MATHS

BOOKS - MBD MATHS (ODIA ENGLISH)

INVERSE TRIGONOMETRIC FUNCTIONS

Question Bank

1. Fill in the blank choosing correct answer from the brackets if $A = \tan^{-1} x$, then the value of sin 2A =_____

$\left(\frac{2x}{1-x^2}, \frac{2x}{\sqrt{1-x^2}}, \frac{2x}{1+x^2} \right)$

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2. Fill in the blank choosing correct answer from the brackets if the value of $\sin^{-1} x = \frac{\pi}{5}$ for some $x \in (-1, 1)$then the value of

$\cos^{-1} x is$ _ _ _ .

$\left(\frac{3\pi}{10}, \frac{5\pi}{10}, \frac{7\pi}{10}\right)$

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3. Fill in the blank choosing correct answer from the brackets the value of

$\tan^{-1}\left(2\frac{\cos\pi}{x}\right)$ is _ _ _ _

$\left(1, \frac{\pi}{4}, \frac{\pi}{3}\right)$

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4. Fill in the blank choosing correct answer from the brackets

if $x + y = 4, xy = 1, then$tan^(-1)x + tan^(-1) y =_____

((3pi)/4,pi/4,pi/2)`

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5. Fill in the blank choosing correct answer from the brackets The value of $\cot^{-1} 2 + \frac{\tan^{-1} 1}{3} =$ _ _ _ _ _ _. (pi/4,1,pi/2)`

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6. Fill in the blank choosing correct answer from the brackets $Thepr \in cipalvalueof$"sin"^(-1)("sin"(2pi)/3) "is"_____.((2pi)/3, pi/3,(4pi)/3)`

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

(2,3,4)

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8. 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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9. Fill in the blank choosing correct answer from the brackets $\cot^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\left(\sqrt{1}+\sin x\right)}\right]=$_____

$\left(2\pi-\frac{x}{2}, \frac{x}{2}, \pi-\frac{x}{2}\right)$

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10. Fill in the blank choosing correct answer from the brackets $2\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{24}{25}=$_____.

$(\pi, -\pi, 0)$

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11. 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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12. Fill in the blank choosing correct answer from the brackets $\sec^2\left(\tan^{-1} 2\right) + \cos ec^2\left(\cot^{-1} 3\right) =$ _ _ .

$(16, 14, 15)$

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13. Write whether $\sin^{-1}\frac{1}{x}\text{cosec}^{-1}x = 1$ statements are true or false.

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14. Write whether $\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{2}{3}=\tan^{-1}\frac{17}{6}$ statements are true or false.

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15. Write whether $\tan^{-1}\frac{4}{3}+\cot^{-1}\left(\frac{-3}{4}\right)=\pi$ statements are true or false.

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16. Write whether $\sec^{-1}\frac{1}{2}+\operatorname{cosec}^{-1}\frac{1}{2}=\frac{\pi}{2}$ statements are true or false.

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17. Write whether $\sec^{-1}\left(-\frac{7}{5}\right)=\pi-\cos^{-1}\frac{5}{7}$ statements are true or false.

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18. Write whether $\tan^{-1}(\tan 3) = 3$ statements are true or false.

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19. Write whether The principal value of $\tan^{-1}\left(\tan\frac{3\pi}{4}\right) is \frac{3\pi}{4}$ statements are true or false.

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20. Write whether $\cot^{-1}(-\sqrt{3})$ is in the second quadrant. statements are true or false.

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21. Write whether $3\tan^{-1}3 = \tan^{-1}\frac{9}{13}$ statements are true or false.

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22. Write whether $\tan^{-1}2+\tan^{-1}3=-\frac{\pi}{4}$ statements are true or false.

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23. Write whether $2\sin^{-1}\frac{4}{5}=\sin^{-1}\frac{24}{25}$ statements are true or false.

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24. Write whether the equation $\tan^{-1}(\cot x)=2x$ has exactly two real solutions statements are true or false.

