

⇒

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

⇒

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

⇒

$$\csc^2 \theta = 1 + \cot^2 \theta$$



$$\sec^2\theta + \operatorname{cosec}^2\theta \longrightarrow \frac{1}{\cos^2\theta} + \frac{1}{\sin^2\theta} \longrightarrow \frac{\sin^2\theta + \cos^2\theta}{\sin^2\theta \cos^2\theta} \longrightarrow \frac{1}{\sin^2\theta \cos^2\theta}$$

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

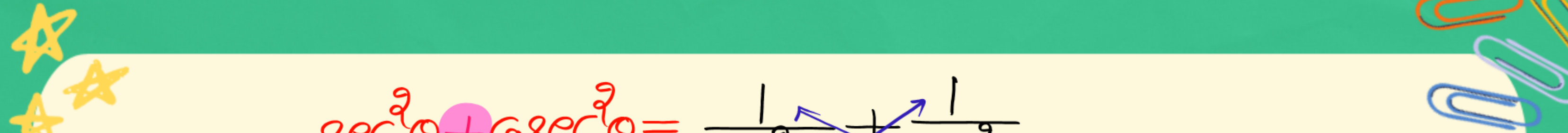
$$\tan^2\theta - \sin^2\theta \longrightarrow \frac{\sin^2\theta}{\cos^2\theta} - \sin^2\theta \longrightarrow \frac{\sin^2\theta - \sin^2\theta \cos^2\theta}{\cos^2\theta} \longrightarrow \frac{\sin^2\theta(1 - \cos^2\theta)}{\cos^2\theta} \longrightarrow \frac{\sin^2\theta \cdot \sin^2\theta}{\cos^2\theta}$$

$$\tan^2\theta - \sin^2\theta = \tan^2\theta \cdot \sin^2\theta$$

$$\cot^2\theta - \cos^2\theta \longrightarrow \frac{\cos^2\theta}{\sin^2\theta} - \cos^2\theta \longrightarrow \frac{\cos^2\theta - \sin^2\theta \cos^2\theta}{\sin^2\theta} \longrightarrow \frac{\cos^2\theta(1 - \sin^2\theta)}{\sin^2\theta} \longrightarrow \frac{\cos^2\theta \cdot \cos^2\theta}{\sin^2\theta}$$

$$\cot^2\theta - \cos^2\theta = \cot^2\theta \cdot \cos^2\theta$$




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

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

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

$$= \sec^2 \theta \times \csc^2 \theta$$


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

$$= \sin^2 \theta \cdot \left( \frac{1}{\cos^2 \theta} - 1 \right)$$

$$= \sin^2 \theta \cdot (\sec^2 \theta - 1)$$

$$= \sin^2 \theta \cdot \tan^2 \theta$$





$$\tan \theta + \cot \theta = \frac{1}{\sin \theta \cdot \cos \theta} = \sec \theta \cdot \csc \theta$$

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

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

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

$$\sec \theta \cdot \csc \theta$$

(v.v.v.v imp)



$$(\tan \theta + \cot \theta)^2 = \tan^2 \theta + \cot^2 \theta + 2 = \sec^2 \theta + \csc^2 \theta = \sec^2 \theta \cdot \csc^2 \theta$$

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







28. If  $\tan \theta = \frac{1-p^2}{2p}$  and  $\theta$  is an acute angle, find the value of  $\sin \theta$ .

यदि  $\tan \theta = \frac{1-p^2}{2p}$  है तथा  $\theta$  एक न्यून कोण है, तो  $\sin \theta$  का मान ज्ञात कीजिए।

(RRB GROUP-D 2025)

~~[A]~~  $\frac{1-p^2}{1+p^2}$

[C]  $\frac{1+p^2}{2p}$

[B]  $\frac{2p}{1+p^2}$

[D]  $\frac{1+p^2}{1-p^2}$

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

$1-p^2, 2p, 1+p^2$   
 $\uparrow$   
 H





29. If  $\sqrt{13}\sin\theta = 2$ , then the value of  $\frac{3\tan\theta + \sqrt{13}\sin\theta}{\sqrt{13}\cos\theta - 3\tan\theta}$  is:

