Sample Task **Questions**

Questions with Answer Keys **MathonGo**

Q1

The value of x for which $\sin\left(\cot^{-1}(1+x)\right) = \cos\left(\tan^{-1}x\right)$ is

(1) $\frac{1}{2}$

(2) 1

(3) 0

(4) $-\frac{1}{2}$

Q2

The value of $\cos\left(\frac{1}{2}\cos^{-1}\left(\cos\left(\sin^{-1}\frac{\sqrt{63}}{8}\right)\right)\right)$ is

(1) $\frac{3}{16}$

(2) $\frac{3}{8}$

(3) $\frac{3}{4}$

(4) $\frac{3}{2}$

Q3

The value of $\sin^{-1}\sin 17 + \cos^{-1}\cos 10$ is equal to

(1) 27

(2) -27

(3) $17 - 5\pi$

(4) $9\pi - 27$

Q4

The value of $\sin\left\{\cot^{-1}\left[\cos\left(\cot^{-1}\left(\frac{1}{x}\right)\right)\right]\right\}$ is equal to $(x > 0)$

(1) $\sqrt{\frac{1+x^2}{2+x^2}}$

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

(3) $\sqrt{\frac{1+x^2}{2-x^2}}$

(4) $\sqrt{\frac{2+x^2}{1+x^2}}$

Q5

If the value of the expression $\tan\left(\frac{1}{2}\cos^{-1}\frac{2}{\sqrt{5}}\right)$ is in the form of $a+\sqrt{b}$ where $a,\ b \in Z,$ then the value of $\frac{a+b}{b}$ is

Q6

If $\sin^{-1}\frac{1}{3}+\sin^{-1}\frac{2}{3}=\sin^{-1}x$, then the value of x is

(1) 0

(2) $\frac{\left(\sqrt{5}-4\sqrt{2}\right)}{9}$

(3) $\frac{\left(\sqrt{5}+4\sqrt{2}\right)}{9}$

(4) $\frac{\pi}{2}$

Q7

The complete solution set of the inequality $\cos^{-1}(\cos 4) > 3x^2 - 4x$ is

(1) $\left(0, \frac{2+\sqrt{6\pi-8}}{3}\right)$

(2) $\left(\frac{2-\sqrt{6\pi-8}}{3}, 0\right)$

(3) $(-2, 2)$

(4) $\left(\frac{2-\sqrt{6\pi-8}}{3}, \frac{2+\sqrt{6\pi-8}}{3}\right)$

Q8

If $x = \sin\left(2\tan^{-1}3\right)$ and $y = \sin\left(\frac{1}{2}\tan^{-1}\frac{4}{3}\right)$, then

(1) $2x = 1 - y$

(2) $x^2 = 1 - 2y$

(3) $x^2 = 1 + y$

(4) $y^2 = 2x - 1$

Q9

$\tan\left(2\tan^{-1}\frac{1}{5} + \sec^{-1}\frac{\sqrt{5}}{2} + 2\tan^{-1}\frac{1}{8}\right)$ is equal to:

(1) 1

(2) 2

(3) $\frac{1}{4}$

(4) $\frac{5}{4}$

Q10

The value of $2\sin^{-1}\frac{4}{5} + 2\sin^{-1}\frac{5}{13} + 2\sin^{-1}\frac{16}{65}$ is equal to

(1) $\frac{3\pi}{2}$

(2) $\frac{\pi}{2}$

(3) π

(4) 2π

Q11

The number of solution of the equation $2\tan^{-1}x + \cot^{-1}x = \frac{7\pi}{6}$ is

(1) 0

(2) 1

(3) 2

(4) 3

Q12

The value of $\tan^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right]\left(\forall x \in \left[0, \frac{\pi}{2}\right]\right)$ is equal to

(1) $\frac{x}{2} - \frac{\pi}{2}$

(2) $\frac{x}{2} + \frac{\pi}{2}$

(3) $\frac{x}{2} - \pi$

(4) $\frac{\pi}{2} - \frac{x}{2}$

Q13

If the equation $\sin^{-1}\left(4x^2 - 12x + 10\right) + \cos^{-1}\left(12x - 4x^2 - 10\right) + \lambda x = 0$ has a real solution, then λ is equal to

(1) $\frac{\pi}{4}$

(2) $-\pi$

(3) $\frac{\pi}{2}$

(4) $\frac{-\pi}{2}$

Q14

If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = \pi$, then

(1) $x^2 + y^2 + z^2 + xyz = 0$

(2) $x^2 + y^2 + z^2 + 2xyz = 0$

(3) $x^2 + y^2 + z^2 + xyz = 1$

(4) $x^2 + y^2 + z^2 + 2xyz = 1$

Q15

If $\left(\cot^{-1}x\right)^2 - 7\left(\cot^{-1}x\right) + 10 > 0$, then the range of x will be

(1) $(-\infty, \cot 2)$

(2) $(-\infty, \cot 5)$

(3) $(\cot 2, \cot 5)$

(4) $(\cot 2, \infty)$

Q16

The value of a for which $ax^2 + \sin^{-1}\left(x^2 - 2x + 2\right) + \cos^{-1}\left(x^2 - 2x + 2\right) = 0$ has a real solution, is

