

102. 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] $\frac{1}{3}$

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

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

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

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

$$(S+C)^2 = 1 + 2SC$$

$$\frac{1}{\cancel{\cos\theta} \cdot \cancel{\sec\theta} \times \cancel{2} \cancel{\sin\theta} \cdot \cancel{\cos\theta}} = \frac{1}{2}$$

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

$C+C^2$

SSC CGL 2021, 2022, 2023 PRE

[A] $\tan\theta$

[B] $\sec\theta$

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

☒ [D] $\cot\theta$

$$\frac{\cancel{C \cdot (1+C)}}{\cancel{S \cdot (1+C)}} \times \frac{\cancel{\sec \cdot \operatorname{cosec}}}{\cancel{\tan + \cot}} = \cot\theta$$

104. If $0^\circ < \theta < 90^\circ$, $\sqrt{\frac{\sec^2 \theta + \operatorname{cosec}^2 \theta}{\tan^2 \theta - \sin^2 \theta}}$ is equal to:

यदि $0^\circ < \theta < 90^\circ$ है, तो $\sqrt{\frac{\sec^2 \theta + \operatorname{cosec}^2 \theta}{\tan^2 \theta - \sin^2 \theta}}$ का मान ज्ञात करें।

SSC CGL 2022 PRE

[A] $\sec^3 \theta$

[B] $\sin^2 \theta$

✓ [C] $\operatorname{cosec}^3 \theta$

[D] $\sec^2 \theta$

$$\frac{\cancel{\sec \theta} \cdot \cancel{\operatorname{cosec} \theta}}{\frac{\cancel{\sec \theta}}{\cancel{\operatorname{cosec} \theta}} \cdot \sin \theta} = \cancel{\sec \theta} \cdot \cancel{\operatorname{cosec} \theta}$$

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

= $\frac{1}{\sec\theta \cdot \operatorname{cosec}\theta} \frac{\sec\theta \cdot \operatorname{cosec}\theta}{2+\tan^2\theta +\cot^2\theta}$ 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] $\cos\theta \operatorname{cosec}\theta$

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

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$$\cot\theta + \tan\theta = \frac{1}{\sin\theta \cdot \cos\theta} = \sec\theta \cdot \sec\theta = 2\sec^2\theta$$

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

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

$$\tan 45^\circ + \cot 45^\circ = 2\sec^2 45^\circ = 2\sqrt{2} \checkmark$$

$$\frac{1 \times 2}{2\sin\theta \cdot \cos\theta}$$

$$\frac{2}{\sin 2\theta}$$

$$= 2\sec 2\theta$$



$$\cot \theta - \tan \theta = 2 \cot 2\theta$$

$$= \frac{\frac{C}{S} - \frac{S}{C}}{2SC}$$

$$= \frac{2 \cos 2\theta}{\sin 2\theta}$$

$$= 2 \cot 2\theta$$



106. What will be the value of $\cos x \operatorname{cosec} x - \sin x \sec x$?

$\cos x \operatorname{cosec} x - \sin x \sec x$ का मान क्या होगा?

SSC CGL 2024 PRE

[A] $\cot \frac{2x}{2}$

[B] $\tan 2x$

[C] $\cot 2x$

[D] $2\cot 2x$

$$\frac{C}{S} - \frac{S}{C}$$

$\cot x - \tan x$



107. Simplify: $\left(\sec\theta - \frac{1}{\sec\theta}\right) \times \left(\operatorname{cosec}\theta - \frac{1}{\operatorname{cosec}\theta}\right) \times \left(\sin\theta - \frac{1}{\sin\theta}\right)$.
 $\left(\sec\theta - \frac{1}{\sec\theta}\right) \times \left(\operatorname{cosec}\theta - \frac{1}{\operatorname{cosec}\theta}\right) \times \left(\sin\theta - \frac{1}{\sin\theta}\right)$ को सरल कीजिए

RRB NTPC GRADUATE LEVEL 2025 CBT-1

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

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

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

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

$$\frac{s^2 - 1}{s}$$

~~$$\frac{\tan^2\theta}{\sec\theta} \times \frac{\cot^2\theta}{\operatorname{cosec}\theta} \times \frac{1}{\sin\theta}$$~~

$$= -c^3$$

108. **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

[B] $\tan 23^\circ$

[C] 0

[D] $\sin 23^\circ$

$$\frac{1}{S} - S$$

$$\frac{1}{C} - C$$

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

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

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

RRB NTPC UG LEVEL 2024

[A] $\operatorname{cosec}^2 \theta + \cot^2 \theta$

[B] $\sec^2 \theta - \tan^2 \theta$

[C] $\cos^2 \theta - \cot^2 \theta$

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

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

$$= -(1+\cos \theta)$$

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

110. Which of the following is/are identity/identities?
निम्नलिखित में से कौन सी सर्वसमिका/सर्वसमिकाएँ है/हैं?

- I. $\frac{\sin^3 \theta + \cos^3 \theta}{\sin \theta + \cos \theta} + \sin \theta \cos \theta = 1; 0 < \theta < \frac{\pi}{2}$
- II. $1 - \sin^6 \theta = \cos^2 \theta (\cos^4 \theta + 3 \sin^2 \theta)$