यदि  $\sqrt{13}\sin\theta = 2$ , है, तो  $\frac{3\tan\theta + \sqrt{13}\sin\theta}{\sqrt{13}\cos\theta - 3\tan\theta}$  का मान क्या होगा:

[A] 5

[B] 4

[C] 3

[D]  $\frac{1}{2}$



30. If  $\operatorname{cosec}\theta = b/a$ , then  $\frac{\sqrt{3}\cot\theta+1}{\tan\theta+\sqrt{3}}$  is equal to:

यदि  $\operatorname{cosec}\theta = b/a$  है, तो  $\frac{\sqrt{3}\cot\theta+1}{\tan\theta+\sqrt{3}}$  के बराबर है।

☒ [A]  $\frac{\sqrt{b^2-a^2}}{a}$

[B]  $\frac{\sqrt{b^2+a^2}}{a}$

[C]  $\frac{\sqrt{a^2+b^2}}{b}$

[D]  $\frac{\sqrt{b^2-a^2}}{b}$

$$\operatorname{cosec}\theta = \frac{b}{a} \rightarrow \begin{matrix} H \\ a \rightarrow P \end{matrix}$$

$$B = \sqrt{b^2 - a^2}$$

$$\begin{aligned} & \frac{\sqrt{3}\cot\theta+1}{\frac{1}{\tan\theta}+\sqrt{3}} \\ &= \frac{\sqrt{3}\cot\theta+1}{\frac{1+\sqrt{3}\cot\theta}{\tan\theta}} = \cot\theta = \frac{\sqrt{b^2-a^2}}{a} \end{aligned}$$

$$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \frac{a}{b} \times \frac{d}{c}$$

$$\frac{\frac{a}{b}}{c} = \frac{a}{b \times c}$$

$$\frac{a}{\left(\frac{b}{c}\right)} = \frac{a \times c}{b}$$





**31. If  $b \sin \theta = a$ , then  $\sec \theta + \tan \theta = ?$**   
**यदि  $b \sin \theta = a$  है, तो  $\sec \theta + \tan \theta = ?$**   
**(SSC CGL 2022 PRE)**

$$x^2 - y^2 = (x-y) \cdot (x+y)$$

$$\frac{x}{\sqrt{x}} = \sqrt{x}$$

☒ [A]  $\sqrt{\frac{b+a}{b-a}}$

[B]  $\sqrt{\frac{1}{b+a}}$

[C]  $\sqrt{\frac{1}{b-a}}$

[D]  $\sqrt{\frac{b-a}{b+a}}$

$$\sin \theta = \frac{a}{b} \rightarrow P$$

$$b \rightarrow H$$

$$B = \sqrt{b^2 - a^2}$$

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

$$= \frac{\cancel{b+a}}{\sqrt{(b-a) \cdot \cancel{(b+a)}}} = \frac{\sqrt{b+a}}{\sqrt{b-a}}$$



32. If  $\sec\theta = \frac{a}{b}, b \neq 0$ , then  $\frac{1-\tan^2\theta}{2-\sin^2\theta} = ?$

यदि  $\sec\theta = \frac{a}{b}, b \neq 0$  है, तो  $\frac{1-\tan^2\theta}{2-\sin^2\theta} = ?$

**(SSC CGL Mains 2021)**

[A]  $\frac{a^2(2b^2+a^2)}{b^2(a^2-b^2)}$

[B]  $\frac{a^2(2b^2+a^2)}{b^2(a^2+b^2)}$

[C]  $\frac{a^2(2b^2-a^2)}{b^2(a^2+b^2)}$

[D]  $\frac{a^2(2b^2-a^2)}{a^2(a^2+b^2)}$

$\sec\theta = \frac{a}{b} \rightarrow H$   
 $\qquad \qquad \qquad b \rightarrow B$

$P \rightarrow \sqrt{a^2-b^2}$

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

$b^2 - a^2 + b^2$





33. If  $\theta$  is an acute angle and  $\sin \theta = \frac{43}{47}$ , what is the value of  $\cos \theta$ ?

यदि  $\theta$  एक न्यूनकोण है और  $\sin \theta = \frac{43}{47}$ , तो  $\cos \theta$  का मान क्या है?

