# Trigonometry Questions for SSC CGL Tier 2 PDF

**Instructions**

For the following questions answer them individually

**Question 1**

**If 0° ≤ A ≤ 90°, the simplified form of the given expression sin A cos A (tan A - cot A) is**

**A** 1

**B** 1 - 2 $sin^2$ A

**C** 2 $sin^2$ A - 1

**D** 1 - cos A

**Answer:** C

**Explanation:**

Expression : $sinAcosA(tanA - cotA)$

= $sinAcosA(\frac{sinA}{cosA} - \frac{cosA}{sinA})$

= $sinAcosA(\frac{sin^2A - cos^2A}{sinAcosA})$

= $sin^2A - cos^2A$

= $sin^2A - (1 - sin^2A)$

= $2sin^2A - 1$

**Question 2**

**If a cos θ + b sin θ = p and a sin θ - b cos θ = q, then the relation between a, b, p and q is**

**A** $a^2 - b^2 = p^2 - q^2$

**B** $a^2 + b^2 = p^2 + q^2$

**C** $a + b = p + q$

**D** $a - b = p - q$

**Answer:** B

**Explanation:**

Expression 1 : a cos θ + b sin θ = p

Squaring both sides, we get :

=> $a^2cos^2\theta + b^2sin^2\theta + 2absin\theta cos\theta = p^2$ -------Eqn(1)

Expression 2 : a sin θ - b cos θ = q

Squaring both sides, we get :

=> $a^2sin^2\theta + b^2cos^\theta - 2absin\theta cos\theta = q^2$ ---------Eqn(2)

Adding eqns (1) & (2)

=> $a^2(sin^2\theta + cos^2\theta) + b^2(sin^2\theta + cos^2\theta) = p^2 + q^2$

=> $a^2 + b^2 = p^2 + q^2$

**Question 3**

**If** $2\sin\theta + \cos\theta - \frac{7}{3}$ **then the value of** $(\tan^2\theta - \sec^2\theta)$ **is**

**A** 0

**B** -1

**C** $\frac{3}{7}$

**D** $\frac{7}{3}$

**Answer:** B

**Explanation:**
$\tan^2\theta - \sec^2\theta$

$\Rightarrow -(\sec^2\theta - \tan^2\theta)$

$\Rightarrow$ -1 because $\sec^2\theta - \tan^2\theta = 1$

## SSC CGL Tier 2 Mock Tests

**Question 4**

**If tan θ + cot θ = 2, then the value of $tan^n\theta + cot^n\theta$(0° < θ < 90°, n is an integer) is**

**A** 2

**B** 2n+1

**C** 2n

**D** 0

**Answer:** A

**Explanation:**
Given tan θ + cot θ = 2
Then $(tan\theta + cot\theta)^2 = 4$
$(tan^2\theta + cot^2\theta + 2tan\theta cot\theta) = 4$
$(tan^2\theta + cot^2\theta) = 2$
Option A is the correct answer.

**Question 5**

**If sin θ + cosec θ = 2 then the value of $sin^5\theta + cosec^5\theta$ is**

**A** 1/2

**B** 1

**C** 0

**D** 2

**Answer:** D

**Explanation:**
Since $cosec\theta = \frac{1}{sin\theta}$
$sin\theta + cosec\theta = 2$ becomes
$sin\theta + \frac{1}{sin\theta} = 2$
$sin^2\theta - 2sin\theta + 1 = 0$
which is $(sin\theta - 1)^2 = 0$
$sin\theta = 1$
$sin^5\theta + cosec^5\theta = 1 + 1 = 2$
Hence Option D is th correct answer.

