



MATHS

BOOKS - CALCUTTA BOOK HOUSE MATHS (BENGALI ENGLISH)

TRIGONOMETRIC RATIOS OF COMPLEMENTARY ANGLES

Examples

1. The value of $(\sin 43^\circ \cos 47^\circ + \cos 43^\circ \sin 47^\circ)$ is

A. 0

B. 1

C. $\sin 4^\circ$

D. $\cos 4^\circ$

Answer: B

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2. The value of $\left(\frac{\tan 35^\circ}{\cot 55^\circ} + \frac{\cot 78^\circ}{\tan 12^\circ} \right)$ is

A. 0

B. 1

C. 2

D. none of these

Answer: C

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3. The value of $\{\cos(40^\circ + \theta) - \sin(50^\circ - \theta)\}$ is

A. $2 \cos \theta$

B. $7 \sin \theta$

C. 0

D. 1

Answer: C

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4. ABC is a triangle. $\sin\left(\frac{B + C}{2}\right) =$

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

B. $\frac{\cos(A)}{2}$

C. $\sin A$

D. $\cos A$

Answer: B

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5. If $A + B = 90^\circ$ and $\tan A = \frac{3}{4}$, then value of $\cot B$ is

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

B. $\frac{4}{3}$

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

D. $\frac{4}{5}$

Answer: A



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6. If $\sin 5\theta = \cos 4\theta$ then the value of θ is

A. 1°

B. 10°

C. 30°

D. 45°

Answer: B

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7. If $\tan 2\theta = \cos(\theta + 15^\circ)$ then the value of θ is

A. 5°

B. 10°

C. 20°

D. 25°

Answer: D

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8. If $A + B = 90^\circ$, then the value of $\sin^2 A + \sin^2 B =$

A. -1

B. 0

C. 1

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

Answer: C



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9. $\frac{\sin 30^\circ 17'}{\cos 59^\circ 43'}$

A. -1

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

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

D. 1

Answer: D

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10. $\tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \dots \dots \tan 89^\circ =$

A. 0

B. 1

C. $\sqrt{3}$

D. undefined

Answer: B

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11. If the sum of two angles is 90° , then they are called complementary to each other.

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12. The value of $\cos 54^\circ$ and $\sin 36^\circ$ are equal.

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13. The simplified value of $(\sin 12^\circ - \cos 78^\circ)$ is 1.

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14. The values of $\sin 72^\circ$ and $\cos 108^\circ$ are equal.

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15. The value of $(\tan 15^\circ \times \tan 45^\circ \times \tan 60^\circ \times \tan 75^\circ)$ is

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16. The value of $(\sin 12^\circ \times \cos 18^\circ \times \sec 78^\circ \times \csc 72^\circ)$ is _____



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17. If A and B are complementary to each other, then $\sin A$ _____



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18. $\cos 72^\circ - \sin 18^\circ =$ _____



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19. If $\sin 10\theta = \cos 8\theta$ and 10θ is a positive acute angle, then find the value of $\tan 9\theta$.



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20. If $\tan 4\theta = \frac{1}{\tan 6\theta} \Rightarrow \tan 4\theta = \cot 6\theta$ is a positive acute angle, then find the value of θ .

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21. Find the value of $\frac{2 \sin^2 63^\circ + 1 + 2 \sin^2 27^\circ}{3 \cos^2 17^\circ - 2 + 3 \cos^2 73^\circ}$

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22. Find the value of $\tan 1^\circ \times \tan 2^\circ \times \tan 3^\circ \times \dots \times \tan 89^\circ$

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23. If $\sec 5A = \operatorname{cosec}(A + 36^\circ)$ and $5A$ is a positive acute angle, then find the value of A .

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24. Find the value of $\cot 17^\circ \left(\cot 73^\circ \cos^2 22^\circ + \frac{1}{\tan 73^\circ \sec^2 68^\circ} \right)$

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25. If $\alpha + \beta = \frac{\pi}{2}$, then prove that $\cos \alpha = \sqrt{\frac{\sin \alpha}{\cos \beta} - \sin \alpha \cos \beta}$

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26. If $\sin 17^\circ = \frac{x}{y}$ then prove that $\sec 17^\circ - \sin 73^\circ = \frac{x^2}{y\sqrt{y^2 - x^2}}$

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27. If $\sin 51^\circ = \frac{a}{\sqrt{a^2 + b^2}}$ then find the value of $\tan 39^\circ$

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28. If $\sec(\alpha - \beta) = \sqrt{2}$ and $\sin(\alpha + \beta) = \frac{1}{2}$, then find the least positive values of α and β .

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29. Prove that (a) $\cos^2 48^\circ - \tan^2 42^\circ = 1$

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30. Find value of

$$\left(\frac{\tan 20^\circ}{\sec 70^\circ}\right)^2 + \left(\frac{\cot 20^\circ}{\sec 70^\circ}\right)^2 + 2\tan 15^\circ \tan 37^\circ \tan 53^\circ \tan 60^\circ \tan 75^\circ$$

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31. Prove that if two angles α and β are complementary angles, then

$$\sin^2 \alpha + \sin^2 \beta = 1$$



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32. Prove that if two angles α and β are complementary angles, then

$$\cot \beta + \cos \beta = \frac{\cos \beta}{\cos \alpha} (1 + \sin \beta)$$



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33. Prove that if two angles α and β are complementary angles, then

$$\frac{\sec \alpha}{\cos \alpha} - \cot^2 \beta = 1$$



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34. Prove that $\sec^2 12^\circ - \frac{1}{\tan^2 78^\circ} = 1$.



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35. If $A + B = 90^\circ$ then prove that $1 + \frac{\tan A}{\tan B} = \sec^2 A$.

