



TRIGONOMETRY

त्रिकोणमिति

SHEET-03

CLASS NOTES

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TRIGONOMETRIC IDENTITIES

- $\sin^2\theta + \cos^2\theta = 1$
- $\sec^2\theta - \tan^2\theta = 1$
- $\operatorname{cosec}^2\theta - \cot^2\theta = 1$

1. Select the **INCORRECT** formula from the following options.

निम्नलिखित विकल्पों में से गलत सूत्र का चयन कीजिए।

✓ **SSC CGL 17/07/2023 (Shift-01)**

- (a) $\sec^2\theta - \tan^2\theta = 1$
- (b) $\sin^2\theta + \cos^2\theta = 1$
- (c) $\operatorname{cosec}^2\theta - \cot^2\theta = 1$
- ✓ (d) $\sec^2\theta + \cos^2\theta = 1$

$$\tan\theta + \cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$$

$$= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta \cdot \cos\theta}$$

$$= \frac{1}{\sin\theta \cdot \cos\theta}$$

$$\tan\theta + \cot\theta = \operatorname{cosec}\theta \operatorname{sec}\theta$$

2. Which of the following is equal to

$$\frac{1}{\tan \theta} + \tan \theta ?$$

$$\begin{aligned} & \cot \theta + \tan \theta \\ &= \sec \theta \cdot \operatorname{cosec} \theta \end{aligned}$$

निम्न में से कौन $\frac{1}{\tan \theta} + \tan \theta$ के बराबर है?

SSC CGL MAINS (08/08/2022)

(a) $\frac{\cos \theta}{\sec \theta}$

(b) $\tan^2 \theta$

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

(d) 1

Value Putting -

$$\theta = 45^\circ$$

$$1 + 1 = 2$$

2. Which of the following is equal to

$$\frac{1}{\tan \theta} + \tan \theta ?$$

निम्न में से कौन $\frac{1}{\tan \theta} + \tan \theta$ के बराबर है?

SSC CGL MAINS (08/08/2022)

(a) $\frac{\operatorname{cosec} \theta}{\sec \theta}$ $\frac{\sqrt{2}}{\sqrt{2}}$ ①

(b) $\tan^2 \theta$ ①

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

(d) 1 ①

$$\sqrt{2} \times \sqrt{2} = 2$$

3. Which of the following is equal to

$$\left[\frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta} \right] ?$$

$\cot \theta + \tan \theta$

निम्न में से कौन $\left[\frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta} \right]$ के बराबर है?

SSC CGL MAINS (08/08/2022)

- (a) $\cot \theta \cdot \sec \theta$ (b) $\operatorname{cosec} \theta \cdot \sec \theta$
(c) $\sec \theta \cdot \tan \theta$ (d) $\operatorname{cosec} \theta \cdot \tan \theta$

4. Which of the following is equal to $\sec A - \cos A$?

निम्न में से कौन $\sec A - \cos A$ के बराबर है?

SSC CGL MAINS (08/08/2022)

(a) $\sin A \cdot \cot A$

(b) $\cot A \cdot \cos A$

(c) $\tan A \cdot \sin A$

(d) $\cos A \sin A$

Basic

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

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

$$= \frac{\sin^2 A}{\cos A} = \sin A \cdot \frac{\sin A}{\cos A}$$

$$= \sin A \cdot \tan A$$

$\theta = 60^\circ$ $\sec 60^\circ - \cos 60^\circ$

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

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

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

Ⓒ $\sqrt{3} \times \frac{\sqrt{3}}{2} = \frac{3}{2}$

5. $[(\sin \theta \tan \theta + \cos \theta)^2 - 1]$ is equal to:

$[(\sin \theta \tan \theta + \cos \theta)^2 - 1]$ इनमें से किसके बराबर है?

SSC Phase X 02/08/2022 (Shift- 02)

(a) $\sec^2 \theta$ 2

(b) $\sec \theta$ $\sqrt{2}$

(c) $\operatorname{cosec} \theta$ $\sqrt{2}$

(d) $\tan^2 \theta$ 1

$\theta = 45^\circ$
 $\left(\frac{1}{\sqrt{2}} \times 1 + \frac{1}{\sqrt{2}}\right)^2 - 1$
 $= \left(\frac{2}{\sqrt{2}}\right)^2 - 1$
 $= 2 - 1$
 $= 1$

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

$$\Rightarrow (\sec \theta - \tan \theta)(\sec \theta + \tan \theta) = 1$$

$$(\sec \theta - \tan \theta) = \frac{1}{(\sec \theta + \tan \theta)} \quad \bigg| \quad (\sec \theta + \tan \theta) = \frac{1}{(\sec \theta - \tan \theta)}$$

6. For $0^\circ < \theta < 90^\circ$, $\frac{1}{\cos \theta} + \frac{1}{\tan \theta - \sec \theta}$ is equal to:

$0^\circ < \theta < 90^\circ$ के लिए, $\frac{1}{\cos \theta} + \frac{1}{\tan \theta - \sec \theta}$ बराबर है।

SSC CGL 17/08/2021 (Shift- 02)

(a) $-\sec \theta$

(b) $\tan \theta$

(c) $\sec \theta$

(d) $-\tan \theta$


$$\begin{aligned} &\rightarrow \sec \theta - \frac{1}{\sec \theta - \tan \theta} \\ &= \sec \theta - (\sec \theta + \tan \theta) \\ &= \cancel{\sec \theta} - \cancel{\sec \theta} - \tan \theta \end{aligned}$$

$$\theta = 45^\circ$$

$$\sec \theta + \frac{1}{\tan \theta - \sec \theta}$$

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

$$= \sqrt{2} + \frac{1}{1 - \sqrt{2}} \times \frac{(1 + \sqrt{2})}{(1 + \sqrt{2})}$$

$$= \sqrt{2} + \frac{(1 + \sqrt{2})}{(1 - 2)}$$

$$= \sqrt{2} - 1(1 + \sqrt{2})$$

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

$$= -1$$

6. For $0^\circ < \theta < 90^\circ$, $\frac{1}{\cos \theta} + \frac{1}{\tan \theta - \sec \theta}$ is equal to:

$0^\circ < \theta < 90^\circ$ के लिए, $\frac{1}{\cos \theta} + \frac{1}{\tan \theta - \sec \theta}$ बराबर है।

SSC CGL 17/08/2021 (Shift- 02)

(a) $-\sec \theta - \sqrt{2}$

(b) $\tan \theta$ 1

(c) $\sec \theta$ $\sqrt{2}$

✓ (d) $-\tan \theta$ -1

$$\begin{aligned}
 & \frac{5}{4} + \frac{1}{\frac{3}{4} - \frac{5}{4}} \\
 &= \frac{5}{4} + \frac{1}{-\frac{2}{4}} \\
 &= \frac{5}{4} - \frac{2}{4} = \frac{3}{4}
 \end{aligned}$$

6. For $0^\circ < \theta < 90^\circ$, $\frac{1}{\cos \theta} + \frac{1}{\tan \theta - \sec \theta}$ is equal to:

$0^\circ < \theta < 90^\circ$ के लिए, $\frac{1}{\cos \theta} + \frac{1}{\tan \theta - \sec \theta}$ बराबर है।

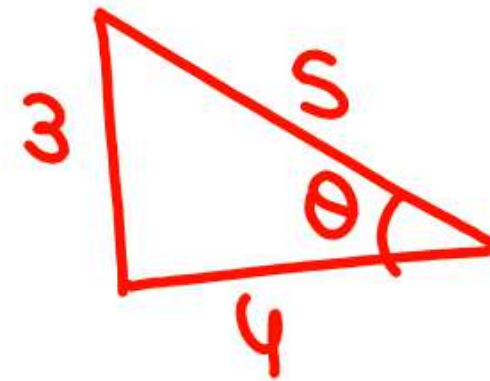
SSC CGL 17/08/2021 (Shift- 02)

(a) $-\sec \theta$

~~(b) $\tan \theta$~~

~~(c) $\sec \theta$~~

~~(d) $-\tan \theta$~~



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

7. The value of $\left(\frac{1}{\sin \theta} + \frac{1}{\tan \theta}\right) \left(\frac{1}{\sin \theta} - \frac{1}{\tan \theta}\right)$ is:

$\left(\frac{1}{\sin \theta} + \frac{1}{\tan \theta}\right) \left(\frac{1}{\sin \theta} - \frac{1}{\tan \theta}\right)$ का मान क्या होगा?

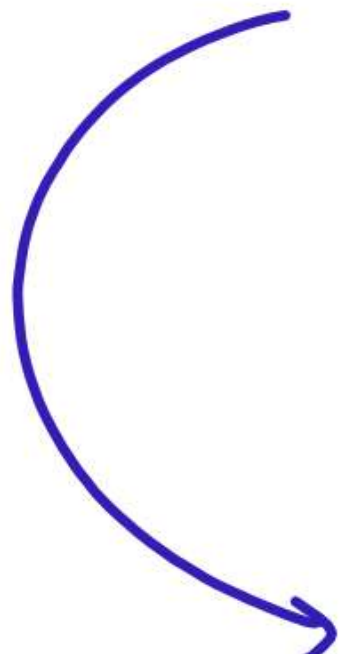
SSC CGL 18/07/2023 (Shift-02)

(a) 0

(b) 2

(c) 3

(d) 1


$$\begin{aligned} & (\operatorname{cosec} \theta + \cot \theta)(\operatorname{cosec} \theta - \cot \theta) \\ &= \operatorname{cosec}^2 \theta - \cot^2 \theta \\ &= 1 \end{aligned}$$

8. $(\operatorname{cosec} A - \cot A)(1 + \cos A) = ?$

SSC CGL 23/08/2021 (Shift- 02)

(a) $\operatorname{cosec} A$

(b) $\cos A$

(c) $\sin A$

(d) $\cot A$


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

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

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

Basic

$$\left(\frac{1}{s} - \frac{c}{s}\right)^2 = \left(\frac{1-c}{s}\right)^2 \quad 9.$$

$$= \frac{(1-c)^2}{s^2} = \frac{(1-c)(1-c)}{(1-c^2)}$$

$$= \frac{\cancel{(1-c)}(1-c)}{\cancel{(1-c)}(1+c)}$$

$$(\operatorname{cosec} \theta - \cot \theta)^2 =, 0^\circ < \theta < 90^\circ$$

SSC CHSL 09/06/2022 (Shift- 03)

(a) $\frac{1 - \sin \theta}{1 + \cos \theta}$

(c) $\frac{1 + \cos \theta}{1 - \cos \theta}$

(b) $\frac{1 - \cos \theta}{1 + \cos \theta}$

(d) $\frac{1 + \cos \theta}{1 - \sin \theta}$

10. The given expression is equal to:

$$\frac{(1 + \tan^2 A)}{\operatorname{cosec}^2 A \cdot \tan A}$$

$$= \frac{\sec^2 A}{\operatorname{cosec}^2 A \cdot \tan A}$$

$$= \frac{\sin^2 A}{\cos^2 A \times \frac{\sin A}{\cos A}} = \tan A$$

$\frac{(1 + \tan^2 A)}{\operatorname{cosec}^2 A \cdot \tan A}$ दी गई अभिव्यक्ति इसके बराबर है:

