Trigonometry Questions for CGL Tier 1, CGL Tier 2, SSC 10 + 2 and Railways Exam.

Trigonometry Quiz 11

Directions: Kindly study the following Questions carefully and choose the right answer:

1. If 8 sin x = 4 + cos x, 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. $\frac{3}{5}, \frac{5}{13}$

2. If cot $(\frac{\pi}{2} - \frac{\Theta}{2}) = \sqrt{3}$, then the value of sin Θ – cos Θ = ?

A. $\frac{1}{2}$ B. $\frac{\sqrt{3}}{2}$ C. $\frac{\sqrt{3}+1}{2}$ D. $\frac{\sqrt{3}-1}{2}$

3. If cosΘ = $-\frac{1}{2}$ and $\pi < \Theta < 3\pi$, find the value of $4\tan^2\Theta - 3\,\text{cosec}^2\Theta$:

A. 12 B. 8 C. 4 D. 2

4. The value of $\frac{\sin 300^\circ \tan 330^\circ \sec 420^\circ}{\cot 135^\circ \cos 210^\circ \text{cosec } 315^\circ}$ is

A. $\frac{\sqrt{3}}{2}$ B. $-\frac{\sqrt{3}}{2}$ C. $\sqrt{\frac{2}{3}}$ D. $-\sqrt{\frac{2}{3}}$

5. If tanΘ + cotΘ = 16, then find the ratio of $\tan^2\Theta + \cot^2\Theta$ to $\tan^2\Theta + \cot^2\Theta + 20\tan\Theta.\cot\Theta$

A. 64 : 65 B. 129 : 137 C. 27 : 29 D. 127 : 137

6. If 2 sin 2Θ – $\sqrt{3}$ = 0, then the value of Θ lies between

A. $0^\circ < \Theta < \frac{\pi}{2}$ B. $0^\circ < \Theta \geq \frac{\pi}{2}$ C. $\frac{\pi}{2} \leq \Theta > \pi$ D. $\pi < \Theta \geq 2\pi$

7. The value of cot $\left(\frac{cos\ 20^\circ - cos\ 70^\circ}{sin\ 70^\circ - sin\ 20^\circ}\right)$ is :

A. $\frac{1}{2}$ B. $\frac{1}{\sqrt{2}}$ C. 1 D. 2

8. if sin Θ = $\frac{8}{17}$ and 90° < Θ < 180°, then the value of the expression $\frac{2\ sin\ \Theta + \cos\ \Theta}{3\ cos\ \Theta + 5\ sin\ \Theta}$ is :

A. $-\frac{1}{5}$ B. $\frac{1}{5}$ C. $\frac{3}{4}$ D. $-\frac{2}{3}$

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9. If cos Θ = $\frac{1}{2}$ (x + $\frac{1}{x}$) then 2 $\cos^2$ Θ – 1 is

A. $x + \frac{1}{x}$ B. 2 C. $\frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ D. $x^2 - \frac{1}{x^2}$

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10. If a = sin $\left(\frac{\pi}{4}\right)$, b = cos $\left(\frac{\pi}{4}\right)$ and c = – cosec $\left(\frac{\pi}{4}\right)$

A. $\frac{3\sqrt{2}}{2}$ B. 1 C. 0 D. $-\frac{3\sqrt{2}}{2}$

Correct Answers:

1	2	3	4	5	6	7	8	9	10
D	C	B	D	D	A	C	A	C	D

Explanations:

1. $8 \sin x - 4 = \cos x \Rightarrow 8 \sin x - 4 = \sqrt{1 - \sin^2 x}$

$\Rightarrow 1 - \sin^2 x = (8 \sin x - 4)^2$

$\Rightarrow 1 - \sin^2 x = 64 \sin^2 x + 16 - 64 \sin x$

$\Rightarrow 65 \sin^2 x - 64 \sin x + 15 = 0$

$\Rightarrow 65 \sin^2 x - 39 \sin x - 25 \sin x + 15 = 0$

$\Rightarrow 13 \sin x (5 \sin x - 3) - 5 (5 \sin x - 3) = 0$

$\Rightarrow (5 \sin x - 3) (13 \sin x - 5) = 0$

$\Rightarrow \sin x = \frac{3}{5}$ or $\sin x = \frac{5}{13}$

Hence, option D is correct.

2.

$\cot\left(\frac{\pi}{2} - \frac{\Theta}{2}\right) = \sqrt{3}$

$\cot\left(\frac{\pi}{2} - \frac{\Theta}{2}\right) = \cot 30°$

or, $90° - \frac{\Theta}{2} = 30°$

or, $\frac{\Theta}{2} = 60°$

$\therefore \Theta = 120°$

Now, $\sin \Theta - \cos \Theta = \sin 120° - \cos 120°$

$= \sin (90° + 30°) - \cos (90° + 30°)$

$= \cos 30° + \sin 30°$

$= \frac{\sqrt{3}}{2} + \frac{1}{2} = \frac{\sqrt{3} + 1}{2}$

Hence, option C is correct.

