



# CGGL CHSL 2021

**MATHS**

**60 दिन 60 मैराथन**

**08:30 PM**

## Trigonometry 4

के सवाल चुटकियों में हल होंगे



**23**  
**60**



**Target 50/50**



**ADITYA RANJAN**  
**CGL TOPPER**



# अब तो OFFICER बन के रहेंगे

- ✓ **CHAPTERWISE**
- ✓ **MOCK TEST**
- ✓ **LATEST QUESTIONS ASKED BY  
TCS IN VARIOUS EXAMS**
- ✓ **DIVIDED ON DIFFERENT LEVELS.**



अपनी मंज़िल को भुला कर जिया तो क्या जिया  
है दम तुझमे तो उसे पा के दिखा  
लिखे दे खून से अपने कामयाबी की कहानी  
और बोल उस किस्मत को है दम तो मिटा के दिखा





# Trigonometry -4

## त्रिकोणमिति



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

$$x^{100} + \frac{1}{x^{100}} =$$

$$1 + 1 = 2$$

If  $\tan A + \cot A = 2$ , then the value of  $\tan^{10} A + \cot^{10} A$  is :

(a) 4

(c)  $2^{10}$

 (b) 2

(d) 1

$$\textcircled{x} + \frac{1}{x} = 2$$

**If  $\sin\theta + \operatorname{cosec}\theta = 2$ , then the value of  $\sin^{100}\theta + \operatorname{cosec}^{100}\theta$  is equal to :**

**(a) 1**

☒ **(b) 2**

**(c) 3**

**(d) 100**

If  $\sec x + \cos x = 2$ , then the value of  $\sec^{16}x + \cos^{16}x$  will be :

(a)  $\sqrt{3}$

☒ (b) 2

(c) 1

(d) 0

$$Q. \quad (5 + \sin \theta) + \frac{1}{5 + \sin \theta} = 2$$

$$(5 + \sin \theta)^3 + \frac{1}{(5 + \sin \theta)^3} =$$

$$p + \frac{1}{p} = 2$$

$$p^3 + \frac{1}{p^3}$$

$$1 + 1 = \textcircled{2}$$



**If  $\sin\theta + \operatorname{cosec}\theta = 2$ , then what is the value of  $(\sin^{153}\theta + \operatorname{cosec}^{253}\theta)$ ?**

***SSC CHSL 10 July 2019 (Afternoon)***

(a)  $\frac{1}{153 \times 253}$

(b)  $\frac{253}{123}$

☒ (c) 2

(d)  $\frac{153}{253}$

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

$$\Rightarrow 9x^2 - \frac{9}{x^2} = 1$$

$$9\left(x^2 - \frac{1}{x^2}\right) = 1$$

If  $\sec \theta = 3x$  and  $\tan \theta = \frac{3}{x}$ , ( $x \neq 0$ ), then

the value of  $9\left(x^2 - \frac{1}{x^2}\right)$  is :

*SSC CHSL 5 July 2019 (Evening)*

(a)  $\frac{1}{2}$

(b)  $\frac{1}{3}$

✓ (c)  $1$

(d)  $\frac{1}{4}$



$$\left( \frac{25}{x^2} - 25x^2 \right) = 1$$

$$5 \left[ x^2 - \frac{1}{x^2} \right] = \frac{1}{5}$$

If  $\cot\theta = 5x$  and  $\operatorname{cosec}\theta = \frac{5}{x}$ , ( $x \neq 0$ ), then

the value of  $\textcircled{5} \left( x^2 - \frac{1}{x^2} \right)$  is :

SSC CHSL 8 July 2019 (Evening)

(a)  $\frac{1}{5}$

(b)  $\frac{1}{2}$

☒ (c)  $-\frac{1}{5}$

(d)  $-\frac{1}{4}$

$$2 \left( \frac{1}{\sqrt{2}} + \sqrt{2} \right)^2 = k + 2$$

$$\Rightarrow \left[ \frac{9}{2} \right] = k + 2$$

$$k = 7$$

If  $(\sin \alpha + \operatorname{cosec} \alpha)^2 + (\cos \alpha + \sec \alpha)^2 = k + \tan^2 \alpha + \cot^2 \alpha$ , the value of  $k$  is :