✓ SSC CHSL 03/08/2023 (Shift-03)

(a) $\sec^2 A$

(b) $\sec A$

(c) $\tan^2 A$

(d) ✓ $\tan A$

$$\# \ x + \frac{1}{x} = n$$

$$x^2 + \frac{1}{x^2} = n^2 - 2$$

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

$$(x=1)$$

$$x^{99} + \frac{1}{x^{99}}$$

$$= 1+1$$

$$= \textcircled{2}$$

x

$$\# \sin \theta + \operatorname{cosec} \theta = 2$$

$$\sin^{10} \theta + \operatorname{cosec}^{10} \theta = ?$$

Ans
 $\theta = 90^\circ$

$$\sin^1 \theta + \frac{1}{\sin \theta} = 2$$

$$\begin{aligned} \sin^{10} \theta + \frac{1}{\sin^{10} \theta} &= \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

$$\# \cos \theta + \sec \theta = 2$$

$$\cos^{99} \theta + \sec^{99} \theta = ?$$

Ans
 $\theta = 0^\circ$

$$\cos^1 \theta + \frac{1}{\cos \theta} = 2$$

$$\begin{aligned} \cos^{99} \theta + \frac{1}{\cos^{99} \theta} &= \\ &= 1^{99} + \frac{1}{1^{99}} \\ &= 2 \end{aligned}$$

$$\# \tan \theta + \cot \theta = 2$$

$$\tan^{99} \theta + \cot^{99} \theta = ?$$

Ans
 $\theta = 45^\circ$

$$\tan^1 \theta + \frac{1}{\tan \theta} = 2$$

$$\begin{aligned} \tan^{99} \theta + \frac{1}{\tan^{99} \theta} &= \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

$$\sin \theta + \operatorname{cosec} \theta = 2$$

$$\sin^{99} \theta + \operatorname{cosec}^{99} \theta =$$

$$= 1 + 1$$

$$= \underline{\underline{2}}$$

11. ~~If θ is an acute angle~~ and $\sin \theta + \operatorname{cosec} \theta = 2$, then the value of $\sin^{99} \theta + \operatorname{cosec}^{99} \theta$ is:

~~यदि θ न्यून कोण है~~ और $\sin \theta + \operatorname{cosec} \theta = 2$ है तो $\sin^{99} \theta + \operatorname{cosec}^{99} \theta$ का मान क्या होगा?

SSC Phase X 02/08/2022 (Shift- 02)

(a) 1

(b) -1

(c) 0

(d) 2

$$\cdot a^2 - b^2 = (a - b)(a + b)$$

$$\cdot a^4 - b^4 = (a^2 - b^2)(a^2 + b^2)$$

$$\cdot a^6 - b^6 = (a^3 - b^3)(a^3 + b^3)$$

$$\cdot a^8 - b^8 = (a^4 - b^4)(a^4 + b^4)$$

12. If $\operatorname{cosec}^2\theta + \cot^2\theta = \frac{1}{3}$, where $0 \leq \theta \leq \frac{\pi}{2}$, then

the value of $\operatorname{cosec}^4\theta - \cot^4\theta$ is:

यदि $\operatorname{cosec}^2\theta + \cot^2\theta = \frac{1}{3}$ है, जहाँ $0 \leq \theta \leq \frac{\pi}{2}$ है, तो $\operatorname{cosec}^4\theta - \cot^4\theta$ का मान है।

SSC CHSL 09/06/2022 (Shift- 01)

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

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

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

(d) $-\frac{2}{3}$

$$\operatorname{cosec}^4\theta - \cot^4\theta = (\operatorname{cosec}^2\theta - \cot^2\theta)(\operatorname{cosec}^2\theta + \cot^2\theta)$$

$$= 1 \times \frac{1}{3}$$

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

13. If $\operatorname{cosec}\theta + \cot\theta = 5$, then $\operatorname{cosec}\theta$ is equal to _____.

Hold

यदि $\operatorname{cosec}\theta + \cot\theta = 5$ है, तो $\operatorname{cosec}\theta$ का मान ज्ञात कीजिए।

SSC CHSL 03/06/2022 (Shift- 01)

(a) $\left(5 + \frac{1}{5}\right)$

(b) $\frac{1}{2}\left(3 + \frac{1}{3}\right)$

(c) $\frac{1}{2}\left(5 + \frac{1}{5}\right)$

(d) $\left(3 + \frac{1}{3}\right)$

Q-1 $(\tan \theta + \cot \theta)^2 = (4)^2$

$$\tan^2 \theta + \cot^2 \theta + 2 \cancel{\tan \theta \cdot \cot \theta} = 16$$

$$\tan^2 \theta + \cot^2 \theta = 14$$

14. If $\tan \theta + \cot \theta = 4$, then find the value of $\tan^2 \theta + \cot^2 \theta$.

यदि $\tan \theta + \cot \theta = 4$ है, तो $\tan^2 \theta + \cot^2 \theta$ का मान ज्ञात करें।

SSC CHSL 30/05/2022 (Shift- 01)

(a) 10

(b) 12

(c) 16

(d) 14

$$x + \frac{1}{x} = n$$
$$x^2 + \frac{1}{x^2} = n^2 - 2$$

14. If $\tan\theta + \cot\theta = 4$, then find the value of $\tan^2\theta + \cot^2\theta$.

यदि $\tan\theta + \cot\theta = 4$ है, तो $\tan^2\theta + \cot^2\theta$ का मान ज्ञात करें।

SSC CHSL 30/05/2022 (Shift- 01)

(a) 10

(b) 12

(c) 16

(d) 14

$$\tan\theta + \frac{1}{\tan\theta} = 4$$

$$\tan^2\theta + \frac{1}{\tan^2\theta} = (4)^2 - 2 = \underline{\underline{14}}$$

$$x + \frac{1}{x} = n$$
$$x^2 + \frac{1}{x^2} = n^2 - 2$$

$$\sin 18^\circ = \frac{\sqrt{5}-1}{4}$$

$$\begin{aligned}\cos 18^\circ &= \sqrt{1 - \left(\frac{\sqrt{5}-1}{4}\right)^2} \\ &= \sqrt{1 - \frac{(5+1-2\sqrt{5})}{16}} \\ &= \sqrt{\frac{16 - (6-2\sqrt{5})}{16}} \\ &= \sqrt{\frac{10+2\sqrt{5}}{16}} \\ &= \frac{\sqrt{10+2\sqrt{5}}}{4}\end{aligned}$$

15. The value of $\sin 18^\circ$ is given as $\frac{\sqrt{5}-1}{4}$. Using this value, find the value of $\cos 18^\circ$.

$\sin 18^\circ$ का मान $\frac{\sqrt{5}-1}{4}$ के रूप में दिया गया है। इस मान का उपयोग करते हुए $\cos 18^\circ$ का मान ज्ञात कीजिए।

✓ SSC CHSL 30/05/2022 (Shift- 2)

✓ (a) $\frac{\sqrt{10+2\sqrt{5}}}{4}$

(b) $\frac{\sqrt{5}+1}{4}$

(c) $\frac{\sqrt{6}+\sqrt{2}}{4}$

(d) $\frac{\sqrt{10-2\sqrt{5}}}{4}$

$$\begin{aligned}\operatorname{Cosec} 18^\circ &= \frac{1}{\sin 18^\circ} \\&= \frac{4}{\sqrt{5}-1} \times \frac{\sqrt{5}+1}{\sqrt{5}+1} \\&= \frac{4(\sqrt{5}+1)}{(5)-(1)} \\&= \frac{4(\sqrt{5}+1)}{4}\end{aligned}$$

16. The value of $\sin 18^\circ$ is given as $\frac{\sqrt{5}-1}{4}$. Find the value of $\operatorname{cosec} 18^\circ$.

$\sin 18^\circ$ का मान $\frac{\sqrt{5}-1}{4}$ के रूप में दिया गया है।
 $\operatorname{cosec} 18^\circ$ का मान ज्ञात कीजिए।

SSC CHSL 06/06/2022 (Shift- 02)

(a) $\frac{\sqrt{5}-1}{4}$

(b) $\frac{\sqrt{5}+1}{2}$

(c) $\sqrt{5}-1$

✓ (d) $\sqrt{5}+1$

$$\begin{aligned} & \frac{1+s}{4(1-s)} - \frac{1-s}{4(1+s)} \\ &= \frac{1}{4} \left\{ \left(\frac{1+s}{1-s} \right) - \left(\frac{1-s}{1+s} \right) \right\} \\ &= \frac{1}{4} \left\{ \frac{(1+s)^2 - (1-s)^2}{1-s^2} \right\} \\ &= \frac{1}{4} \left\{ \frac{\cancel{1} + \cancel{s^2} + 2s - (\cancel{1} + \cancel{s^2} - 2s)}{c^2} \right\} \\ &= \frac{1}{4} \times \frac{4s}{\cancel{4} \cos t \cdot \cos t} = \tan t \cdot \sec t \end{aligned}$$

17. Simplify: $\frac{1 + \sin t}{4 - 4 \sin t} - \frac{1 - \sin t}{4 + 4 \sin t}$

$\frac{1 + \sin t}{4 - 4 \sin t} - \frac{1 - \sin t}{4 + 4 \sin t}$ का मान ज्ञात करें।

SSC CGL 21/07/2023 (Shift-04)

- (a) $4 \tan t \cdot \sin t$
(c) $\tan t - \sin t$

- (b) $\tan t \cdot \sec t$
(d) $\tan t + \sin t$

$$\frac{(\tan \theta + \sec \theta) + (\tan^2 \theta - \sec^2 \theta)}{\tan \theta - \sec \theta + 1}$$

18. Which of the following is equal to $\left[\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} \right]$?

Best Question

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

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

$$= \frac{\tan \theta + \sec \theta \{ 1 + \tan \theta - \sec \theta \}}{(\tan \theta - \sec \theta + 1)}$$

निम्न में से कौन $\left[\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} \right]$ के बराबर है?

SSC CGL MAINS (08/08/2022)

$$= \frac{\sin \theta}{\cos \theta} + \frac{1}{\cos \theta} = \frac{1 + \sin \theta}{\cos \theta}$$

(a) $\frac{1 + \cos \theta}{\sin \theta}$

(b) $\frac{1 + \cot \theta}{\tan \theta}$

(c) $\frac{1 + \sin \theta}{\cos \theta}$

(d) $\frac{1 + \tan \theta}{\cot \theta}$

$$\frac{\frac{s}{c} + \frac{1}{c} - \frac{1}{c} \times c}{\frac{s}{c} - \frac{1}{c} + \frac{1}{c} \times c}$$

$$= \frac{\cancel{\frac{1}{c}} (s + 1 - c)}{\cancel{\frac{1}{c}} (s - 1 + c)}$$

$$= \tan \theta + \sec \theta$$

18. Which of the following is equal to

$$\left[\frac{\tan \theta + \sec \theta - \underline{1}}{\tan \theta - \sec \theta + 1} \right] ?$$

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

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

निम्न में से कौन $\left[\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} \right]$ के बराबर है?

