MATHS

BOOKS - ARIHANT PRAKASHAN

INVERSE TRIGONOMETRIC FUNCTIONS

Practice Questions Exams Textbook S Other Imp Questions 1 Mark Questions

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

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2. Using the principal values, write the value of

$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

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3. Write the principal value of the following:

$$\left[\cos^{-1}\frac{\sqrt{3}}{2}+\cos^{-1}\left(-\frac{1}{2}\right)\right]$$

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4. What is the principal value of $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$?

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5. The value of $\cos^{-1}\left(\cos,\frac{3\pi}{2}\right)$ is

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

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

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

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9. Write the value of $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$.

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10. Write the value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$.

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11. If $\tan^{-1}(\sqrt{3}) + \cot^{-1}x = \frac{\pi}{2}$, then find the value of x.

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12. If $\sin\left(\frac{\sin^{-1}1}{5}+\cos^{-1}x\right)=1$, then find the value of x.

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13. If $x+y=4, xy=1$, then find $\tan^{-1}x+\tan^{-1}y$.

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14. Write the value of $\tan\left(2\tan^{-1}\left(\frac{1}{5}\right)\right)$.

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15. Prove that: $3\sin^{-1}x=\sin^{-1}\left(3x-4x^3\right), x\in\left[-\frac{1}{2},\frac{1}{2}\right]$

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

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Practice Questions Exams Textbook S Other Imp Questions 4 Marks Questions

1. Solve for x, $2\tan^{-1}(\cos x) = \tan^{-1}(2\text{cosec}x)$.

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2. Prove that :

$\cos^{-1}\left(\frac{b+a\cos x}{a+b\cos x}\right)$

` =2"tan"^(-1)(sqrt((a-b)/(a+b)) "tan" x/2)

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3. Prove the $\sin^{-1}\sqrt{\frac{x-q}{p-q}} = \cos^{-1}$sqrt((p-x)/(p-q))="cot"^(-1) sqrt((p-x)/(x-q))`

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

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5. Prove statement $\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13} = \cos^{-1}\frac{33}{65}$

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6. Prove that $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\left(\frac{1}{3}\right) = \frac{9}{4}\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)$.

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7. Express the value of $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\frac{(x-y)}{(x+y)}$ in simplest form.

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8. Prove that

$$\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}.$$

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9. Prove that $\cos\left(\sin^{-1}\left(\frac{3}{5}\right) + \cot^{-1}\left(\frac{3}{2}\right)\right) = \frac{6}{5\sqrt{13}}$

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10. Prove the following: $2\tan^{-1}\left(\frac{3}{4}\right) - \tan^{-1}\left(\frac{17}{31}\right) = \frac{\pi}{4}$

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11. Prove that : $\cot^{-1} 7 + \cot^{-1} 8 + \cot^{-1} 18 = \cot^{-1} 3$

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12. Solve for x: - $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{8}{31}\right)$

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13. Solve the following for x: $\tan^{-1} 2x + \tan^{-1} 3x = n\pi + \frac{3\pi}{4}$

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14. Prove that:

$$\tan^{-1}\left[\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right] = \frac{\pi}{4} - \frac{1}{2}\cos^{-1} x, \quad -\frac{1}{\sqrt{2}} \leq x \leq 1$$

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15. Prove that $\cos^{-1}(x) + \cos^{-1}\left\{\frac{x}{2} + \frac{\sqrt{3-3x^2}}{2}\right\} = \frac{\pi}{3}$.

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

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17. Solve: $2\sin^{-1}x + \sin^{-1}(1-x) = \frac{\pi}{2}$

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18. Prove that following

$\cot^{-1}\left(\frac{xy+1}{x-y}\right) + \cot^{-1}\left(\frac{yz+1}{y-z}\right) + \cot^{-1}\left(\frac{zx+1}{z-x}\right) = 0, (0 < xy, yz,$

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19. Prove that

$$\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)=\frac{\pi}{4}-\frac{x}{2}, x \in\left(-\frac{\pi}{2}, \frac{\pi}{2}\right).$$

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20. Prove that $\tan^{-1}(1)+\tan^{-1}(2)+\tan^{-1}(3)=\pi$.

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21. Prove that

$$\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=\frac{x}{2}, 0<x<\frac{\pi}{2}, \text{ or } x \in\left(0, \frac{\pi}{4}\right)$$

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22. Show that $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)=\frac{4-\sqrt{7}}{3}$.

