Trigonometry Questions for SSC CGL Tier 1 & 2 and 10+2 Exams

TRIGONOMETRY QUIZ 6

Direction: Study the following questions carefully and choose the right answer:

(1). If sin 21° = x/y, then sec 21° – sin 69° is equal to

A. $\frac{x^2}{y\sqrt{y^2-x^2}}$

B. $\frac{y^2}{x\sqrt{y^2-x^2}}$

C. $\frac{x^2}{y\sqrt{x^2-y^2}}$

D. $\frac{y^2}{x\sqrt{x^2-y^2}}$

(2). The degree measure of 1 radian (taking π = 22/7) is

A. 57°61'22'' (approx)

B. 57°16'22''(approx)

C. 57°22'16''(approx)

D. 57°32'16''(approx)

(3). If x $\sin^2 60°$ – sec 60° $\tan^2 30°$ + $\sin^2 45°$ tan2 60 = 0 then x is

A. –1/15

B. – 4

C. – 4/15

D. – 2

(4). If the sum of two angles is 135° and their difference is (π/12), then the circular measure of the greater angle is

A. 2π/3

B. 3π/5

C. 5π/12

D. π/3

(5). The minimum value of 2 $\sin^2\Theta$ + 3 $\cos^2\Theta$ is

A. 0

B. 3

C. 2

D. 1

(6). $\frac{1}{\text{cosec}^2 51^\circ} + \sin 239^\circ + \tan 251^\circ - \frac{1}{\sin^2 51^\circ \sec^2 39^\circ}$ is

A. $\sqrt{x^2 - 1}$ B. $\sqrt{1 - x^2}$

C. $x^2 - 1$ D. $1 - x^2$

(7). The value of tan 4° . tan 43° . tan 47° . tan 86° is

A. 2 B. 3

C. 1 D. 4

(8). If $\frac{\tan\theta + \cot\theta}{\tan\theta - \cot\theta} = 2$, $(0 \le \Theta \le 90^\circ)$, then the value of sin Θ is

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

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

(9). If cos x + cos y = 2, the value of sin x + sin y is

A. 0 B. 1

C. 2 D. – 1

(10). The measure of the angles of a triangle are in the ratio 2 : 7 : 11. Measures of angles are

A. 16°, 56°, 88° B. 18°, 63°, 99°

C. 20°, 70°, 90° D. 25°, 175°, 105°

Correct answers:

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

Explanations:

1.

$\sin 21° = \frac{x}{y}$

$\cos 21° = \sqrt{1 - \sin^2 21°}$

$= \sqrt{1 - \frac{x^2}{y^2}} = \frac{\sqrt{y^2 - x^2}}{y}$

$\therefore \sec 21° = \frac{y}{\sqrt{y^2 - x^2}}$

$\therefore$ sec 21° – sin 69°

= sec 21° – sin (90° – 21°)

= sec 21° – cos 21°

$= \frac{y}{\sqrt{y^2 - x^2}} - \frac{\sqrt{y^2 - x^2}}{y}$

$= \frac{y^2 - (y^2 - x^2)}{y\sqrt{y^2 - x^2}} = \frac{x^2}{y\sqrt{y^2 - x^2}}$

Hence, option A is correct.

2.

π = radian = 180°

$\therefore$ 1 radian = $\frac{180°}{\pi}$

= $\frac{180 \times 7°}{22} = \frac{630}{11} = 57\frac{3}{11}°$

= $57°\frac{3}{11} \times 60' = 57°\frac{180'}{11}$

= $57°16'\frac{4'}{11} \times 60'' = 57°16'22''$

Hence, option B is correct.

3.

$x \sin^2 60° - 3/2 \sec 60° \tan^2 30° + 4/5 \sin^2 45° \tan^2 60 = 0$

$$\Rightarrow x\left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{2} \times 2\left(\frac{1}{\sqrt{3}}\right)^2 + \frac{4}{5} \times \left(\frac{1}{\sqrt{2}}\right)^2 \times \left(\sqrt{3}\right)^2 = 0$$

$\Rightarrow \frac{3x}{4} - \frac{3}{2} \times 2 \times \frac{1}{3} + \frac{4}{5} \times \frac{1}{2} \times 3 = 0$

$\Rightarrow \frac{3x}{4} - 1 + \frac{6}{5} = 0$

$\Rightarrow x = -\frac{1}{5} \times \frac{4}{3} = -\frac{4}{15}$

Hence, option C is correct.

