



SSC CHSL 2023



EXAM DAY

मैराथन

4 घंटे लगातार

**ALL
SUBJECTS**



पूरे दिन का **संपूर्ण विश्लेषण** एवं आधारित प्रश्नों की चर्चा

2 अगस्त से 21 अगस्त रोज़ शाम 6 बजे से 10 बजे तक

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If $\tan \theta = \frac{a}{b}$, find the value of $\frac{a \sin \theta - b \cos \theta}{a \sin \theta + b \cos \theta}$ = $\frac{a^2 - b^2}{a^2 + b^2}$
यदि $\tan \theta = \frac{a}{b}$, तो $\frac{a \sin \theta - b \cos \theta}{a \sin \theta + b \cos \theta}$ ज्ञात कीजिए।

$$\tan \theta = \frac{a}{b}$$

$$\sin \theta : \cos \theta = a : b$$

a. $\frac{a^2 + b^2}{a^2 - b^2}$

b. $\frac{a^2 - b^2}{a^2 + b^2}$ ✓

c. $a^2 b^2$

d. $b^2 - a^2$



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If $\cot\theta = 2$, find the value of $\frac{5 \sin \theta - 2 \cos \theta}{5 \sin \theta + 2 \cos \theta}$.

यदि $\cot\theta = 2$, तो $\frac{5 \sin \theta - 2 \cos \theta}{5 \sin \theta + 2 \cos \theta}$ ज्ञात कीजिए।

a. $1/9$

b. $1/8$

c. 1

d. 0

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

$$\frac{5 \times 1 - 2 \times 2}{5 \times 1 + 2 \times 2} = \left(\frac{1}{9}\right) \text{ Ans}$$



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If $\tan 9^\circ = \frac{a}{b}$, find the value of $\frac{\sec^2 81^\circ}{1 + \cot^2 81^\circ}$.

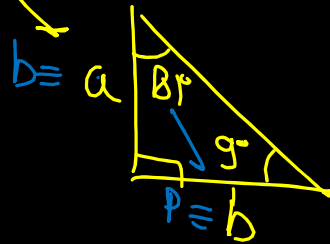
यदि $\tan 9^\circ = \frac{a}{b}$, तो $\frac{\sec^2 81^\circ}{1 + \cot^2 81^\circ}$ ज्ञात कीजिए।

a. $\frac{a}{b}$

b. $\frac{b}{a}$

c. $\frac{b^2}{a^2}$

d. $\frac{a^2}{b^2}$



$$\frac{\sec^2 81^\circ}{\operatorname{cosec}^2 81^\circ} = \frac{\sin^2 81^\circ}{\cos^2 81^\circ} = \tan^2 81^\circ = \left(\frac{b}{a}\right)^2$$



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If $\cos\theta + \cos^2\theta = 1$; find $\sin^8\theta + 2\sin^6\theta + \sin^4\theta$.

यदि $\cos\theta + \cos^2\theta = 1$; तो $\sin^8\theta + 2\sin^6\theta + \sin^4\theta$ ज्ञात कीजिए।

a. 0

b. -1

c. 1

d. 2

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

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

$$\cos^2\theta = \sin^4\theta$$

$$a^2 + 2ab + b^2 = (a+b)^2$$

$$(\sin^4\theta)^2 + 2 \cdot \sin^4\theta \cdot \sin^2\theta + (\sin^2\theta)^2$$

$$= (\sin^4\theta + \sin^2\theta)^2$$

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

$$= 1 \text{ (Ans)}$$



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DISCUSSION

$$\text{If } \sec\theta - \tan\theta = x \\ \Rightarrow \sec\theta + \tan\theta = \frac{1}{x}$$

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

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

$$(\sec\theta + \tan\theta) \times x = 1$$

$$\sec\theta + \tan\theta = \frac{1}{x}$$

If $\sec\theta - \tan\theta = 3$; find $\cos\theta + \sin\theta$.