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25. Express the value of $\sin\left(2\sin^{-1}0.6\right)$ in simplest form.

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26. Express the value of $\tan\left(\frac{\pi}{4}+2\cot^{-1}3\right)$ in simplest form.

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27. Express the value of$\cos\left(2\sin^{-1}x\right)$ in simplest form.

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28. Express the value of$\tan\left(\cos^{-1}x\right)$ in simplest form.

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29. 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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30. Express the value of $\operatorname{cosec}\left(\cos^{-1}\frac{3}{5}+\cos^{-1}\frac{4}{5}\right)$ in simplest form.

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31. Express the value of $\sin^{-1}\frac{1}{\sqrt{5}}+\cos(-1)\frac{3}{\sqrt{10}}$ in simplest form.

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32. Express the value of $\sin\cos^{-1}\tan\sec^{-1}\sqrt{2}$ in simplest form.

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33. Express the value of $\sin\left(2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right)$ in simplest form.

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34. Express the value of $\tan\left\{\frac{1}{2}\sin^{-1}\frac{2x}{1+x^2}+\frac{1}{2}\cos^{-1}\frac{1-y^2}{1+y^2}\right\}$ in simplest form.

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35. Express the value of$\sin\cot^{-1}\cos\tan^{-1}x$ in simplest form.

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

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37. Prove statement $\sin^{-1}\frac{3}{5}+\sin^{-1}\frac{8}{17}=\cos^{-1}\frac{36}{85}$

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

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39. Prove statement $\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{13}=\tan^{-1}\frac{2}{9}$

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40. Prove statement $\tan(-1)\frac{1}{2}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$

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41. Prove statement $\tan\left(2\tan^{-1}\frac{1}{5}-\frac{\pi}{4}\right)+\frac{7}{17}=0$

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42. Prove statement $\cot^{-1}9+\operatorname{cosec}^{-1}\frac{\sqrt{41}}{4}=\frac{\pi}{4}$

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43. Prove statement $\sin^{-1}\frac{4}{5}+2\tan^{-1}\frac{1}{3}=\frac{\pi}{2}$

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44. Prove statement $4\tan^{-1}\frac{1}{5}-\tan^{-1}\frac{1}{70}+\tan^{-1}\frac{1}{99}=\frac{\pi}{4}$

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45. Prove statement $2\tan^{-1}\frac{1}{5}+\sec^{-1}\frac{5\sqrt{2}}{7}+2\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$

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46. Prove statement

$$\cos^{-1}\frac{12}{13}+2\cos^{-1}\sqrt{\frac{64}{65}}+\cos^{-1}\sqrt{\frac{49}{50}}=\cos^{-1}\frac{1}{\sqrt{2}}$$

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47. Prove statement $\tan^2\cos^{-1}\frac{1}{\sqrt{3}}+\cot^2\sin^{-1}\frac{1}{\sqrt{5}}=6$

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48. Prove statement $\cos\ \tan^{-1}\ \cot\ \sin^{-1}x=x$

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49. Prove statement $\cot^{-1}(\tan 2x)+\cot^{-1}(-\tan 2x)=\pi$

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50. Prove statement $\tan^{-1}x+\cot^{-1}(x+1)=\tan^{-1}\left(x^2+x+1\right)$

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51. Prove statement $\tan^{-1}\left(\frac{a-b}{1+ab}\right)+\tan^{-1}\left(\frac{b-c}{1+bc}\right)$

$=\tan^{-1}a-\tan^{-1}c.$

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52. Prove statement $\cot^{-1}\frac{pq+1}{p-q}+\cot^{-1}\frac{qr+1}{q-r}+\cot^{-1}\frac{rp+1}{r-p}=0$

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53. Prove statement$\tan^{-1}\frac{a-b}{1+ab}+\tan^{-1}\frac{b-c}{1+bc}+\tan^{-1}\frac{c-a}{1+ca}$