SSC CGL MAINS (08/08/2022)

(a) $\frac{1 + \cos \theta}{\sin \theta}$

(b) $\frac{1 + \cot \theta}{\tan \theta}$

(c) $\frac{1 + \sin \theta}{\cos \theta}$

(d) $\frac{1 + \tan \theta}{\cot \theta}$

$$\begin{aligned} & \left(\frac{1 - \cot \theta}{1 - \frac{1}{\cot \theta}} \right)^2 - 1 \\ &= \left(\frac{1 - \cot \theta}{\frac{\cot \theta - 1}{\cot \theta}} \right)^2 - 1 \\ &= \left[\frac{\cot \theta (1 - \cot \theta)}{-1 (1 - \cot \theta)} \right]^2 - 1 \\ &= \cot^2 \theta - 1 \end{aligned}$$

19. The value of $\left(\frac{1 - \cot \theta}{1 - \tan \theta} \right)^2 - 1$ when $1^\circ < \theta < 90^\circ$, is equal to:

$\left(\frac{1 - \cot \theta}{1 - \tan \theta} \right)^2 - 1$ का मान बराबर है, जहाँ $1^\circ < \theta < 90^\circ$

SSC CGL 12/04/2022 (Shift- 02)

(a) $\cos^2 - 1$

(b) $\sec^2 \theta + 1$

✓ (c) $\cot^2 \theta - 1$

(d) $\sin^2 \theta - 1$

$$\cdot \sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$$

$$= \sqrt{\frac{(1+S) \times (1+S)}{(1-S) (1+S)}}$$

$$= \sqrt{\frac{(1+S)^2}{(1-S^2)}}$$

$$= \sqrt{\frac{(1+S)^2}{c^2}}$$

$$= \frac{1+S}{c} = \text{Sec}\theta + \tan\theta$$

$$\# \sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta \quad \checkmark$$

$$\# \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec\theta - \tan\theta$$

$$\# \sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$$

$$\# \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \operatorname{cosec}\theta - \cot\theta$$

20. The value of $1 + \sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$, if $0^\circ < \theta < 90^\circ$, is equal to:

$$\begin{aligned}
 &= 1 + \sqrt{\frac{\cancel{\frac{1}{\sin\theta}} + \cancel{\cos\theta}}{\cancel{\frac{1}{\sin\theta}} - \cancel{\cos\theta}}} \\
 &= 1 + \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} \\
 &= 1 + \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} \cdot \frac{1 + \sin\theta}{1 + \sin\theta} = 1 + \sec\theta + \tan\theta
 \end{aligned}$$

$1 + \sqrt{\frac{\cot\theta + \cos\theta}{\cot\theta - \cos\theta}}$ का मान बराबर है, यदि $0^\circ < \theta < 90^\circ$

SSC CGL 12/04/2022 (Shift- 02)

(a) $1 - \sec\theta + \tan\theta$

(b) $1 - \sec\theta - \tan\theta$

(c) $1 + \sec\theta - \tan\theta$

✓ (d) $1 + \sec\theta + \tan\theta$

$$\begin{aligned}
 & \left(\frac{\frac{3}{5}}{1-\frac{4}{5}} + \frac{1-\frac{4}{5}}{\frac{3}{5}} \right) \div \left(\frac{\frac{16}{9}}{1+\frac{5}{3}} + 1 \right) \\
 &= \left(\frac{\cancel{3}/\cancel{5}}{\cancel{5}/\cancel{1}} + \frac{\cancel{1}/\cancel{5}}{\cancel{3}/\cancel{5}} \right) \div \left(\frac{\cancel{2}/\cancel{16}}{\cancel{3}/\cancel{9}} + 1 \right) \\
 &= \left(3 + \frac{1}{3} \right) \div \left(\frac{2}{3} + 1 \right) \\
 &= \frac{10}{3} \div \frac{5}{3} \\
 &= \frac{10}{3} \times \frac{3}{5} = 2
 \end{aligned}$$

21. The value of

$$\left(\frac{\sin A}{1 - \cos A} + \frac{1 - \cos A}{\sin A} \right) \div \left(\frac{\cot^2 A}{1 + \operatorname{cosec} A} + 1 \right) \text{ is :}$$

$$\left(\frac{\sin A}{1 - \cos A} + \frac{1 - \cos A}{\sin A} \right) \div \left(\frac{\cot^2 A}{1 + \operatorname{cosec} A} + 1 \right) \text{ का मान ज्ञात करें}$$

SSC CGL Tier-II (12/09/2019)

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

(c) 1

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

(d) 2

$$\begin{aligned}
 & \left(\frac{\sin^2 A + (1 - \cos A)^2}{\sin A (1 - \cos A)} \right) \div \left(\cancel{\csc A - 1 + 1} \right) \\
 &= \left(\frac{\sin^2 A + 1 + \cos^2 A - 2\cos A}{\sin A (1 - \cos A)} \right) \div \frac{1}{\sin A} \\
 &= \frac{2 - 2\cos A}{\cancel{\sin A (1 - \cos A)}} \times \cancel{\sin A} \\
 &= \frac{2(1 - \cos A)}{\cancel{(1 - \cos A)}}
 \end{aligned}$$

21. The value of

$$\left(\frac{\sin A}{1 - \cos A} + \frac{1 - \cos A}{\sin A} \right) \div \left(\frac{\cancel{\csc^2 A - 1}}{1 + \csc A} + 1 \right) \text{ is :}$$

$$\left(\frac{\sin A}{1 - \cos A} + \frac{1 - \cos A}{\sin A} \right) \div \left(\frac{\cot^2 A}{1 + \csc A} + 1 \right) \text{ का मान ज्ञात करें}$$

करें

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

(c) 1

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

(d) 2

$\cot^2 A = \csc^2 A - 1$

SSC CGL Tier-II (12/09/2019)

$A = 45^\circ$

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

22. What is value of the expression

अभिव्यक्ति का मूल्य क्या है?

$$\sin A \left(1 + \frac{\sin A}{\cos A} \right) + \cos A \left(1 + \frac{\cos A}{\sin A} \right)$$

SSC CHSL 04/08/2023 Shift-01

$2\sqrt{2}$ (a) $\sec A + \operatorname{cosec} A$
(c) $\sin A - \cos A$

(b) $\sin A + \cos A$

(d) $\sec A - \operatorname{cosec} A$

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

$$\frac{(S-C) \times \left(1 + \frac{S}{C} + \frac{C}{S}\right)}{(1+S \cdot C)}$$

$$= \frac{(S-C) \times \left(\frac{Sc + S^2 + C^2}{Sc}\right)}{(1+S \cdot C)}$$

$$= \frac{(S-C) \times \left(\frac{1+Sc}{Sc}\right)}{(1+S \cdot C)}$$

$$= \frac{S-C}{Sc} = \frac{S}{Sc} - \frac{C}{Sc} = \sec\theta - \operatorname{cosec}\theta$$

23. Find the value

$$\frac{(\sin\theta - \cos\theta) \times (1 + \tan\theta + \cot\theta)}{1 + \sin\theta \cos\theta} = ?$$

$$\frac{(\sin\theta - \cos\theta) \times (1 + \tan\theta + \cot\theta)}{1 + \sin\theta \cos\theta} \text{ का मान ज्ञात करें?}$$

SSC CGL Tier-II (13/09/2019)

- (a) ☒ $\sec\theta - \operatorname{cosec}\theta$
(c) $\sin\theta + \cos\theta$

- (b) $\operatorname{cosec}\theta - \sec\theta$
(d) $\tan\theta + \cot\theta$

$A = 45^\circ$

24. The value of $(\operatorname{cosec} A + \cot A + 1)(\operatorname{cosec} A - \cot A + 1) - 2\operatorname{cosec} A$ is

$(\operatorname{cosec} A + \cot A + 1)(\operatorname{cosec} A - \cot A + 1) - 2\operatorname{cosec} A$ का मान बराबर है।

SSC CGL 09/03/2020 (Shift- 02)

- (a) $4\operatorname{cosec} A$ $4\sqrt{2}$ (b) 2
(c) $2\operatorname{cosec} A$ $2\sqrt{2}$ (d) 0

$$\begin{aligned} & (\sqrt{2} + 1 + 1)(\sqrt{2} - 1 + 1) - 2\sqrt{2} \\ &= (2 + \sqrt{2})\sqrt{2} - 2\sqrt{2} \\ &= \cancel{2\sqrt{2}} + 2 - \cancel{2\sqrt{2}} \end{aligned}$$

25. $\cos A(\sec A - \cos A)(\cot A + \tan A) = ?$

SSC CGL 2019 Tier-II (15/10/2020)

(a) $\sec A$

(b) $\cot A$

(c) $\sin A$

(d) $\tan A$


$$\begin{aligned} & (1 - \cos^2 A) \cdot \sec A \operatorname{cosec} A \\ &= \sin^2 A \cdot \frac{1}{\cos A} \cdot \frac{1}{\sin A} \\ &= \tan A \end{aligned}$$

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

$$\Rightarrow (\sec A - \tan A)(\sec A + \tan A) = 1$$

$$\Rightarrow \boxed{(\sec A - \tan A) = \frac{1}{\sec A + \tan A}}$$

$$(\sec A + \tan A)^{\text{or}} = \frac{1}{(\sec A - \tan A)}$$

26. $\left(\frac{1}{\cos\theta} - \frac{1}{\sin\theta} \right) + \frac{1}{\operatorname{cosec}\theta - \cot\theta} - \frac{1}{\sec\theta + \tan\theta} = ?$

SSC CGL 2019 Tier-II (15/10/2020)

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

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

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

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

$$= (\sec\theta - \cancel{\operatorname{cosec}\theta}) + \cancel{\operatorname{cosec}\theta} + \cot\theta - (\sec\theta + \tan\theta)$$

$$= \cancel{\sec\theta} + \cot\theta - \cancel{\sec\theta} + \tan\theta$$

$$= \cot\theta + \tan\theta$$

$$= \sec\theta \cdot \operatorname{cosec}\theta$$

$$\theta = 45^\circ$$

27. The value of

$$\frac{\sec^2 \theta (2 + \tan^2 \theta + \cot^2 \theta) \div (\sin^2 \theta - \tan^2 \theta)}{(\operatorname{cosec}^2 \theta + \sec^2 \theta)(1 + \cot^2 \theta)^2} \text{ is:}$$

SSC CGL 2019 Tier-II (15/10/2020)

(a) ~~-1~~

(b) 1

(c) -2

(d) 2


$$\begin{aligned} & \frac{2(2+1+1) \div \left(\frac{1}{2} - 1\right)}{(2+2)(1+1)^2} \\ &= \frac{8 \div \left(-\frac{1}{2}\right)}{4 \times 4} = \frac{8 \times (-2)}{16} = -\frac{16}{16} = -1 \end{aligned}$$

$$\# \frac{\sin \theta + \cos \theta - 1}{\sin \theta - \cos \theta + 1} = \sec \theta - \tan \theta \checkmark$$

$$\# \frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \sec \theta + \tan \theta \checkmark$$

