\tan^{-1}\left[\sin\left(-\frac{\pi}{2}\right)\right]$

35) Find value of k, if $\sin^{-1}\left[k\tan\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right] = \frac{\pi}{3}$

36) If $a = \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)$ and $b = \tan^{-1}(\sqrt{3}) - \cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ then find the value of a+b.

37) Simplify $\cos^{-1} x + \cos^{-1}\left[\frac{x}{2} + \frac{\sqrt{3-3x^2}}{2}\right]; \frac{1}{2} \leq x \leq 1$

38) Write the domain and range (principle value branch) of the following function $f(x) = \tan^{-1} x$

39) Find the value of $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right] + \tan^{-1} 1$

40) Evaluate $\sin^{-1}\left(\sin\frac{3\pi}{4}\right) + \cos^{-1}\left(\cos\frac{3\pi}{4}\right) + \tan^{-1}(1)$

41) Find the domain of $y = \sin^{-1}\left(x^2 - 4\right)$

42) Evaluate $\cos^{-1}\left[\cos\left(-\frac{7\pi}{3}\right)\right]$

43) Evaluate $3\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) + 2\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) + \cos^{-1}(0)$

44) Draw the graph of $f(x) = \sin^{-1} x, x \in \left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$. Also, write range of f(x).

45) Find the value of $\sin^{-1}\left[\cos\frac{33\pi}{5}\right]$

46) Find the value of $\sin^{-1}\left[\sin\frac{13\pi}{7}\right]$

47) Express $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right) \frac{-3\pi}{2} < x < \frac{\pi}{2}$ in the simplest form.

3 Marks 7 x 3 = 21

48) Find the values of each of the expressions in Exercises
$\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$

49) Write the principal value of $tan^{-1}\left(\sqrt{3}\right) + cot^{-1}\left(-\sqrt{3}\right)$

50) Evaluate of the following
$\cos\left(\cos^{-1}\frac{1}{2}\right)$

51) If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$, then findthe value of x . Sol We have, $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$

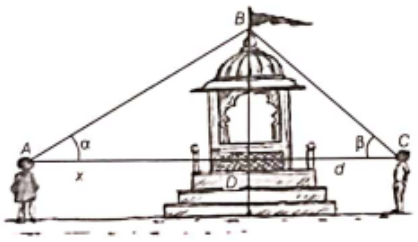
52) Solve the equation $\cos\left(\tan^{-1} x\right) = \sin\left(\cot^{-1}\frac{3}{4}\right)$

53) Find the value of $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$

54) If $y = \cot^{-1}(\sqrt{\cos x}) - \tan^{-1}(\sqrt{\cos x})$, then prove that $\sin y = \tan^2\left(\frac{x}{2}\right)$

Case Study Questions 1 x 4 = 4

55) Two men on either side of a temple of 30 m high observe its top at the angles of elevation = α and ß respectively. (as shown in the figure below).



The distance between the two men is $40\sqrt{3}$ m and the distance between the first person A and the temple is $30\sqrt{3}$ m. Based on the above information answer the following questions.

∠CAB = α =

a) $\sin^{-1}$ (2/ $\sqrt{3}$)	**b) $\sin^{-1}$ (1/2)**	**c) $\sin^{-1}$ (2)**	**d) $\sin^{-1}$ ($\sqrt{3}$/2)**

(ii) $\angle CAB = \alpha =$

a) $\cos^{-1}\left(\frac{1}{5}\right)$	**b)** $\cos^{-1}\left(\frac{2}{5}\right)$	**c)** $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$	**d)** $\cos^{-1}\left(\frac{4}{5}\right)$

(iii) $\angle BCA = \beta =$

a) $\tan^{-1}\left(\frac{1}{2}\right)$	**b)** $\tan^{-1}(2)$	**c)** $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$	**d)** $\tan^{-1}(\sqrt{3})$

(iv) $\angle ABC =$

a) $\frac{\pi}{4}$	**b)** $\frac{\pi}{6}$	**c)** $\frac{\pi}{2}$	**d)** $\frac{\pi}{3}$

(v) Domain and range of $\cos^{-1} x =$

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

5 Marks 15 x 5 = 75

56) Find the values of each of the following:
$\tan \frac{1}{2}\left[\sin^{-1} \frac{2x}{1+x^2} + \cos^{-1} \frac{1-y^2}{1+y^2}\right], \ |x| < 1, \ y > 0$ and xy < 1.

57) Solve the following equations:
$\tan^{-1} \frac{1-x}{1+x} = \frac{1}{2}\tan^{-1} x, (x > 0)$

58) Solve for $x, \tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1} \frac{8}{31}$\(0

59) Solve for x, $tan^{-1}3x + tan^{-1}2x = \frac{\pi}{4}$

60) Prove that : $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right) = \frac{\pi}{4} - \frac{x}{2}, x\epsilon\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

61) Prove that :$tan^{-1}\left(\frac{1}{2}\right) + tan^{-1}\left(\frac{1}{5}\right) + tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$

62) Prove that $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$.

63) If sin[$\cot^{-1}$ (x + 1)] = cos($\tan^{-1}$x), then find x.

64) Prove that : $2sin^{-1}\frac{3}{5} - tan^{-1}\frac{17}{31} = \frac{\pi}{4}$

65) Show that $\sin^{-1}\left(\frac{8}{17}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \cos^{-1}\left(\frac{36}{85}\right)$

66) Solve following equation for x.
$\tan^{-1}\left(\frac{1-x}{1+x}\right) = \frac{1}{2}\tan^{-1} x, x > 0$

67) Solve for $x, \tan^{-1} x + 2\cot^{-1} x = \frac{2\pi}{6}$.

68) Prove that $\tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

69) Prove that $\tan^{-1}\left(\frac{6x-8x^3}{1-12x^2}\right) - \tan^{-1}\left(\frac{4x}{1-4x^2}\right) = \tan^{-1} 2x, |2x| < \frac{1}{\sqrt{3}}$

70) Prove that $2\tan^{-}1(1/2) + \tan^{-}1(1/7) = \sin^{-}1(31/25\sqrt{2})$

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