



# MATHS

## BOOKS - ARIHANT PUBLICATION

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## TRIGONOMETRIC IDENTITIES

### Solved Examples

1. Find the value of  $\frac{\sin 135^\circ - \cos 120^\circ}{\sin 135^\circ + \cos 120^\circ}$

A.  $3 - 2\sqrt{2}$

B.  $4 - 2\sqrt{2}$

C.  $3 + 2\sqrt{2}$

D.  $2\sqrt{2}$

**Answer: B::C**



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2. If  $A - B = \frac{\pi}{3}$ , then find  $\cos A \cos B + \sin A \sin B$ .

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

B.  $\frac{1}{3}$

C. 2

D. 1

**Answer: A::B::C**



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3. Find the value of  $\frac{\sqrt{3}\cos 23^\circ - \sin 23^\circ}{2}$

A.  $\cos 53^\circ$

B.  $\sin 53^\circ$

C.  $\tan 53^\circ$

D. 1

**Answer: C**



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4. If  $A + B = 45^\circ$ , then  $(\cot A - 1)(\cot B - 1)$  is equal to

A. 1

B. 2

C. 4

D. 3

**Answer: B**



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## Exam Booster For Cracking Exam

1.  $\cot 85^\circ + \cos 75^\circ$  can be expressed as

A.  $\tan 5^\circ + \sin 15^\circ$

B.  $\sin 15^\circ + \cos 15^\circ$

C.  $\tan 15^\circ + \sin 5^\circ$

D.  $\tan 5^\circ + \cos 15^\circ$

**Answer: A**



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2.  $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = ?$

A.  $\frac{1}{\tan \theta - \sec \theta}$

B.  $\frac{1}{\sec \theta - \tan \theta}$

C.  $\frac{1}{\cos \theta - \tan \theta}$

D.  $\frac{1}{\tan \theta - \cos \theta}$

**Answer: B**



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3. The value of  $\cos 15^\circ - \sin 15^\circ$  is equal to

A.  $\frac{1}{3}$

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

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

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

**Answer: B**



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4. If  $8 \sin x = 4 + \cos x$ , then the values of  $\sin x$  are

A.  $\frac{3}{5}, \frac{-5}{13}$

B.  $\frac{-3}{5}, \frac{-5}{13}$

C.  $\frac{3}{5}, \frac{5}{13}$

D.  $\frac{5}{3}, \frac{5}{13}$

**Answer: C**



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5.  $\sqrt{\frac{1 + \sin x}{1 - \sin x}}$

A.  $\sec x + \tan x$

B.  $\sec^2 x + \tan^2 x$

C.  $\sec^2 x - \tan^2 x$

D.  $\sec x - \tan x$

**Answer: A**



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6.  $\sqrt{\frac{\sec x - \tan x}{\sec x + \tan x}}$  is equal to

A.  $\operatorname{cosec} x + \cot x$

B.  $\sec x - \tan x$

C.  $\sec x + \tan x$

D.  $\operatorname{cosec} x - \cot x$

**Answer: B**



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7. The value of  $\frac{\sin 7A + \sin 3A}{\cos 7A + \cos 3A}$  is equal to

A.  $\tan 5A$

B.  $\cot 5A$

C.  $\sec 5A - \tan 5A$

D.  $\sec 5A + \cot 5A$

**Answer: A**



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8. Prove:  $\sec A(1 - \sin A)(\sec A + \tan A) = 1$

A. 0

B. 2

C. 1

D. None of these

**Answer: C**



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9. The value of  $\frac{\sin 2A}{1 - \cos 2A}$  is

A.  $\cos ecA$

B.  $\tan A$

C.  $\cot A$

D.  $\tan 2A$

**Answer: C**



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10.  $\cos^4 \theta - \sin^4 \theta$  is :

A.  $\sin 2\theta$

B.  $\cos 2\theta$

C.  $\tan 2\theta$

D.  $\sec 2\theta$

**Answer: B**



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11. Show that  $\sqrt{2 + \sqrt{2 + 2 \cos 4\theta}} = 2 \cos \theta$

A.  $2 \cos^2 \theta$

B.  $2 \cos 2\theta$

C.  $2 \cos \theta$

D.  $2 \cos \frac{\theta}{2}$

**Answer: C**



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12. The value of  $\frac{\tan 47^\circ + \tan 43^\circ}{1 - \tan 47^\circ \tan 43^\circ}$  is

A. 1

B. 0

C.  $\infty$

D.  $-1$

**Answer: C**



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**13.**

**if**

$\tan A = \frac{5}{6}$  and  $\tan B = \frac{1}{11}$ , prove that  $A + B = \frac{\pi}{4}$

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

B.  $\frac{\pi}{4}$

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

D.  $\pi$

**Answer: B**



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**14.** The value of  $\frac{1}{\sqrt{2}}(\cos A - \sin A)$  is

A.  $\cos\left(\frac{\pi}{3} + A\right)$

B.  $\cos\left(\frac{\pi}{2} + A\right)$

C.  $\cos\left(\frac{\pi}{4} + A\right)$



$$D. \sin\left(\frac{\pi}{4} + A\right)$$

**Answer: C**



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**15.**  $\sin \frac{\pi}{4} \cos \frac{\pi}{12} - \cos \frac{\pi}{4} \sin \frac{\pi}{12}$  is equal to