SSC CHSL 2023 PRE

[A]  $\frac{43}{6\sqrt{10}}$   
[C]  $\frac{6\sqrt{10}}{43}$

[B]  $\frac{47}{6\sqrt{10}}$   
[D]  $\frac{6\sqrt{10}}{47}$

$$= \sqrt{1 - \left(\frac{43}{47}\right)^2} = \sqrt{\frac{47^2 - 43^2}{47^2}} = \frac{\sqrt{4 \times 90}}{47} = \frac{6\sqrt{10}}{47}$$

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

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

$$\sqrt{6 \times 10}$$



34. If  $\cot\theta = \frac{9}{17}$ , find the value of  $\operatorname{cosec}2\theta$ .

यदि  $\cot\theta = \frac{9}{17}$ , तो  $\operatorname{cosec}^2\theta$  का मान ज्ञात कीजिए।

SSC CHSL 2023 PRE

$$= 1 + \cot^2\theta = 1 + \frac{81}{289} = 1\frac{81}{289}$$

[A]  $1\frac{9}{17}$   
 [C]  $1\frac{81}{289}$

[B]  $\frac{208}{289}$   
 [D]  $\frac{8}{17}$

$$5\frac{3}{7} = 5 + \frac{3}{7} = \frac{38}{7}$$



**35. If  $\sec\theta = 2\frac{4}{23}$ , find the value of  $\tan^2\theta$ .**

**यदि  $\sec\theta = 2\frac{4}{23}$ , तो  $\tan^2\theta$  का मान ज्ञात कीजिए।**

**SSC CHSL 2023 PRE**

$$= \sec^2\theta - 1 = \frac{2500}{529} - 1 = \frac{1971}{529}$$

[A]  $3\frac{177}{529}$  ✗

[C]  $1\frac{200}{529}$

[B]  $2\frac{16}{529}$

[D]  $3\frac{384}{529}$

$$\sec\theta = \frac{50}{23}$$



36. If  $\cos\theta = \frac{7}{3\sqrt{6}}$  and  $\theta$  is an acute angle, then the value of  $27\sin^2\theta - \frac{3}{2}$  is:

यदि  $\cos\theta = \frac{7}{3\sqrt{6}}$  है और  $\theta$  न्यून कोण है, तो  $27\sin^2\theta - \frac{3}{2}$  का मान ज्ञात करें।

[A] 12

[C] 1 ✓

[B] 15

[D] 9

$$27 \times \frac{5}{54} - \frac{3}{2} = 1$$

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

$$= 1 - \frac{49}{54}$$

$$= \frac{5}{54}$$

37. If  $\sin\phi = \frac{5}{6}$ , the value of  $\cot\phi \cdot \sin\phi \cdot \cos\phi$  is \_\_\_\_\_.

यदि  $\sin\phi = \frac{5}{6}$  तो  $\cot\phi \cdot \sin\phi \cdot \cos\phi$  का मान ..... है।

**SSC CHSL 2023 PRE**

[A]  $\frac{6}{5}$   
[C]  $\frac{5}{6}$

[B]  $\frac{25}{36}$   
[D]  $\frac{11}{36}$

$\sin\phi \rightarrow S$

$\cos\phi \rightarrow C$

$\tan\phi \rightarrow T$

$$\begin{aligned}
 &= \cancel{S} \times \cancel{S} \times C \\
 &= C^2 = 1 - S^2 \\
 &= 1 - \frac{25}{36}
 \end{aligned}$$



38. If  $\sin^2 \theta = \frac{3}{5}$  find the value of  $\frac{(1-\cos^2 \theta)}{(1+\tan^2 \theta)}$

यदि  $\sin^2 \theta = \frac{3}{5}$  है, तो  $\frac{(1-\cos^2 \theta)}{(1+\tan^2 \theta)}$  का मान ज्ञात कीजिए।

