

38. If θ lies in the first quadrant and $\cos^2 \theta - \sin^2 \theta = \frac{1}{2}$, then the value of $\tan^2 2\theta + \sin^2 3\theta$ is:

यदि θ प्रथम चतुर्थांश में है और $\cos^2 \theta - \sin^2 \theta = \frac{1}{2}$, तो $\tan^2 2\theta + \sin^2 3\theta$ का मान है:

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

[B] $\textcircled{4}$

$3+1$

[C] 3

[D] $\frac{7}{2}$

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

$$\cos 2\theta = \cos 60^\circ$$

$$\theta = 30^\circ$$



39. If $\sin\alpha = \frac{4}{5}$ and $\cos\beta = \frac{5}{13}$, then $\cos\left(\frac{\alpha-\beta}{2}\right) = ?$

[A] $\frac{8}{\sqrt{63}}$

☒ [C] $\frac{8}{\sqrt{65}}$

[B] $\frac{63}{65}$

[D] $\frac{4}{\sqrt{65}}$

$$\begin{aligned}\cos(\alpha-\beta) &= \cos\alpha \cdot \cos\beta + \sin\alpha \cdot \sin\beta \\ &= \frac{3}{5} \times \frac{5}{13} + \frac{4}{5} \times \frac{12}{13} \\ &= \frac{63}{65}\end{aligned}$$

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

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

$$\cos\left(\frac{\alpha-\beta}{2}\right) = \sqrt{\frac{1 + \frac{63}{65}}{2}} = \sqrt{\frac{64}{65}}$$



40. If $\cos x + \cos y = \frac{1}{3}$ & $\sin x + \sin y = \frac{1}{4}$, then find $\sin(x+y)$?

यदि $\cos x + \cos y = \frac{1}{3}$ & $\sin x + \sin y = \frac{1}{4}$ है, तो $\sin(x+y)$ ज्ञात कीजिये?

[A] 24/25

[B] 16/25

[C] 32/75

[D] 9/16

$$= 2 \sin\left(\frac{x+y}{2}\right) \cos\left(\frac{x+y}{2}\right)$$

$$= 2 \times \frac{3}{5} \times \frac{4}{5}$$

$$= \frac{24}{25}$$

$$\cos\left(\frac{x+y}{2}\right) = \frac{4}{3} \rightarrow B$$
$$\sin\left(\frac{x+y}{2}\right) = \frac{1}{3} \rightarrow P$$

$$\frac{\cos x + \cos y = \frac{1}{3}}{\sin x + \sin y = \frac{1}{4}} \Rightarrow \frac{2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}}{2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}} = \frac{4}{3}$$



41. Using $\cos(A+B) = \cos A \cos B - \sin A \sin B$, then find the value of $\cos 75^\circ$?

$\cos(A+B) = \cos A \cos B - \sin A \sin B$ का उपयोग करके, $\cos 75^\circ$ का मान ज्ञात कीजिए?

[A] $\frac{\sqrt{5}-1}{4}$

[B] $\frac{\sqrt{5}+1}{4}$

☒ [C] $\frac{\sqrt{6}-\sqrt{2}}{4}$

[D] $\frac{\sqrt{6}+\sqrt{2}}{4}$

$$= \sin 15^\circ$$

$$= \frac{(\sqrt{3}-1) \times \sqrt{2}}{2\sqrt{2} \times \sqrt{2}}$$

$$= \frac{\sqrt{6}-\sqrt{2}}{4}$$



42. $\overset{C}{\sin 75^\circ} + \overset{D}{\sin 15^\circ} = ?$

[A] $\sqrt{3}$

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

[B] $2\sqrt{3}$

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

$\rightarrow 2 \sin 45^\circ \cos 30^\circ$

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



43. $\tan 15^\circ - \cot 165^\circ = ?$
($-\cot 15^\circ$)

[A] 4

[C] 2

[B] $2\sqrt{3}$

[D] $\sqrt{3} + 2$

$$\begin{aligned} & \tan 15^\circ + \cot 15^\circ \\ &= (\cancel{2 - \sqrt{3}}) + (\cancel{2 + \sqrt{3}}) \\ &= 4 \end{aligned}$$

$$\begin{aligned} \cot 165^\circ &= \cot(180^\circ - 15^\circ) \\ &= -\cot 15^\circ \end{aligned}$$



44. Find the value of $\cos 15^\circ \sin 7\frac{1}{2}^\circ \cos 7\frac{1}{2}^\circ$?
 $\frac{1}{2} \times \cos 15^\circ \sin 7\frac{1}{2}^\circ \cos 7\frac{1}{2}^\circ$ का मान ज्ञात कीजिये?