4.

Two angles = A and B where A > B ∴ A + B = 135°

$= (\frac{135 \times \pi}{180})$ radian

$\Rightarrow A + B = (\frac{3\pi}{4})$ radian ...(i)

$\Rightarrow A - B = (\frac{\pi}{12})$ radian ...(ii)

On adding these equations,

$2A = \frac{3\pi}{4} + \frac{\pi}{12}$

$= \frac{9\pi + \pi}{12} = \frac{10\pi}{12} = \frac{5\pi}{6}$

∴ $A = \frac{5\pi}{12}$ radian

Hence, option C is correct.

5.

$2 \sin^2 \Theta + 3 \cos^2 \Theta$

$= 2 \sin^2 \Theta + 2 \cos^2 \Theta + \cos^2 \Theta$

$= 2 (\sin^2 \Theta + \cos^2 \Theta) + \cos^2 \Theta$

$= 2 + \cos^2 \Theta$

[∵ $\sin^2 \Theta + \cos^2 \Theta = 1$]

∵ Minimum value of $\cos \Theta = -1$

But $\cos^2 \Theta \geq 0$, when $\Theta = 90°$

[∵ $\cos 0° = 1, \cos 90° = 0$]

∴ Required minimum value = 2 + 0 = 2.

Hence, option C is correct.

6.

$$\frac{1}{\text{cosec}^2 51°} + \sin^2 39° + \tan^2 51° - \frac{1}{\sin^2 51° \sec^2 39°}$$

$$= \sin^2 51° + \sin^2 (90° - 51°) + \tan^2 (90° - 39°) - \frac{1}{\sin^2 (90° - 39°) \sec^2 39°}$$

$$= \sin^2 51° + \cos^2 51° + \cot^2 39° - \frac{1}{\cos^2 39° \sec^2 39°}$$

[∵ $\sin (90° - \Theta) = \cos \Theta$ & $\tan (90° - \Theta) = \cot \Theta$]

$$= 1 + \cot^2 39° - 1$$

[∵ $\sin^2 \Theta + \cos^2 \Theta = 1$ & $\cos^2 \Theta \sec^2 \Theta = 1$]

$$= \text{cosec}^2 39° - 1$$

Hence, option C is correct.

7.

$\tan 4° . \tan 43° . \tan 47° . \tan 86°$

$= \tan 4° . \tan 43° . \tan (90° - 43°) . \tan (90° - 4°)$

$= \tan 4° . \tan 43° . \cot 43° . \cot 4°$

[∵ $\tan (90° - \Theta) = \cot \Theta$ & $\tan \Theta . \cot \Theta$

= [1]

= 1

Hence, option C is correct.

8.

$$\frac{\tan \Theta + \cot \Theta}{\tan \Theta - \cot \Theta} = \frac{2}{1}$$

By componen do and dividendo,

$$\frac{2 \tan \Theta}{2 \cot \Theta} = \frac{3}{1}$$

$$\Rightarrow \frac{\sin \Theta}{\cos \Theta} \cdot \frac{\sin \Theta}{\cos \Theta} = 3$$

$$\Rightarrow \sin^2 \Theta = 3 \cos^2 \Theta$$

$$\Rightarrow \sin^2 \Theta = 3 (1 - \sin^2 \Theta)$$

$$\Rightarrow 4 \sin^2 \Theta = 3$$

$$\Rightarrow \sin^2 \Theta = \frac{3}{4}$$

$$\Rightarrow \sin \Theta = \frac{\sqrt{3}}{2}$$

Hence, option B is correct.

9.

$\cos x + \cos y = 2$

$\because \cos x \leq 1$

$\Rightarrow \cos x = 1 ; \cos y = 1$

$\Rightarrow x = y = 0°$ [$\because \cos 0° = 1$]

$\therefore \sin x + \sin y = 0$

Hence, option A is correct.

10.

Let the measure of three angles of triangle are 2x, 7x and 11x respectively.

$\therefore 2x + 7x + 11x = 180°$

$\Rightarrow 20x = 180°$

$\Rightarrow x = 9°$

$\therefore$ First angle = $2x = 2 \times 9° = 18°$

Second angle = $7x = 7 \times 9° = 63°$

Third angle = $11x = 11 \times 9° = 99°$

Hence, option B is correct.