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MATHS

BOOKS - PEARSON IIT JEE FOUNDATION

TRIGONOMETRY

Example

1. Convert 60° into circular measure.



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2. Convert 180^g into sexagesimal measure .



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3. The angle measuring $\frac{\pi}{4}$ when expressed in sexagesimal measure is

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4. If $\cos \theta = \frac{3}{5}$, then find the value of $\tan \theta$, $\operatorname{cosec} \theta$

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5. Find the value of $\sin 60^\circ + 2\tan 45^\circ - \cos 30^\circ$.

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6. Using the trigonometric table and evaluate

(a) $\sin^2 45^\circ + \cos^2 45^\circ$

(b) $\sec^2 30^\circ - \tan^2 30^\circ$

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7. Find the value of $\frac{\tan 30^\circ + \tan 60^\circ}{1 - \tan 30^\circ \tan 60^\circ}$ and $\tan 90^\circ$, what do you observe ?



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8. Find the value of $\sin 15^\circ$



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9. Find the value of $\tan 75^\circ$.



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10. Eliminate θ from the equation $a = x \sec \theta$ and $b = y \tan \theta$.



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11. Find the relation obtained by eliminating θ from the equations

$$x = a \cos \theta + b \sin \theta \text{ and } y = a \sin \theta - b \cos \theta.$$



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12. Eliminate θ from the equation $P = a \operatorname{cosec} \theta$ and $Q = a \cot \theta$.



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13. Eliminate θ from the equation

$$s = \sin \theta + \operatorname{cosec} \theta \text{ and } r = \sin \theta - \operatorname{cosec} \theta.$$



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14. If $\sin(A + B) = \frac{\sqrt{3}}{2}$ and $\operatorname{cosec} A = 2$, then find A and B.



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15. Find the length of the chord which subtends an angle of 90° at the centre 'O' and which is at a distance of 6 cm from the centre.



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16. Evaluate $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}}$



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17. If $\sin \alpha$ and $\cos \alpha$ are the roots of the equation $ax^2 - bx - 1 = 0$, then find the relation between a and b.



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18. If $\cos \alpha = \frac{2}{3}$ and $\sin \beta = \frac{1}{4}$, then find $\cos(\alpha - \beta)$.



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19. Express the following as a single trigonometric ratio: $\sqrt{3} \cos \theta - \sin \theta$



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Very Short Answer Type Questions

1. The value of 144° in circular measure = _____



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2. The value of $\sin 30^\circ \cdot \sin 45^\circ \cdot \operatorname{cosec} 45^\circ \cdot \cos 30^\circ$ = _____



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3. If $\frac{1 - \tan^2 60^\circ}{1 + \tan^2 60^\circ} = \cos X$, then the value of X is _____



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4. The value of $\log[(\sec \theta + \tan \theta)(\sec \theta - \tan \theta)]$ is _____



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5. If $\frac{\cos 13^\circ + \sin 13^\circ}{\cos 13^\circ - \sin 13^\circ} = \tan A$, then $A =$ _____



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6. If $\sin \theta = \frac{1}{2}$ and $0^\circ < \theta < 90^\circ$, then $\cos 2\theta =$ _____



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7. If $\operatorname{cosec} \theta - \cot \theta = x$, then $\operatorname{cosec} \theta + \cot \theta =$ _____



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8. The value of $\frac{\sin 20^\circ \cos 70^\circ + \cos 20^\circ \sin 70^\circ}{\sin 23^\circ \operatorname{cosec} 23^\circ + \cos 23^\circ \sec 23^\circ}$ is _____.