A.  $\frac{1}{\sqrt{3}}$

B.  $\sqrt{3}$

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

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

**Answer: D**



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**16.** Prove that  $\tan 56^\circ = \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$

$$\tan 56^\circ = \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$$

A.  $\tan 56^\circ$

B.  $\tan 32^\circ$

C.  $\tan 55^\circ$

D.  $\tan 40^\circ$

**Answer: A**



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17. The value of  $\frac{\cos 15^\circ - \sin 15^\circ}{\cos 15^\circ + \sin 15^\circ}$  is

A. 1

B.  $\sqrt{3}$

C. 0

D.  $\frac{1}{\sqrt{3}}$

Answer: D



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18. If  $\tan \theta = \frac{x \sin \phi}{1 - x \cos \phi}$  and  $\tan \phi = \frac{y \sin \theta}{1 - y \cos \theta}$  then the value of  $\frac{x}{y}$  is

A.  $\sin \theta$

B.  $\sin \phi$

C.  $\frac{1}{\sin \phi}$

D.  $\frac{\sin \theta}{\sin \phi}$

**Answer: D**



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19. If  $\sin(\theta + \alpha) = \cos(\theta + \alpha)$  then the value of  $\tan \theta$  is

A.  $1 - \tan \alpha$

B.  $\frac{1 - \tan \alpha}{1 + \tan \alpha}$

C.  $1 + \tan \alpha$

D. None of these

**Answer: B**



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20. The value of  $\frac{\cos^2(\theta - \phi)}{2} - \frac{\sin^2(\theta + \phi)}{2}$  is

A.  $\cos \theta$

B.  $\cos \phi$

C.  $\cos \theta \cos \phi$

D. None of these

**Answer: C**



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21.  $\cos^2 45^\circ - \sin^2 15^\circ =$

A.  $\frac{\sqrt{3}}{4}$

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

C.  $\frac{4}{\sqrt{3}}$

D. None of these

**Answer: A**



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22. If  $0 \leq \theta \leq 90^\circ$ , then the value of

$$\frac{5 \cos \theta - 4}{3 - 5 \sin \theta} - \frac{3 + 5 \sin \theta}{4 + 5 \cos \theta} \text{ is}$$

A. 0

B. 1

C. 2

D. 4

**Answer: A**



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**23.** What is the value of

$$\cos 10^\circ + \cos 110^\circ + \cos 130^\circ ?$$

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

B. 0



C. 1

D. 2

**Answer: B**



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**24.** The value of  $\cos 52^\circ + \cos 68^\circ + \cos 172^\circ$  is

A. 0

B. 1

C. 2

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

**Answer: A**



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25. The value of  $\frac{\sin 38^\circ - \cos 68^\circ}{\cos 68^\circ + \sin 38^\circ}$  is

A.  $\sqrt{3}\tan 40^\circ$

B.  $\sqrt{3}\tan 8^\circ$

C.  $\sqrt{3}\tan 12^\circ$

D. None of these

**Answer: B**



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26. If  $\cos x = k \cos(x - 2y)$ , then the value of  $\tan(x - y) \cdot \tan y$  is



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27. The value of  $2 \cos x - \cos 3x - \cos 5x$  is

A.  $16 \cos^2 x \sin^3 x$

B.  $16 \cos^3 x \sin^2 x$

C.  $16 \cos^3 x$

D.  $6 \cos^3 x \cos^2 x$

**Answer: B**



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**28.** A horse is tied to a post by a rope. If the horse moves along a circular path always keeping the rope tight, and describes 88 metres when it traces  $72^\circ$  at the centre, find the length of the rope.

A. 40 m

B. 32 m

C. 70 m

D. 88 m

**Answer: C**



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**29.** The largest hand of a clock is 42 cm long, then the distance covered by the extremity in 20 min is

A. 42 cm

B. 44 cm

C. 22 cm

D. 88 cm

**Answer: D**



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30. The interior angle of a convex polygon are in AP. The smallest angle is  $\frac{2\pi}{3}$  and the common difference is  $5^\circ$ . Then, the number of sides of the polygon are

A. 16

B. 9

C. 12

D. 18

**Answer: B**



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31. The value for

$$2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 \text{ is}$$

A. 1

B. 0

C. 5

D. 3

**Answer: B**



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32. The value of

$$2 \sec^2 \theta - \sec^4 \theta - 2 \operatorname{cosec}^2 \theta + \operatorname{cosec}^4 \theta$$
 is

A.  $\cot^4 \theta - \tan^4 \theta$

B.  $\cot^4 \theta - \tan^2 \theta$

C.  $\cot^4 \theta + \tan^4 \theta$

D.  $\cos 4\theta - \tan 4\theta$

**Answer: A**



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33. if  $\sin x + \sin^2 x = 1$ , then the value of  $\cos^2 x + \cos^4 x$  is

A. 1

B. 2

C. 0

D. None of these

**Answer: A**



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34. If  $\sec \theta - \sin \theta = a^3$ ,  $\sec \theta - \cos \theta = b^3$ ,  
then prove that  $a^2 b^2 (a^2 + b^2) = 1$

A. 2

B. 3

C. 4

D. 1

**Answer: D**



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35. If  $\sin \theta + \cos \theta = m$  and  $\sec \theta + \operatorname{cosec} \theta = n$ ,

prove that

$$n(m^2 - 1) = 2m.$$

A.  $m$

B.  $2m$

C.  $n$

D.  $2n$

**Answer: B**



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