Select the correct answer using the code given below:-
नीचे दिए गए कोड का उपयोग करके सही उत्तर चुनें:-

(CDS 2023)

[A] I only

[B] II only

[C] Both I and II

[D] Neither I nor II

$$\sin \theta = \frac{P}{H}$$

$$\cos \theta = \frac{B}{H}$$

$$P, B < H$$

$$-1 \leq \sin \theta, \cos \theta \leq 1$$



111. If $3(\sin^2\theta + \operatorname{cosec}^2\theta) = 10$, then the value of $\cot^6\theta + \operatorname{cosec}^6\theta$ is:

यदि $3(\sin^2\theta + \operatorname{cosec}^2\theta) = 10$ है, तो $\cot^6\theta + \operatorname{cosec}^6\theta$ का मान कितना होगा?

RRB NTPC GRADUATE LEVEL CBT-1 2025

[A] 35

[B] 43

[C] 28

[D] 37

$$(\cot^2\theta)^3 + (\operatorname{cosec}^2\theta)^3$$

$$2^3 + 3^3 = 35$$

$$\sin^2\theta + \frac{1}{\sin^2\theta} = \left(\frac{1}{3}\right) + \left(\frac{1}{3}\right)$$

$$\therefore \operatorname{cosec}^2\theta = \frac{2}{3}$$

$$\sin^2\theta = \frac{1}{3}$$

$$\cot^2\theta = 2 \text{ \& } \operatorname{cosec}^2\theta = 3$$

$$x = \left(\frac{1}{x}\right)$$

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

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

[A] 16

[C] NONE

[B] $6\sqrt{7}$

[D] 1

$= \cancel{1000} + 610$

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

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

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

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

113. If $\tan A = \sqrt{2} - 1$, then find $\sin A \cos A + \tan A$?

यदि $\tan A = \sqrt{2} - 1$, तो $\sin A \cos A + \tan A$ ज्ञात कीजिए?

SSC CHSL PRE 2024

[A] $\frac{24\sqrt{2}+15}{4}$

[C] $\frac{24\sqrt{2}-15}{4}$

[B] $\frac{5\sqrt{2}-4}{4} = \frac{5\sqrt{2}}{4} - 1$

[D] $\frac{5\sqrt{2}+4}{4}$

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

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

$$2\sqrt{2} = \frac{1}{\sin A \cos A} \Rightarrow \sin A \cos A = \frac{1}{2\sqrt{2}}$$



114. If $\cot A = 7$, then find $\frac{5 \cos A + 4 \sin A}{\cos^3 A + 7 \sin^3 A + 6 \sin A}$?

यदि $\cot A = 7$, तो $\frac{5 \cos A + 4 \sin A / \sin A}{\cos^3 A + 7 \sin^3 A + 6 \sin A / \sin A}$ ज्ञात कीजिए?

SSC CHSL PRE 2024

[A] 3

[C] 1

[B] 2

[D] 0

$$\frac{\cos A}{\sin A} = 7$$

$$\frac{5 \overset{\times 7}{\cos A} + 4}{7 \cos^3 A + 7 \sin^3 A + 6}$$

$$\frac{39}{7+6}$$

$$\frac{39}{7+6} = 3$$

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

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

$$5^2 = (-5)^2 = 25$$



115. If $\sin A + \cos A = \frac{5}{4}$, then the value of $\sin 2A$ is found.
यदि $(\sin A + \cos A) = \frac{5}{4}$, तो $\sin 2A$ का मान ज्ञात कीजिए।

SSC CHSL 2025 PRE

[A] $\frac{1}{4}$
 [C] $\frac{7}{8}$

[B] $\frac{5}{18}$
 [D] $\frac{9}{16}$

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

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

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

SSC CGL 2025 PRE

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

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

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

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

$$1 - \sin 2A = \frac{1}{9}$$

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

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

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117. The given expression is equal to: $\frac{\sin^4 A + \cos^4 A}{1 - 2\sin^2 A \cos^2 A}$

दिया गया व्यंजक $\frac{\sin^4 A + \cos^4 A}{1 - 2\sin^2 A \cos^2 A}$ _____ के बराबर है।

SSC CHSL 2023 PRE

[A] 0

[C] 1 ✓

[B] 2

[D] -1

118. If $\sin\theta + \cos\theta = \frac{5}{4}$, and θ is acute, what is the value of $\sin^4\theta + \cos^4\theta$?
 यदि $(\sin\theta + \cos\theta) = \frac{5}{4}$ तथा θ न्यून कोण है, तो $\sin^4\theta + \cos^4\theta$ का मान क्या है?