यदि $\sec\theta - \tan\theta = 3$; तो $\cos\theta + \sin\theta$ ज्ञात कीजिए।

1. 5/7

2. 7/5

3. -1/5

4. Either (2) or (3)

$$\therefore \sec\theta - \tan\theta = 3 \\ \sec\theta + \tan\theta = \frac{1}{3}$$

$$\text{Add} \Rightarrow 2\sec\theta = 3 + \frac{1}{3} = \frac{10}{3}$$

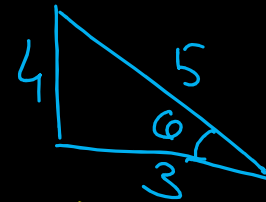
$$\sec\theta = \frac{5}{3}$$

Ⓘ

ⓓ

$$\left(\frac{+3}{5}\right) + \left(\frac{+4}{5}\right) \\ = \frac{7}{5}$$

$$\left(\frac{+3}{5}\right) + \left(\frac{-4}{5}\right) \\ = \frac{-1}{5}$$



Ans

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If $5\sin\theta + 12\cos\theta = 13$; find the value of $5\operatorname{cosec}\theta + 12\sec\theta$

यदि $5\sin\theta + 12\cos\theta = 13$ तो $5\operatorname{cosec}\theta + 12\sec\theta$ का मान ज्ञात कीजिए।

- a. 13 b. 12 c. 26 d. None

Discussion:

(Nano-Technique)
 $P=a$ $Q=b$ $R=\sqrt{a^2+b^2}$

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

a^2

$+ b^2$

$$(\sqrt{a^2+b^2})^2$$

$$= a^2 + b^2$$

संगत

$$\begin{aligned} & 5 \times \frac{13}{5} + 12 \times \frac{13}{12} \\ &= 13 + 13 \\ &= 26 \text{ (Ans)} \end{aligned}$$



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If $(a^2 - b^2)\sin\theta + 2ab\cos\theta = a^2 + b^2$; find the value of $\sin\theta$.

यदि $(a^2 - b^2)\sin\theta + 2ab\cos\theta = a^2 + b^2$, तो $\sin\theta$ का मान ज्ञात कीजिए।

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

b. $\frac{2ab}{(a^2 + b^2)}$

c. $\frac{2ab}{(a^2 - b^2)}$

d. None

$$\begin{aligned} & (a^2 - b^2)^2 + (2ab)^2 && (a^2 + b^2)^2 \\ & = (a^2)^2 + (b^2)^2 - 2a^2b^2 + 4a^2b^2 \\ & = (a^2)^2 + (b^2)^2 + 2a^2b^2 \\ & = (a^2 + b^2)^2 \end{aligned}$$

Equal



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How to solve quadratic in one line.

$$8x^2 + 10x + 3 = 0$$

$x = \frac{-6}{8}; \frac{-4}{8}$
 $= -\frac{3}{4}; -\frac{1}{2}$

+	+	-	1
-	+	+	+
+	-	-	+
-	-	+	-

a. 1

$$8x^2 + 10x + 3 = 0$$

$x = \frac{-10}{2} \pm \frac{\sqrt{100 - 96}}{2}$
 $= -\frac{10}{2} \pm \frac{2}{2}$
 $= -5 \pm 1$
 $= -4, -6$

If $90^\circ \leq \theta \leq 180^\circ$ and $4\cos^2\theta - 3\sqrt{3}\cos\theta - 3 = 0$; find $\sin^2\theta - \cos^2\theta$.

यदि $90^\circ \leq \theta \leq 180^\circ$ और $4\cos^2\theta - 3\sqrt{3}\cos\theta - 3 = 0$; $\sin^2\theta - \cos^2\theta$ ज्ञात कीजिए.