28. The value of $\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}}$

$\left(\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \right) \times \left(\sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} \right)$ का मान ज्ञात करें।

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

(a) 1

(c) - 2

(b) - 1

(d) 2

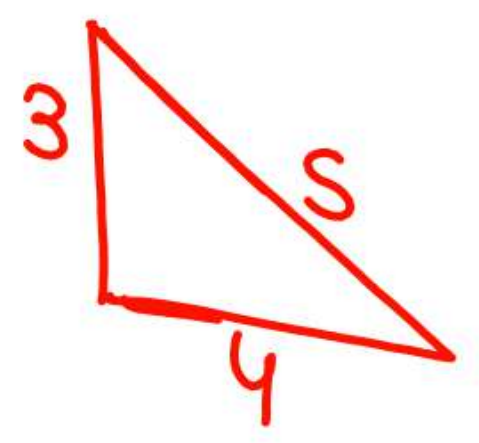
$$\begin{aligned} & (\sec\theta - \tan\theta) \times (\tan\theta + \sec\theta) \\ &= \sec^2\theta - \tan^2\theta \\ &= 1 \end{aligned}$$

28. The value of $\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}}$

$\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}}$ का मान ज्ञात करें।

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

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



$$\begin{aligned}
 & \frac{\frac{3}{5} + \frac{4}{5} - 1}{\frac{3}{5} - \frac{4}{5} + 1} \times \sqrt{\frac{1 + \frac{3}{5}}{1 - \frac{3}{5}}} \\
 = & \frac{3+4-5}{3-4+5} \times \sqrt{\frac{1+\frac{3}{5}}{1-\frac{3}{5}}} \\
 = & \frac{3+4-5}{3-4+5} \times \sqrt{\frac{\frac{5+3}{5}}{\frac{5-3}{5}}} \\
 = & \frac{3+4-5}{3-4+5} \times \sqrt{\frac{8}{2}} \\
 = & \frac{3+4-5}{3-4+5} \times \sqrt{4} \\
 = & \frac{3+4-5}{3-4+5} \times 2 \\
 = & \frac{2}{2} \times 2 \\
 = & 2
 \end{aligned}$$

$$x \sin \theta = y \cos \theta \text{ --- (i)}$$

$$x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cdot \cos \theta \text{ --- (ii)}$$

$$\Rightarrow \underline{x \sin \theta} \cdot \sin^2 \theta + y \cos^3 \theta = \sin \theta \cos \theta$$

$$\Rightarrow y \cos \theta \cdot \sin^2 \theta + y \cos^3 \theta = \sin \theta \cos \theta$$

$$\Rightarrow y \cancel{\cos \theta} [\sin^2 \theta + \cos^2 \theta] = \sin \theta \cdot \cancel{\cos \theta}$$

$$\Rightarrow \textcircled{y = \sin \theta}$$

$$x \cancel{\sin \theta} = \cancel{\sin \theta} \cdot \cos \theta$$

$$\textcircled{x = \cos \theta}$$

29. If $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cdot \cos \theta$ and $x \sin \theta = y \cos \theta$ then the value of $x^2 + y^2$ is :

यदि $x \sin^3 \theta + y \cos^3 \theta = \sin \theta \cdot \cos \theta$ तथा $x \sin \theta = y \cos \theta$ है तो $x^2 + y^2$ का मान ज्ञात कीजिए।

SSC CHSL 20/10/2020 (Shift- 01)

(a) 0

(b) 4

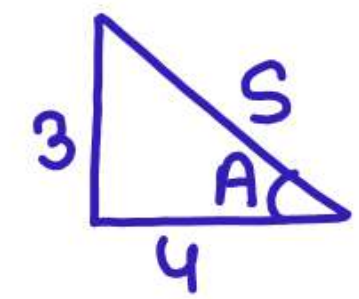
☒ (c) 1

(d) 2

$$\begin{aligned} x^2 + y^2 &= \cos^2 \theta + \sin^2 \theta \\ &= \underline{\underline{1}} \end{aligned}$$

30. Simplify the following expression:

निम्नलिखित व्यंजक को सरल कीजिए।



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

SSC CGL 19/04/2022 (Shift- 03)

(a) $1 + \sin A$

(b) $(1 + \sin A) \cos A$

(c) $\cos A \left(\frac{4}{5} \right)$

(d) $1 + \cos A$

Handwritten solution:

$$\frac{\frac{4}{5}}{1 - \frac{3}{4}} + \frac{\frac{3}{5}}{1 - \frac{4}{3}} - \frac{3}{5}$$

$$= \frac{4}{5} \cdot \frac{4}{4-3} + \frac{3}{5} \cdot \frac{3}{3-4} - \frac{3}{5}$$

$$= \frac{16}{5} - \frac{9}{5} - \frac{3}{5}$$

$$= \frac{16 - 9 - 3}{5} = \frac{4}{5}$$

31. $\frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta - 1} + \frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta + 1} - \tan^2 \theta, 0^\circ < \theta < 90^\circ,$
is equal to:

$\frac{\operatorname{Cosec}^2 \theta + \cancel{\operatorname{cosec} \theta} + \operatorname{Cosec}^2 \theta - \cancel{\operatorname{cosec} \theta}}{\operatorname{Cosec}^2 \theta - 1^2} - \tan^2 \theta$ $\frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta - 1} + \frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta + 1} - \tan^2 \theta, 0^\circ < \theta < 90^\circ$ का मान ज्ञात करें।

$$= \frac{2 \operatorname{Cosec}^2 \theta}{\cot^2 \theta} - \tan^2 \theta$$

$$= \frac{2 \times \frac{1}{\cancel{\sin^2 \theta}}}{\frac{\cos^2 \theta}{\cancel{\sin^2 \theta}}} - \tan^2 \theta$$

$$\therefore \frac{2 \operatorname{Sec}^2 \theta - \tan^2 \theta}{\operatorname{Sec}^2 \theta + \operatorname{Sec}^2 \theta - \tan^2 \theta}$$

$$\therefore \frac{2 \operatorname{Sec}^2 \theta - \tan^2 \theta}{\operatorname{Sec}^2 \theta + 1}$$

SSC CGL 13/08/2021 (Shift- 01)

(a) $2 \sec^2 \theta$

(c) $\sec^2 \theta$

(b) $\sec^2 \theta + 1$

(d) $1 - \tan^2 \theta$

$$\text{ans} = \frac{5 \times 3}{3} + \frac{5 \times 3}{3} - \frac{9}{16}$$

$$= \frac{5}{2} + \frac{5}{2} - \frac{9}{16} = \frac{40 + 10 - 9}{16} = \frac{41}{16}$$

31. $\frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta - 1} + \frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta + 1} - \tan^2 \theta$, $0^\circ < \theta < 90^\circ$,
is equal to:

$\frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta - 1} + \frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta + 1} - \tan^2 \theta$, $0^\circ < \theta < 90^\circ$ का
मान ज्ञात करें।

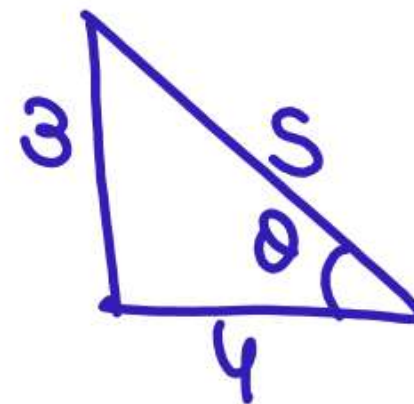
SSC CGL 13/08/2021 (Shift- 01)

(a) $2 \sec^2 \theta$

(c) $\sec^2 \theta$

(b) $\sec^2 \theta + 1$

(d) $1 - \tan^2 \theta$



$$\frac{25}{16} + 1 = \frac{41}{16}$$

$$\frac{1 + \cancel{\cos \theta} + 1 - \cancel{\cos \theta}}{\sec^2 \theta - 1}$$

$$= \frac{2}{\tan^2 \theta}$$

$$= 2 \cot^2 \theta$$

32. $\frac{\cos \theta}{\sec \theta - 1} + \frac{\cos \theta}{\sec \theta + 1}$ is equal to:

$\frac{\cos \theta}{\sec \theta - 1} + \frac{\cos \theta}{\sec \theta + 1}$ के बराबर है:

SSC CHSL 02/08/2023 Shift-01

(a) $2 \sec^2 \theta$

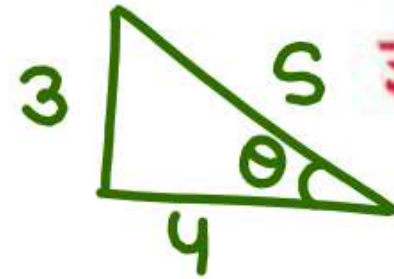
(c) $2 \cos^2 \theta$

✓ (b) $2 \cot^2 \theta$

(d) $2 \sin^2 \theta$

$$\frac{1}{1} + 2 \times \frac{9}{16} + 2 \times \frac{3}{5} \times \frac{25}{16} = \frac{8+9+15}{8} = \frac{32}{8} = 4$$

$$\frac{8+9+15}{8} = \frac{32}{8} = 4$$



33. $1 + 2 \tan^2 \theta + 2 \sin \theta \sec^2 \theta$, $0^\circ < \theta < 90^\circ$, is equal to :

$1 + 2 \tan^2 \theta + 2 \sin \theta \sec^2 \theta$, $0^\circ < \theta < 90^\circ$ का मान ज्ञात करें।

SSC CGL 16/08/2021 (Shift- 01)

(a) $\frac{1 - \sin \theta}{1 + \sin \theta}$

(c) $\frac{1 - \cos \theta}{1 + \cos \theta}$

(b) $\frac{1 + \cos \theta}{1 - \cos \theta} = \frac{1 + \frac{4}{5}}{1 - \frac{4}{5}} = \frac{\frac{9}{5}}{\frac{1}{5}} = 9$

(d) $\frac{1 + \sin \theta}{1 - \sin \theta} = \frac{1 + \frac{3}{5}}{1 - \frac{3}{5}} = \frac{\frac{8}{5}}{\frac{2}{5}} = 4$

$$1 + \cancel{2} \times \frac{9}{16} + \cancel{2} \times \frac{3}{8} \times \frac{25}{16} = 1 + \frac{9}{8} + \frac{75}{16}$$

$$\frac{16 + 18 + 30}{16} = \frac{4}{1} = \frac{4}{1}$$

$$\frac{a+b}{a-b} = \frac{5}{3} = \operatorname{cosec} \theta$$

34. If $1 + 2\tan^2 \theta + 2\sin \theta \sec^2 \theta = a/b$, $0^\circ < \theta < 90^\circ$,

then $\frac{a+b}{a-b} = ?$

यदि $1 + 2\tan^2 \theta + 2\sin \theta \sec^2 \theta = a/b$, $0^\circ < \theta < 90^\circ$