SSC CHSL 2025 PRE

[A] 225/16

[C] 677/85

[B] 431/512

[D] 239/18

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

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

$$= \frac{512 - 81}{512}$$

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

$$2\sin\theta \cos\theta = \frac{9}{16}$$

$$\sin\theta \cos\theta = \frac{9}{32}$$

119. 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] $\frac{2}{2}$

$= \sqrt{\frac{2}{9}}$

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

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

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

120. If $\sin 2\theta = \frac{2}{5}$ then what is $\sin^6\theta + \sin^4\theta + \cos^6\theta + \cos^4\theta$ equal to?

यदि $\sin 2\theta = \frac{2}{5}$ है, तो $\sin^6\theta + \sin^4\theta + \cos^6\theta + \cos^4\theta$ किसके बराबर है?

[A] 1.8

[B] 1.6

[C] 1.4

[D] 1.2

$$\cancel{2SC} = \cancel{\frac{2}{5}}$$

$$S.C = \frac{1}{5}$$

$$= 1 - 3SC^2 + 1 - 2SC^2$$

$$= 2 - 5(S.C)^2$$

$$= 2 - 5 \times \frac{1}{5}$$

$$= \frac{9}{5} = 1.8$$



121. 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

- | | |
|---------------------|---------------------|
| [A] 1336 | [B] 169 |
| [C] 167 | [D] 1372 |

यदि, $x + \frac{1}{x} = k$

तो $x^2 + \frac{1}{x^2} = k^2 - 2$

तो $x^3 + \frac{1}{x^3} = k^3 - 3k$

$$T + \frac{1}{T} = 13$$

$$8 \cdot \left(T^2 + \frac{1}{T^2} \right) = 8 \times (13^2 - 2)$$

$$= 8 \times 167$$

122. 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

[C] 15

☒ [B] 11

[D] 12

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

123. If $\cos x + \sec x = \frac{7}{2\sqrt{3}}$, then the value of $\cos^2 x + \sec^2 x$ will be ____.

यदि $\cos x + \sec x = \frac{7}{2\sqrt{3}}$, तो $\cos^2 x + \sec^2 x$ का मान ज्ञात कीजिए।

SSC CGL 2023 PRE

[A] 15/12

[B] 10/12

[C] 25/10

[D] 25/12 ✓

$$C^2 + \frac{1}{C^2} = \frac{49}{12} - 2 = \frac{25}{12}$$

$$C + \frac{1}{C} = \frac{7}{2\sqrt{3}}$$

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

यदि $(\sec x + \cos x)^2 = 3^2$, तो $\tan^2 x - \sin^2 x = ?$ 9-4

[A] 5

[B] 13

[C] 9

[D] 4

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



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

125. If $\sin\theta + \operatorname{cosec}\theta = k$, then what is the value of $\cos^2\theta - \cot^2\theta$?

यदि $(\sin\theta + \operatorname{cosec}\theta)^2 = k^2$ है तो $\cos^2\theta - \cot^2\theta$ का मान क्या है?

[A] $3 - k^2$

[B] $4 - k^2$

[C] $k^2 - 4$

[D] $k^2 + 2$

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

$$\downarrow \quad \downarrow$$

$$1 - \cos^2\theta + 1 + \cot^2\theta + 2 = k^2$$

$$4 - k^2 = \cos^2\theta - \cot^2\theta$$

126. 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

☒ [A] 125

[B] 85

[C] 110

[D] 115

$$T + \frac{1}{T} = 5$$

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

127. If $\sin\theta + \operatorname{cosec}\theta = 7$, then what is the value of $\sin^3\theta + \operatorname{cosec}^3\theta$?
यदि $\sin\theta + \operatorname{cosec}\theta = 7$ है, तो $\sin^3\theta + \operatorname{cosec}^3\theta$ का मान ज्ञात कीजिए।

SSC CGL 2021 PRE

[A] 350

[B] 382

[C] 322

[D] 367

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

$$S^3 + \frac{1}{S^3} = 7^3 - 3 \times 7 = 343 - 21 = 322$$

128. If $\cos \theta + \sec \theta = \sqrt{3}$, then the value of $\cos^3 \theta + \sec^3 \theta$ is:
 यदि $\cos \theta + \sec \theta = \sqrt{3}$, तो $\cos^3 \theta + \sec^3 \theta$ का मान ज्ञात कीजिए।

SSC CHSL 2023 PRE

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

[B] $2\sqrt{3}$

[C] 0 ✓

[D] $\sqrt{3}$

$$C + \frac{1}{C} = \sqrt{3}$$

$$C^3 + \frac{1}{C^3} = \sqrt{3}^3 - 3 \times \sqrt{3} = 0$$

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

यदि $(\sin A + \cos A)^2 = \left(\frac{4}{3}\right)^2$ तो $\sin^3 A + \cos^3 A$ ज्ञात कीजिए।

[A] $\frac{22}{27}$

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

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

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

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

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

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

$$S^3 + C^3 = (S+C) \cdot (1-SC)$$

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

$$= \frac{4}{3} \times \frac{11}{18} = \frac{22}{27}$$