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

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

[C] $\frac{1}{8}$

[D] $\frac{1}{6}$

$$\frac{1}{2} \times \left(\cos 15^\circ \times \sin 15^\circ \right)$$

$$= \frac{1}{4} \times \sin 30^\circ$$

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



45. Find $\frac{\sin 13^\circ \cdot \sin 77^\circ}{\sin 154^\circ}$?

$\frac{\sin 13^\circ \cdot \sin 77^\circ}{\sin 154^\circ}$ ज्ञात कीजिए?

[A] 1

[B] 0.5

[C] 2

[D] 0.25

~~$\frac{\sin 13^\circ \cdot \sin 77^\circ}{\sin 154^\circ}$~~

~~$\sin 154^\circ$~~

$= \frac{1}{2}$



46. If $\tan 12^\circ = x$, then find the value of $\cos 66^\circ$?
यदि $\tan 12^\circ = x$ है तो $\cos 66^\circ$ का मान ज्ञात कीजिये?

[A] $\frac{2x}{1+x^2}$

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

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

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

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

$$\sin 24^\circ = \frac{2x}{1+x^2}$$



47. If $\tan 16^\circ = a$, then find $\operatorname{cosec} 302^\circ$?

यदि $\tan 16^\circ = a$, तो $\operatorname{cosec} 302^\circ$ ज्ञात कीजिए?

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

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

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

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

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

$$\operatorname{cosec} 3^\circ = \frac{1 - a^2}{1 + a^2}$$

$$\operatorname{cosec}(27^\circ + 3^\circ) = -\operatorname{cosec} 3^\circ$$

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

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





48. A signal tower forms an elevation such that $\tan\theta = \frac{3}{4}$. Compute $\sin 2\theta$.

एक सिग्नल मीनार एक ऐसा कोण बनाता है कि $\tan\theta = \frac{3}{4}$ $\sin 2\theta$ का मान ज्ञात कीजिए

SSC CHSL PRE 2025

[A] (24/25)

[D] (12/25)

[C] (14/25)

[D] (9/25)

$H=5$

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

$$= 2 \times \frac{3}{5} \times \frac{4}{5}$$



49. Simplify: $\frac{1 - \cos 2\theta}{\sin 2\theta}$ को सरल करें।

~~$\frac{2\sin\theta}{2\sin\theta \cdot 2\cos\theta}$~~ $\leftarrow \frac{1 - \cos 2\theta}{\sin 2\theta}$

(RRB GROUP-D 2025)

- [A] cosec θ
[C] sin θ

- [B] tan θ
[D] cot θ

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

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

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



50. If $4 \tan \theta - 3 = 0$, then the value of $\frac{1 - \cos 2\theta}{1 + \cos 2\theta}$ is:

यदि $4 \tan \theta - 3 = 0$ है, तो $\frac{1 - \cos 2\theta}{1 + \cos 2\theta}$ का मान ज्ञात कीजिए।

[A] 1

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

[B] $\frac{7}{15}$

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

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

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



51. What is the simplified value of $\operatorname{cosec} 2A + \cot 2A$?

$\operatorname{cosec} 2A + \cot 2A$ का सरल मान क्या है?

