# INVERSE TRIGONOMETRY

## Class 12 - Mathematics

**Time Allowed: 1 hour and 30 minutes**                                           **Maximum Marks: 45**

1.  Range of $\sin^{-1}x$ is                                                                                   **[1]**

    a) $\left[0, \frac{\pi}{4}\right]$                                          b) $[0, \pi]$

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

2.  If $\cos\left(\sin^{-1}\frac{2}{\sqrt{5}} + \cos^{-1}x\right) = 0$, then x is equal to           **[1]**

    a) 1                                                             b) $\frac{2}{\sqrt{5}}$

    c) $-\frac{2}{\sqrt{5}}$                                              d) $\frac{1}{\sqrt{5}}$

3.  If $\theta = \sin^{-1}(\sin 600^{\circ})$ then the value of $\theta$ is                             **[1]**

    a) 0                                                             b) $\frac{\pi}{3}$

    c) $\frac{2\pi}{3}$                                                   d) $-\frac{\pi}{3}$

4.  $\sin^{-1}\left(\frac{1}{\sqrt{5}}\right) + \cot^{-1}(3) =$                                            **[1]**

    a) $\frac{\pi}{4}$                                                    b) $\frac{\pi}{2}$

    c) $\frac{\pi}{3}$                                                    d) $\frac{\pi}{6}$

5.  Let $f(x) = \sqrt{\cos x}$ Then, dom (f) = ?                                          **[1]**

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

    c) $\left[0, \frac{\pi}{2}\right] \cup \left[\frac{3\pi}{2}, 2\pi\right]$                     d) $\left[\frac{3\pi}{4}, 3\pi\right]$

6.  The domain of the function $\cos^{-1}(2x-1)$ is                                      **[1]**

    a) $[0, \pi]$                                                     b) $[-1, 1]$

    c) $[0, 1]$                                                      d) $(-1, 0)$

7.  if $\theta = cos^{-1}\left(\frac{1}{x}\right)$, then $\tan\theta$ is equal to                             **[1]**

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

    c) $\frac{x\sqrt{1-x^2}}{|x|}$                                          d) $\sqrt{x^2-1}$

8.  The value of $\cot\left[\frac{1}{2}\sin^{-1}\frac{\sqrt{3}}{2}\right]$ is                                   **[1]**

    a) $\frac{1}{\sqrt{3}}$                                                b) $\sqrt{3}$

    c) 0                                                             d) 1

9.  If $\sin^{-1}(x^2 - 7x + 12) = n\pi, \forall\ n \in Z$, then x equals                        **[1]**

a) 4

b) 3

c) -3

d) -4

10. If f(x) = sin⁻¹x, then domain of f(x) is **[1]**

    a) $x \geq 1$ or $x \leq -1$

    b) $x \geq 1$

    c) $0 \leq x \leq 1$

    d) $-1 \leq x \leq 1$

11. Draw the graph of the principal branch of the function f(x) = cos⁻¹ x. **[1]**

12. Write the value of $\cos^{-1}\left(-\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$. **[1]**

13. Find the principal value of $\cos^{-1}\left(-\frac{1}{2}\right)$. **[1]**

14. Evaluate: $\sin\left[\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$. **[1]**

15. $\cos^{-1}\left(\frac{-1}{2}\right)$ **[2]**

16. $\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$ **[2]**

17. Find the principal value of $\cot^{-1}(\sqrt{3})$. **[2]**

18. For the principal value, evaluate $\tan^{-1}\left\{2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right\}$. **[2]**

19. Write the value of $\sin^{-1}\left(\frac{1}{3}\right) - \cos^{-1}\left(-\frac{1}{3}\right)$ **[2]**

20. Which is greater, tan 1 or tan⁻¹ 1? **[2]**

21. Find the value of $\tan^{-1}\left(\tan\frac{2\pi}{3}\right)$. **[2]**

22. Write the interval for the principal value of function and draw its graph: tan⁻¹ x. **[2]**

23. Evaluate: $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$. **[2]**

24. Find the principal value of tan⁻¹ $(\sqrt{3})$. **[2]**

25. Find the value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ **[3]**

26. **Read the following text carefully and answer the questions that follow:** **[4]**

Two men on either side of a temple of 30 meters high observe its top at the angles of elevation $\alpha$ and $\beta$ respectively. (as shown in the figure above). The distance between the two men is $40\sqrt{3}$ meters and the distance between the first person A and the temple is $30\sqrt{3}$ meters.
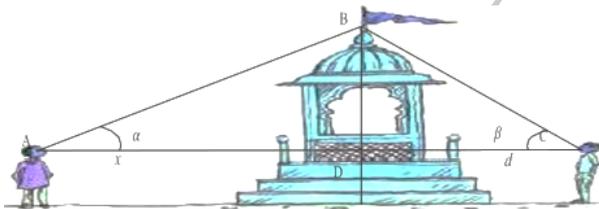


  i. Find the measure of ∠CAB = $\alpha$ in terms of sin and cos. (1)

  ii. Find the measure of ∠BCA = $\beta$. (1)
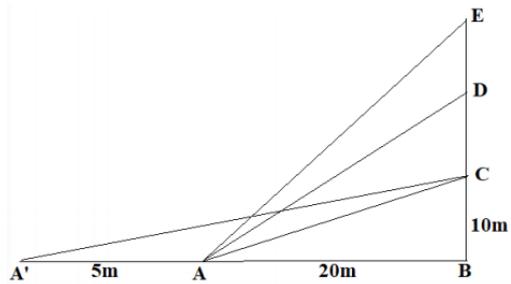
  iii. Find the measure of ∠ABC. (2)

    **OR**

  What is the Domain and Range of cos⁻¹x. (2)

27. **Read the following text carefully and answer the questions that follow:** **[4]**

The Government of India is planning to fix a hoarding board at the face of a building on the road of a busy market for awareness on COVID-19 protocol. Ram, Robert, and Rahim are the three engineers who are working on this project. A is considered to be a person viewing the hoarding board 20 metres away from the building, standing at the edge of a pathway nearby. Ram, Robert and Rahim suggested to the firm to place the hoarding board at three different locations namely C, D and E. C is at the height of 10 metres from the ground level. For

the viewer, A, the angle of elevation of "D" is double the angle of elevation of C The angle of elevation of E is triple the angle of elevation of C for the same viewer. Look at the figure given:



i. Find the measure of $\angle CAB$ and $\angle DAB$. (1)

ii. Find the measure of $\angle EAB$. (1)

iii. A' is another viewer standing on the same line of observation across the road. If the width of the road is 5 meters, then find the difference between $\angle CAB$ and $\angle CA'B$. (2)

**OR**

What is the Domain and Range of $\tan^{-1}x$. (2)