(a) 1

☒ (b) 7

(c) 3

(d) 5



$$* \sin \theta \cdot \sin(60-\theta) \cdot \sin(60+\theta) = \frac{1}{4} \sin 3\theta$$

$$* \cos \theta \cdot \cos(60-\theta) \cdot \cos(60+\theta) = \frac{1}{4} \cos 3\theta$$

$$* \tan \theta \tan(60-\theta) \cdot \tan(60+\theta) = \tan 3\theta$$

$$= \frac{1}{4} \sin 60^\circ \cdot \sin 60^\circ$$

$$= \frac{1}{4} \times \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \frac{3}{16}$$

Find  $\sin 20^\circ \cdot \sin 40^\circ \cdot \sin 60^\circ \cdot \sin 80^\circ$ .

$\underbrace{\sin 20^\circ}_{\theta} \cdot \underbrace{\sin 40^\circ}_{60-\theta} \cdot \underbrace{\sin 60^\circ}_{60-\theta} \cdot \underbrace{\sin 80^\circ}_{60-\theta}$

(a)  $\frac{1}{16}$

(b)  $\frac{5}{16}$

✓ (c)  $\frac{3}{16}$

(d)  $\frac{1}{8}$



$$= \sin 12^\circ \sin 48^\circ \frac{\sin 72^\circ}{\sin 72^\circ} \cdot \sin 54^\circ$$

$$= \frac{2 \times 1}{2 \times 4} \frac{\sin 36^\circ \cos 36^\circ}{\sin 72^\circ}$$

$$= \frac{\cancel{\sin 72^\circ}}{8 \cancel{\sin 72^\circ}}$$

**Find  $\sin 12^\circ \cdot \sin 48^\circ \cdot \sin 54^\circ$ .**

CGL Mains

(a)  $\frac{5}{8}$

(b)  $\frac{7}{8}$

(c)  $\frac{3}{8}$

✓ (d)  $\frac{1}{8}$

$$= \frac{1}{4} \cos 45^\circ$$

$$= \frac{1}{4\sqrt{2}}$$

The value of  $(\cos 15^\circ \cdot \cos 45^\circ \cdot \cos 75^\circ)$  is :

(a)  $\frac{1}{3\sqrt{2}}$

☒ (b)  $\frac{1}{4\sqrt{2}}$

(c)  $\frac{1}{8}$

(d)  $\frac{\sqrt{3}}{8}$



$$= \tan 30$$

$$= \tan 60 = \sqrt{3}$$

**The value of  $(\tan 20^\circ \cdot \tan 40^\circ \cdot \tan 80^\circ)$  is :**

(a) 1

(b) 0

☒ (c)  $\sqrt{3}$

(d) 3

$$\cot \theta \times \cot (60^\circ - \theta) \times \cot (60^\circ + \theta) = ?$$

(a)  $\cot 2\theta$

 (b)  $\cot 3\theta$

(c)  $\cot \theta$

(d)  $\cot 4\theta$



\*  $\cos 2\theta$

- (a)  $2\cos^2\theta - 1$
- (b)  $1 - 2\sin^2\theta$
- (c)  $(\cos^4\theta - \sin^4\theta)$  or  $(\cos^2\theta - \sin^2\theta)$
- (d)  $\left(\frac{1 - \tan^2\theta}{1 + \tan^2\theta}\right)$

$$2 \times \cos 2\theta = 1$$

$$\Rightarrow \cos 2\theta = \frac{1}{2}$$

$$2\theta = 60^\circ$$

If  $2(\cos^2\theta - \sin^2\theta) = 1$  ( $\theta$  is a positive acute angle), then  $\cot\theta$  is equal to :

(a)  $-\sqrt{3}$

(b)  $\frac{1}{\sqrt{3}}$

(c) 1

✓ (d)  $\sqrt{3}$



1 sec

The value of  $\sec^2\theta - \frac{\sin^2\theta - 2\sin^4\theta}{2\cos^4\theta - \cos^2\theta}$  is :