90° है तो $\frac{a+b}{a-b}$ का मान ज्ञात कीजिए।

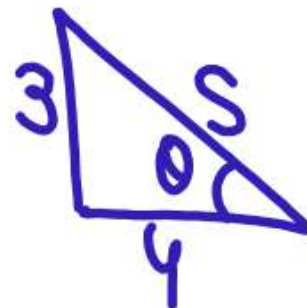
SSC CGL MAINS 29/01/2022

(a) $\sin \theta$

(b) $\cos \theta$

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

(d) $\sec \theta$



$\theta = 45^\circ$

35. $\frac{\cot^3 \theta}{\operatorname{cosec}^2 \theta} + \frac{\tan^3 \theta}{\sec^2 \theta} + 2 \sin \theta \cos \theta = ?$

SSC CGL 16/08/2021 (Shift-02)

(a) $\sqrt{2} \times \sqrt{2}$
 $\operatorname{cosec} \theta \sec \theta = 2$

(b) $\operatorname{cosec}^2 \theta \sec^2 \theta$

(c) $\sin \theta \cos \theta$

(d) $\sin \theta$

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

$$= 1 + 1$$

$$= 2$$

36. $\left(\sqrt{\sec^2 \theta \times \operatorname{cosec}^2 \theta} \right) \left(\frac{\sin \theta (1 + \cos \theta)}{1 + \cos \theta - \sin^2 \theta} \right),$

$\sec \theta \times \operatorname{cosec} \theta \times \frac{\sin \theta (1 + \cos \theta)}{\cos \theta + \cos^2 \theta}$

$= \frac{1}{\cos \theta} \times \frac{1}{\sin \theta} \times \frac{\cancel{\sin \theta} (1 + \cancel{\cos \theta})}{\cos \theta (1 + \cancel{\cos \theta})}$

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

$= \sec^2 \theta$

$0^\circ < \theta < 90^\circ$ is equal to:

$\left(\sqrt{\sec^2 \theta \times \operatorname{cosec}^2 \theta} \right) \left(\frac{\sin \theta (1 + \cos \theta)}{1 + \cos \theta - \sin^2 \theta} \right), 0^\circ < \theta <$

90° का मान ज्ञात करें।

SSC CGL 17/08/2021 (Shift- 01)

(a) $\cot \theta$

(b) $\operatorname{cosec}^2 \theta$

☒ (c) $\sec^2 \theta$

(d) $\tan \theta$

$$\begin{aligned} \theta &= 45^\circ \\ \frac{\left(\frac{1}{\sqrt{2}} + \sqrt{2}\right)^2 + \left(\frac{1}{\sqrt{2}} + \sqrt{2}\right)^2}{(1 + \sqrt{2} \times \sqrt{2})^2} \\ &= \frac{\left(\frac{3}{\sqrt{2}}\right)^2 + \left(\frac{3}{\sqrt{2}}\right)^2}{(1+2)^2} = \frac{\frac{9}{2} + \frac{9}{2}}{9} \\ &= \frac{9}{9} = 1 \end{aligned}$$

37. Simplify: $\frac{(\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2}{(1 + \sec \theta \operatorname{cosec} \theta)^2}, \quad 0 < \theta < 90^\circ$

$< \theta < 90^\circ$ is equal to:

$$\frac{(\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2}{(1 + \sec \theta \operatorname{cosec} \theta)^2}, \quad 0 < \theta < 90^\circ \text{ सरल करें।}$$

करें।

SSC CGL 24/08/2021 (Shift- 03)

(a) 0

(b) 2

(c) -1

✓ (d) 1

$$\frac{\left(s + \frac{1}{c}\right)^2 + \left(c + \frac{1}{s}\right)^2}{\left(1 + \frac{1}{s} \cdot \frac{1}{c}\right)^2}$$

$$= \frac{\frac{(sc+1)^2}{c^2} + \frac{(cs+1)^2}{s^2}}{\frac{(sc+1)^2}{(sc)^2}}$$

$$= \frac{\frac{1}{c^2} + \frac{1}{s^2}}{\frac{1}{(sc)^2}} = \frac{\frac{s^2 + c^2}{(sc)^2}}{\frac{1}{(sc)^2}} = 1$$

37. Simplify: $\frac{(\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2}{(1 + \sec \theta \operatorname{cosec} \theta)^2}, 0$

$0 < \theta < 90^\circ$ is equal to:

$\frac{(\sin \theta + \sec \theta)^2 + (\cos \theta + \operatorname{cosec} \theta)^2}{(1 + \sec \theta \operatorname{cosec} \theta)^2}, 0 < \theta < 90^\circ$ सरल करें।

करें।

SSC CGL 24/08/2021 (Shift- 03)

(a) 0

(b) 2

(c) -1

✓ (d) 1

38. $\left(\frac{\tan^3 \theta}{\sec^2 \theta} + \frac{\cot^3 \theta}{\operatorname{cosec}^2 \theta} + 2 \sin \theta \cos \theta \right) \div (1 + \operatorname{cosec}^2 \theta + \tan^2 \theta), 0^\circ < \theta < 90^\circ$ is equal to:

$\left(\frac{1}{2} + \frac{1}{2} + 2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} \right) \div (1 + 2 + 1)$

$= (1 + 1) \div 4$

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

$\left(\frac{\tan^3 \theta}{\sec^2 \theta} + \frac{\cot^3 \theta}{\operatorname{cosec}^2 \theta} + 2 \sin \theta \cos \theta \right) \div (1 + \operatorname{cosec}^2 \theta + \tan^2 \theta), 0^\circ < \theta < 90^\circ$ का मान ज्ञात करें।

SSC CGL MAINS 29/01/2022

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

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

$$\theta = 45^\circ$$


$$\begin{aligned} & 2 \times 2 \times \left(\frac{1}{\sqrt{2}} - \sqrt{2} \right) \left(\frac{1}{\sqrt{2}} - \sqrt{2} \right) \\ &= 4 \frac{(1-2)}{\sqrt{2}} \frac{(1-2)}{\sqrt{2}} \\ &= \frac{4(-1)(-1)}{\cancel{2}} \\ &= 2 \end{aligned}$$

39. Let $0^\circ < \theta < 90^\circ$, $(1 + \cot^2 \theta)(1 + \tan^2 \theta) \times (\sin \theta - \operatorname{cosec} \theta)(\cos \theta - \sec \theta)$ is equal to:

यदि $0^\circ < \theta < 90^\circ$, $(1 + \cot^2 \theta)(1 + \tan^2 \theta) \times (\sin \theta - \operatorname{cosec} \theta)(\cos \theta - \sec \theta)$ का मान ज्ञात करें।

SSC CGL MAINS 29/01/2022

$\sqrt{2} \times \sqrt{2} = 2$

(a) $\sec \theta \operatorname{cosec} \theta$

(c) $\sin \theta + \cos \theta$

(b) $\sec \theta + \operatorname{cosec} \theta$

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

$$\frac{\left(1 + \frac{1}{c \cdot s}\right)^2 \times \left(\frac{1}{c} - \frac{s}{c}\right)^2 (1+s)}{\left(s + \frac{1}{c}\right)^2 + \left(c + \frac{1}{s}\right)^2} \quad 40.$$

$$\frac{(1 + \sec \theta \cos \text{ec} \theta)^2 (\sec \theta - \tan \theta)^2 (1 + \sin \theta)}{(\sin \theta + \sec \theta)^2 + (\cos \theta + \cos \text{ec} \theta)^2}, \quad 0^\circ, < \theta < 90^\circ, \text{ is equal to:}$$

$$\frac{(1 + \sec \theta \cos \text{ec} \theta)^2 (\sec \theta - \tan \theta)^2 (1 + \sin \theta)}{(\sin \theta + \sec \theta)^2 + (\cos \theta + \cos \text{ec} \theta)^2} \quad \text{का}$$

मान ज्ञात करें।

SSC CGL MAINS 29/01/2022

- (a) $1 - \cos \theta$
- (c) $\cos \theta$

- (b) $1 - \sin \theta$
- (d) $\sin \theta$

$$= \frac{\frac{(cs+1)^2}{(cs)^2} \times \frac{(1-s)^2}{c^2} \times (1+s)}{\frac{(sc+1)^2}{c^2} + \frac{(cs+1)^2}{s^2}}$$

$$= \frac{(1-s)(1-s)(1+s)}{(sc)^2 \times c^2} \times \frac{c^2}{s^2 + c^2} = 1 - \sin \theta$$

$$(1-s)(1+s) = 1-s^2 = c^2$$

41.

$$\frac{1 + \cos \theta - \sin^2 \theta}{\sin \theta (1 + \cos \theta)} \times \frac{\sqrt{\sec^2 \theta \times \operatorname{cosec}^2 \theta}}{\tan \theta + \cot \theta}, \quad 0^\circ < \theta < 90^\circ.$$

SSC CGL MAINS 29/01/2022

(a) $\tan \theta$

(b) $\sec \theta$

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

(d) $\cot \theta$

$$\frac{\cos \theta + \cos^2 \theta}{\sin \theta (1 + \cos \theta)} \times \frac{\sec \theta \times \operatorname{cosec} \theta}{\sec \theta \times \operatorname{cosec} \theta}$$

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

$$= \cot \theta$$

$$\odot \sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \times \operatorname{cosec}^2 \theta$$

$$\odot \tan \theta + \cot \theta = \sec \theta \cdot \operatorname{cosec} \theta$$

$$\begin{aligned} & \left(\frac{S}{C} + \frac{C}{S}\right) \left(\frac{1}{C} + \frac{S}{C}\right) (1-S) \\ &= \left(\frac{S^2 + C^2}{SC}\right) \times \frac{(1+S)}{C} \times (1-S) \\ &= \frac{1}{SC} \times \frac{(1-S^2)}{C} \\ &= \frac{1}{S\cancel{C}} \times \frac{\cancel{C}^2}{\cancel{C}} \\ &= \underline{\underline{\text{cosec } \theta}} \end{aligned}$$

42. The expression $(\tan \theta + \cot \theta) (\sec \theta + \tan \theta) (1 - \sin \theta)$, $0^\circ < \theta < 90^\circ$, is equal to:

व्यंजक $(\tan \theta + \cot \theta) (\sec \theta + \tan \theta) (1 - \sin \theta)$, $0^\circ < \theta < 90^\circ$ का मान ज्ञात करें।

SSC CGL MAINS 03/02/2022

- (a) $\sec \theta$
- (c) $\cot \theta$

- ☒ (b) $\text{cosec } \theta$
- (d) $\sin \theta$

$$\theta = 45^\circ$$

43. The expression

$$\frac{\tan^6 \theta - \sec^6 \theta + 3 \sec^2 \theta \tan^2 \theta}{\tan^2 \theta + \cot^2 \theta + 2} \quad 0^\circ < \theta < 90^\circ, \text{ is}$$

equal to:

व्यंजक $\frac{\tan^6 \theta - \sec^6 \theta + 3 \sec^2 \theta \tan^2 \theta}{\tan^2 \theta + \cot^2 \theta + 2} \quad 0^\circ < \theta < 90^\circ$

का मान ज्ञात करें।

SSC CGL MAINS 03/02/2022

(a) $\sec^2 \theta \operatorname{cosec}^2 \theta$

(b) $-\sec^2 \theta \operatorname{cosec}^2 \theta$

(c) $\cos^2 \theta \sin^2 \theta$

✓ (d) $-\cos^2 \theta \sin^2 \theta$

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

$$\frac{1 - (\sqrt{2})^6 + 3 \times (\sqrt{2})^2 \times 1}{1 + 1 + 2}$$

$$= \frac{1 - 8 + 3 \times 2 \times 1}{4}$$

$$= -\frac{1}{4}$$

$$4(1-c^2) = 3(1+c)$$

$$\Rightarrow 4(1-c)(1+c) = 3(1+c)$$

$$\Rightarrow 1 - \cos \theta = \frac{3}{4}$$

$$\Rightarrow 1 - \frac{3}{4} = \cos \theta$$

$$\Rightarrow \frac{1}{4} = \cos \theta$$

$$\begin{aligned} & 2 \times \frac{\sqrt{15}}{1} + 4 \times \frac{\sqrt{15}}{4} - \frac{4}{1} \\ &= \underline{3\sqrt{15} - 4} \end{aligned}$$

44. If $4\sin^2 \theta = 3(1 + \cos \theta)$, $0^\circ < \theta < 90^\circ$, then what is the value of $(2\tan \theta + 4\sin \theta - \sec \theta)$?