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9. If $A + B = 45^\circ$, then $(1 + \tan A)(1 + \tan B) = \underline{\hspace{2cm}}$



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10. If $\tan \theta = \frac{5}{6}$ and $\tan \phi = \frac{1}{11}$, then $\theta + \phi = \underline{\hspace{2cm}}$



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11. If $A - B = 45^\circ$ and $\tan A - \tan B = \sqrt{3}$, then $\tan A \cdot \tan B = \underline{\hspace{2cm}}$



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12. If $\cos A + \sin A = \frac{1}{2(\cos A - \sin A)}$, ($0^\circ < A < 90^\circ$), then $\sin^2 A = \underline{\hspace{2cm}}$





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13. The value of $(\sin A - \cos A)^2 + (\sin A + \cos A)^2$ is _____



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14. If $A + B = 60^\circ$, then the value of $\sin A \cos B + \cos A \sin B =$ _____



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15. In ΔABC , the value of $\cos(A - B) - \cos(C)$ is _____



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16. ABC is right triangle , right angled at A, then $\tan B \cdot \tan C =$ _____



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17. $\tan(A + B) = \sqrt{3}$ and $\sin A = \frac{1}{\sqrt{2}}$, then the value of B in radians
is _____



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18. In ΔABC , the lengths of the three sides AB, BC and CA are 28cm, 96 cm and 100 cm respectively. Find the value of $\cos C$.



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19. If $\sin A = \cos B$, where A and B are acute angles, then $A + B$
= _____



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20. ABC is a right isosceles triangle, right angled at B.
Then $\sin^2 A + \cos^2 C =$ _____



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21. Evaluate: $\sin^2 60^\circ \cos^2 45^\circ \cos^2 60^\circ \operatorname{cosec}^2 90^\circ$



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22. If $\sin \theta = \frac{3}{5}$ and θ is acute, then find the value of $\frac{\tan \theta - 2 \cos \theta}{3 \sin \theta + \sec \theta}$.



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23. Find the value of $\cos 15^\circ$.



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24. Evaluate: $\operatorname{cosec}^2 30^\circ + \sec^2 60^\circ + \tan^2 30^\circ$.

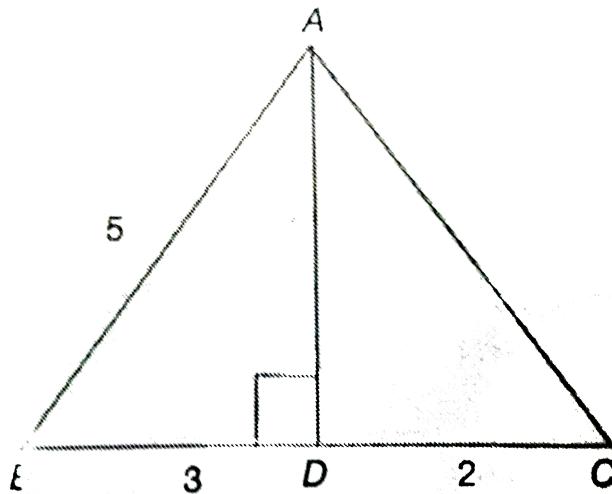


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25. Convert $\frac{\pi^c}{15}$ into the other two systems.

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26. In the adjoining figure, find the value of $\tan B$.



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27. Simplify and express $\sec^4 \alpha - \tan^4 \alpha$ in their least exponents.

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28. Convert $\left(\frac{200}{3}\right)^g$ into other two systems.



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29. Convert 270° into other two systems.



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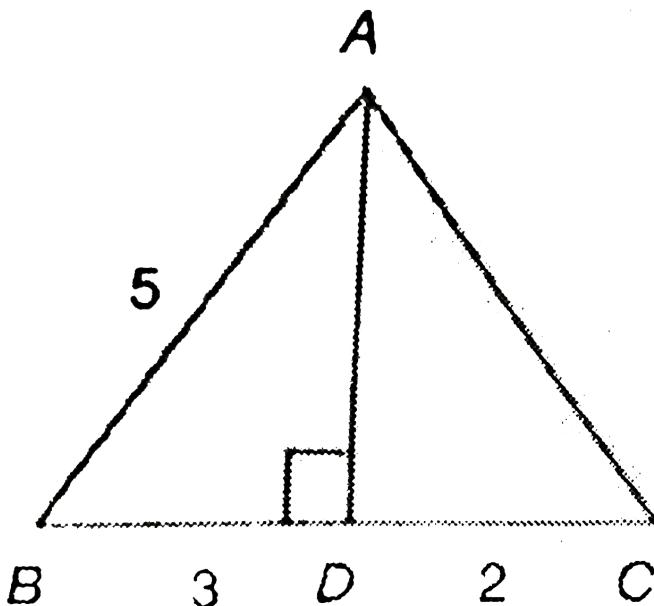
30. Evaluate : $\cos 0^\circ + \sqrt{2}\sec 45^\circ - \sqrt{3}\tan 30^\circ$.