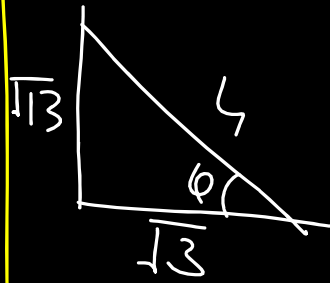
$$12 = 4 \times 3$$

$$4 \times \sqrt{3}; 1 \times \sqrt{3}$$

b. 0

c. $-\frac{\sqrt{3}}{4}$

d. 5/8



$$\cos\theta = \frac{1}{2}; \frac{\sqrt{3}}{2}$$

$$\cos\theta = \frac{\sqrt{3}}{2}; \frac{1}{2}$$

($1 \leq \cos\theta \leq 1$)

$$= \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2$$

$$= \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$$

(Ans)



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If $\sin\theta \sec^2\theta = \frac{2}{3}$, $0 < \theta < 90^\circ$, the value of $(\tan^2\theta + \cos^2\theta)$ is:

यदि $\sin\theta \sec^2\theta = \frac{2}{3}$, $0 < \theta < 90^\circ$, $(\tan^2\theta + \cos^2\theta)$ का मान है:

a. $\frac{7}{6}$

b. $\frac{11}{12}$

c. $\frac{13}{12}$

c. $\frac{5}{4}$

$$\begin{aligned} & \tan^2 30^\circ + \cos^2 30^\circ \\ &= \left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 \\ &= \frac{1}{3} + \frac{3}{4} \\ &= \frac{13}{12} \text{ (Ans)} \end{aligned}$$

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

$$3 \sin\theta = 2 \cos^2\theta$$

$$3 \sin\theta = 2(1 - \sin^2\theta)$$

$$2 \sin^2\theta + 3 \sin\theta - 2 = 0$$

$$\begin{aligned} \sin\theta &= \frac{-3 \pm \sqrt{9 + 16}}{4} \\ &= \frac{-3 \pm 5}{4} \end{aligned}$$

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

$$\theta = 30^\circ$$



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$$2 - \cos^2 \theta = 3 \sin \theta \cos \theta; 0^\circ < \theta < 90^\circ; \text{ find } \cot^2 \theta.$$

$$2 - \cos^2 \theta = 3 \sin \theta \cos \theta; 0^\circ < \theta < 90^\circ; \cot^2 \theta \text{ ज्ञात कीजिए.}$$

- a. 1 or 4 Ans b. 1 or 2 c. 1 or 1/4 d. 1 or 1/2

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

$$\cot \theta = 1; 2$$

$$\boxed{\cot^2 \theta = 1; 4}$$

Ans

$$\rightarrow \frac{2}{\cos^2 \theta} - \frac{\cos^2 \theta}{\cos^2 \theta} = \frac{3 \sin \theta \cdot \cancel{\cos \theta}}{\cos^2 \theta}$$

$$\Rightarrow 2 \sec^2 \theta - 1 = 3 \tan \theta$$

$$\Rightarrow 2 + 2 \tan^2 \theta - 1 = 3 \tan \theta$$

$$\Rightarrow 2 \tan^2 \theta - 3 \tan \theta + 1 = 0$$

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



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If θ is an acute angle and $\cos^2\theta + \cos^4\theta = 1$; then find the value of $\tan^2\theta + \tan^4\theta$.

यदि θ एक न्यून कोण है और $\cos^2\theta + \cos^4\theta = 1$; तो $\tan^2\theta + \tan^4\theta$ का मान ज्ञात कीजिए।

a. 0

b. -1

c. 1

d. 2

$$\cos^2\theta + \cos^4\theta = 1$$

$$\cos^4\theta = 1 - \cos^2\theta$$

$$\cos^4\theta = \sin^2\theta$$

$$\frac{\cos^4\theta}{\cos^2\theta} = \frac{\sin^2\theta}{\cos^2\theta}$$

$$\cos^2\theta = \tan^2\theta$$

$$\cos^4\theta = \tan^4\theta$$

$$\tan^2\theta + \tan^4\theta = \cos^2\theta + \cos^4\theta$$

$$\tan^2\theta + \tan^4\theta = 1$$





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Thank You
धन्यवाद