$=\tan^{-1}\frac{a^2-b^2}{1+a^2b^2}+\tan^{-1}\frac{b^2-c^2}{1+b^2c^2}+\tan^{-1}\frac{c^2-a^2}{1+c^2a^2}$

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54. Prove the $\tan^{-1}\frac{2a-b}{b\sqrt{3}}+\tan^{-1}\frac{2b-a}{a\sqrt{3}}=\frac{\pi}{3}$

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55. Prove the $\tan^{-1}\frac{1}{x+y}+\tan^{-1}\frac{y}{x^2=xy+1}=\tan^{-1}\frac{1}{x}$

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56. 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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57. Prove the $\sin^2\left(\sin^{-1}x+\sin^{-1}y+\sin^{-1}z\right)$

$=\cos^2\left(\cos^{-1}x+\cos^{-1}y+\cos^{-1}z\right)$

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58. Prove the

$\tan\left(\tan^{-1}x+\tan^{-1}y+\tan^{-1}z\right)=\cot\left(\cot^{-1}x+\cot^{-1}y+\cot^{-1}z\right)$

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59. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \pi$, show that $x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz$

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60. If $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z - \pi$

show that x+y+z=xyz.

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61. If $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \frac{\pi}{2}$. Show that xy+yz+zx =1.

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62. If $r^2 = x^2 + y^2 + z^2$, Prove that

$\tan^{-1}\frac{yz}{xr} = \tan^{-1}\frac{zx}{yr} + \tan^{-1}\frac{xy}{zr} = \frac{\pi}{2}$

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63. 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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64. Solve: $\cos\left(2\sin^{-1}x\right) = \frac{1}{9}$

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

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

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67. Solve: $\cos^{-1}x + \sin^{-1}\frac{x}{2} = \frac{\pi}{6}$

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68. Solve: $\tan^{-1}\frac{x-2}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$

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69. Solve: $\tan^{-1}\frac{1}{2x+1} + \tan^{-1}\frac{1}{4x+1}$
$= \tan^{-1}\frac{2}{x^2}$

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70. Solve: $3\sin^{-1}\frac{2x}{1+x^2} - 4\cos^{-1}\frac{1-x^2}{1+x^2} + 2\tan^{-1}\frac{2x}{1-x^2} = \frac{\pi}{3}$

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71. Solve:$\cot^{-1}\frac{1}{x-1}+\cot^{-1}\frac{1}{x}+\cot^{-1}\frac{1}{x+1}=\cot^{-1}\frac{1}{3x}$

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72. Solve: $\cot^{-1}\frac{1-x^2}{2x}=\operatorname{cosec}^{-1}\frac{1+a^2}{2a}-\sec^{-1}\frac{1+b^2}{1-b^2}$

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73. Solve: $\sin^{-1}\left(\frac{2a}{1+a^2}\right)+\sin^{-1}\left(\frac{2b}{1+b^2}\right)=2\tan^{-1}x$

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74. Solve: $\sin^{-1}x-\cos^{-1}x=\cos^{-1}\frac{\sqrt{3}}{2}$

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

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76. Prove the Statement:$\sin^{-1}\frac{12}{13} - \sin^{-1}\frac{3}{5} = \sin^{-1}\frac{33}{65}$

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77. 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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78. 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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79. 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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80. If

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

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81. If

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

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82. 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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83. If

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

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84. If

$\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\pi$prove that$x^4+y^4+z^4+4x^2y^2z^2=2\left(x^2y$

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85. 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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86. Solve equation $\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}x=\frac{\pi}{4}$

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87. Solve equation $\cos^{-1}\left(x+\frac{1}{2}\right)+\cos^{-1}x$

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88. Solve equation $3\tan^{-1}\frac{1}{\left(2+\sqrt{3}\right)}-\tan^{-1}\frac{1}{x}=\tan^{-1}\frac{1}{3}$

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