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Short Answer Type Questions

1. In the adjoining figure, find the value of $\sin C$.



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2. A wheel makes 200 revolution in 2 minutes. Find the measure of the angle it describes at the centre in 24 seconds.



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3. Find the length of the chord subtending an angle of 120° at the centre of the circle whose radius is 4 cm.

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4. Find the value of $\tan 75^\circ$

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5. If $\sec^2 \alpha + \cos^2 \alpha = 2$, then find the value of $\sec \alpha + \cos \alpha$.

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6. Eliminate θ from the equation ,
 $a = x \sin \theta - y \cos \theta$ and $b = x \cos \theta + y \sin \theta$.

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7. If $\cos \alpha = \frac{12}{13}$ and $\sin \beta = \frac{4}{5}$, then find $\sin(\alpha + \beta)$.

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8. Express $\sin \theta$ in terms of $\cot \theta$.

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9. If $\sin \alpha = \frac{4}{5}$, then find the value of $\sin 2\alpha$.

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10. Find the value of $\sin 2\alpha$, if $\sin \alpha + \cos \alpha = \frac{1}{3}$.

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11. The length of the minutes hand of a wall clock is 36 cm. Find the distance covered by its tip in 35 minutes.

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12. If $\tan 2\alpha = \frac{3}{4}$, then find $\tan \alpha$.

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13. If $A + B = 45^\circ$, then find the value of $\tan A + \tan B + \tan A \tan B$.

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14. If $\sin(A + B) = \frac{\sqrt{3}}{2}$ and $\cot(A - B) = 1$, then find A and B.

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15. If $\sin\theta$ and $\cos\theta$ are the roots of the quadratic equation $lx^2 - mx - n = 0$, then find the relation between l,m and n.



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Easy Type Questions

1. Show that :

$$3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x) = 3.$$



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2. If $\cos^2 \alpha + \cos \alpha = 1$, then find the value of $4\sin^2 \alpha + 4\sin^4 \alpha + 2$.



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3. Obtain the relation by eliminating θ from the equation,

$$x = a + r \cos \theta \text{ and } y = b + r \sin \theta.$$

A.

B.

C.

D.

Answer: $(x - a)^2 + (y - b)^2 = r^2$



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4. One of the angles of a rhombus is 60° and the length of the diagonal opposite to it is 6 cm. Find the area of the rhombus (in sq. cm).



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5. If $\alpha + \beta + \gamma = 90^\circ$, then $\tan \alpha + \tan \beta + \tan \alpha \tan \beta \cot \gamma$ is _____



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Level 1

1. The length of the minutes hand of a wall clock is 6 cm. Find the distance covered by the tip of the minutes hand in 25 minutes

A. $\frac{270}{1} \text{ cm}$

B. 110 cm

C. $\frac{88}{7} \text{ cm}$

D. $\frac{110}{7} \text{ cm}$

Answer: D



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2. The value of $\tan 10^\circ \cdot \tan 20^\circ \cdot \tan 45^\circ \cdot \tan 70^\circ \cdot \tan 80^\circ = \underline{\hspace{2cm}}$

A. 1

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

C. 0

D. 8

Answer: A



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3. The value of $\sin \theta$ in terms of $\tan \theta$ is _____

A. $\frac{\tan \theta}{\sqrt{1 - \tan^2 \theta}}$

B. $\frac{\tan^2 \theta}{\sqrt{1 + \tan^2 \theta}}$

C. $\frac{\tan^2 \theta}{\sqrt{1 - \tan^2 \theta}}$

D. $\frac{\tan \theta}{\sqrt{1 + \tan^2 \theta}}$

Answer: D



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4. The value of $\sin^2 60^\circ + \cos^2 30^\circ - \sin^2 45^\circ$ is _____

A. 1

B. $\sin 90^\circ$

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

D. Both (a) and (b)

Answer: D



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5. The simplified value of $\cos ec^2 \alpha \left(1 + \frac{1}{\sec \alpha}\right) \left(1 - \frac{1}{\sec \alpha}\right)$ is _____

A. 1

B. 0

C. 2

Answer: A



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6. A wheel makes 240 revolution in one minutes. Find the measure of the angle it describes at the centre in 15 seconds.