(SSC CHSL Mains 2025)

[A]  $\frac{6}{25}$

[B]  $\frac{2}{5}$

[C] 1

[D]  $\frac{5}{3}$

सिन् को. कोस  
 $\frac{3}{5} \times \frac{2}{5}$

$$\begin{aligned} C^2 &= 1 - S^2 \\ &= 1 - \frac{3}{5} \end{aligned}$$



39. If  $\operatorname{cosec} A = \frac{5}{3}$ , then find the value of  $\frac{9(1+\cot^2 A)}{80(1-\sec A)(1+\sec A)}$ .

यदि  $\operatorname{cosec} A = \frac{5}{3}$  है, तो  $\frac{9(1+\cot^2 A)}{80(1-\sec A)(1+\sec A)}$  का मान ज्ञात कीजिए।

**RRB NTPC GRADUATE LEVEL CBT-1 2025**

~~[A]  $\frac{5}{7}$~~   
~~[C]  $\frac{3}{7}$~~

[B]  $\frac{-7}{9}$  ✓  
[D]  $\frac{-5}{9}$  ✓

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

$$= \frac{25}{9} - 1 = \frac{16}{9}$$

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

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

$$\frac{9 \times \cot^2 A}{80 \times -\tan^2 A}$$

$$= \frac{-9}{80} \times \frac{16}{1} = -\frac{9}{5}$$



40. If  $\tan A = \frac{2}{5}$ , then find  $\frac{\sec^2 A}{\operatorname{cosec}^2 A}$ ?

यदि  $\tan A = \frac{2}{5}$ , तो  $\frac{\sec^2 A}{\operatorname{cosec}^2 A}$  ज्ञात कीजिए?

(CPO 2023)

[A]  $3/5$

[C]  $2/5$

$$= \left( \frac{\sec A}{\operatorname{cosec} A} \right)^2$$

$$= \tan^2 A$$

[B]  $4/25$  ✓

[D]  $9/25$



41. If  $5 \cos A = 4$ , Find the value of  $\frac{3\sqrt{\operatorname{cosec}^2 A - 1}}{4\sqrt{\sec^2 A - 1}}$

यदि  $5 \cos A = 4$  है, तो  $\frac{3\sqrt{\operatorname{cosec}^2 A - 1}}{4\sqrt{\sec^2 A - 1}}$  का मान ज्ञात कीजिए।

(RRB GROUP-D 2025)

[A] 1

[B]  $\frac{16}{9}$

[C]  $\frac{4}{3}$  ✓

[D]  $\frac{3}{4}$

$$\cos A = \frac{4}{5} \rightarrow B$$

$$3 \rightarrow P$$

$$3. \operatorname{cosec} A$$

$$4. \sec A$$

$$= \frac{3}{4} \times \operatorname{cosec} A = \frac{3}{4} \times \left(\frac{5}{4}\right)^2$$

42. If  $\cot\theta = \frac{15}{8}$ ,  $\theta$  is an acute angle, then find the value of  $\frac{(1-\cos\theta)(2+2\cos\theta)}{(2-2\sin\theta)(1+\sin\theta)}$ .

यदि  $\cot\theta = \frac{15}{8}$  है,  $\theta$  न्यून कोण है, तो  $\frac{(1-\cos\theta)(1+\cos\theta)}{(1-\sin\theta)(1+\sin\theta)}$  का मान ज्ञात करें।

[A]  $\frac{16}{15}$   
[C]  $\frac{225}{64}$

[B]  $\frac{64}{225}$   
[D]  $\frac{8}{15}$

$$\frac{5^2}{8^2} = \tan^2\theta = \left(\frac{8}{15}\right)^2$$



**43. If  $2\operatorname{cosec}A = 3\sec A$ , then find the value of  $\frac{(1-\cos A)(1+\cos A)}{(1-\sin A)(1+\sin A)}$ .**

