

Ratio

1. If for all real values of x , $\frac{4x^2 + 1}{64x^2 - 96x \sin \alpha + 5} < \frac{1}{32}$, then α lies in the interval
- (a) $\left(0, \frac{\pi}{3}\right)$ (b) $\left(\frac{\pi}{3}, \frac{2\pi}{3}\right)$ (c) $\left(\frac{2\pi}{3}, \pi\right)$ (d) $\left(\frac{4\pi}{3}, \frac{5\pi}{3}\right)$
2. If $x = \cos 10^\circ \cos 20^\circ \cos 40^\circ$, then the value of x is
- (a) $\frac{1}{4} \tan 10^\circ$ (b) $\frac{1}{8} \cot 10^\circ$ (c) $\frac{1}{8} \operatorname{cosec} 10^\circ$ (d) $\frac{1}{8} \sec 10^\circ$
3. $\frac{\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta}{\cos 3\theta + \cos 5\theta + \cos 7\theta + \cos 9\theta} =$
- (a) $\tan 3\theta$ (b) $\cot 3\theta$ (c) $\tan 6\theta$ (d) $\cot 6\theta$
4. If $\cos(\theta - \alpha)$, $\cos \theta$ and $\cos(\theta + \alpha)$ are in H.P., then $\cos \theta \sec \frac{\alpha}{2}$ is equal to
- (a) $\pm \sqrt{2}$ (b) $\pm \sqrt{3}$ (c) $\pm 1/\sqrt{2}$ (d) None of these
5. $\frac{\sin(B + A) + \cos(B - A)}{\sin(B - A) + \cos(B + A)} =$
- (a) $\frac{\cos B + \sin B}{\cos B - \sin B}$ (b) $\frac{\cos A + \sin A}{\cos A - \sin A}$ (c) $\frac{\cos A - \sin A}{\cos A + \sin A}$ (d) None of these
6. If $\frac{\pi}{2} < \alpha < \pi$, $\pi < \beta < \frac{3\pi}{2}$, $\sin \alpha = \frac{15}{17}$ and $\tan \beta = \frac{12}{5}$, the value of $\sin(\beta - \alpha)$ is
- (a) $-\frac{171}{221}$ (b) $-\frac{21}{221}$ (c) $\frac{21}{221}$ (d) $\frac{17}{221}$
7. If $\alpha + \beta - \gamma = \pi$, then $\sin^2 \alpha + \sin^2 \beta - \sin^2 \gamma =$
- (a) $2 \sin \alpha \sin \beta \cos \gamma$ (b) $2 \cos \alpha \cos \beta \cos \gamma$ (c) $2 \sin \alpha \sin \beta \sin \gamma$ (d) None of these
8. Maximum value of $\cos^2 x + \cos^2 y - \cos^2 z$ is
- (a) 0 (b) 1 (c) 3 (d) 2
9. Let n be a positive integer such that $\sin\left(\frac{\pi}{2^n}\right) + \cos\left(\frac{\pi}{2^n}\right) = \frac{\sqrt{n}}{2}$, then
- (a) $6 \leq n \leq 8$ (b) $4 < n \leq 8$ (c) $4 \leq n < 8$ (d) $4 < n < 8$
10. Let $0 < x < \frac{\pi}{4}$. Then $\sec 2x - \tan 2x =$
- (a) $\tan\left(x - \frac{\pi}{4}\right)$ (b) $\tan\left(\frac{\pi}{4} - x\right)$ (c) $\tan\left(x + \frac{\pi}{4}\right)$ (d) $\tan^2\left(x + \frac{\pi}{4}\right)$
11. $\sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$ is equal to
- (a) $\cot 7\frac{1}{2}^\circ$ (b) $\sin 7\frac{1}{2}^\circ$ (c) $\sin 15^\circ$ (d) $\cos 15^\circ$
12. $\left(1 + \cos \frac{\pi}{8}\right)\left(1 + \cos \frac{3\pi}{8}\right)\left(1 + \cos \frac{5\pi}{8}\right)\left(1 + \cos \frac{7\pi}{8}\right) =$
- (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{8}$ (d) $\frac{1}{16}$
13. If $\cos(\alpha + \beta) = \frac{4}{5}$, $\sin(\alpha - \beta) = \frac{5}{13}$ and α, β lie between 0 and $\frac{\pi}{4}$, then $\tan 2\alpha =$
- (a) $\frac{16}{63}$ (b) $\frac{56}{33}$ (c) $\frac{28}{33}$ (d) None of these

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14. If $x \cos \theta = y \cos\left(\theta + \frac{2\pi}{3}\right) = z \cos\left(\theta + \frac{4\pi}{3}\right)$, then the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ is equal to

(a) 1

(b) 2

(c) 0

(d) $3 \cos \theta$

15. $\frac{1}{\sin 10^\circ} - \frac{\sqrt{3}}{\cos 10^\circ}$

(a) 0

(b) 1

(c) 2

(d) 4

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