A. $60\pi^c$

B. $120\pi^c$

C. $8\pi^c$

D. None of these

Answer: B



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7. If $3 \tan A = 4$, then find the value of $\frac{2 \sin A - 7 \cos A}{3 \cos A + 4}$.

A. $\frac{-13}{29}$

B. $\frac{13}{11}$

C. ∞

D. $\frac{29}{13}$

Answer: A



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8. If $\tan \alpha = 3$ and $\tan \beta = \frac{1}{2}$, then which of the following is true ?

A. $\alpha + \beta = \frac{\pi^c}{4}$

B. $\alpha\beta = \frac{\pi^c}{4}$

C. $\alpha - \beta = \frac{\pi^c}{4}$

D. None of these

Answer: C



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9. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then which of the following is true ?

A. $A + B = \frac{\pi^c}{4}$

B. $A - B = \frac{\pi^c}{4}$

C. $2A + B = \frac{\pi^c}{4}$

D. $A + 2B = \frac{\pi^c}{4}$

Answer: A



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10. If $\sin A = \frac{1}{2}$ and $90^\circ < A < 180^\circ$, then the value of a in circular measure is _____

A. $\frac{\pi}{6}$

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

C. $\frac{5\pi}{6}$

D. $\frac{7\pi}{6}$

Answer: C



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11. The value of $\frac{3\pi^c}{5}$ in sexagesimal measure is _____

A. 216°

B. 144°

C. 128°

D. 108°

Answer: D



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12. The value of $\log_{\sec \theta} (1 - \sin^2 \theta)$ is _____

A. 2

B. - 2

C. 0

D. 1

Answer: B



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13. If $\sin A = \frac{\sqrt{3}}{2}$ and A is an acute angle, then find the value of $\frac{\tan A - \cot A}{\sqrt{3} + \operatorname{cosec} A}$.

A. $\frac{-2}{5}$

B. $\frac{2}{5}$

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

D. -2

Answer: B



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14. The length of an arc, which subtends an angle of 30° at the centre of the circle of radius 42 cm is _____

A. 22 cm

B. 44 cm

C. 11 cm

D. $\frac{22}{7}$ cm

Answer: A



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15. If $\sin^4 \theta + \cos^4 \theta = \frac{1}{2}$, then find $\sin \theta \cos \theta$.

A. $\pm \frac{1}{8}$

B. $\pm \frac{1}{4}$

C. ± 1

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

Answer: D



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16. If $\sin \theta = \frac{a}{b}$, then $\cos \theta$ and $\tan \theta$ in term of a and b are

A. $\frac{\sqrt{b^2 - a^2}}{b}$ and $\frac{b}{\sqrt{b^2 - a^2}}$

B. $\frac{b}{\sqrt{b^2 - a^2}}$ and $\frac{a}{\sqrt{b^2 - a^2}}$

C. $\frac{\sqrt{a^2 - b^2}}{a}$ and $\frac{b}{\sqrt{a^2 - b^2}}$

D. $\frac{\sqrt{b^2 - a^2}}{b}$ and $\frac{a}{\sqrt{b^2 - a^2}}$

Answer: D



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17. The distance covered by the tip of a minute hand in 35 minutes is 33 cm. What is the length of the minute hand ?

A. 6 cm

B. 9 cm

C. 10 cm

D. 12 cm

Answer: B



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18. If $\sin \alpha = \frac{4}{5}$, where ($0^\circ \leq \alpha \leq 90^\circ$), then find $\sin 2\alpha$.