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36. Prove that $\cos^2 22^\circ \cot^2 68^\circ = \sin^2 22^\circ + \sin^2 68^\circ + \cot^2 68^\circ$.

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37. Prove that $\cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 78^\circ \cot 60^\circ = \frac{1}{\sqrt{3}}$

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38. AOB is a diameter of a circle with centre O and C is any point on the circle, joining A, C, B, C, and O, C, prove that

$$\tan \angle ABC = \cot \angle ACO$$

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39. AOB is a diameter of a circle with centre O and C is any point on the circle, joining A, C, B, C, and O, C, prove that

$$\sin^2 \angle BCO + \sin^2 \angle ACO = 1$$

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40. AOB is a diameter of a circle with centre O and C is any point on the circle, joining A, C, B, C, and O, C, prove that

$$\cos ec^2 \angle CAB - 1 = \tan^2 \angle ABC.$$

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41. ABCD is a rectangular figure, joining A, C prove that

$$\tan \angle ACD = \cot \angle ACB$$

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42. ABCD is a rectangular figure, joining A, C prove that

$$\tan^2 \angle CAD + 1 = \frac{1}{\sin^2 \angle BAC}.$$

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43. Find the value of

$$\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \dots + \sin^2 90^\circ.$$

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44. If $\sec\left(\frac{\pi}{2} - \alpha\right) + \operatorname{cosec}\left(\frac{\pi}{2} - \alpha\right)$.

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45. Prove that $\tan 20^\circ + \tan 70^\circ = \frac{\sec^2 20^\circ}{\sqrt{\sec^2 20^\circ - 1}}$

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1. If A, B, C are the angles of a triangle then $\tan\left(\frac{B+C}{2}\right) =$

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

B. $\cot \frac{A}{2}$

C. $\cos \frac{A}{2}$

D. $\sec \frac{A}{2}$

Answer: b

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2. $\frac{\sin 21^{\circ} 30' }{\cos 68^{\circ} 30' }$

A. 1

B. 0

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

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

Answer: a



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3. $\frac{\sin 52^\circ + \cos 38^\circ}{\sin 38^\circ + \cos 52^\circ}$

A. $\cot 52^\circ$

B. $\sin 52^\circ$

C. $\cos \sec 52^\circ$

D. $\tan 52^\circ$

Answer: d



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4. If $\sec 9\theta = \operatorname{cosec} 9\theta$, then the value of θ is equal to

A. 2°

B. 3°

C. 5°

D. 8°

Answer: c



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5. If the sum of any two acute angles be 180° , then they are called complementary angles to each other.



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6. If $\sin(\theta + 36^\circ) = \cos \theta$ then the value of θ is 27°



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7. The complementary angle of 90° is _____

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8. If in $\triangle ABC$, $\angle C = 90^\circ$ then $1 + \tan^2 A$

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9. If $\theta = 0^\circ$ then the trigonometrical ratio tangent of complementary angle of θ is _____

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10. Find the value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \dots \dots \cos 180^\circ$

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11. If $0^\circ < \theta < 20^\circ$, then find the value of θ when $\sin^2 5\theta - \sin 5\theta = 0$.

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12. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, then the value of $(x + y + z)$ is -

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13. If X, Y, Z are the angles of a $\triangle XYZ$ then prove that

$$\cos^2 \frac{X}{2} + \cos^2 \left(\frac{Y + Z}{2} \right) = 1$$

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14. If $x = a \cos(90^\circ - \theta)$ and $y = b \cot(90^\circ - \theta)$, then prove that

$$\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1.$$

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15. Prove that $(1 + \sec 22^\circ + \cot 68^\circ)(1 - \sec 22^\circ + \tan 68^\circ) = 2$

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16. If $\angle A + \angle B = 90^\circ$ then prove that $1 + \frac{\cot A}{\cot B} = \sec^2 A$

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17. If $\alpha + \beta = 90^\circ$, then find the value of

$$\cot \beta + \cos \beta - \frac{\cos \beta}{\cos \alpha} (1 + \sin \beta)$$

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18. Find the value of $\frac{5\sin 75^\circ \sin 77^\circ + 2\cos 13^\circ \cos 15^\circ}{\cos 15^\circ \sin 77^\circ} - \frac{7\sin 81^\circ}{\cos 9^\circ}$

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19. If $\alpha + \beta = 90^\circ$ then prove that $\operatorname{cosec}^2 \alpha + \operatorname{cosec}^2 \beta = \operatorname{cosec}^2 \alpha \operatorname{cosec}^2 \beta$.

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20. Prove that $\sec^2 11^\circ - \frac{1}{\tan^2 79^\circ} = 1$.

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21. If $A + B = 90^\circ$ then prove that $\tan A + \tan B = \frac{\operatorname{cosec}^2 A}{\sqrt{\operatorname{cosec}^2 A - 1}}$.

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22. Prove that $\tan 4^\circ \tan 43^\circ \tan 47^\circ \tan 86^\circ = 1$.

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23. If $\tan \theta \times \tan 3\theta = 1$, then find the value of $\tan 2\theta$.

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24. If $\cos 5\theta = 0$, then find the value of $\cos \theta$.

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25. If $0 < x < \frac{\pi}{2}$ then prove that $\cos(\sin x) > \sin(\cos x)$

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26. Prove that $\frac{1}{2\sin 10^\circ} - 2\sin 70^\circ = 1$.

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27. Prove that $\tan 70^\circ = 2\tan 50^\circ + \tan 20^\circ$.

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28. Prove that $\cos 35^\circ 42' \cos 24^\circ 18' - \cos 54^\circ 18' \cos 65^\circ 42' = \frac{1}{2}$

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