**Question 6**

**Find the value of** $1 - 2sin^2\theta + sin^4\theta.$

**A** $sin^4\theta$

**B** $cos^4\theta$

**C** $cosec^4\theta$

**D** $sec^4\theta$

**Answer:** B

**Explanation:**
Here,

$1 - 2sin^2\theta + sin^4\theta.$ = $1^2 + (sin^2\theta)^2 - 2 \times 1 \times sin^2\theta$

it is similar to $(a - b)^2 = a^2 + b^2 - 2ab$

So,

$1^2 + (sin^2\theta)^2 - 2 \times 1 \times sin^2\theta = (sin^2\theta - 1)^2$.....(1)

Now $sin^2\theta + cos^2\theta$ = 1.....(2)

From equation 1 and 2

$(sin^2\theta - 1)^2 = (sin^2\theta - sin^2\theta - cos^2\theta)^2$

$= (cos^2\theta)^2$

$= cos^4\theta$



**Question 7**

**If sin (x + y) = cos [3(x + y)], then the value of tan[2(x + y)] is :**

**A** $\sqrt{3}$

**B** 1

**C** 0

**D** $\frac{1}{\sqrt{3}}$

**Answer:** B

**Explanation:**
Given,

sin (x + y) = cos [3(x + y)]
Using: cos θ = sin (90° - θ)
sin (x + y) = sin [90° - 3(x + y)]
sin [90° - 3(x + y)] - sin (x + y) = 0
sinC−sinD =2sin[(C−D)/2] cos[(C+D)/2]
=2sin $\frac{(90-3(x+y)-(x+y))}{2}$ $cos$ $\frac{90-3(x+y)+(x+y)}{2}$ =0
=2sin(45-2(x+y)) cos (45-(x+y))=0
∴ sin 45° - 2(x + y)} = 0
45° - 2(x + y) = 0

2(x + y) = 45°
OR
Cos{45°- (x + y)} = 0
45°- (x + y)} = 90°
x + y = - 45°
2(x + y) = - 90°
Putting 2(x + y) = 45°
tan 2(x + y) = tan 45° = 1
Again, Putting 2(x + y) = - 90°, we will not get any answer among given options
Option B is the correct answer.

**Question 8**

**The height of a tower is h and the angle of elevation of the top of the tower is a. On moving a distance h/2 towards, the tower, the angle of elevation becomes 0. The value of cotα - cot β is**

**A** 1

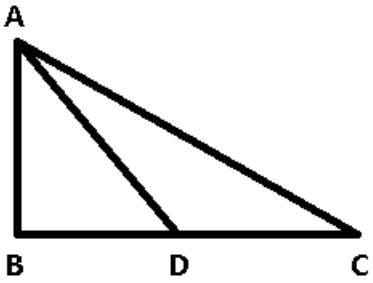
**B** 2

**C** 1/2

**D** 2/3

**Answer:** C

**Explanation:**




Here, ∠ACB = $\alpha$ and ∠ADB = $\beta$

AB = tower = $h$ metre

and CD = $\frac{h}{2}$ metre

From △ABC

=> $tan\alpha = \frac{AB}{BC} = \frac{h}{BC}$

=> $BC = hcot\alpha$ ---------Eqn(1)

From △ABD

=> $tan\beta = \frac{AB}{BD} = \frac{h}{BC-CD}$

=> $tan\beta = \frac{h}{hcot\alpha - \frac{h}{2}}$

=> $hcot\alpha - \frac{h}{2} = hcot\beta$

=> $h(cot\alpha - cot\beta) = \frac{h}{2}$

=> $cot\alpha - cot\beta = \frac{1}{2}$

**Question 9**

**If A and B are positive acute angles such that sin (A — B) =1/2 and cos (A+ B) = 1/2 , then A and B are given by**

**A** A = 45°, B = 15°

**B** A = 15°, B = 45°

**C** A = 30°, B = 30°

**D** None of these

**Answer:** A

**Explanation:**

$sin(A-B) = \frac{1}{2} = sin30^\circ$

=> $A - B = 30^\circ$ ---------Eqn(1)

Again, $cos(A+B) = \frac{1}{2} = cos60^\circ$

=> $A + B = 60^\circ$ --------Eqn(2)

Adding eqns (1) & (2)