[A] $\sec A$

[B] $\tan A$

[C] $\cot A$

[D] $\cot^2 A$

$$\frac{1 + \cot 2A}{\sin 2A} \rightarrow \frac{\cancel{\sec^2}^2}{\cancel{\sec}^1} = \cot A$$



52. If , $\tan x = 0.68$, then $\tan 2x + \sec 2x = ?$

[A] $\frac{21}{4}$ $\frac{\sin x}{\cos x} = \frac{17}{25}$

[B] $\frac{25}{9}$
[D] $\frac{42}{11}$

[C] $\frac{34}{7}$

$$(\cos x \pm \sin x)^2 = 1 \pm \sin 2x$$

$$\frac{(\cancel{C+S})^2}{(\cancel{C-S})(\cancel{C+S})}$$

$$= \frac{\sin 2x + 1}{\cos 2x} = \frac{(C+S)^2}{C^2 - S^2}$$

$$= \frac{C+S}{C-S}$$
$$= \frac{42}{11}$$



53. If $\frac{\cos 34^\circ}{1 + \sin 34^\circ} = \cot (3\theta + 23^\circ)$, then $\theta = ?$ where $(0 < \theta < 90^\circ)$

[A] 12°

[C] 14°

[B] 13°

[D] 15°

$$\frac{\sin 56^\circ}{1 + \cos 56^\circ} = \frac{\cancel{\sin 28^\circ} \cdot \cancel{\cos 28^\circ}}{\cancel{\sin 28^\circ}}$$

$$\tan 28^\circ = \cot (30 + 23^\circ)$$

$$51^\circ + 30 = 90^\circ$$

$$\theta = 13^\circ$$



54. If $\tan A = \frac{1 - \cos B}{\sin B}$ then find the value of $\tan 2A = ?$

[A] $\cot B$

[C] $\cos B$

[B] $\tan B$

[D] $\operatorname{cosec} B$

$= \tan B$

$$\tan A = \frac{\cancel{2} \sin(\cancel{\frac{B}{2}})}{\cancel{2} \sin \frac{B}{2} \cdot \cancel{2} \cos \frac{B}{2}}$$

$$\tan A = \tan \left(\frac{B}{2} \right)$$

$$A = \frac{B}{2}$$

$$2A = B$$

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



55. $\left[\frac{1}{1-\tan\theta} \right] - \left[\frac{1}{1+\tan\theta} \right] = ?$

[A] $\tan \theta$

[B] $\cot 2\theta$

☒ [C] $\tan 2\theta$

[D] $\cot \theta$

$$\frac{2 \tan \theta}{1 - \tan^2 \theta}$$



56. What is the simplified value of $\left[\frac{\cos^2 \theta}{1+\sin \theta} - \frac{\sin^2 \theta}{1+\cos \theta} \right]^2$?

[A] $\sin \theta$

[C] $1+\sin 2\theta$

✓ [B] $1-\sin 2\theta$

[D] $1-\sin \theta$

$$\begin{aligned} & \left[\cancel{(1-s)} - \cancel{(1-c)} \right]^2 \\ &= (-s)^2 \\ &= 1-\sin 2\theta \end{aligned}$$



57.

$$\left[\frac{2}{\cot \frac{A}{2} + \tan \frac{A}{2}} \right] = ?$$

~~$\frac{2}{2 \sec A}$~~

[A] $\sin A$

[C] $\cos^2 A$

[B] $\cos \frac{A}{2}$

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

$$\cot 0 + \tan 0 = \frac{1}{\sin 0 \cdot \cos 0} = \frac{2}{2 \sec 0}$$



58. If $\cos x - \sin x = a$ and $\cos x + \sin x = b$, then the value of $\frac{1 - \tan^2 x}{1 + \tan^2 x}$ is:

यदि $\cos x - \sin x = a$ और $\cos x + \sin x = b$ है, तो $\frac{1 - \tan^2 x}{1 + \tan^2 x}$ का मान ज्ञात कीजिए।

[A] $a^2 + b^2$

[B] ab

[C] $a^2 - b^2$

[D] $-ab$

$\frac{1 - \tan^2 x}{1 + \tan^2 x} = \frac{\cos^2 x - \sin^2 x}{\cos^2 x + \sin^2 x}$
 $= ab$



59. If $x \operatorname{cosec} x = 5/4$ and $\sec x = 5/3$, what is the value of $\sin\left[2\left(x - \frac{\pi}{8}\right)\right] = ?$
 अगर $\operatorname{cosec} x = 5/4$ और $\sec x = 5/3$ है, तो $\sin\left[2\left(x - \frac{\pi}{8}\right)\right]$ का मान क्या होगा?