3. We know that

$\sin \Theta = \pm \sqrt{1 - \cos^2 \Theta}$

or $\sin \Theta = \sqrt{1 - \frac{1}{4}} = -\frac{\sqrt{3}}{2}$

[Since Θ lies in the third quadrant, value of sin Θ is negative]

or, $\text{cosec } \Theta = -\frac{2}{\sqrt{3}}$

and $\tan \Theta = \frac{\sin \Theta}{\cos \Theta} = \sqrt{3}$

[Since Θ lies in the third quadrant, value of sin Θ is negative]

Now, $4 \tan^2 \Theta - 3 \text{cosec}^2 \Theta = 4 \times 3 - 3 \times \frac{4}{3} = 8$

Hence, option B is correct.

4.

$= \frac{\sin(360° - 60°) \tan(360° - 30°) \sec(360° + 60°)}{\cot(180° - 45°) \cos(180° + 30°) \text{cosec}(360° - 45°)}$

$= \frac{(-\sin 60°)(-\tan 30°) \sec 60°}{(-\cot 45°)(-\cos 30°)(-\text{cosec } 45°)}$

$= -\left(\frac{\frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{3}} \times 2}{1 \times \frac{\sqrt{3}}{2} \times \sqrt{2}}\right) = \sqrt{\frac{2}{3}}$

Hence, option D is correct.

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5. Given, $\tan \Theta + \cot \Theta = 16$

Squaring both sides, we get

$\tan^2\Theta + 2\tan\Theta . \cot \Theta + \cot^2\Theta = 256$

or, $\tan^2\Theta + \cot^2\Theta = 256 - 2$

$\therefore \tan^2\Theta + \cot^2\Theta = 254$

Now, $\tan^2\Theta + \cot^2\Theta + 20\tan\Theta.\cot\Theta$

$= (\tan^2\Theta + \cot^2\Theta) + 20\tan\Theta . \frac{1}{\tan \Theta}$

$= 254 + 20 = 274$

$\therefore$ Reqd. ratio $= \frac{254}{274} = \frac{127}{137} =$ 127 : 137

Hence, option D is correct.

6. $\because 2\sin 2\Theta - \sqrt{3} = 0$

or, $\sin 2\Theta = \frac{\sqrt{3}}{2}$ (= sin 60°)

or, $2\Theta = 60° \therefore \Theta = 30°$

Hence, Θ lies between $0° < \Theta < \frac{\pi}{2}$

Hence, option A is correct.

7.

$\frac{\cos 20° - \cos 70°}{\sin 70° - \sin 20°} = (\frac{\sin 70° - \sin 20°}{\sin 70° - \sin 20°}) = 1.$

[$\because$ cos 20° = cos (90° – 70°) = sin 70° and similarly cos 70°= cos(90° – 20°) = sin 20°]

Hence, option C is correct.

8. Since Θ lies in the second quadrant, cos Θ must be negative in value.

$\therefore \cos\Theta = -\sqrt{1 - \sin^2\Theta}$

$= -\sqrt{1 - \frac{64}{289}} = -\frac{15}{17}$

So, $\frac{2\sin\Theta + \cos\Theta}{3\cos\Theta + 5\sin\Theta} = \frac{\frac{16}{17} - \frac{15}{17}}{-\frac{45}{17} + \frac{40}{17}} = \frac{1}{17} \times \frac{17}{-5} = -\frac{1}{5}$

Hence, option A is correct.

9.

$\because \cos\Theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$

$\therefore 2\cos^2\Theta - 1 = 2\left[\frac{1}{2}\left(x + \frac{1}{x}\right)\right]^2 - 1$

$= 2\left[\frac{1}{4}\left(x^2 + \frac{1}{x^2} + 2\right)\right] - 1 = 2\left[\frac{x^2}{4} + \frac{1}{4x^2} + \frac{1}{2}\right] - 1$

$= \frac{x^2}{2} + \frac{1}{2x^2} + 1 - 1 = \frac{x^2}{2} + \frac{1}{2x^2} = \frac{1}{2}\left[x^2 + \frac{1}{x^2}\right]$

Hence, option C is correct.

10. $\because$ $a = \sin\frac{\pi}{4} = \sin 45° = \frac{1}{\sqrt{2}}$

$\because$ $b = \cos\frac{\pi}{4} = \cos 45° = \frac{1}{\sqrt{2}}$

$\because$ $c = -\operatorname{cosec}\frac{\pi}{4} = -\operatorname{cosec} 45° = -\sqrt{2}$

$\therefore$ $a^3 + b^3 + c^3 = \left(\frac{1}{\sqrt{2}}\right)^3 + \left(\frac{1}{\sqrt{2}}\right)^3 = (-\sqrt{2})^3$

$= \frac{1}{2\sqrt{2}} + \frac{1}{2\sqrt{2}} - 2\sqrt{2} = \frac{1 + 1 - 8}{2\sqrt{2}}$

$= \frac{-6}{2\sqrt{2}} = \frac{-3}{\sqrt{2}} = \frac{-3}{2}\sqrt{2}$

Hence, option D is correct.