$2A = 90^\circ$

=> $A = 45^\circ$ and $B = 15^\circ$



**Question 10**

**If 2secA - (1 + sinA)/cosA = x, then the value of x is**

**A** cosecA/(1+sinA)

**B** cosA/(1+sinA)

**C** cosA(1+sinA)

**D** cosecA(1+sinA)

**Answer:** B

**Explanation:**

Expression : 2secA - (1 + sinA)/cosA = x

$= sec^2A - \frac{(1+sinA)}{cosA}$

$= \frac{2-1-sinA}{cosA} = \frac{1-sinA}{cosA}$

Multiplying both numerator and denominator by $(1 + sinA)$

$= \frac{1-sinA}{cosA} \times \frac{(1+sinA)}{(1+sinA)}$

$= \frac{1-sin^2A}{cosA(1+sinA)} = \frac{cos^2A}{cosA(1+sinA)}$

$= \frac{cosA}{1+sinA}$

=> Ans - (B)

**Question 11**

**If 1/(cosecA + cotA) = x, then the value of x is**

**A** cosecA + cotA

**B** cosecA - cotA

**C** $cosec^2$ A + cot2A

**D** √[$cosec^2$ A + cot2A]

**Answer:** B

**Explanation:**

Expression : $\frac{1}{cosecA+cotA}$

= $\frac{1}{\frac{1}{sinA}+\frac{cosA}{sinA}}$

= $\frac{1}{\frac{1+cosA}{sinA}} = \frac{sinA}{1+cosA}$

Multiplying both numerator and denominator by $(1 - cosA)$

= $\frac{sinA}{1+cosA} \times \frac{(1-cosA)}{(1-cosA)}$

= $\frac{sinA(1-cosA)}{1-cos^2A} = \frac{sinA(1-cosA)}{sin^2A}$

= $\frac{1-cosA}{sinA} = \frac{1}{sinA} - \frac{cosA}{sinA}$

= $cosecA - cotA$

=> Ans - (B)

**Question 12**

**cos3A is equal to**

**A** $cos^3A - 3sin^2cosA$

**B** $cos^3A + 4sin^2cosA$

**C** $cos^3A + 3sin^2cosA$

**D** $cos^3A - 4sin^2cosA$

**Answer:** A

**Explanation:**

Using triple angle formula, we know that : $cos(3A) = 4cos^3A - 3cosA$

= $cos^3A + (3cos^3A - 3cosA)$

= $cos^3A + 3cosA(cos^2A - 1)$

= $cos^3A - 3cosA(1 - cos^2A)$

= $cos^3A - 3sin^2AcosA$

=> Ans - (A)

## SSC CGL Free Mock Test

**Question 13**

**What is the value of tan** $\left(-\frac{5\pi}{6}\right)$

**A** $-\frac{1}{\sqrt{3}}$

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

**C** $\sqrt{3}$

**D** $-\sqrt{3}$

**Answer:** B

**Explanation:**

Expression : tan $(-\frac{5\pi}{6})$

= $-tan(\frac{5\pi}{6})$

= $-tan(\pi - \frac{\pi}{6}) = -(-tan\frac{\pi}{6})$

= $tan(\frac{\pi}{6}) = \frac{1}{\sqrt{3}}$

=> Ans - (B)

**Question 14**

**If cos 135° = x, then the value of x is**

**A** -1/√2

**B** -√3/2

**C** -1/2

**D** 2

**Answer:** A

**Explanation:**

Expression : cos 135° = x

= $cos(180 - 45) = -cos(45°)$

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

=> Ans - (A)

**Question 15**

**2cos[(C+D)/2].cos[(C-D)/2] is equal to**

**A** cosC - cosD

**B** sinC + sinD

**C** cosC + cosD

**D** sinC - sinD

**Answer:** C

**Explanation:**

Expression : 2cos[(C+D)/2]cos[(C-D)/2]

Using the formula : $cosx.cosy = \frac{1}{2}[cos(x+y) + cos(x-y)]$ ----------(i)

Substituting $(x+y) = C$ and $(x-y) = D$

=> $x = \frac{C+D}{2}$ and $y = \frac{C-D}{2}$ in equation (i),

=> $cos(\frac{C+D}{2}).cos(\frac{C-D}{2}) = \frac{1}{2}[cosC + cosD]$

=> $2.cos(\frac{C+D}{2}).cos(\frac{C-D}{2}) = cosC + cosD$

=> Ans - (C)