यदि $4\sin^2 \theta = 3(1 + \cos \theta)$, $0^\circ < \theta < 90^\circ$ है तो $2\tan \theta + 4\sin \theta - \sec \theta$ का मान ज्ञात कीजिए।

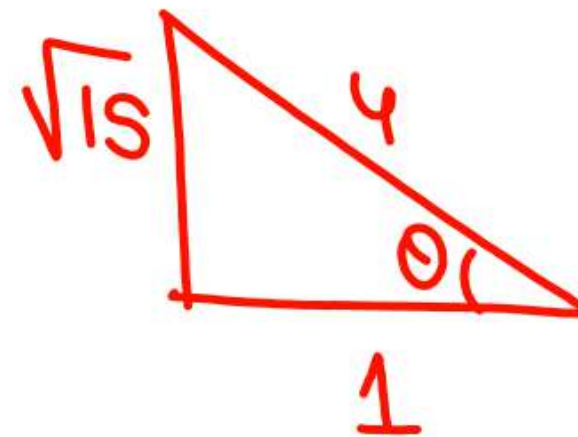
SSC CGL 11/04/2022 (Shift- 01)

✓ (a) $3\sqrt{15} - 4$

(c) $15\sqrt{3} + 3$

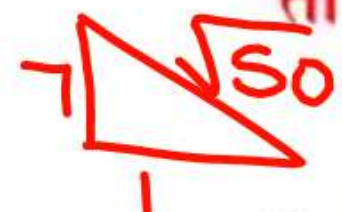
(b) $15\sqrt{3} - 4$

(d) $4\sqrt{15} - 3$



$$\begin{aligned}t^2 + 2t - 63 &= 0 \\ \Rightarrow t^2 + 9t - 11t - 63 &= 0 \\ \Rightarrow t(t+9) - 11(t+9) &= 0 \\ \Rightarrow (t+9)(t-11) &= 0\end{aligned}$$

~~$t = -9$~~ or $t = 11$
 $\tan \theta = \frac{11}{1}$



$$\begin{aligned}\text{ans} &= 2 \times \frac{1}{\sqrt{50}} + 5 \times \frac{11}{\sqrt{50}} \\ &= \frac{19}{\sqrt{50}}\end{aligned}$$

45. If $\tan^2 A + 2 \tan A - 63 = 0$ Given that $0 < A < \frac{\pi}{4}$ what is the value of $(2 \sin A + 5 \cos A)$?

यदि $\tan^2 A + 2 \tan A - 63 = 0$ दिया है $0 < A < \frac{\pi}{4}$,
तो $(2 \sin A + 5 \cos A)$ का मान ज्ञात कीजिए।

SSC CGL 11/04/2022 (Shift- 03)

(a) $19\sqrt{50}$

(b) $15\sqrt{50}$

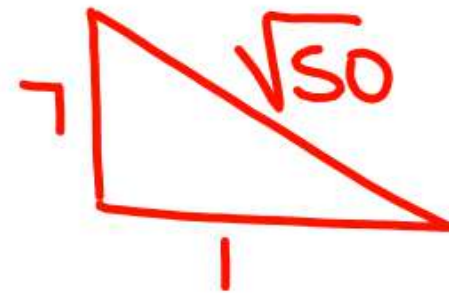
✓ (c) $\frac{19}{\sqrt{50}}$

(d) $\frac{15}{\sqrt{50}}$

$$t^2 + 2t - 63 = 0$$

$$t = \cancel{-9}$$

$$t = +\frac{7}{1}$$



$$\begin{aligned} \text{ans} &= 2 \times \frac{7}{\sqrt{50}} + 5 \times \frac{1}{\sqrt{50}} \\ &= \frac{19}{\sqrt{50}} \end{aligned}$$

45. If $\tan^2 A + 2\tan A - 63 = 0$ Given that $0 < A < \frac{\pi}{4}$ what is the value of $(2\sin A + 5\cos A)$?

यदि $\tan^2 A + 2\tan A - 63 = 0$ दिया है $0 < A < \frac{\pi}{4}$, तो $(2\sin A + 5\cos A)$ का मान ज्ञात कीजिए।

SSC CGL 11/04/2022 (Shift- 03)

(a) $19\sqrt{50}$

(b) $15\sqrt{50}$

✓ (c) $\frac{19}{\sqrt{50}}$

(d) $\frac{15}{\sqrt{50}}$

$$3(1+t^2) + t - 4 = 0$$

$$\Rightarrow 3 + 3t^2 + t - 4 = 0$$

$$\Rightarrow 3t^2 + t - 1 = 0$$

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

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

$$\tan \theta = 1$$

$$\therefore \theta = 45^\circ$$

$$\text{ans} = \frac{2 \times \frac{1}{\sqrt{2}} + 3 \times \frac{1}{\sqrt{2}}}{\sqrt{2} + \sqrt{2}} = \frac{\frac{5}{\sqrt{2}}}{2\sqrt{2}} = \frac{5}{4}$$

46. If $3\sec^2 \theta + \tan \theta - 7 = 0$, $0^\circ < \theta < 90^\circ$, then what

is the value of $\left(\frac{2\sin\theta + 3\cos\theta}{\operatorname{cosec}\theta + \sec\theta} \right)$?

यदि $3\sec^2 \theta + \tan \theta - 7 = 0$, $0^\circ < \theta < 90^\circ$ दिया है तो

$\left(\frac{2\sin\theta + 3\cos\theta}{\operatorname{cosec}\theta + \sec\theta} \right)$ का मान ज्ञात कीजिए।

SSC CGL 12/04/2022 (Shift- 01)

(a) 10

(b) $5/2$

(c) $5/4$

(d) $4\sqrt{2}$

$$S^2 - (1 - S^2) - 3S + 2 = 0$$

$$\Rightarrow S^2 - 1 + S^2 - 3S + 2 = 0$$

$$\Rightarrow 2S^2 - 3S + 1 = 0$$

$$\sin \theta = +\frac{1}{2}$$

~~$\sin \theta = 1$
 $\theta = 90^\circ$~~

$$+\frac{1}{2}$$
$$\sin \theta = \frac{1}{2}$$
$$\theta = 30^\circ$$

$$\text{Ans} = 1 + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} = 1 + \frac{2}{\sqrt{3}} = 1 + \sqrt{3}$$

47. If $\sin^2 \theta - \cos^2 \theta - 3\sin \theta + 2 = 0$, $0^\circ < \theta < 90^\circ$, Then what is the value of $1 + \sec \theta + \tan \theta$?

यदि $\sin^2 \theta - \cos^2 \theta - 3\sin \theta + 2 = 0$, $0^\circ < \theta < 90^\circ$ दिया है तो $1 + \sec \theta + \tan \theta$ का मान ज्ञात कीजिए।

SSC CGL 13/04/2022 (Shift- 03)

(a) $-1 - \sqrt{3}$

(b) $-1 + \sqrt{3}$

☒ (c) $1 + \sqrt{3}$

(d) $1 - \sqrt{3}$

48. If $7\sin^2 \theta + 4\cos^2 \theta = 5$ and θ lies in the first quadrant, then what is the value of

$$\frac{\sqrt{3} \sec \theta + \tan \theta}{\sqrt{2} \cot \theta - \sqrt{3} \cos \theta} ?$$

यदि $7\sin^2 \theta + 4\cos^2 \theta = 5$ and θ पहले चतुर्थांश में स्थित

है, तो $\frac{\sqrt{3} \sec \theta + \tan \theta}{\sqrt{2} \cot \theta - \sqrt{3} \cos \theta}$ का मान क्या होगा?

SSC CGL MAINS 29/01/2022

☒ (a) $2(1 + \sqrt{2})$

(b) $3\sqrt{2}$

(c) $2(\sqrt{2} - 1)$

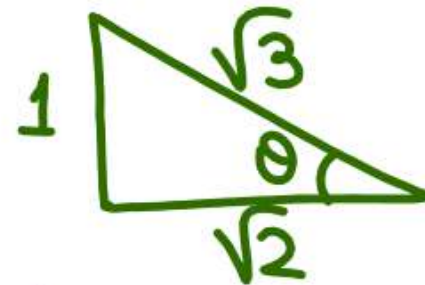
(d) $4\sqrt{2}$

$$7s^2 + 4(1-s^2) = 5$$

$$\Rightarrow 7s^2 + 4 - 4s^2 = 5$$

$$\Rightarrow 3s^2 = 1$$

$$\Rightarrow s^2 = \frac{1}{3} \quad \therefore s = \frac{1}{\sqrt{3}}$$



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

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

$$= \frac{\frac{4}{\sqrt{2}-2}}{2(\sqrt{2}-1)} = \frac{2 \times (\sqrt{2}+1)}{1}$$

$$\frac{7 \times 14 \times \sqrt{3}}{18 \times 36 \times \sqrt{3}} = \frac{7\sqrt{3}}{54}$$

49. If $\frac{\sin^2 \theta}{\cos^2 \theta - 3 \cos \theta + 2} = 1$, θ lies in the first

quadrant, then the value of $\frac{\tan^2 \frac{\theta}{2} + \sin^2 \frac{\theta}{2}}{\tan \theta + \sin \theta}$ is:

$\theta = 60^\circ$ { यदि $\frac{\sin^2 \theta}{\cos^2 \theta - 3 \cos \theta + 2} = 1$, θ ^{पहला} चतुर्थांश में स्थित है,
तो $\frac{\tan^2 \frac{\theta}{2} + \sin^2 \frac{\theta}{2}}{\tan \theta + \sin \theta}$ का मान ज्ञात कीजिए।

$$\frac{\tan^2 30^\circ + \sin^2 30^\circ}{\tan 60^\circ + \sin 60^\circ}$$

$$= \frac{\frac{1}{3} + \frac{1}{4}}{\sqrt{3} + \frac{\sqrt{3}}{2}} = \frac{\frac{7}{12}}{\frac{3\sqrt{3}}{2}} = \frac{14}{36\sqrt{3}}$$

