



MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

TRIGONOMETRIC RATIOS IDENTITIES AND TRIGONOMETRIC EQUATIONS

Question Bank

1. Number of solutions of the equation

$\sin 7\theta = \sin \theta + \sin 3\theta \in 0 < \theta < \frac{\pi}{2}$ is equal to



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2. If L denotes the least value of the expression $y = 9\sec^2 x + 16\cos^2 x$ and M denotes the maximum value of the expression $y = \sin^2 x + 8\cos x - 7$, find the value of $(L + M)$



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3. The expression $\tan 55^\circ \tan 65^\circ \cdot \tan 75^\circ$ simplifies to $\cot x^\circ$ where $x \in (0, 90)$ then x equals



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4.

$[(-1 + \cot 23^\circ)(-1 + \cot 22^\circ)(-1 + \cot 29^\circ) \cdot (-1 + \cot 16^\circ)]$

is equal to



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5. Number of integers in the range of $\frac{\sin 3x - \sin 2x}{\sin x}$ is



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6. If 'm' and 'M' represents the least and greatest values of the function $f(\theta) = \frac{1}{2}\cos 2\theta - 4\cos \theta + 6$, then $\frac{M}{m}$ is



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7. If $\sin 2x \cos y = (a^2 - 1)^2 + 1$ and $\cos 2x \sin y = a + 1$ where $x, y \in [0, \pi]$ and $a \in R$, then number of ordered pairs (x, y) is



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8. Let $E = \frac{1 - (\cos 61^\circ)}{\cos 1^\circ} \left(\frac{1 - \cos 62^\circ}{\cos 2^\circ} \right) \dots \left(\frac{1 - \cos 119^\circ}{\cos 59^\circ} \right)$,

then E is equal to



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9. If $3 \sin x - 2 \cos(x + \theta) - 2 \cos(x - \theta) = 5$ for some real x ,

then the value of $|\cos \theta|$ is equal to



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10. If the sum of the roots of the equation $\cos 4x + 6 = 7 \cos 2x$ in the interval $[0, 314]$ is $k\pi$, $k \in R$. Find $(k - 4948)$.



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11. If $\frac{\tan 5^\circ \cdot \tan 55^\circ \cdot \tan 65^\circ}{\sin^2 36^\circ - \sin^2 18^\circ} = a - b\sqrt{c}$, where a, b are even and c is odd natural number, then the value of $a + c - b$ is

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12. The maximum value of $1 + \sin\left(\frac{\pi}{4} + \theta\right) + 2\cos\left(\frac{\pi}{4} - \theta\right)$ for all real values of θ is

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13. Let triangle ABC be the isosceles triangle and $\angle A = 100^\circ$, if $\sin A + \sin B + \sin C = x$ and $\cos A + \cos B + \cos C = y$, then $(x^2 + y^2)$ is

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14. Let $\sin \alpha + \sin \beta = \frac{\sqrt{6}}{3}$ and $\cos \alpha + \cos \beta = \frac{\sqrt{3}}{3}$, then the value of $100 \cos^2 \left(\alpha - \frac{\beta}{2} \right)$, is equal to

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15. Number of ordered pairs (x, y) satisfying the equation $4y^2 + 2 \cos^2 x = 4y - \sin^2 x$, where $x, y \in [0, 2\pi]$, is

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16. If $\alpha, \beta \in \left(0, \frac{\pi}{2} \right)$ satisfy the following simultaneous equation $2 \sin 2\beta = 3 \sin 2\alpha$ and $\tan \beta = 3 \tan \alpha$, then the value of $(8 \cos^2 \alpha)$ is

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17. Number of solutions of the equation $\tan 2\theta = \tan 6\theta$ in $(0, 3\pi)$ is equal to

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18. The least value of ' a ' for which the equation $2\sqrt{a}\sin^2 x + \sqrt{a} - 3\sin 2x = 5 + \sqrt{a}$ has atleast one solution is

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19. The number of solution (s) of the equation

$$\sqrt{2} + \cos 2x = (\sin x + \cos x) \in \left[-\frac{\pi}{2}, \pi \right]$$

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20. If $\frac{\cos 3x}{\cos x} = \frac{1}{3}$ for some angle x , $0 \leq x \leq \frac{\pi}{2}$, then the value of $3\left(\frac{\sin 3x}{\sin x}\right)$ for same x , is

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21. If $\frac{\cos^4 \alpha}{\cos^2 \beta} + \frac{\sin^4 \alpha}{\sin^2 \beta} = 1$, then the value of $\left[\frac{\cos^4 \beta}{\cos^2 \alpha} + \frac{\sin^4 \beta}{\sin^2 \alpha} \right]$ is (where $[.]$ denotes greatest integer function)

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22. The numbers of solution (s) of the equation $\left(1 - \frac{1}{2}\sin x\right)\cos^2 2x = 2\sin x - 3 + \frac{1}{\sin x}$ in $[0, 4\pi]$ is

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23. If $2 \sin x = 1 - 2 \cos x$, then value of $|\tan x + 1|/(\tan x)$ is

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24. The number of pairs of integer (x, y) that satisfy the following two equations $\{(\cos(xy) = x), (\tan(xy) = y)$ is

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25. If $(\cos \theta)^6 + (\sin \theta)^6 = a_0 + a_1 \cos 4\theta$ and $a_0 a_1 = \frac{m}{n}$ (where $\frac{m}{n} \in \mathbb{Q}$) is in its lowest form, then $(m+n)$ equals

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26. If $\frac{\sin \alpha}{\sin \beta} = \frac{\cos \gamma}{\cos \delta}$, then $\frac{\sin\left(\frac{\alpha-\beta}{2}\right) \cdot \cos\left(\frac{\alpha+\beta}{2}\right) \cdot \cos \delta}{\sin\left(\frac{\delta-\gamma}{2}\right) \cdot \sin\left(\frac{\delta+\gamma}{2}\right) \cdot \sin \beta}$



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27. If $0 < \theta < \frac{\pi}{4}$, $2y \cos \theta = x \sin \theta$ and $2x \sec \theta + y \operatorname{cosec} \theta = 5$, then value of $x^2 + 4y^2$ is



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28. Maximum value of the expression $25 \sin^4 x - 20 \sin^2 x - 2$ is equal to



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29. For $x \in [0, 3\pi]$, the number of integral values of x satisfying $\sec^2 x - 4 \tan x < 0$ is



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30. If
$$\frac{\sum_{r=1}^8 \sin\left((2r-1)\frac{\pi}{36}\right)}{\prod_{k=0}^6 \cos\left(2^k \cdot \frac{\pi}{36}\right)} = 2^n \tan 140^\circ, \quad (\text{where } n \in \mathbb{N})$$

then 'n' is an integer



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31. The number of solution (s) of $\cos \sqrt{3}x + \cos \sqrt{5}x = 2$ is



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32. Number of ordered pairs (x, y) which satisfies the relation

$$x^4 + \frac{1}{8}x^2 = \sin^2 y \cdot \cos^2 y \text{ where } y \in [0, 2\pi]$$



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33. If $28 \sin^4 \alpha + 21 \cos^4 \alpha = 12$ then value of $24(\tan^2 \alpha + \cot^2 \alpha)$ is

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34. The value of the expression $(\operatorname{cosec} 50^\circ + \sqrt{3} \sec 50^\circ)$ is equal to

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