A. $\frac{12}{25}$

B. $-\frac{24}{25}$

C. $\frac{25}{24}$

D. $\frac{24}{25}$

Answer: D



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19. In a ΔABC , $\cos\left(\frac{A + B}{2}\right) = \underline{\hspace{2cm}}$

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

B. $-\sin \frac{C}{2}$

C. $\cos\left(\frac{A - B}{2}\right)$

D. $\sin \frac{C}{2}$

Answer: D



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20. $\sin^4 \theta - \cos^4 \theta = \underline{\hspace{2cm}}$

- A. -1
- B. $\cos 2\theta$
- C. $2 \sin^2 \theta - 1$
- D. $\sin 2\theta$

Answer: C



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21. If $P:Q = \tan 2A : \cos A$ and $Q:R = \cos 2A : \sin 2A$, then $P:R$ is _____

- A. $\tan 2A$
- B. $2 \sin A$
- C. 1

D. sec A

Answer: D



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22. If $A = \sin \theta + \cos \theta$ and $B = \sin \theta - \cos \theta$, then which of the following is true ?

A. $A^2 + B^2 = 1$

B. $A^2 - B^2 = 2$

C. $A^2 + B^2 = 2$

D. $2A^2 + B^2 = 4$

Answer: C



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23. If $\cot(A - B) = 1$ and $\cos(A + B) = \frac{1}{2}$, then find B

A. $42\frac{1}{2}^\circ$

B. $7\frac{1}{2}^\circ$

C. $15\frac{1}{2}^\circ$

D. 60°

Answer: B



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24. Find the measure of angle A, if $(2 \sin A + 1)(2 \sin A - 1) = 0$

A. 75°

B. 60°

C. 45°

D. 30°

Answer: D



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25. The value of $\cos 2\theta$ in terms of $\cot \theta$ is _____

A.
$$\frac{\cot^2 \theta + 1}{\cot^1 \theta - 1}$$

B.
$$\frac{1 + \cot^2 \theta}{\cot^2 \theta - 1}$$

C.
$$\frac{\cot^2 \theta - 1}{\cot^2 \theta + 1}$$

D.
$$\frac{1 - \cot^2 \theta}{1 + \cot^2 \theta}$$

Answer: C



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26. The simplified value of $\sin^4 \alpha + \cos^4 \alpha + \frac{1}{2}\sin^2 2\alpha$ is

A. -1

B. $\sin \alpha + \cos \alpha$

C. 0

D. 1

Answer: D



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$$27. \sqrt{\frac{(1 + \sin 2\theta)}{1 - \cos^2 \theta}} \left[\text{where } \theta \in \left[0, \frac{\pi}{4}\right] \right] =$$

A. cosec²θ

B. 1

C. 1 + cot θ

D. 1 + tan θ

Answer: C



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28. If A and B are complementary angles, then the value of

$$\frac{\sin^2 A + \sin^2 B}{\operatorname{cosec}^2 A - \tan^2 B} \text{ is } \underline{\hspace{2cm}}$$

A. 0

B. 1

C. -1

D. 2

Answer: B



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29. Find the value of $4(\sin^4 30^\circ + \cos^4 30^\circ) - 3(\cos^2 45^\circ + \sin^2 90^\circ)$.

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

B. -2

C. 2

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

Answer: B



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30. If $\sec \theta + \tan \theta = \frac{4}{3}$, then $\sec \theta \tan \theta = \underline{\hspace{2cm}}$

A. $\frac{175}{24}$

B. $\frac{25}{576}$

C. $\frac{27}{576}$

D. $\frac{175}{576}$

Answer: D



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Level 2

1. If $\sin \alpha + \cos \alpha = n$, then $\sin^6 \alpha + \cos^6 \alpha$ in terms of n is _____

A. $4 + 3(n - 1)^2$

B. $\frac{4 + 3(n^2 - 1)}{4}$

C. $4 - 3(n^2 - 1)^2 \frac{1}{4}$

D. None of these

Answer: C



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2. Find the value of $\frac{\sin 25^\circ}{\cos 35^\circ} - \frac{\cos 25^\circ}{\sin 35^\circ}$