यदि  $2\operatorname{cosec}A = 3\sec A$  है, तो  $\frac{(1-\cos A)(1+\cos A)}{(1-\sin A)(1+\sin A)}$  का मान ज्ञात कीजिए।

**RRB NTPC GRADUATE LEVEL CBT-1 2025**

[A]  $\frac{4}{\sqrt{13}}$   
[C]  $\frac{\sqrt{13}}{9}$

[B]  $\frac{4}{9}$  ✓  
[D]  $\frac{2}{3}$

$$\frac{S^2}{C^2} = \tan^2 A = \frac{4}{9}$$

$$\frac{2}{3} = \frac{\sec A}{\operatorname{cosec} A} = \tan A$$

If  $x = \frac{(1+\cos\theta)(2-2\cos\theta)}{(2+2\sin\theta)(1-\sin\theta)}$ , then the value of  $x + \frac{1}{x} + 2$  is:

यदि  $x = \frac{(1+\cos\theta)(2-2\cos\theta)}{(2+2\sin\theta)(1-\sin\theta)}$  है, तो  $x + \frac{1}{x} + 2$  का मान ज्ञात करें।

(RRB NTPC 12<sup>th</sup> LEVEL 2025)  $= \tan^2\theta + \cot^2\theta + 2$

[A]  $\cos^2\theta + \sec^2\theta$

[B]  $\operatorname{cosec}^2\theta + \sec^2\theta$

[C]  $\cot^2$

[D]  $\sec^2\theta + \sin^2\theta$

$$x = \frac{S^2}{C^2} = \tan^2\theta$$



44. If  $3 \tan A = 4$ , then find the value of  $\frac{(1-\sec A)(1+\sec A)}{(1-\operatorname{cosec} A)(1+\operatorname{cosec} A)}$ .

यदि  $3 \tan A = 4$  है तो  $\frac{(1-\sec A)(1+\sec A)}{(1-\operatorname{cosec} A)(1+\operatorname{cosec} A)}$  का मान ज्ञात करें।

[A]  $\frac{64}{9}$   
[C]  $\frac{80}{27}$

[B]  $\frac{256}{81}$   
[D]  $\frac{16}{9}$

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

$$= \frac{1 - \tan^2 A}{1 + \tan^2 A} = \left(\frac{4}{3}\right)^4$$

$$\frac{1 - \tan^2 A}{1 + \tan^2 A}$$

$$1 - \sec^2 A$$



45. If  $\operatorname{cosec} \theta = \frac{5}{3}$ , then evaluate  $(\sec^2 \theta - 1) \times \cot^2 \theta \times (1 + \cot^2 \theta)$ ?

यदि  $\operatorname{cosec} \theta = \frac{5}{3}$ , तो  $(\sec^2 \theta - 1) \times \cot^2 \theta \times (1 + \cot^2 \theta)$  मूल्यांकन करें

SSC CGL PRE 2024

$= 68 \text{CC} \text{ 9}$

[A] 25/16

[B] 9/16

[C] 25/9

[D] 4/5



46. If  $\cos A = \frac{\sqrt{10}}{\sqrt{15}}$ , then the value of  $\frac{\operatorname{cosec}^2 A + \tan^2 A}{\sin^2 A + \cot^2 A}$  is:

अगर  $\cos A = \frac{\sqrt{10}}{\sqrt{15}}$  है, तो  $\frac{\operatorname{cosec}^2 A + \tan^2 A}{\sin^2 A + \cot^2 A}$  का मान ज्ञात कीजिए।

[A]  $\frac{9}{4}$   
[C]  $\frac{3}{2}$

[B]  $\frac{4}{9}$   
[D]  $\frac{2}{3}$

$$\cos A = \sqrt{\frac{2}{3}}$$

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

$$= \frac{\cancel{\tan^2 A}}{\cancel{\tan^2 A}} \cdot \frac{1}{\cancel{\operatorname{cosec}^2 A}} = \sec^2 A = \left(\sqrt{\frac{3}{2}}\right)^2$$