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

TRIGONOMETRY QUIZ 8

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

(1). The value of $\frac{\sin 39^\circ}{\cos 51^\circ} + 2 \tan 11^\circ \tan 31^\circ \tan 45^\circ \tan 59^\circ \tan 79^\circ - 3 (\sin^2 21^\circ + \sin^2 69^\circ)$ is :

- A. 2
B. -1
C. 1
D. 0

(2). If $\frac{\cos^2 \theta}{\cot^2 \theta - \cos^2 \theta} = 3$ and $0^\circ < \theta < 90^\circ$, then the value of θ is :

- A. 30°
B. 45°
C. 60°
D. None of these

(3). If $A = \tan 11^\circ \tan 29^\circ$, $B = 2 \cot 61^\circ \cot 79^\circ$, then :

- A. $A = 2B$
B. $A = -2B$
C. $2A = B$
D. $2A = -B$

(4). If $\sin 17^\circ = \frac{x}{7}$, then the value of $\sec 17^\circ - \sin 73^\circ$ is

- A. $\frac{y^2}{x\sqrt{y^2-x^2}}$
B. $\frac{x^2}{y\sqrt{y^2-x^2}}$
C. $\frac{x^2}{y\sqrt{(x^2-y^2)}}$
D. $\frac{y^2}{x\sqrt{x^2-y^2}}$

(5). The expression $\frac{\tan 57^\circ + \cot 37^\circ}{\tan 33^\circ + \cot 53^\circ}$ is equal to

A. $\tan 33^\circ \cot 57^\circ$

B. $\tan 57^\circ \cot 37^\circ$

C. $\tan 33^\circ \cot 53^\circ$

D. $\tan 53^\circ \cot 37^\circ$

(6). If $x \sin 45^\circ = y \operatorname{cosec} 30^\circ$, then $\frac{x^4}{y^4}$ is equal to:

A. 4^3

B. 6^3

C. 6^3

D. 8^3

(7). If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, then $\cos \theta - \sin \theta$ is

A. $\sqrt{2} \tan \theta$

B. $-\sqrt{2} \tan \theta$

C. $-\sqrt{2} \tan \theta$

D. $\sqrt{2} \sin \theta$

(8). The value of $\frac{\sin A}{1 + \cos A} + \frac{\sin A}{1 - \cos A}$ is ($0^\circ < A < 90^\circ$)

A. $2 \operatorname{cosec} A$

B. $2 \sec A$

C. $2 \sin A$

D. $2 \cos A$

(9). If $r \sin \theta = 1$, $r \cos \theta = \sqrt{3}$, then the value of $(\sqrt{3} \tan \theta + 1)$ is

A. $\sqrt{3}$

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

C. 1

D. 2

(10). If $\tan x = \sin 45^\circ \cos 45^\circ + \sin 30^\circ$ then the value of x is

A. 30°

B. 30°

C. 60°

D. 90°

Correct answers:

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

Explanations:**1.**

$$\frac{\sin 39^\circ}{\cos 51^\circ} + 2 \tan 11^\circ \tan 31^\circ \tan 45^\circ \tan 59^\circ \tan 79^\circ - 3 (\sin^2 21^\circ + \sin^2 69^\circ)$$

$$\frac{\sin 39^\circ}{\sin 39^\circ} + 2 \tan 11^\circ \cot 11^\circ \tan 31^\circ \cot 31^\circ \tan 45^\circ - 3 (\sin^2 21^\circ + \cos^2 21^\circ)$$

$$[\because \cos (90^\circ - \Theta) = \sin \Theta, \tan (90^\circ - \Theta) = \cot \Theta \text{ \& \ } \sin (90^\circ - \Theta) = \cos \Theta]$$

$$= 1 + 2 \times 1 \times 1 \times 1 \times 1 - 3 \times 1$$

$$[\because \tan \Theta \cot \Theta = 1, \tan 45^\circ = 1 \text{ \& \ } \sin^2 \Theta + \cos^2 \Theta = 1]$$

$$= 1 + 2 - 3 = 0$$

Hence, option D is correct.

2.

$$\frac{\cos^2 \Theta}{\cot^2 \Theta - \cos^2 \Theta} = 3$$

$$\Rightarrow \cos \Theta = 3 \cot \Theta - 3 \cos \Theta$$

$$\Rightarrow 4 \cos \Theta = 3 \frac{\cos \Theta}{\sin \Theta}$$

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

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

$$\Rightarrow \sin \Theta = \frac{\sqrt{3}}{2} = \sin 60^\circ$$

$$\Rightarrow \Theta = 60^\circ$$

Hence, option C is correct.

3.

$$\text{Given, } A = \tan 11^\circ \tan 29^\circ$$

$$\text{And, } B = 2 \cot 61^\circ \cot 79^\circ$$

$$\text{Or, } B = 2 \tan 29^\circ \tan 11^\circ = 2A$$

$$[\because \cot (90^\circ - \Theta) = \tan \Theta]$$

$$\text{So, } 2A = B.$$

Hence, option C is correct.