A. $\operatorname{cosec} 70^\circ$

B. $\sin 70^\circ$

C. $-\sin 70^\circ$

D. $-\operatorname{cosec} 70^\circ$

Answer: D



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3. The value of $\frac{3\tan 30^\circ - \tan^3 30^\circ}{1 - 3\tan^2 30^\circ}$ is _____

A. $\tan 90^\circ$

B. $\tan 60^\circ$

C. $\tan 45^\circ$

D. $\tan 30^\circ$

Answer: A



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4. If $\cot^4 x - \cot^2 x = 1$, then the value of $\cos^4 x + \cos^2 x$ is _____

A. -1

B. 0

C. 2

D. 1

Answer: D



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5. If $\frac{\cos(A - B)}{\cos(A + B)} = \frac{8}{3}$, then $\tan A \cdot \tan B$ is ____

A. $\frac{5}{11}$

B. $\frac{7}{13}$

C. $\frac{8}{5}$

D. $\frac{11}{5}$

Answer: A



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6. If $A + B = 45^\circ$, then find the value of $\tan A + \tan B + \tan A \tan B$.



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7. If $\cot \theta + \tan \theta = 2$, then the value of $\tan^2 \theta - \cot^2 \theta$ is _____

A. 1

B. 0

C. -1

D. 2

Answer: B



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8. The value of
 $\cot 5^\circ \cdot \cot 15^\circ \cdot \cot 25^\circ \cdot \cot 35^\circ \cdot \cot 45^\circ \cdot \cot 55^\circ \cdot \cot 65^\circ \cdot \cot 75^\circ \cdot \cot$
is _____

A. 0

B. -1

C. -2

D. 1

Answer: D



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9. The simplified form of $\sqrt{1 + \sin\left(\frac{x}{8}\right)}$ is _____

A. $\sin\left(\frac{x}{8}\right) + \cos\left(\frac{x}{8}\right)$

B. $\sin\left(\frac{x}{16}\right) + \cos\left(\frac{x}{16}\right)$

C. $\sin\left(\frac{x}{4}\right) + \cos\left(\frac{x}{4}\right)$

D. None of these

Answer: B



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10. $\sin^4 \theta + \cos^4 \theta$ in terms of $\sin \theta$ is _____

A. $2\sin^4 \theta - 2\sin^2 \theta - 1$

B. $2\sin^4 \theta - 2\sin^2 \theta + 1$

C. $2\sin^4 \theta + 2\sin^2 \theta - 1$

D. $2\sin^4 \theta - 2\sin^2 \theta$

Answer: B



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11. If $\tan(A - B) = 1$ and $\sin(A + B) = \frac{\sqrt{3}}{2}$, then find B.

A. $42\frac{1}{2}^\circ$

B. $7\frac{1}{2}^\circ$

C. $15\frac{1}{2}^\circ$

D. 60°

Answer: B



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12. If $\sin \beta + \cos \beta = \frac{5}{4}$, then find the value of $\sin \beta \cdot \cos \beta$.

A. $\frac{1}{4}$

B. $\frac{9}{32}$

C. $\frac{5}{16}$

D. $\frac{11}{32}$

Answer: B



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13. If $\sin^2 \alpha + \sin \alpha = 1$, then the value of $\cos^4 \alpha + \cos^2 \alpha$ is _____

A. 0

B. -1

C. 1

D. 2

Answer: C



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14. If $\tan P + \cot P = 2$, then the value of $\tan^n P + \cot^n P$ is _____

A. 2

B. 2^n

C. 2^{n-1}

D. 2^{n+1}

Answer: A



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15. The value of $\sqrt{3}\tan 10^\circ + \sqrt{3}\tan 20^\circ + 1\tan 10^\circ \cdot \tan 20^\circ$ is _____

A. -1

B. 0

C. 1

D. 2

Answer: C



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16. If $\tan(A + B) = 1$ and $A(-B) = \frac{1}{\sqrt{2}}$, then find A and B.

The following are the steps involved in solving the above problem.

Arrange them in sequential order.

