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

TRIGONOMETRY QUIZ 2

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

(1). If tan Θ = $\sqrt{3}$ and 0 < Θ < 2π(pi), find the values of Θ.

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

C. Both A and B D. None of these

(2). What is the value of $\sin^2 60° + \cos^2 30° + \cot^2 45° + \sec^2 60° - \text{cosec}^2 30° + \cos 2\ 0°$.

A. $\frac{1}{7}$ B. $\frac{7}{3}$

C. $\frac{7}{2}$ D. 7

(3). If tan 62° = p, find the value of tan 28°.

A. p = q B. $\frac{q}{p}$

C. p ≠ q D. None of these

(4). If $x^2 + y^2 + z^2 = r^2$ and x = r cos A sin B, y = r sin A sin B, find the value of z.

A. z = *r* sin B B. z = *r* sin B

C. z = *r* sin A cos B D. None of these

(5). If 8 tan x = 15, the value of (sin x - cos x) is:

A. $\frac{12}{5}$ B. $\frac{17}{5}$

C. $\frac{7}{17}$ D. $\frac{12}{7}$

(6). If 3 sin Θ + 5 cos Θ = 5, then the value of 5 sin Θ – 3 cos Θ will be

A. ± 3 B. ± 5

C. ± 2 D. ± 1

(7). If sec α + tan α = 2, then the value of sin α is _____ (assume that 0 < α < 90°)

A. 0.4 B. 0.5

C. 0.6 D. 0.8

(8). The simplest value of tan 1° tan 2° tan 3° _____ tan 89° is

A. $\frac{1}{2}$ B. 0

C. 1 D. $\frac{2}{3}$

(9). If tan Θ + cot Θ = 5, then $\tan^2\Theta + \cot^2\Theta$ is:

A. 26 B. 23

C. 24 D. 25

10. If $\frac{\cos\alpha}{\sin\beta}$ = n and $\frac{cos\alpha}{cos\beta}$ = m, then the value of cos2β is:

A. $\frac{n^2}{m^2+n^2}$ B. $\frac{m^2}{m^2+n^2}$

C. $\frac{1}{m^2+n^2}$ D. 0

Correct Answers:

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

Explanations:

1.

tan Θ = √3 = tan $\frac{\pi}{3}$ ⇒ Θ = $\frac{\pi}{3}$.

But, tan Θ = tan (π + Θ).

(Because values of tan are in positive in the 1st and the 3rd quadrants only.)

So, tan $\frac{\pi}{3}$ = tan(π + $\frac{\pi}{3}$) = tan $\frac{4\pi}{3}$.

Hence, the required values of Θ are $\frac{\pi}{3}$ and $\frac{4\pi}{3}$.

Hence, option C is correct.

2.

We know that: sin 60° = $\frac{\sqrt{3}}{2}$, cos 30° = $\frac{\sqrt{3}}{2}$, cot 45° = 1;

sec 60° = $\frac{1}{\cos 60°}$ = 2; cosec 30° = $\frac{1}{\sin 30°}$ = 2 & cos 0° = 1.

∴ $\sin^2 60° + \cos^2 30° + \cot^2 45° + \sec^2 60° - \text{cosec}^2 30° + \cos^2 0°$

$$= \left[\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + 1^2 + 2^2 + 1^2\right] = \frac{7}{2}$$

Hence, option C is correct.

3.

tan 28° = (tan 90° - 62°) = cot 62° = $\frac{q}{p}$.

Hence, option B is correct.

4.

$x^2 + y^2 = r^2 \cos^2 A \sin^2 B + r^2 \sin^2 A \sin^2 B$

$= r^2 \sin^2 B (\cos^2 A + \sin^2 A) = r^2 \sin^2 B.$

Now, $x^2 + y^2 + z^2 = r^2 \Rightarrow z^2 = r^2 - (x^2 + y^2)$

$\therefore z^2 = r^2 - r^2 \sin^2 B = r^2 (1 - \sin^2 B) = r^2 \cos^2 B$ Hence, $z = r \cos B$.

Hence, option B is correct.

5.

$\tan x = \frac{15}{8}$

$$\therefore \sec x = \sqrt{1 + \tan^2 2x} = \sqrt{1 + \frac{225}{64}} = \frac{\sqrt{289}}{64} = \frac{17}{8}$$

$$\text{cosec } x = \sqrt{1 + \cot^2 x} = \sqrt{1 + \left(\frac{64}{225}\right)} = \sqrt{\frac{289}{225}} = \frac{17}{15}$$

$\therefore \cos x = \frac{8}{17}$ and $\sin x = \frac{15}{17}$

So, $(\sin x - \cos x) = \left(\frac{15}{17} - \frac{8}{17}\right) = \frac{7}{17}$.

Hence, option C is correct.

6.

