

Example

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

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

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

$$(1+S) \cdot (1-S) = 1-S^2 = c^2$$



80. If $M = \sqrt{\frac{1+\cos A}{1-\cos A}} - \operatorname{cosec} A - \cot A$, and A is an acute angle, then value of M is.

यदि $M = \sqrt{\frac{1+\cos A}{1-\cos A}} - \operatorname{cosec} A - \cot A$ है और A एक न्यून कोण है, तो M का मान ज्ञात कीजिए।

SSC CHSL 2023 PRE (RRB NTPC 12th LEVEL 2025), (RRB NTPC 12th LEVEL 2025)

[A] 1

[B] -1

[C] 0 ✓

[D] 2

$$\begin{aligned}\sqrt{\frac{1+\cos A}{1-\cos A}} &= \sqrt{\frac{1+\cos A}{1-\cos A} \times \frac{1+\cos A}{1+\cos A}} = \frac{1+\cos A}{S} \\ &= \frac{1}{S} + \frac{\cos A}{S} \\ &= \operatorname{cosec} A + \cot A\end{aligned}$$

81. What is $(\sec \theta - \tan \theta) - \sqrt{\frac{1-\sin \theta}{1+\sin \theta}}$ equal to?

$(\sec \theta - \tan \theta) - \sqrt{\frac{1-\sin \theta}{1+\sin \theta}}$ किसके बराबर है?

(UPSC CDS - II 2025)

[A] 0

[B] $2\tan \theta$

[C] $2\sec \theta$

[D] $\sin \theta + \cos \theta$

82. Find the value of $\frac{\sqrt{1+\sin 4\theta}}{\sqrt{1-\sin 4\theta}}$.

$\frac{\sqrt{1+\sin 4\theta}}{\sqrt{1-\sin 4\theta}}$ का मान ज्ञात कीजिए।

[RRB GROUP – D 2026]

[A] $\tan 4\theta + \cot 4\theta$

[B] $-\sec 4\theta + \tan 4\theta$

[C] $\sec 4\theta + \tan 4\theta$

[D] $\sec 4\theta - \tan 4\theta$

$$\sqrt{\frac{1+\sin 4\theta}{1-\sin 4\theta}}$$

83. Find the value of $\sqrt{\frac{\tan\theta + \sin\theta}{\tan\theta - \sin\theta}} - \operatorname{cosec}\theta$.

$\sqrt{\frac{\tan\theta + \sin\theta}{\tan\theta - \sin\theta}} - \operatorname{cosec}\theta$ का मान ज्ञात कीजिए।

RRB GROUP-D 2026

[A] $\operatorname{cosec}\theta - \cot\theta$

[B] $\operatorname{cosec}\theta + \cot\theta$

[C] $\operatorname{cosec}\theta$

[D] $\cot\theta$

$$\begin{aligned} \sqrt{\frac{\cancel{\frac{\sin\theta}{\cos\theta}} + \sin\theta}{\cancel{\frac{\sin\theta}{\cos\theta}} - \sin\theta}} &= \sqrt{\frac{1 + \cos\theta}{1 - \cos\theta}} = \sqrt{\frac{1 + \cos\theta}{1 - \cos\theta} \times \frac{1 + \cos\theta}{1 + \cos\theta}} \\ &= \frac{1 + \cos\theta}{\sin\theta} \\ &= \operatorname{cosec}\theta + \cot\theta \end{aligned}$$

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

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

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

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

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



84. If $(1 + \tan^2\theta) + (1 + (\tan^2\theta)^{-1}) = k$, then $\sqrt{k} = ?$
 यदि $(1 + \tan^2\theta) + (1 + (\tan^2\theta)^{-1}) = k$ है, तो $\sqrt{k} = ?$

