MATHS

BOOKS - MAXIMUM PUBLICATION

INVERSE TRIGNOMETRY

Example

1. prove the following

$$\sin^{-1}\frac{8}{17}+\sin^{-1}\frac{3}{5}=\sin^{-1}\frac{77}{85}$$

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2. prove the following

$$\tan^{-1}\frac{63}{16} = \sin^{-1}\frac{5}{13} + \cos^{-1}\frac{3}{5}$$

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3. prove the following

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

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4. Find the value of

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

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5. If $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=\pi$,show that

$$x+y+z=xyz$$

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6. Match the following

A	B
$\sin x \cos y - \cos x \sin y$	1
$\tan \frac{\pi}{4}$	$2\cos^2 x$
$2 \sin x \cos x$	$\sin(x - y)$
$1 + \cos 2x$	$\sin 2x$

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7. Solve $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos x)$

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8. Solve the following

$$2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$$

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9. Solve the following

$$\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$$

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10. Solve $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos x)$

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11. Prove that $\sin^{-1}\frac{12}{13}+\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{63}{16}=\pi$

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

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13. If $\sin\left(\sin^{-1}\left(\frac{1}{5}\right)+\cos^{-1}(x)\right)=1$

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14. Solve the following

$$\tan^{-1}\left(\frac{1-x}{1+x}\right)=\frac{1}{2}\tan^{-1}x$$

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15. Solve the following

$$\sin^{-1}x+\sin^{-1}2x=\frac{\pi}{3}$$

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16. Choose the correct answer from the bracket.

$\cos\left(\tan^{-1} x\right), |x| < 1$ 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. $\frac{x}{\sqrt{1+x^2}}$

Answer: C

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17. Prove that $\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{5}{13}=\sin^{-1}\frac{63}{65}$

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18. In which quadrants are the graph of $\cos^{-1}(x)$ lies,$x \in [-1,1]$

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19. If $\cos^{-1} x + \cos^{-1} y = \frac{\pi}{3}$, then

$\sin^{-1} x + \sin^{-1} y = \ldots\ldots\ldots$

A. $\frac{2\pi}{3}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{6}$

D. π

Answer: A

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20. if $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$ then prove that

$x + y + xy = 1$

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21. $\sin\left(\tan^{-1}(1)\right)$ is equal to

A. $\frac{1}{\sqrt{2}}$

B. 1

C. $\frac{1}{2}$

D. $\frac{\sqrt{3}}{2}$

Answer: A

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22. if $x \in \left(o, \frac{\pi}{2}\right)$,show that

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

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23. show that

$$\sin^{-1}\frac{3}{5} - \sin^{-1}\frac{8}{17} = \cos^{-1}\frac{84}{85}$$

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24. Choose the correct answer from the bracket.

if $\cos^{-1} x = y$,then y is equal to

A. $-\pi \leq y \leq \pi$

B. $0 \leq y \leq \pi$

C. $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

D. $o < y < \pi$

Answer: B

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25. find the value of $\cos^{-1}\cos\left(\frac{7\pi}{3}\right)$

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26. Solve for x if,$\tan^{-1}\left(\frac{1+x}{1-x}\right) = 2\tan^{-1}x$

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

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28. Prove that $2\sin^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{24}{7}\right)$

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

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

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

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32. The principal value of $\cos^{-1}\left(-\frac{1}{2}\right)$

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33. Express $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right)$ in the simplest Form.

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

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35. show that

$$\sin^{-1}\left(\frac{3}{5}\right)-\sin^{-1}\left(\frac{8}{17}\right)=\cos^{-1}\left(\frac{84}{85}\right)$$

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36. The principal value of $\tan^{-1}(-1)$ is

$$\left[\frac{\pi}{4}, -\frac{\pi}{4}, \pi - \frac{\pi}{4}, \pi + \frac{\pi}{4}\right]$$

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37. If $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$

,

then find the value of x

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38. Give an expression for $\tan(x+y)$

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39. Prove that $xy < 1$,

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

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40. Using the above result prove that

$$\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$$

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41. Show that

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

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42. Given that $\cot 3\theta=\frac{3\cot^2\theta-1}{\cot^3\theta-3\cot\theta}$,show that $\cot^{-1}\frac{3x^2-1}{x^3-3x},|x|<\sqrt{3}$ is $3\cot^{-1}x$

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