(a) $\frac{2\sqrt{3}}{27}$

(c) $\frac{2\sqrt{3}}{9}$

(b) $\frac{5\sqrt{3}}{27}$

✓ (d) $\frac{7\sqrt{3}}{54}$

SSC CGL MAINS 03/02/2022

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

$$\Rightarrow (\sec \theta - \tan \theta)(\sec \theta + \tan \theta) = 1$$

$$\Rightarrow (\sec \theta - \tan \theta) = \frac{1}{(\sec \theta + \tan \theta)}$$

$$\sec \theta - \cancel{\tan \theta} = p$$

$$\sec \theta + \cancel{\tan \theta} = \frac{1}{p}$$

(+)

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

$$\therefore 2 \sec \theta = \frac{p^2 + 1}{p}$$

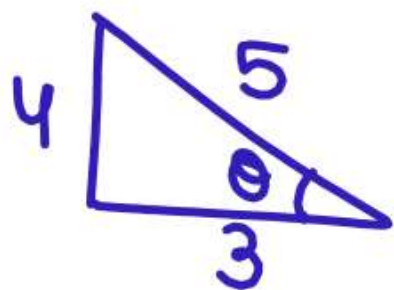
$$\sec \theta = \frac{p^2 + 1}{2p}$$

Q. $\sec\theta - \tan\theta = 3$

$\sin\theta + \cos\theta = ?$

Ans

$$\sec\theta = \frac{p^2+1}{2p} = \frac{9+1}{6} = \frac{10}{6} = \frac{5}{3}$$

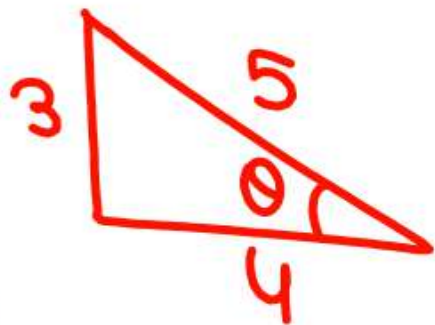


$$\therefore \frac{4}{5} + \frac{3}{5} = \frac{7}{5}$$

Q. $\sec\theta - \tan\theta = 2$

$\tan\theta + \cot\theta = ?$

Ans $\sec\theta = \frac{p^2+1}{2p} = \frac{5}{4}$



Ans

$$= \frac{3}{4} + \frac{4}{3} = \frac{9+16}{12} = \frac{25}{12}$$

50. If $\sec\theta + \tan\theta = p$, then if $\sec\theta$ is equal to:

यदि $\sec\theta + \tan\theta = p$ है, तो $\sec\theta$ का मान ज्ञात करें।

(a) $\left(p - \frac{1}{p}\right), p \neq 0$

(b) $2\left(p - \frac{1}{p}\right), p \neq 0$

(c) $\left(p + \frac{1}{p}\right), p \neq 0$

☒ (d) $\frac{1}{2}\left(p + \frac{1}{p}\right), p \neq 0$

~~$\sec\theta + \tan\theta = p$~~

~~$\sec\theta - \tan\theta = \frac{1}{p}$~~

$\Rightarrow \sec\theta = p + \frac{1}{p}$

$\Rightarrow \sec\theta = \frac{1}{2}\left(p + \frac{1}{p}\right)$

51. If $\sec^2\theta + \tan^2\theta = \frac{25}{18}$, then the value of $\sec^4\theta - \tan^4\theta$ is:

यदि $\sec^2\theta + \tan^2\theta = \frac{25}{18}$ है, तो $\sec^4\theta - \tan^4\theta$ का मान

$\sec^4\theta - \tan^4\theta = (\sec^2\theta - \tan^2\theta)(\sec^2\theta + \tan^2\theta)$ ज्ञात करें।

$$= 1 \times \frac{25}{18}$$

(a) $\frac{18}{25}$

(c) $\frac{25}{9}$

(b) $\frac{25}{12}$

(d) $\frac{25}{18}$

SSC CGL 14/07/2023 (Shift-3)

$$a^4 - b^4 = (a^2 - b^2)(a^2 + b^2)$$

$$\star \sec \theta - \tan \theta = p$$

or

$$\sec \theta + \tan \theta = p$$

$$\sec \theta = \frac{p^2 + 1}{2p}$$

$$\star \operatorname{cosec} \theta - \cot \theta = p$$

or

$$\operatorname{cosec} \theta + \cot \theta = p$$

$$\operatorname{cosec} \theta = \frac{p^2 + 1}{2p}$$

52. If $\operatorname{cosec} \theta - \cot \theta = \frac{7}{2}$, the value of $\operatorname{cosec} \theta$ is:

$$\begin{aligned} \operatorname{cosec} \theta &= \frac{p^2 + 1}{2p} \\ &= \frac{\frac{49}{4} + 1}{\cancel{2} \times \frac{1}{2}} \\ &= \frac{\frac{53}{4}}{1} = \frac{53}{28} \end{aligned}$$

यदि $\operatorname{cosec} \theta - \cot \theta = \frac{7}{2}$ है, तो $\operatorname{cosec} \theta$ का मान ज्ञात करें।

(a) $\frac{47}{28}$

(b) $\frac{51}{28}$

(c) $\frac{53}{28}$

(d) $\frac{49}{28}$

53. If $\sec\theta + \tan\theta = 2 + \sqrt{5}$, then the value of $\sin\theta$ is ($0^\circ \leq \theta \leq 90^\circ$)

$$\cancel{\sec\theta + \tan\theta = \sqrt{5} + 2}$$

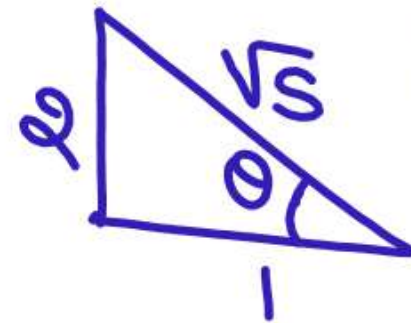
$$\cancel{\sec\theta - \tan\theta = \frac{1}{\sqrt{5} + 2} = \frac{\sqrt{5} - 2}{1}}$$

यदि $\sec\theta + \tan\theta = 2 + \sqrt{5}$ है, तो $\sin\theta$ का मान ज्ञात करें। ($0^\circ \leq \theta \leq 90^\circ$)

(+)

$$\cancel{\sec\theta} = \frac{\cancel{\sqrt{5}}}{1}$$

$$\text{Ans} = \frac{2}{\sqrt{5}}$$



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

(c) $\frac{1}{\sqrt{5}}$

(b) $\frac{2}{\sqrt{5}}$

(d) $\frac{4}{5}$

54. If $\sec\theta + \tan\theta = 2 + \sqrt{5}$, then the value of $\sin\theta + \cos\theta$ is:

H.C

यदि $\sec\theta + \tan\theta = 2 + \sqrt{5}$ है, तो $\sin\theta + \cos\theta$ का मान ज्ञात करें।

$$\frac{2}{\sqrt{5}} + \frac{1}{\sqrt{5}}$$

(a) $\frac{3}{\sqrt{5}}$

(b) $\sqrt{5}$

(c) $\frac{7}{\sqrt{5}}$

(d) $\frac{1}{\sqrt{5}}$

Questions Based on Condition

$$\textcircled{i} \left\{ \begin{array}{l} A \sin \theta + B \cos \theta = X; \\ A \cos \theta - B \sin \theta = Y \text{ then} \\ A^2 + B^2 = X^2 + Y^2 \end{array} \right.$$

$$\textcircled{ii} \left\{ a \sin \theta + b \cos \theta = \sqrt{a^2 + b^2} \right.$$

$$a \sin \theta + b \cos \theta = x \quad \text{--- (i)}$$

$$\underline{a \cos \theta - b \sin \theta = y} \quad \text{--- (ii)}$$

$$\underline{a^2 + b^2 = x^2 + y^2} \quad \checkmark$$

$$* \quad a \sin \theta + b \cos \theta = \sqrt{a^2 + b^2}$$

Proof: $\frac{a}{\sqrt{a^2 + b^2}} \sin \theta + \frac{b}{\sqrt{a^2 + b^2}} \cos \theta = 1$

$\sin \theta \sin \theta + \cos \theta \cos \theta = 1$

$$\sin \theta = \frac{a}{\sqrt{a^2 + b^2}}$$

Diagram: A right triangle with vertical side 'a' (labeled 'P'), horizontal side 'b' (labeled 'H'), and hypotenuse $\sqrt{a^2 + b^2}$. The angle θ is at the origin.

$$\cos \theta = \frac{b}{\sqrt{a^2 + b^2}}$$

Diagram: A right triangle with vertical side 'a' (labeled 'P'), horizontal side 'b' (labeled 'H'), and hypotenuse $\sqrt{a^2 + b^2}$. The angle θ is at the origin.

$$\underline{\sin^2 \theta + \cos^2 \theta = 1}$$

$$* \quad a \sin \theta + b \cos \theta = \sqrt{a^2 + b^2}$$

$$\text{Ex:- } \overset{P}{\textcircled{3}} \sin \theta + \overset{B}{\textcircled{4}} \cos \theta = \overset{H}{\textcircled{5}}$$

$$\therefore \sin \theta = \frac{3}{5}$$

$$\cos \theta = \frac{4}{5}$$

$$\tan \theta = \frac{3}{4}$$

55. If $3\sin\theta + 4\cos\theta = 5$, then $\tan\theta = ?$

यदि $\overset{P}{3}\sin\theta + \overset{B}{4}\cos\theta = \overset{H}{5}$ है तो $\tan\theta$ का मान ज्ञात कीजिए।

~~(a)~~ $\frac{3}{4}$

(b) $\frac{5}{4}$

(c) $\frac{4}{5}$

(d) $\frac{3}{5}$

$\tan\theta = \frac{3}{4}$

Ex:- $\overset{P}{\textcircled{3}} \sin \theta + \overset{B}{\textcircled{4}} \cos \theta = \overset{H}{\textcircled{5}}$ $\sin \theta = \frac{3}{5}$

$\overset{P}{\textcircled{7}} \sin \theta + \overset{B}{\textcircled{24}} \cos \theta = \overset{H}{\textcircled{25}}$ $\sin \theta = \frac{7}{25}$

$\overset{P}{\textcircled{9}} \sin \theta + \overset{B}{\textcircled{40}} \cos \theta = \overset{H}{\textcircled{41}}$ $\sin \theta = \frac{9}{41}$

56. If $2xy \sin \theta + (x^2 - y^2) \cos \theta = x^2 + y^2$, then $\tan \theta = ?$

यदि $2xy \sin \theta + (x^2 - y^2) \cos \theta = x^2 + y^2$ है तो $\tan \theta$
का मान ज्ञात कीजिए।

(a) $\frac{2xy}{x^2 - y^2}$

(b) $\frac{2xy}{x^2 + y^2}$

(c) $\frac{x^2 - y^2}{x^2 + y^2}$

(d) 1

57. If $12\overset{P}{\sin}\theta + 35\overset{B}{\cos}\theta = \overset{H}{37}$, then $\operatorname{cosec}\theta = ?$

यदि $12\sin\theta + 35\cos\theta = 37$ है तो $\operatorname{cosec}\theta$ का मान ज्ञात कीजिए।