SSC CGL 2020 PRE

[A] cosec θ sec θ

[B] cosec θ cos θ

[C] sin θ cos θ

[D] sin θ sec θ

$$\sec^2\theta + \sec^2\theta = k$$

$$\sqrt{\sec^2\theta \cdot \sec^2\theta} = \sqrt{k}$$

$$a^{-1} = \frac{1}{a}$$

85. **Simplify:**/निम्न को सरल कीजिए:

$$(1 + \cot^2 A) + \left(1 + \frac{1}{\cot^2 A}\right)$$

(RRB NTPC 12th LEVEL 2025)

[A] $\tan^2 A$

[B] $\cot^2 A$

[C] $\sin^2 A \cos^2 A$

[D] $\operatorname{cosec}^2 A \sec^2 A$

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

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

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



86. Find the value of $\frac{\cos^6 \theta + \sin^6 \theta + 3 \sin^2 \theta \cos^2 \theta}{\operatorname{cosec} \theta \sec \theta \{(\sin \theta + \cos \theta)^2 - 1\}}$
 $\frac{\cos^6 \theta + \sin^6 \theta + 3 \sin^2 \theta \cos^2 \theta}{\operatorname{cosec} \theta \sec \theta \{(\sin \theta + \cos \theta)^2 - 1\}}$ का मान ज्ञात कीजिए:

RRB NTPC UG LEVEL 2024

[A] $\frac{1}{3}$

[C] $-\frac{1}{2}$

[B] $\frac{1}{4}$

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

~~$\operatorname{cosec} \theta \cdot \sec \theta \times 2 \sin \theta \cos \theta$~~

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

$$(\cos^2 \theta + \sin^2 \theta)^3 = 1$$

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

$\frac{1+\cos\theta-\sin^2\theta}{\sin\theta(1+\cos\theta)} \times \frac{\sqrt{\sec^2\theta \times \operatorname{cosec}^2\theta}}{\tan\theta+\cot\theta} = ?$, $0^\circ < \theta < 90^\circ$, बराबर है:

SSC CGL 2021, 2022, 2023 PRE

[A] $\tan\theta$

[B] $\sec\theta$

[C] $\operatorname{cosec}\theta$

[D] $\cot\theta$

$$\begin{aligned} & \frac{C+C^2}{S(1+C)} \times 1 \\ &= \frac{C(1+C)}{S(1+C)} = \cot\theta \end{aligned}$$

$$\tan\theta + \cot\theta = \frac{1}{\sin\theta.\cos\theta} = \sec\theta.\operatorname{cosec}\theta$$



89. The value of $\frac{\sec\theta \operatorname{cosec}\theta}{2+\tan^2\theta+\cot^2\theta}$ is equal to:

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

$\frac{\sec\theta \cdot \operatorname{cosec}\theta}{2+\tan^2\theta+\cot^2\theta}$ का मान ज्ञात करें।

SSC CGL 2025 PRE

[A] $\sec\theta \operatorname{cosec}\theta$

[B] $\sec\theta \sin\theta$

[C] $\sin\theta \cos\theta$

[D] $\cos\theta \operatorname{cosec}\theta$

$$(\tan\theta + \cot\theta)^2 = \tan^2\theta + \cot^2\theta + 2 = \sec^2\theta + \operatorname{cosec}^2\theta = \sec\theta \cdot \operatorname{cosec}\theta$$

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

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



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

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

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

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

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



90. If $\frac{(\sin\theta - \operatorname{cosec}\theta)(\cos\theta - \sec\theta)}{\tan^2\theta - \sin^2\theta} = r^3$, then $r = ?$

यदि $\frac{(\sin\theta - \operatorname{cosec}\theta)(\cos\theta - \sec\theta)}{\tan^2\theta \times \sin^2\theta} = r^3$ है तो r बराबर है:

RRB NTPC GRADUATE LEVEL CBT-1 2025

[A] $\sin\theta\cos\theta$

[B] $\tan\theta$

[C] $\cot\theta$

[D] $\operatorname{cosec}\theta\sec\theta$

$$S - \frac{1}{S} = \frac{S^2 - 1}{S}$$

$$= \frac{1}{\cancel{S}^2}$$

$$\cancel{C} - \frac{1}{\cancel{C}} = \frac{1}{\cancel{C}^2}$$

$$\frac{\frac{\cancel{O}^2}{\cancel{S}^2} \times \frac{\cancel{S}^2}{\cancel{C}^2}}{\cancel{T}^2 \times \cancel{S}^2}$$

$$\frac{\cancel{O}^2 \cdot \cancel{O}^2}{\cancel{O}^3} = r^3$$

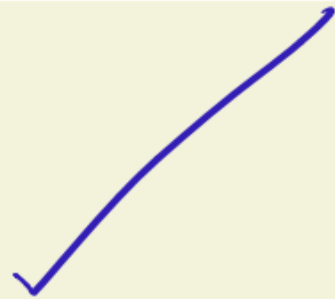
91. Find the value of $(\sec A - \operatorname{cosec} A) - \frac{1}{\sec A + \tan A} + \frac{1}{\operatorname{cosec} A - \cot A}$?
 $(\sec A - \operatorname{cosec} A) - \frac{1}{\sec A + \tan A} + \frac{1}{\operatorname{cosec} A - \cot A}$ का मान ज्ञात कीजिये ?

[A] $\sec A \operatorname{cosec} A$

[B] $\sin A \cos A$

[C] $\tan A \sec A$

[D] $\tan A$



92. Simplify: $(\sec\theta - \frac{1}{\sec\theta}) \times (\operatorname{cosec}\theta - \frac{1}{\operatorname{cosec}\theta}) \times (\sin\theta - \frac{1}{\sin\theta})$

$(\sec\theta - \frac{1}{\sec\theta}) \times (\operatorname{cosec}\theta - \frac{1}{\operatorname{cosec}\theta}) \times (\sin\theta - \frac{1}{\sin\theta})$ को सरल कीजिए।

RRB NTPC GRADUATE LEVEL 2025 CBT-1

[A] ~~$\cos^3\theta$~~

[B] $-\sin^3\theta$

$\sin^2\theta - 1$

[C] ~~$\sin^3\theta$~~

[D] $-\cos^3\theta$

$$\frac{\cancel{\sin\theta}}{\cancel{\sec\theta}} \times \frac{\cancel{\cos\theta}}{\cancel{\operatorname{cosec}\theta}} \times \frac{-\cancel{\cos\theta}}{\cancel{\sin\theta}} = -\cos^3\theta$$

93. **Solve the following:** / निम्नलिखित को हल कीजिए:

$$(\operatorname{cosec} 23^\circ - \sin 23^\circ)(\tan 23^\circ + \cot 23^\circ)(\sec 23^\circ - \cos 23^\circ)$$

(RRB NTPC 12th LEVEL 2025)

[A] **1** $\frac{1}{S} \rightarrow S$

[C] 0

[B] $\tan 23^\circ$

[D] $\sin 23^\circ$

$\frac{1}{C} \rightarrow C$

$$\frac{\cancel{C^2}}{\cancel{S}} \times \frac{1}{\cancel{SC}} \times \frac{\cancel{S^2}}{\cancel{C}} = 1$$

94. If $\cot\theta = 3\sqrt{7} + 8$, then $\operatorname{cosec}\theta \sec\theta = ?$

यदि $\cot\theta = 3\sqrt{7} + 8$ है, तो $\operatorname{cosec}\theta \cdot \sec\theta$ का मान ज्ञात करें।

[A] 16

[C] NONE

[B] $6\sqrt{7}$

[D] 1

$$\frac{1}{8+3\sqrt{7}} \times \frac{8-3\sqrt{7}}{8-3\sqrt{7}}$$

$$64 - 63 = 1$$

$$\rightarrow \sec\theta + \operatorname{cosec}\theta$$

$$= \frac{1}{(8+3\sqrt{7})} + (8+3\sqrt{7})$$

$$= (8-3\sqrt{7}) + (8+3\sqrt{7})$$

$$= 16$$



95. If $\sin A + \cos A = \frac{5}{4}$, find $\sin 2A$

यदि $(\sin A + \cos A)^2 = \left(\frac{5}{4}\right)^2$ तो $\sin 2A$ का मान ज्ञात कीजिए।