(A)

$$\tan(A + B) = 1 \Rightarrow \tan(A + B) = \tan 45^\circ \text{ and } \sin(A - B) = \frac{1}{\sqrt{2}} \Rightarrow \sin(A - B) = \frac{1}{\sqrt{2}}$$

(B) $2A = 90^\circ \Rightarrow A = 45^\circ$.

(C) $A + B = 45^\circ$ and $A - B = 45^\circ$.

(D) $\therefore A = 45^\circ$ and $B = 0^\circ$.

A. DBCA

B. CABD

C. ACDB

D. ACBD

Answer: D



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17. If $\cos(A - B) = \frac{1}{2}$ and $\sin(A + B) = \frac{\sqrt{3}}{2}$, then find A and B

The following are the steps involved in solving the following problem.

Arrange them in sequential order.

(A) $2A = 120^\circ \Rightarrow A = 60^\circ$

(B) $\therefore A = 60^\circ, B = 0^\circ$.

(C)

)

$$\cos(A - B) = \frac{1}{2} \Rightarrow \cos(A - B) = \cos 60^\circ \text{ and } \sin(A + B) = \frac{\sqrt{3}}{2} \Rightarrow \sin(A + B) = \sin 60^\circ$$

(D) $A + B = 60^\circ$ and $A - B = 60^\circ$.

A. DCAB

B. CADB

C. DCBA

D. CDAB

Answer: D



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18. If $\sin \alpha + \sin \beta + \sin \gamma = 3$, then $\sin^3 \alpha + \sin^3 \beta + \sin^3 \gamma =$

A. 0

B. 2

C. 3

D. 1

Answer: C



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19. $\sec^4 \theta - \sec^2 \theta = \underline{\hspace{2cm}}$

A. $\tan^2 \theta \sec^2 \theta$

B. $\frac{\tan^2 \theta}{\sec^2 \theta}$

C. $\operatorname{cosec}^2 \theta \cot^2 \theta$

D. $\frac{\cot^2 \theta}{\operatorname{cosec}^2 \theta}$

Answer: A



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20. $\sin \theta + \cos \theta = \sqrt{2}$, then $\sin^{16} \theta = \underline{\hspace{2cm}}$

- A. $\frac{\cos^{16} \theta}{2^{16}}$
- B. $\frac{\sec^{16} \theta}{2^8}$
- C. $\frac{1}{2 \sec^{16} \theta}$
- D. $\frac{1}{2^{16} \cos^{16} \theta}$

Answer: D



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Level 3

1. If $\frac{\sin(x - y)}{\sin(x + y)} = \frac{3}{5}$, then $\tan x \cdot \cot y$ is _____

A. 1

B. 2

C. 3

D. 4

Answer: D



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2. $\sqrt{\sqrt{16 \sin^4 \theta + \cos ec^4 \theta} + 8} - 4 =$

- A. $2 \sin \theta - \operatorname{cosec} \theta$
- B. $2 \sin \theta + \operatorname{cosec} \theta$
- C. $2 \operatorname{cosec} \theta + \cos \theta$
- D. $2 \operatorname{cosec} \theta + \sin \theta$

Answer: C



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3. If $\sin \theta$ and $\cos \theta$ are the roots of the quadratic equation $px^2 + qx + r = 0$ ($p \neq 0$), then which of the following relation holds good?

A. $q^2 - p^2 = 2pr$

B. $p^2 - q^2 = 2pr$

C. $p^2 + q^2 + 2pr = 0$

D. $(p - q)^2 = 2pr$

Answer: A



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4. If $\sin \alpha - \cos \alpha = m$, then the value of $\sin^6 \alpha + \cos^6 \alpha$ in terms of m is

A. $1 - \frac{3}{4}(1 + m^2)^2$

B. $1 - \frac{4}{3}(m^2 - 1)^2$

C. $1 - \frac{3}{4}(1 - m^2)^2$

D. $1 - \frac{3}{4}(1 + m^2)^2.$

Answer: C



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5. The value of $\frac{8 \sec^4 \theta - 8 \tan^4 \theta}{4 + 8 \tan^2 \theta} - \frac{2 \cos^6 \theta + 2 \sin^6 \theta}{1 - 3 \sin^2 \theta \cos^2 \theta}$ is _____

A. 0

B. 1

C. -1

D. 3

Answer: A



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6. If $\frac{1 + \tan \theta}{1 - \tan \theta} = \sqrt{3}$, then find the value of θ .