(a) $\frac{12}{37}$

✓ (b) $\frac{37}{12}$

(c) $\frac{35}{37}$

(d) $\frac{12}{35}$

$$\operatorname{Cosec}\theta = \frac{H}{P} = \frac{37}{12}$$

✓ 58. $(a^2 - 1)\sin \theta + 2a \cos \theta = a^2 + 1$, then $\tan \theta = ?$

$(a^2 - 1)\sin \theta + 2a \cos \theta = a^2 + 1$ है तो $\tan \theta$ का मान ज्ञात कीजिए।

✓ (a) $\frac{a^2 - 1}{2a}$

(b) $\frac{2a}{a^2 - 1}$

(c) $\frac{a^2 + 1}{a^2 - 1}$

(d) 1

$$3 \sin x + 4 \cos x = 2$$

$$3 \cos x - 4 \sin x = K$$

$$(3)^2 + (4)^2 = (2)^2 + (K)^2$$

$$\Rightarrow 25 = 4 + K^2$$

$$\Rightarrow K^2 = 21$$

$$\Rightarrow K = \sqrt{21}$$

59. If $3 \sin x + 4 \cos x = 2$, then the value of $3 \cos x - 4 \sin x$ is equal to :

यदि $3 \sin x + 4 \cos x = 2$ है तो $3 \cos x - 4 \sin x$ का मान ज्ञात कीजिए।

SSC CGL 2019 Tier-II (18/10/2020)

☒ (a) $\sqrt{21}$

(b) $\sqrt{23}$

(c) 21

(d) $\sqrt{29}$

$$2\cos\theta - \sin\theta = \frac{1}{\sqrt{2}}$$

$$2\sin\theta + \cos\theta = k$$

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

$$\Rightarrow 4 + 1 = \frac{1}{2} + k^2$$

$$\Rightarrow 5 - \frac{1}{2} = k^2$$

$$\Rightarrow \frac{9}{2} = k^2$$

$$\Rightarrow \frac{3}{\sqrt{2}} = k$$

60. If $2\cos\theta - \sin\theta = \frac{1}{\sqrt{2}}$, ($0^\circ < \theta < 90^\circ$) the value of $2\sin\theta + \cos\theta$ is :

यदि $2\cos\theta - \sin\theta = \frac{1}{\sqrt{2}}$, ($0^\circ < \theta < 90^\circ$) है तो $2\sin\theta + \cos\theta$ का मान ज्ञात कीजिए।

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

(b) $\sqrt{2}$

✓ (c) $\frac{3}{\sqrt{2}}$

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

$$\sin\theta + \cos\theta = \frac{\sqrt{11}}{3}$$

$$\cos\theta - \sin\theta = k$$

$$(1)^2 + (1)^2 = \left(\frac{\sqrt{11}}{3}\right)^2 + k^2$$

$$\Rightarrow 2 = \frac{11}{9} + k^2$$

$$\Rightarrow 2 - \frac{11}{9} = k^2$$

$$\Rightarrow \frac{2 \times 9 - 11}{9} = k^2$$

$$\Rightarrow \frac{\sqrt{7}}{3} = k$$

61. If $\sin\theta + \cos\theta = \frac{\sqrt{11}}{3}$, then the value of $(\cos\theta - \sin\theta)$ is:

यदि $\sin\theta + \cos\theta = \frac{\sqrt{11}}{3}$, तो $(\cos\theta - \sin\theta)$ का मान है:

SSC CPO 03/10/2023 (Shift-3)

(a) $\frac{\sqrt{5}}{3}$

(b) $\frac{7}{3}$

(c) $\frac{5}{3}$

(d) $\frac{\sqrt{7}}{3}$

62. If $3 \sin \theta + 5 \cos \theta = 5$, then $5 \sin \theta - 3 \cos \theta$ is equal to:

यदि $3 \sin \theta + 5 \cos \theta = 5$ है तो $5 \sin \theta - 3 \cos \theta$ का मान ज्ञात करें।

✓ (a) ± 3
(c) 1

(b) ± 5
(d) ± 2

$$\begin{aligned} 5 \cos \theta + 3 \sin \theta &= 5 \\ 5 \sin \theta - 3 \cos \theta &= k \\ \hline (\cancel{5})^2 + (3)^2 &= (\cancel{5})^2 + k^2 \\ \therefore k^2 &= 9 \\ \therefore k &= \pm 3 \end{aligned}$$

$$\cos A + \sin^2 A = 1$$

$$\Rightarrow \cos A = 1 - \sin^2 A$$

$$\cos A = \sin^2 A \quad \checkmark$$

$$\therefore \sin^4 A + \sin^6 A$$

$$= \cos^2 A + \cos^3 A$$

$$= \cos A (\cos A + \cos^2 A)$$

$$= \cos A$$

63. If $\cos A + \cos^2 A = 1$, then the value of $\sin^4 A + \sin^6 A$ is :

यदि $\cos A + \cos^2 A = 1$, तो $\sin^4 A + \sin^6 A$ का मान क्या होगा?

✓ SSC CGL 26/07/2023 (Shift-1)

(a) 2

(c) 1

(b) $\cos A$

(d) $\sin A$

64.

Try.

If $\tan^4\theta + \tan^2\theta = 1$, what is the value of $11(\cos^4\theta + \cos^2\theta)$?

यदि $\tan^4\theta + \tan^2\theta = 1$, तो $11(\cos^4\theta + \cos^2\theta)$ का मान क्या होगा?

SSC CGL 27/07/2023 (Shift-3)

(a) -11

(b) 8

(c) 0

(d) 11

65. If $\cos x + \cos^2 x = 1$, the numerical value of $(\sin^{12}x + 3 \sin^{10}x + 3 \sin^8x + \sin^6x - 1)$ is:

यदि $\cos x + \cos^2 x = 1$ है, तो $(\sin^{12}x + 3 \sin^{10}x + 3 \sin^8x + \sin^6x - 1)$ का आंकिक मान है।

(a) -1

(b) 2

(c) 0

(d) 1

$$\cos x = 1 - \cos^2 x$$

$$\Rightarrow \cos x = \sin^2 x$$

$$\sin^{12}x + 3\sin^{10}x + 3\sin^8x + \sin^6x - 1$$

$$= 1\cos^6x + 3\cos^5x + 3\cos^4x + 1\cos^3x - 1$$

$$= (\cos^2x + \cos x)^3 - 1$$

$$= 1^3 - 1$$

$$= 0$$

$$(x+y)^2 = x^2 + 2xy + y^2$$
$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$\sin \theta + \sin^2 \theta = 1$$

$$\Rightarrow \sin \theta = 1 - \sin^2 \theta$$

$$\Rightarrow \sin \theta = \cos^2 \theta$$

$$\begin{aligned} & \cos^2 \theta + \cos^4 \theta \\ &= \frac{\sin \theta + \sin^2 \theta}{1} \\ &= 1 \end{aligned}$$

66. If $\sin \theta + \sin^2 \theta = 1$, then the value of $\cos^2 \theta + \cos^4 \theta$ is:

यदि $\sin \theta + \sin^2 \theta = 1$ है, तो $\cos^2 \theta + \cos^4 \theta$ का मान ज्ञात करें।

(a) 2

(b) 4

(c) 0

(d) 1

67. If $\sin A + \sin^2 A = 1$, then the value of $\cos^4 A + \cos^6 A$ is:
H.W.

यदि $\sin A + \sin^2 A = 1$ है, तो $\cos^4 A + \cos^6 A$ का मान क्या होगा?

SSC CPO 04/10/2023 (Shift-01)

- | | |
|--|--------------|
| (a) 1 | (b) $\cos A$ |
| ☒ (c) $\sin A$ | (d) 0 |

$$\sin \theta + \sin^2 \theta = 1$$

$$\Rightarrow \sin \theta = 1 - \sin^2 \theta$$

$$\Rightarrow \sin \theta = \cos^2 \theta$$

68. If $\sin \theta + \sin^2 \theta = 1$ then the value of $\cos^{12} \theta + 3\cos^{10} \theta + 3\cos^8 \theta + \cos^6 \theta - 1$ is:

यदि $\sin \theta + \sin^2 \theta = 1$ है, तो $\cos^{12} \theta + 3\cos^{10} \theta + 3\cos^8 \theta + \cos^6 \theta - 1$ का मान ज्ञात करें।

(a) 1

(b) 2

(c) 3

(d) 0

$$\begin{aligned} & \cos^{12} \theta + 3\cos^{10} \theta + 3\cos^8 \theta + \cos^6 \theta - 1 \\ &= \sin^6 \theta + 3\sin^5 \theta + 3\sin^4 \theta + \sin^3 \theta - 1 \\ &= (\sin^2 \theta + \sin \theta)^3 - 1 \\ &= 1^3 - 1 \\ &= 0 \end{aligned}$$

Concept

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

$$\therefore x = 1$$

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

यदि $\tan A + \cot A = 2$ है, तो $\tan^{10} A + \cot^{10} A$ का मान ज्ञात करें।

(a) 4

(c) 2^{10}

☒ (b) 2

(d) 1

$$\tan A + \frac{1}{\tan A} = 2$$

$$\therefore \tan A = 1$$

$$\therefore A = 45^\circ$$

$$1 + 1 = 2$$

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

यदि $\sin\theta + \operatorname{cosec}\theta = 2$ है, तो $\sin^{100}\theta + \operatorname{cosec}^{100}\theta$ का मान ज्ञात करें।

(a) 1

(c) 3

~~(b) 2~~

(d) 100

$$\sin\theta + \frac{1}{\sin\theta} = 2$$

$$\therefore \sin\theta = 1$$

$$\sin^{100}\theta + \frac{1}{\sin^{100}\theta}$$

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

$$= 1 + 1$$

$$= 2$$

71. If $\sin \theta + \operatorname{cosec} \theta = 2$, then the value of $\sin^9 \theta + \operatorname{cosec}^9 \theta$ is:

यदि $\sin \theta + \operatorname{cosec} \theta = 2$ है, तो $\sin^9 \theta + \operatorname{cosec}^9 \theta$ का मान ज्ञात करें।

(a) 3

(c) 4

(b) 2

(d) 1

72. If $\tan \theta + \cot \theta = 2$, then the value of $\tan^n \theta + \cot^n \theta$ ($0^\circ \leq \theta < 90^\circ$, n is an integer) is:

यदि $\tan \theta + \cot \theta = 2$ है, तो $\tan^n \theta + \cot^n \theta$ का मान ज्ञात कीजिए। ($0^\circ \leq \theta < 90^\circ$, n एक पूर्णांक हैं।)

(a) ~~2~~

(b) 2^n

(c) $2n$

(d) 2^{n+1}

$$\tan \theta + \frac{1}{\tan \theta} = 2$$

$$\therefore \tan \theta = 1$$

$$\tan^n \theta + \cot^n \theta$$

$$= 1^n + 1^n$$

$$= 1 + 1$$

$$= 2$$