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MATHS

BOOKS - S CHAND IIT JEE FOUNDATION

TRIGONOMETRICAL RATIOS OF STANDARD ANGLES

Solved Examples

1. Evaluate : $2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$

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2. Prove that : $\frac{4}{3}\tan^2 30^\circ + \sin^2 60^\circ - 3\cos^2 60^\circ + \frac{3}{4}\tan^2 60^\circ - 2\tan^2 45^\circ = \frac{25}{36}$

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3. Find the value of x if tan 3 x = sin $45^\circ \cos 45^\circ + \sin 30^\circ$

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4. Without using trigonometric tables, show that $\frac{\cos 70^\circ}{\sin 20^\circ} + \cos 49^\circ \operatorname{cosec} 41^\circ = 2$

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5. Evaluate : $\tan 7^\circ \tan 23^\circ \tan 60^\circ \tan 67^\circ \tan 83^\circ$

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6. The value of (tan $1^\circ \tan 2^\circ \tan 3^\circ \ldots \tan 89^\circ$) is

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7. If $\sin 3\theta = \cos(\theta - 6^\circ)$, where 3θ and $(\theta - 6^\circ)$ are acute angle then the value of θ is _____.

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8. Show that $\frac{1}{1+\cos(90^\circ - \theta)} + \frac{1}{1-\cos(90^\circ - \theta)} = 2\cos ec^2(90^\circ - \theta)$

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Question Bank 33

1. v20

A. $\tan 90^\circ$

B. 1

C. $\sin 45^\circ$

D. 0

Answer: D

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2. If x $\tan 30^\circ = \frac{\sin 30^\circ + \cos 60^\circ}{\tan 60^\circ + \sin 60^\circ}$, then the value of x is :

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

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

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

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

Answer: A

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3. The value of $\sin 0^\circ + \cos 30^\circ - \tan 45^\circ + \cos ec60^\circ + \cot 90^\circ$ is equal to

A. $\frac{5\sqrt{3}-6}{6}$

B. $\frac{-6+7\sqrt{3}}{6}$

C. 0

D. 2

Answer: B

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4. If $2\sin^2 x + \cos^2 45^\circ = \tan 45^\circ$ and x is an acute angle, then the value of tan x is :

A. 1

B. $\sqrt{3}$

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

D. 3

Answer: C

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5. The value of a $\sin 0^\circ + b\cos 90^\circ + c\tan 45^\circ$ is

A. a + b + c

B. b + c

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

D. c

Answer: D

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6. The value of $\frac{\sin 30^\circ - \cos 60^\circ + \tan 45^\circ}{\cos 90^\circ + \tan 45^\circ + \sin 90^\circ}$ is

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

B. 1

C. $\sqrt{3}$

D. ∞

Answer: D

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7. The value of $\frac{1}{2}\sin^2 90^\circ \sin^2 30^\circ \cos^2 45^\circ + 4\tan^2 30^\circ + \frac{1}{2}\sin^2 90^\circ - 2\cos^2 90^\circ$ is :

A. $\frac{45}{24}$

B. $\frac{46}{24}$

C. $\frac{47}{24}$

D. $\frac{49}{24}$

Answer: C

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8. The value of $(\cos 0^\circ + \sin 45^\circ + \sin 30^\circ)(\sin 90^\circ - \cos 45^\circ + \cos 60^\circ)$ is

A. 0

B. 1

C. $\frac{7}{4}$

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

Answer: C

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9. $\frac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \tan 30^\circ}$ equal

A. $\tan 60^\circ$

B. $\tan 0^\circ$

C. $\tan 30^\circ$

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

Answer: C

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10. Find the value of x, if

$\sin 2x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

A. 20°

B. 15°

C. 30°

D. 45°

Answer: B

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11. $\tan 26^\circ - \cot 64^\circ$ equals

A. -1

B. 1

C. 0

D. 2

Answer: C

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12. $\frac{\sin 19^\circ}{\cos 71^\circ} + \frac{\cos 73^\circ}{\sin 17^\circ}$

A. 0

B. 1

C. 2

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

Answer: C

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13. Consider the following equations :

1. $\frac{\cos 75^\circ}{\sin 15^\circ} + \frac{\sin 12^\circ}{\cos 78^\circ} - \frac{\cos ec 18^\circ}{\sec 72^\circ} = 1$

2. $\frac{\tan 50^\circ + \sec 50^\circ}{\cot 40^\circ + \cos ec 40^\circ} + \cos 40^\circ \cos ec 50^\circ = +2$

3. $\frac{\sin 80^\circ}{\cos 10^\circ} - \sin 59^\circ \sec 31^\circ = 0$

Which of these statements given below is correct

A. 1 only is correct

B. 3 only is correct

C. All 1, 2 and 3 are correct

D. 2 and 3 are correct

Answer: C

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14. $\sin^2 25^\circ + \sin^2 65^\circ$ is equal to

A. 0

B. $2\sin^2 25^\circ$

C. $\cos^2 65^\circ$

D. 1

Answer: C

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15. If $\sin(30^\circ - \theta) = \cos(60^\circ + \phi)$, then