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23. Prove that

$$\tan\left\{\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right\}+\tan\left\{\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right\}=\frac{2b}{a}.$$

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24. Prove that

$$2\tan^{-1}\left(\frac{1}{5}\right)+\sec^{-1}\left(\frac{5\sqrt{2}}{7}\right)+2\tan^{-1}\left(\frac{1}{8}\right)=\frac{\pi}{4}.$$

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25. Prove that $\tan^{-1}\sqrt{x}=\frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), x\in(0,1).$

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26. Solve for x, $\cos\left(2\sin^{-1}x\right)=\frac{1}{9}, x>0.$

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27. Prove that

$$\sin^{-1}\left(\frac{4}{5}\right)+\sin^{-1}\left(\frac{5}{13}\right)+\sin^{-1}\left(\frac{16}{65}\right)=\frac{\pi}{2}$$

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Practice Questions Exams Textbook S Other Imp Questions 6 Marks Questions

1. In a triangle ABC if $m\angle A=90^\circ$,

prove that $\tan\hat{}(-1)\ b/(a+b)+\frac{\tan^{-1}c}{a+b}=\frac{\pi}{4}$. where a,b,c, are sides of the triangle.

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2. If $\sin^{-1}\left(\frac{x}{a}\right)+\sin^{-1}\left(\frac{y}{b}\right)=\sin^{-1}\left(\frac{c^2}{ab}\right)$,

then prove that $b^2x^2+2xy\sqrt{a^2b^2-c^4}+a^2y^2=c^4$

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3. If $\left(\tan^{-1}x\right)^2+\left(\cot^{-1}x\right)^2=\frac{5\pi^2}{8}$, then find x.

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4. Solve for x, $\cos^{-1}x+\sin^{-1}\left(\frac{x}{2}\right)=\frac{\pi}{6}$.

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5. If $\cos^{-1}\left(\frac{x}{y}\right)+\cos^{-1}\left(\frac{y}{3}\right)=\theta$, prove that $9x^2-12xy\cos\theta+4y^2=36\sin^2\theta$

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Chapter Test 1 Mark Questions

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

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2. Fill in the blank choosing correct answer from the brackets if $\sin^{-1}\frac{x}{5}+\operatorname{cosec}^{-1}\frac{5}{4}=\frac{\pi}{2}$, then the value of x=_____

(2,3,4)

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

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4. Using the principal values, find the value of $\cos^{-1}\cos\left(\frac{13\pi}{6}\right)$.

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5. Fill in the blank choosing correct answer from the brackets The value of $\sin\left(\tan^{-1}x+\frac{\tan^{-1}1}{x}, x>0\_\_\_.\right.$

$\left(0, 1, \frac{1}{2}\right)$

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6. Fill in the blank choosing correct answer from the brackets if $\theta=\cos^{-1}x+\sin^{-1}x-\tan^{-1}x, x\geq 0$, then the smallest interval in which θ lies is ___.

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

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7. Express $\tan^{-1}\left(\sqrt{1+x^2}-x\right)$ in simplest form.

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Chapter Test 4 Marks Questions

1. Prove that

$$\tan^{-1}\left(\frac{1}{5}\right)+\tan^{-1}\left(\frac{1}{7}\right)+\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{8}\right)=\frac{\pi}{4}.$$

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

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3. Solve $\sin^{-1}x+\sin^{-1}(1-x)=\frac{\pi}{2}.$

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4. Solve equation $\tan^{-1}\frac{x-1}{x+1}=\tan^{-1}\frac{2x-x}{2x+1}=\tan^{-1}\frac{23}{36}$

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5. Prove that :

$$\tan^{-1}\sqrt{\frac{xr}{yz}}+\tan^{-1}\sqrt{\frac{yr}{yx}}+\tan^{-1}\sqrt{\frac{zr}{xy}}=\pi \text{where} r=x+y+z.$$

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Chapter Test 6 Marks Questions

1. If

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

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2. Evaluate $\tan^{-1}\left(\frac{3\sin 2\alpha}{5+3\cos 2\alpha}\right)+\tan^{-1}\left(\frac{1}{4}\tan\alpha\right)$, where, $-\frac{\pi}{2}<\alpha<\frac{\pi}{2}$.

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3. Prove that $\cos^{-1}\left[\frac{\cos\alpha+\cos\beta}{1+\cos\alpha\cos\beta}\right]=2\tan^{-1}\left(\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\right)$

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