SSC CHSL 2025 PRE

[A] $\frac{1}{4}$

[C] $\frac{7}{8}$

[B] $\frac{5}{18}$

☒ [D] $\frac{9}{16}$

$$1 + \sin 2A = \frac{25}{16}$$

$$\begin{aligned} \sin 2A &= \frac{25}{16} - 1 \\ &= \frac{9}{16} \end{aligned}$$

96. If $\sin A - \cos A = \frac{1}{3}$ and $A \in (0, \pi/2)$, then what is $\sin 2A$?

यदि $(\sin A - \cos A) = \left(\frac{1}{3}\right)^2$ तथा $A \in (0, \pi/2)$ है, तो $\sin 2A$ क्या है?

SSC CGL 2025 PRE

[A] $\frac{2}{3}$

[B] $\frac{4}{9}$

[C] $\frac{8}{9}$

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

$$1 - \sin A = \frac{1}{9}$$

$$\frac{8}{9} = \sin A$$

$$\sin^4 \theta + \cos^4 \theta = 1 - 2\sin^2 \theta \cdot \cos^2 \theta$$

$$\sin^6 \theta + \cos^6 \theta = 1 - 3\sin^2 \theta \cdot \cos^2 \theta$$

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97. If $\sin\theta + \cos\theta = \frac{5}{4}$, and θ is acute, what is the value of $\sin^4\theta + \cos^4\theta$?

यदि $(\sin\theta + \cos\theta)^2 = \left(\frac{5}{4}\right)^2$ तथा θ न्यून कोण है, तो $\sin^4\theta + \cos^4\theta$ का मान क्या है?

SSC CHSL 2025 PRE, RRB GROUP-D 2026

[A] ~~225/16~~

[B] 431/512

[C] ~~677/1024~~

[D] 239/512

$$= 1 - 2\left(\frac{5}{4}\right)^2$$

$$= 1 - 2 \times \frac{81}{1024}$$

$$= \frac{431}{512}$$

$$1 + 2SC = \frac{25}{16}$$

$$2SC = \frac{9}{16}$$

$$SC = \frac{9}{32}$$

98. If $\sin^6 \theta + \cos^6 \theta = \frac{1}{3}$, $0^\circ < \theta < 90^\circ$, then what is the value of $\sin \theta \cos \theta$?

यदि $\sin^6 \theta + \cos^6 \theta = \frac{1}{3}$, $0^\circ < \theta < 90^\circ$ है, तो $\sin \theta \cos \theta$ का मान ज्ञात करें।

SSC CHSL 2023 PRE

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

[C] $\frac{\sqrt{2}}{\sqrt{3}}$

[B] $\frac{\sqrt{2}}{3}$

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

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

$$1 - 3(\sin \theta \cos \theta)^2 = \frac{1}{3}$$

$$\frac{2}{3} = 3(\sin \theta \cos \theta)^2$$

$$\frac{2}{9} = (\sin \theta \cos \theta)^2$$

#



99. If $\tan \theta + \cot \theta = 13$, then find the value of $8\tan^2 \theta + 8\cot^2 \theta$.

यदि $(\tan \theta + \cot \theta) = 13$ है, तो $8\tan^2 \theta + 8\cot^2 \theta$ का मान ज्ञात कीजिए।

(RRB TECHNICIAN GRADE-3 2024) $= 8 \cdot (\tan^2 \theta + \cot^2 \theta)$

[A] 1336

[B] 169

[C] 167

[D] 1372

$= 8 \times 167$

$$\tan^2 \theta + \cot^2 \theta + 2 = 169$$

100. If $\sec^2 A + \operatorname{cosec}^2 A = 13$, and A is an acute angle, then find the value of $\tan^2 A + \cot^2 A$