(a) 1 (b) 2  
(c) -1 (d) 0

$$\frac{\sin\theta}{\cos\theta} \div \frac{0}{1} = 0$$

$$1 - 0 = 1$$

The value of  $\sec^2\theta - \frac{\sin^2\theta - 2\sin^4\theta}{2\cos^4\theta - \cos^2\theta}$  is :

- ☒ (a) 1  
(c) - 1

- (b) 2  
(d) 0

$$\sec^2\theta - \frac{\sin^2\theta (1 - 2\sin^2\theta)}{\cos^2\theta (2\cos^2\theta - 1)}$$



$$= \cos\left(\frac{\pi}{2} + 2\theta\right)$$

$$= -\sin 2\theta$$

$$1 - 2\sin^2\left(\frac{\pi}{4} + \theta\right) = ? \quad \text{CGL 2020}$$

(a)  $\cos 2\theta$   $\propto$

(c)  $\sin 2\theta$

(b)  $-\cos 2\theta$

☒ (d)  $-\sin 2\theta$

$$\cos 2\alpha = 1 - 2\sin^2\alpha$$

$$* \sin 2\theta = 2 \sin \theta \cdot \cos \theta$$



$$\frac{2}{2} \sin 7\frac{1}{2} \cdot \cos 7\frac{1}{2} \cdot \cos 15$$

$$= \frac{2}{2} \times \frac{1}{2} \times \sin 15 \cos 15$$

$$= \frac{1}{4} \sin 30$$

$$= \frac{1}{4} \times \frac{1}{2}$$

$$\sin 7\frac{1}{2} \sin 82\frac{1}{2} \cos 15^\circ = ?$$

(a)  $\frac{1}{2}$

(c)  $\frac{1}{4}$

(b)  $\frac{1}{8}$

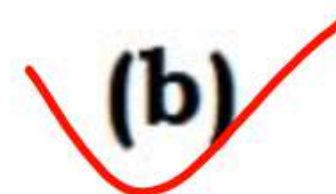
(d)  $\frac{1}{16}$

$$= \cos 45^\circ$$

Find the value of  $\frac{1 - \tan^2 22\frac{1}{2}^\circ}{1 + \tan^2 22\frac{1}{2}^\circ}$  is :

(a)  $\frac{\sqrt{3}}{2}$

(c)  $\frac{1}{2}$

 (b)  $\frac{1}{\sqrt{2}}$

(d)  $\sqrt{3}$



$$= \cos 30^\circ$$

The value of  $\frac{1 - \tan^2 15^\circ}{1 + \tan^2 15^\circ}$  is :

(a) 1

(b)  $\sqrt{3}$

✓ (c)  $\frac{\sqrt{3}}{2}$

(d) 2

$$\frac{\sec^2 \theta \cdot \operatorname{cosec}^2 \theta}{\cancel{\sec \theta} \cdot \cancel{\operatorname{cosec} \theta}}$$

$$1 + \frac{1 + \tan^2 \theta + \cot^2 \theta}{\sec \theta \cdot \operatorname{cosec} \theta} \text{ is equal to :}$$

SSC CGL 4 June 2019 (Morning)

(a)  $\cot \theta$

(b)  $\cos \theta \cdot \sin \theta$

☒ (c)  $\sec \theta \cdot \operatorname{cosec} \theta$

(d)  $\tan \theta$



$A = 45^\circ$

$(\csc A - \sin A)^2 + (\sec A - \cos A)^2 - (\cot A - \tan A)^2$  is equal to :

SSC CPO 2018, 16 March 2019 (Evening)

(a) 2

(b) 0

☒ (c) 1

(d) -1

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

$$= 2 \left( \frac{1}{\sqrt{2}} \right)^2$$

$$\left(\frac{1}{4} - 1\right) \times 4$$

$$-\frac{3}{4} \times 4$$

**The value of the expression**

**(cos<sup>6</sup>θ + sin<sup>6</sup>θ - 1)(tan<sup>2</sup>θ + cot<sup>2</sup>θ + 2) is :**

**SSC CGL Tier-II (11 September, 2019)**

(a) 0

(b) - 1

✓ (c) - 3

(d) 1

$$\cos^6 45^\circ = \left(\frac{1}{\sqrt{2}}\right)^6 = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$$