A. 30°

B. 25°

C. 15°

D. 45°

Answer: C



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7. If $A \times B = 1$, $A + B = \operatorname{cosec}\theta \cdot \sec\theta$ then $\frac{A}{B}$ can be _____

A. $\tan^2 \theta$

B. $\sec^2 \theta$

C. $\sin^2 \theta \cos^2 \theta$

D. $\operatorname{cosec}^2 \theta \sec^2 \theta$.

Answer: A



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8. If $7 \sin^2 \theta + 3 \cos^2 \theta = 4$, then find $\tan \theta$.

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

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

C. $\sqrt{3}$

D. 1

Answer: A



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9. If $\sin(A + B) = \frac{\sqrt{3} + 1}{2\sqrt{2}}$ and $\sec A = 2$, then the value of B in circular measure is _____

A. $\frac{\pi}{12}$

B. $\frac{3\pi}{5}$

C. $\frac{7\pi}{5}$

D. $\frac{5\pi}{12}$

Answer: A



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10. If $\tan \theta - \cot \theta = 7$, then the value of $\tan^3 \theta - \cot^3 \theta$ is

A. 250

B. 354

C. 343

D. 364

Answer: D



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11. If $x^n = a^m \cos^4 \theta$ and $y^n = b^m \sin^4 \theta$ then (i) $\frac{x^{\frac{n}{2}}}{a^{\frac{m}{2}}} + \frac{y^{\frac{n}{2}}}{b^{\frac{m}{2}}} = 1$
(ii) $\frac{x^n}{a^m} + \frac{y^n}{b^m} = 1$ (iii) $\frac{x^{\frac{n}{2}}}{y^{\frac{n}{2}}} + \frac{a^{\frac{m}{2}}}{y^{\frac{m}{2}}} = 1$ (iv) None of these

A. $\frac{x^{n/2}}{a^{m/2}} + \frac{y^{n/2}}{b^{m/2}} = 1$

- B. $\frac{x^n}{a^m} + \frac{y^n}{b^m} = 1$
- C. $\frac{x^{n/2}}{y^{n/2}} + \frac{a^{m/2}}{b^{m/2}} = 1$

D. None of these

Answer: A



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12. If $\sin^2 \theta + 2\cos^2 \theta + 3\sin^2 \theta + 4\cos^2 \theta + \dots + 40$ terms $= 405$
where θ is acute, then find the value of $\tan \theta$.

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

B. $\sqrt{3}$

C. 1

D. ∞

Answer: B



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13. If $\sin \alpha + \sin \beta = 2$, then find the value of $\cos^2 \alpha + \cos^2 \beta$.

A. 0

B. 1

C. 2

D. 3

Answer: A



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14. If $x = a^2 \cos 3\theta$ and $y = b^2 \sin 3\theta$, then

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

B. $\left(\frac{x^2}{a^2}\right)^{1/3} + \left(\frac{y}{b^2}\right)^{1/3} = 1$

C. $\left(\frac{x^2}{a^2}\right)^{2/3} + \left(\frac{y^2}{b^2}\right)^{2/3} = 1$

$$\text{D. } \left(\frac{x}{a^2}\right)^{2/3} + \left(\frac{y}{b^2}\right)^{2/3} = 1$$

Answer: D



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15. If $\cos^2 \theta + 2\sin^2 \theta + 3\cos^2 \theta + 4\sin^2 \theta + \dots 200 terms = 10025$ and θ is an acute angle then the value of $\sin \theta - \cos \theta$ is

A. $\frac{1 - \sqrt{3}}{2}$

B. $\frac{1 + \sqrt{3}}{2}$

C. $\frac{\sqrt{3} - 1}{2}$

D. 0

Answer: A



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