



INDIAN SCHOOL AL WADI AL KABIR

Department of Mathematics, 2021-2022

CLASS: XII

Chapter -2 – Inverse Trigonometric Function

25-04-2021

1- & 2-mark questions

Q.1. Simplify $2 \tan^{-1} x + \sin^{-1} \left(\frac{2x}{1+x^2} \right)$

Q.2. Find the value of $\tan \left(\cos^{-1} \left(\frac{1}{\sqrt{2}} \right) \right)$.

Q.3. Evaluate $\tan \left(\cos^{-1} \left(\frac{4}{5} \right) + \tan^{-1} \left(\frac{2}{3} \right) \right)$

Q.4. Find $\sin(\cot^{-1} x)$ in terms of x .

Q.5. Write $\cot^{-1} \left(\frac{1}{\sqrt{x^2-1}} \right), |x| > 1$ in the simplest form.

Q.6. Prove that $\sin^{-1} \frac{1}{\sqrt{5}} + \cot^{-1} 3 = \frac{\pi}{4}$

Q.7. Prove that $\cos^{-1} x = \tan^{-1} \left(\frac{\sqrt{1-x^2}}{x} \right)$.

Q.8. Find the principal value of $\sin^{-1} \sin \left(\frac{2\pi}{3} \right)$.

Descriptive questions

Q.9. If $\cos^{-1} \left(\frac{x}{a} \right) + \cos^{-1} \left(\frac{y}{b} \right) = \alpha$ prove that $\frac{x^2}{a^2} - \frac{2xy}{ab} \cos \alpha + \frac{y^2}{b^2} = \sin^2 \alpha$

Q.10 Find the value of $\sin \left(2 \tan^{-1} \frac{1}{3} \right) + \cos \left(\tan^{-1} 2\sqrt{2} \right)$

Q.11 Write $\sin^{-1} (x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2})$, in the simplest form.

Q12. Prove the following:

i) $\tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9} = \frac{1}{2} \cos^{-1} \frac{3}{5}$

ii) $\tan \left(\cos^{-1} \frac{4}{5} + \tan^{-1} \frac{2}{3} \right) = \frac{17}{6}$

iii) $2 \tan^{-1} \frac{1}{3} + \sin^{-1} \frac{4}{5} = \frac{\pi}{2}$.

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| Q13. | Simplify the following: |
| i) | $\tan^{-1}\left(\frac{a \cos x - b \sin x}{b \cos x + a \sin x}\right), -\frac{\pi}{2} < x < \frac{\pi}{2}, \frac{a}{b} \tan x > -1$ |
| ii) | $\sin^{-1}\left(\frac{\sin x + \cos x}{\sqrt{2}}\right), \frac{-\pi}{4} < x < \frac{\pi}{4}.$ |
| iii) | If $\tan^{-1}\left(\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}\right) = \alpha$ then prove that $x^2 = \sin^2 \alpha$. |
| Q14. | Solve the following: |
| i) | $\tan^{-1}(x-1) + \tan^{-1}(x) + \tan^{-1}(x+1) = \tan^{-1}(3x).$ |
| ii) | $\tan^{-1}\frac{1}{4} + 2 \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{6} + \tan^{-1}\frac{1}{x} = \frac{\pi}{4}.$ |
| iii) | $\cot^{-1}x - \cot^{-1}(x+2) = \frac{\pi}{12}.$ |
| iv) | $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\frac{8}{31}$ |
| Q15. | If $y = \cot^{-1}(\sqrt{\cos x}) - \tan^{-1}(\sqrt{\cos x})$, then prove that $\sin y = \tan^2\left(\frac{x}{2}\right)$ |
| Q16. | Prove that $\tan\left(\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right) + \tan\left(\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right) = \frac{2b}{a}$ |

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| Answers | 1 | $4 \tan^{-1} x$ | 2 | 1 | 3. | $\frac{7}{16}$ | 4 | $\frac{1}{\sqrt{1+x^2}}$ |
| | 5 | $\sec^{-1} x$ | 6 | | 7 | | 8 | |
| | 9 | $\frac{14}{15}$ | 10 | $\sin^{-1} x - \sin^{-1} \sqrt{x}$ | 11 | | 12 | |
| | 13 | i.) $\tan^{-1} \frac{a}{b} - x$ ii.) $x + \frac{\pi}{4}$ | 14 | i) $0, \pm \frac{1}{2}$ ii). $\frac{-461}{9}$ iii). $\sqrt{3}$ iv). $\frac{1}{4}$ | 15 | | 16 | |