4.

$$\text{Given, } \sin 17^\circ = \frac{x}{y}$$

$$\sec 17^\circ - \sin 73^\circ = \frac{1}{\cos 17^\circ} - \sin (90^\circ - 17^\circ)$$

$$[\because \sec \Theta = \frac{1}{\cos \Theta}]$$

$$= \frac{1}{\cos 17^\circ} - \cos 17^\circ$$

$$[\because \sin (90^\circ - \Theta) = \cos \Theta]$$

$$= \frac{1 - \cos^2 17^\circ}{\cos 17^\circ}$$

$$= \frac{\sin^2 17^\circ}{\sqrt{1 - \sin^2 17^\circ}}$$

$$[\because 1 - \cos^2 \Theta = \sin^2 \Theta \text{ \& } \cos \Theta = \sqrt{1 - \sin^2 \Theta}]$$

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

Hence, option B is correct.

5.

$$\frac{\tan 57^\circ + \cot 37^\circ}{\tan 33^\circ + \cot 53^\circ}$$

$$= \frac{\tan (90^\circ - 33^\circ) + \cot (90^\circ - 53^\circ)}{\tan 33^\circ + \cot 53^\circ}$$

$$= \frac{\cot 33^\circ + \tan 53^\circ}{\tan 33^\circ + \cot 53^\circ}$$

$$[\because \tan (90^\circ - \Theta) = \cot \Theta \text{ \& } \cot (90^\circ - \Theta) = \tan \Theta]$$

$$= \frac{1}{\tan 33^\circ} + \tan 53^\circ$$

$$\tan 33^\circ + \frac{1}{\tan 53^\circ}$$

$$[\because \cot \Theta = \frac{1}{\tan \Theta}]$$

$$\begin{aligned} & \frac{1 + \tan 53^\circ \tan 33^\circ}{\tan 33^\circ} \\ &= \frac{\tan 33^\circ \tan 53^\circ + 1}{\tan 53^\circ} \end{aligned}$$

$$= \frac{\tan 53^\circ}{\tan 33^\circ} = \cot 33^\circ \tan 53^\circ$$

$$[\because \frac{1}{\tan \Theta} = \cot \Theta]$$

$$= \cot (90^\circ - 57^\circ) \tan (90^\circ - 37^\circ)$$

$$= \tan 57^\circ \cot 37^\circ$$

$$[\because \cot (90^\circ - \Theta) = \tan \Theta \text{ \& \; } \tan (90^\circ - \Theta) = \cot \Theta]$$

Hence, option B is correct.

6.

$$x \sin 45^\circ = y \operatorname{cosec} 30^\circ$$

$$\Rightarrow x \times \frac{1}{\sqrt{2}} = y \times 2$$

$$\Rightarrow \frac{x}{y} = 2\sqrt{2}$$

$$\Rightarrow \frac{x^4}{y^4} = (2\sqrt{2})^4 = 2^6 = 4^3$$

Hence, option A is correct.

7.

$$\cos \Theta + \sin \Theta = \sqrt{2} \cos \Theta$$

On squaring both sides,

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

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

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

$$\Rightarrow (\cos \Theta + \sin \Theta) (\cos \Theta - \sin \Theta) = 2 \sin \Theta \cos \Theta$$

$$\Rightarrow \sqrt{2} \cos \Theta (\cos \Theta - \sin \Theta) = \sqrt{2} \sin \Theta \cos \Theta$$

$$\Rightarrow (\cos \Theta - \sin \Theta) = \frac{2 \sin \Theta \cos \Theta}{\sqrt{2} \cos \Theta}$$

$$= \sqrt{2} \sin \Theta$$

Hence, option D is correct.

8.

$$\frac{\sin A}{1 + \cos A} + \frac{\sin A}{1 - \cos A}$$

$$= \frac{\sin A (1 - \cos A) + \sin A (1 + \cos A)}{(1 + \cos A) (1 - \cos A)}$$

$$= \frac{\sin A - \sin A \cos A + \sin A + \sin A \cos A}{1 - \cos^2 A}$$

$$= \underline{2 \sin A}$$

$$\sin^2 A$$

$$[\because 1 - \cos^2 A = \sin^2 A]$$

$$= \frac{2}{\sin A} = 2 \operatorname{cosec} A$$

$$[\because 1 / \sin A = \operatorname{cosec} A]$$

Hence, option A is correct.

9.

Given,

$$r \sin \theta = 1 \quad \dots(i)$$

$$r \cos \theta = \sqrt{3} \quad \dots(ii)$$

Eq. (i) $\div$ (ii),

$$\frac{r \sin \theta}{r \cos \theta} = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \tan \theta = \frac{1}{\sqrt{3}}$$

$$\text{Now, } \sqrt{3} \tan \theta + 1 =$$

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

Hence, option D is correct.

10.

$$\tan x = \sin 45^\circ \cos 45^\circ + \sin 30^\circ$$

$$\Rightarrow \tan x = \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = 1$$

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$$\Rightarrow \tan x = \frac{1}{2} + \frac{1}{2} = 1$$

$$\Rightarrow \tan x = \tan 45^\circ$$

$$\Rightarrow x = 45^\circ$$

Hence, option B is correct.



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