(1) $-\frac{2}{\pi}$

(2) $\frac{2}{\pi}$

(3) $-\frac{\pi}{2}$

(4) $\frac{\pi}{2}$

Q17

Number of real roots of the equation $\sin^{-1}\sin x = \cos^{-1}\cos 4$ in $[0, 2\pi]$ is

(1) 0

(2) 1

(3) 2

(4) more than 2

Q18

The greatest and the least value of $\left(\sin^{-1}x\right)^3 + \left(\cos^{-1}x\right)^3$ are

(1) $-\frac{\pi}{2}, \frac{\pi}{2}$

(2) $-\frac{\pi^3}{8}, \frac{\pi^3}{8}$

(3) $\frac{7\pi^3}{8}, \frac{\pi^3}{32}$

(4) None of these

Q19

The real solutions of the equation $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$ are

(1) -1, 0

(2) 0, 1

(3) -1, 1

(4) $-1,\ 2$

Q20

The number of integers for which the equation $\sin^{-1}x + \cos^{-1}x + \tan^{-1}x = n$ has real solution(s) is

(1) 0

(2) 1

(3) 2

(4) 3

Q21

Let $a = \left(\sin^{-1}x\right)^{\sin^{-1}x}$, $b = \left(\sin^{-1}x\right)^{\cos^{-1}x}$, $c = \left(\cos^{-1}x\right)^{\sin^{-1}x}$, $d = \left(\cos^{-1}x\right)^{\cos^{-1}x}$ and if $x \in (0, 1)$, then

(1) $a > b > d > c$

(2) $d > c > a > b$

(3) $b > a > d > c$

(4) $a < b < d < c$

Q22

The value of $tan^{-1}\left(\frac{9}{19}\right) + tan^{-1}\left(\frac{9}{49}\right) + tan^{-1}\left(\frac{9}{97}\right) + tan^{-1}\left(\frac{9}{163}\right) + \ \ldots \infty$ equals

(1) $\tan^{-1}(3)$

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

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

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

Q23

If $y = \tan^{-1}\frac{1}{1+x+x^2} + \tan^{-1}\frac{1}{x^2+3x+3} + \tan^{-1}\frac{1}{x^2+5x+7} + \ldots.$ + upto $2n$ terms $(\forall x \geq 0)$, then $y(0)$ is

(1) $\tan^{-1}(n)$

(2) $\tan^{-1}(2n)$

(3) $2\tan^{-1}(n)$

(4) 0

Q24

The value of the expression $\cot^{-1}\frac{1}{2} + \cot^{-1}\frac{9}{2} + \cot^{-1}\frac{25}{2} + \cot^{-1}\frac{49}{2} + \ldots\ldots$ upto n terms is

(1) $\tan^{-1}2n$

(2) $\tan^{-1}(2n - 1)$

(3) $\tan^{-1}n$

(4) $\tan^{-1}2n - \tan^{-1}1$

Q25

The value(s) of x satisfying the equation $\sin^{-1}(1 - x) - 2\sin^{-1}x = \frac{\pi}{2}$ is/are

(1) 0

(2) $\frac{1}{2}$

(3) $0, \frac{1}{2}$

(4) $-\frac{1}{2}$

Q26

Solution set of $\left[\sin^{-1}x\right] > \left[\cos^{-1}x\right]$, where [.] denotes the greatest integer function, is

(1) $\left[\frac{1}{\sqrt{2}}, 1\right]$

(2) (cos1, sin1)

(3) [sin 1, 1]

(4) None of these

Q27

If $\cot^{-1}(\alpha) = \cot^{-1}2 + \cot^{-1}8 + \cot^{-1}18 + \cot^{-1}32 + \ldots$ upto 100 terms, then α is:

(1) 1. 01

(2) 1. 00

(3) 1. 02

(4) 1. 03

Q28

For $k \in \mathbb{R}$, let the solutions of the equation $\cos\left(\sin^{-1}\left(x\cot\left(\tan^{-1}\left(\cos\left(\sin^{-1}x\right)\right)\right)\right)\right) = k$, $0 < |x| < \frac{1}{\sqrt{2}}$ be α and β, where the inverse trigonometric functions take only principal values. If the solutions of the equation $x^2 - bx - 5 = 0$ are $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ and $\frac{\alpha}{\beta}$, then $\frac{b}{k^2}$ is equal to _____.

Q29

The number of solutions of the equation $\sin^{-1}x = (\sin x)^{-1}$ is/are

(1) one

(2) two

(3) three

(4) zero

Q30

The number of real solutions (x, y) where $|y| = \sin x, y = \cos^{-1}(\cos x), -2\pi \leq x \leq 2\pi$, is

(1) 2

(2) 1

(3) 3

(4) 4

Sample Task **Questions**

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Answer Key

Q1 (4)	**Q2** (3)	**Q3** (4)	**Q4** (1)
Q5 (0.6)	**Q6** (3)	**Q7** (4)	**Q8** (4)
Q9 (2)	**Q10** (3)	**Q11** (1)	**Q12** (1)
Q13 (2)	**Q14** (4)	**Q15** (4)	**Q16** (3)
Q17 (1)	**Q18** (3)	**Q19** (1)	**Q20** (3)
Q21 (2)	**Q22** (4)	**Q23** (2)	**Q24** (1)
Q25 (1)	**Q26** (3)	**Q27** (1)	**Q28** (12)
Q29 (2)	**Q30** (1)		