The value of  $\tan^2\phi + \cot^2\phi - \sec^2\phi \cdot \operatorname{cosec}^2\phi$   
is equal to :  $1 + 1 - 4$

*SSC CGL Tier-II (12 September, 2019)*

- ☒ (a)  $-2$  (b)  $1$   
(c)  $0$  (d)  $-1$



The value of  $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \cos\theta + \sin\theta) \sec\theta = ?$

SSC CGL Tier-II (13 September, 2019)

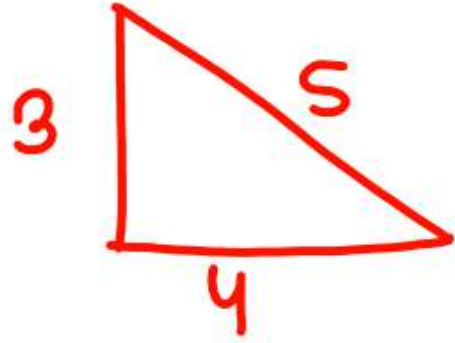
(a)  $-2$

☒ (b)  $2$

(c)  $\sec\theta \cdot \operatorname{cosec}\theta$

(d)  $\sin\theta \cdot \cos\theta$

$$\begin{aligned} & (1 + \cot\theta - \operatorname{cosec}\theta)(\sec\theta + 1 + \tan\theta) \\ = & \boxed{(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta)} \end{aligned}$$



**The value of  $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \cos\theta + \sin\theta) \sec\theta = ?$**

**SSC CGL Tier-II (13 September, 2019)**

- |   |                                   |
|---|-----------------------------------|
| (a) $-2$  | (b) $2$                           |
| (c) $\sec\theta \cdot \operatorname{cosec}\theta$ | (d) $\sin\theta \cdot \cos\theta$ |

$$\begin{aligned}
 & \left(1 + \frac{4}{3} - \frac{5}{3}\right) \left(1 + \frac{4}{5} + \frac{3}{5}\right) \times \frac{5}{4} \\
 & \therefore \left(1 - \frac{1}{3}\right) \left(1 + \frac{7}{5}\right) \times \frac{5}{4} \\
 & \therefore \frac{2}{3} \times \frac{12}{5} \times \frac{5}{4} \\
 & \quad \quad \quad \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}
 \end{aligned}$$



$$S = 1$$

$$C = 0$$

The value of

$$\frac{2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta)}{\cos^4 \theta - \sin^4 \theta - 2\cos^2 \theta} \text{ is :}$$

SSC CGL Tier-II (13 September, 2019)

(a) - 1

(b) - 2

(c) 2

✓ (d) 1

$$\frac{2-3}{-1} = \frac{-1}{-1} = 1$$



**What is the value of**

○ 
$$\frac{\cancel{\operatorname{cosec}(78^\circ + \theta)} - \cancel{\sec(12^\circ - \theta)} - \cancel{\tan(67^\circ + \theta)} + \cancel{\cot(23^\circ - \theta)}}{\tan 13^\circ \tan 37^\circ \tan 45^\circ \tan 53^\circ \tan 77^\circ} ?$$

**SSC CGL 5 March 2020 (Afternoon)**

✓ (a) 0

(b) 2

(c) - 1

(d) 1

The value of  ~~$(\tan^2 A + \cot^2 A - 2)$~~  -  $\sec^2 A \operatorname{cosec}^2 A$  is :

*CGL 2019 Tier-II (16/10/2020)*

☒ (a)  $-4$

(b)  $-1$

(c)  $1$

(d)  $4$

$-(2 \times 2)$

$$\frac{4}{2} = 2$$

The value of

$$\frac{(\cos 9^\circ + \sin 81^\circ)(\sec 9^\circ + \operatorname{cosec} 81^\circ)}{\sin 56^\circ \sec 34^\circ + \cos 25^\circ \operatorname{cosec} 65^\circ} \text{ is :}$$

SSC CHSL 2 July 2019 (Evening)

(a)  $\frac{1}{2}$

(b) 4

☒ (c) 2

(d) 1



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