यदि $\sec^2 A + \operatorname{cosec}^2 A = 13$ है, तथा A एक न्यून कोण है, तो $\tan^2 A + \cot^2 A$ का मान ज्ञात कीजिए।

(RRB GROUP-D 2025)

[A] 9

[B] 11

[C] 15

[D] 12

$$1 + \tan^2 A + 1 + \cot^2 A = 13$$

101. If $\sec x + \cos x = 3$, then $\tan^2 x - \sin^2 x = ?$

यदि $(\sec x + \cos x)^2 = 3^2$, तो $\tan^2 x - \sin^2 x = ?$

[A] 5

[B] 13

[C] 9

[D] 4

$$\sec^2 x + 2\sec x + \cos^2 x = 9$$

$$1 + \tan^2 x + 1 - \sin^2 x + 2 = 9$$

102. A light beam reflects such that $\tan A + \cot A = 5$ and A is an acute angle. Find the value of $\tan^3 A + \cot^3 A$.

एक प्रकाश किरण इस प्रकार परावर्तित होती है कि $\tan A + \cot A = 5$ यदि A एक न्यून कोण है। तो $\tan^3 A + \cot^3 A$ का मान ज्ञात कीजिए।

SSC CHSL 2025 PRE (RRB GROUP-D 2025)

[A] 125

[B] 85

[C] 110

[D] 115

$$\tan A + \frac{1}{\tan A} = 5$$

$$\tan^3 A + \frac{1}{\tan^3 A} = 5^3 - 3 \times 5 = 110$$

$$\text{If, } x + \frac{1}{x} = k$$

$$\text{तो } x^2 + \frac{1}{x^2} = k^2 - 2$$

$$\& x^3 + \frac{1}{x^3} = k^3 - 3k$$

103. If $\sin\theta + \operatorname{cosec}\theta = \sqrt{5}$, then find the value of $\sin^3\theta + \operatorname{cosec}^3\theta$.

यदि $\sin\theta + \operatorname{cosec}\theta = \sqrt{5}$ है, तो $\sin^3\theta + \operatorname{cosec}^3\theta$ का मान ज्ञात कीजिए।

(RRB GROUP-D 2025)

[A] 0

[C] $\frac{1}{\sqrt{5}}$

[B] $2\sqrt{3}$

~~[D] $2\sqrt{5}$~~

$$\sin\theta + \frac{1}{\sin\theta} = \sqrt{5}$$

$$\begin{aligned} \sin^3\theta + \frac{1}{\sin^3\theta} &= \sqrt{5}^3 - 3\sqrt{5} \\ &= 5\sqrt{5} - 3\sqrt{5} \end{aligned}$$

$$\sqrt{5}^3 = 5\sqrt{5}$$

104. If $\sin A + \cos A = \frac{4}{3}$, then find $\sin^3 A + \cos^3 A$.

यदि $(\sin A + \cos A) = \left(\frac{4}{3}\right)$, तो $\sin^3 A + \cos^3 A$ ज्ञात कीजिए।

[A] $\frac{22}{27}$
[C] $\frac{16}{9}$

[B] $\frac{21}{27}$
[D] $\frac{25}{27}$

$$1 + 2SC = \frac{16}{9}$$

$$SC = \frac{7}{18}$$

$$a^3 + b^3 = (a+b) \cdot [a^2 + b^2 - ab]$$

$$(S+C) \cdot (1-SC)$$

$$= \frac{4}{3} \times \left(1 - \frac{7}{18}\right)$$

$$= \frac{4}{3} \times \frac{11}{18}$$

$$= \frac{22}{27}$$



105. **Simplify:**/सरल कीजिए।

$$\frac{(\tan A - \cot B)}{(\tan B - \cot A)}$$

$$(\tan B - \cot A)$$

(RRB NTPC 12th LEVEL 2025)

☒ [A] $\tan A \cot B$

[B] $\tan B \cot A$

[C] $\sin B \cos A$

[D] $\sin A \cos B$

$$\frac{\tan A - \cot B}{\cot B - \tan A}$$

$$= \tan A \cdot \cot B$$