A. $\phi - \theta = 30^\circ$

B. $\phi - \theta = 0^\circ$

C. $\phi + \theta = 60^\circ$

D. $\phi - \theta = 60^\circ$

Answer: D

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16. The value of $\cot 15^\circ \cot 16^\circ \cot 17^\circ \ldots\ldots \cot 73^\circ \cot 74^\circ \cot 75^\circ$ is :

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

B. 0

C. 1

D. -1

Answer: B

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17. If $\sin\theta = \cos\theta$, then value of θ is :

A. 60°

B. 0°

C. 45°

D. 90°

Answer: C

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18. Value of $\cos^2 5^\circ + \cos^2 10^\circ + \cos^2 80^\circ + \cos^2 85^\circ$ is

A. 1

B. 0

C. 2

D. 3

Answer: C

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19. If $\sin\ 3\theta = \cos(\theta - 2^\circ)$ where 3θ and $(\theta - 2^\circ)$ are acute angles, what is the value of θ ?

A. 22°

B. 23°

C. 24°

D. 25°

Answer: C

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20. If $\tan\theta = 1$ and $\sin\phi = \frac{1}{\sqrt{2}}$, then the value of $\cos(\theta + \phi)$ is

A. -1

B. 0

C. 1

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

Answer: B

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21. If $x\cos 60^\circ + y\cos 0^\circ = 3$ and $4x\sin 30^\circ - y\cot 45^\circ = 2$, then what is the value of x ?

A. -1

B. 0

C. 1

D. 2

Answer: D

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22. Which one of the following is true ?

A. $\tan x > 1, 45^\circ < x < 90^\circ$

B. $\sin x > \frac{1}{2}, 0^\circ < x < 30^\circ$

C. $\cos x > \frac{1}{2}, 60^\circ < x < 90^\circ$

D. sin x = cos x for some value of $x, 30^\circ < x < 45^\circ$

Answer: A

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23. If $x + y = 90^\circ$, then what is

$\sqrt{\cos x \cos ecy - \cos x \sin y}$ equal to

A. cos x

B. sin x

C. $\sqrt{\cos x}$

D. $\sqrt{\sin x}$

Answer: B

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24. If $0^\circ < \theta < 90^\circ$ and $\cos^2\theta - \sin^2\theta = \frac{1}{2}$, then what is the value of θ ?

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

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25. The value of $\sin^2(90^\circ - \theta)\left[1 + \cot^2(90^\circ - \theta)\right]$ is

A. -1

B. 0

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

D. 1

Answer: D

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Self Assessment Sheet 32

1. Which of the following is not defined ?

A. $\sin 90^\circ$

B. $\tan 0^\circ$

C. $\cos 90^\circ$

D. $\cos ec 0^\circ$

Answer: D

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2. What is the value of $\frac{\sin 60^\circ}{\cos^2 45^\circ} - 3\tan 30^\circ + 5\cos 90^\circ$

A. 1

B. -1

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

D. 0

Answer: D

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3. The value of $2\sqrt{2}\cos 45^\circ \cdot \cos 60^\circ + 2\sqrt{3}\sin 30^\circ \tan 60^\circ - \cos 0^\circ$ is

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

B. 3

C. -3

D. 0

Answer: B

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4. If $2\cos\theta = \sqrt{3}$ evaluate $3\sin\theta - 4\sin^3\theta$

A. 3

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

C. 1

D. 2

Answer: C

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5. What is the value of

$$\frac{\sin 2^\circ \sin 4^\circ \sin 6^\circ \ldots . \sin^\circ 88^\circ}{\cos 88^\circ \cos 86^\circ \cos 84^\circ \ldots . \cos 2^\circ}$$

(Do not use trigonometric tables)

A. 0

B. 1

C. 2

D. 4

Answer: B

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6. If $x + y = 90^\circ$, then what is the value of $\left(1 + \frac{\tan x}{\tan y}\right)\sin^2 y$?

A. 0

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

C. 1

D. 2

Answer: C

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7. If sin A = cos A and A is acute, tan A - cot a is equal' to :

A. 2

B. 1

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

D. 0

Answer: D

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8. Without using trigonometric tables, find the value of : $\frac{2}{3}\left(\frac{\sec 56^\circ}{\operatorname{cosec} 34^\circ}\right) - 2\cos^2 20^\circ + \frac{1}{2}\cot 28^\circ \cot 35^\circ \cot 45^\circ \cot 62^\circ \cot 55^\circ - 2$

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

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

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

D. 1

Answer: C

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9. If $11x$ is an acute angle and tan 11 x = cot 7 x , then what is the value of x ?

A. 5°

B. 6°

C. 7°

D. 8°

Answer: A

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10. Evaluate

$$\sin(50^\circ + \theta) - \cos(40^\circ - \theta) + \tan 1^\circ \tan 15^\circ \tan 20^\circ \tan 70^\circ \tan 65^\circ \tan 89^\circ$$

A. 0

B. 1

C. 2

D. 3

Answer: C

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