From the given equation,

$3 \sin \Theta + 5 \cos \Theta = 5$

$\therefore (3 \sin \Theta + 5 \cos \Theta)^2 = 5^2$

$\therefore 9 \sin^2\Theta + 25 \cos^2\Theta + 30 \sin \Theta \cos \Theta = 25$

$\therefore 9(1 - \cos^2\Theta) + 25(1 - \sin^2\Theta) + 30 \sin \Theta \cos \Theta = 25$

$\therefore 9 - 9\cos^2\Theta + 25 - 25\sin^2\Theta + 30 \sin \Theta \cos \Theta = 25$

$\therefore\ 9 = 25 \sin^2\Theta + 9 \cos^2\Theta - 30 \sin \Theta \cos \Theta$

$\therefore\ 9 = (5 \sin \Theta - 3 \cos \Theta)^2$

$\therefore\ 5 \sin \Theta - 3 \cos \Theta = \pm\sqrt{9}$

$\therefore\ 5 \sin \Theta - 3 \cos \Theta = \pm 3.$

Hence, option A is correct.

7.

From the given equation,

$\sec \alpha + \tan \alpha = 2$

$\therefore \frac{1}{\cos \alpha} + \frac{\sin \alpha}{\cos \alpha} = 2$

$\therefore \frac{1 + \sin \alpha}{\cos \alpha} = 2$

$\Rightarrow 1 + \sin \alpha = 2 \cos \alpha$

Squaring both sides, we get

$\Rightarrow (1 + \sin \alpha)^2 = (2 \cos \alpha)^2 \Rightarrow 1 + \sin^2 \alpha + 2 \sin \alpha = 4 \cos^2\alpha$

$\Rightarrow 1 + \sin^2 \alpha + 2 \sin \alpha = 4 (1 - \sin^2 \alpha) \Rightarrow 1 + \sin^2 \alpha + 2 \sin \alpha = 4 - 4 \sin^2 \alpha$

$\Rightarrow 5 \sin^2 \alpha + 2 \sin \alpha - 3 = 0$

By the rule of factorization,

$(\sin \alpha + 1)(5 \sin \alpha - 3) = 0$

sin α = – 1 or $\frac{3}{5}$

Since 0 < α < 90, then sin α > 0

So, sin α = $\frac{3}{5}$ = 0.6

Hence, option C is correct.

8.

From the given series,

tan 1° . tan 2° . tan 3° ..... tan 89°

we can write, tan 89° = tan (90 – 1) = cot 1° [tan (90° – Θ) = cot Θ]

Similarly,

tan 88° = cot 2° , tan 87° = cot 3°, ...up to tan 46° = cot 44°

Then middle term is tan 45° = 1

So, the series will be

tan 1° . tan 2° . tan 3°, ... tan 44° . tan 45°. cot 44°,..... cot1°

The terms with tanΘ and cotΘ will be cancelled out by [tan Θ cot Θ = 1]

So, the remaining term is tan 45° = 1.

Hence, option C is correct.

9.

From the given equation,

tanΘ + cotΘ = 5

Now, squaring both sides, we get

⇒ $(\tan\Theta + \cot\Theta)^2 = (5)^2$ ⇒ $\tan^2\Theta + \cot^2\Theta + 2\tan\Theta\cot\Theta = 25$

$\Rightarrow \tan^2\Theta + \cot^2\Theta + 2\tan\Theta = 25$ ..... By applying $\cot\Theta = \frac{1}{tan\Theta}$

$\tan^2\Theta + \cot^2\Theta + 2 = 25$

$\Rightarrow \tan^2\Theta + \cot^2\Theta = 25 - 2$

$\Rightarrow \tan^2\Theta + \cot^2\Theta = 23.$

Hence, option B is correct.

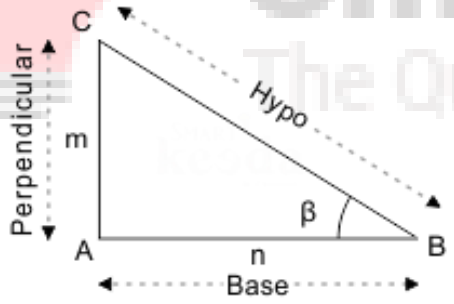
10.

Given, $n = \frac{\cos\alpha}{\sin\beta}$, $m = \frac{\cos\alpha}{\sin\beta}$ $\cos^2\beta$ = ?

Let's divide m by n, we get

$\frac{m}{n} = \frac{\frac{\cos\alpha}{\cos\beta}}{\frac{\cos\alpha}{\sin\beta}} = \frac{\sin\beta}{\cos\beta} = \tan\beta = \frac{\text{Perpendicular}}{\text{Base}}$

For acute angle β



∴ Hypotenuse = $\sqrt{m^2 + n^2}$

∴ $\cos\beta = \frac{n}{\sqrt{m^2+n^2}}$

Squaring both sides, we get

∴ $\cos^2\beta = \frac{n2}{m^2+n^2}$

Hence, option A is correct.