[DELHI POLICE HEAD CONSTABLE 2025]

[A] $\frac{18}{25\sqrt{3}}$
 [C] $\frac{17}{25\sqrt{2}}$

[B] $\frac{17}{25\sqrt{3}}$
 [D] $\frac{18}{25\sqrt{2}}$

$$= \sin(x - 45^\circ)$$

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

$$\begin{aligned} \sin x &= 2 \sin x \cos x \\ &= 2 \times \frac{4}{5} \times \frac{3}{5} \\ &= \frac{24}{25} \end{aligned}$$

$$\begin{aligned} &= \frac{1}{\sqrt{2}} \times \left(\frac{24}{25} - \frac{7}{25} \right) \\ &= \frac{17}{25\sqrt{2}} \end{aligned}$$



60. What is $\tan \frac{\theta}{2}$?

$\tan \frac{\theta}{2}$ क्या है?

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[A] $\frac{\cos \theta}{1 - \sin \theta}$

[C] $\frac{\sin \theta}{1 + \cos \theta} = \frac{2 \sin \frac{\theta}{2} \cos \frac{\theta}{2}}{2 \cos^2 \frac{\theta}{2}}$

[B] $\frac{\sin \theta}{1 - \sin \theta}$

[D] $\frac{\sin \theta}{1 + \sin \theta}$



61. Find the value of $\sqrt{\frac{1-\tan A}{1+\tan A}}$?

$\sqrt{\frac{1-\tan A}{1+\tan A}}$ का मान ज्ञात कीजिये?

[A] ~~$\sqrt{\frac{1+\sin A}{\cos A}}$~~

[C] ~~$\sqrt{\frac{1-\sin A}{\cos A}}$~~

[B] ~~$\sqrt{\frac{1+\sin 2A}{\cos 2A}}$~~

[D] $\sqrt{\frac{1-\sin 2A}{\cos 2A}}$

$$\sqrt{\frac{1-\tan A}{1+\tan A}} = \sqrt{\frac{C-S}{C+S}}$$

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



62. If $K \times \frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = 1$, then the value of K is:

यदि $K \times \frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = 1$ है, तो K का मान ज्ञात कीजिए।

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[A] 1

[B] cosecA

[C] cotA

[D] tanA

$$K \times \frac{\cancel{S \cdot (1 - 2S^2)}}{\cancel{C \cdot (C^2 - 1)}} = 1$$

$$\cos A = 2\cos^3 A - 1 = 1 - 2\sin^2 A$$

$$K \times \cancel{\cos A} = 1$$



63. The value of $\left(\frac{2\cos^3\theta - \cos\theta}{\sin\theta - 2\sin^3\theta}\right) + 1$, $\theta \neq 45^\circ$ is:

$\left(\frac{2\cos^3\theta - \cos\theta}{\sin\theta - 2\sin^3\theta}\right)^2 + 1$ का मान ज्ञात कीजिए, जहाँ $\theta \neq 45^\circ$ है?

[SSC CPO 2024], [SSC CGL 2025 PRE]

[A] $\sin^2\theta$

[B] $\sec^2\theta$

[C] $\operatorname{cosec}^2\theta$

[D] $\cot^2\theta$

$$\left[\frac{C \cdot (\cancel{\sec^2\theta} - 1)}{S \cdot (\cancel{1 - \sec^2\theta})}\right]^2 + 1$$

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



64. Find the value of $\frac{(\sin A - 2\sin^3 A)}{2\cos^3 A - \cos A} + \sqrt{\operatorname{cosec}^2 A - 1}$.

~~$\frac{S \cdot (1 - 2S^2)}{C \cdot (2C^2 - 1)}$~~ $\frac{(\sin A - 2\sin^3 A)}{2\cos^3 A - \cos A} + \sqrt{\operatorname{cosec}^2 A - 1}$ का मान ज्ञात कीजिए।

[RRB NTPC LEVEL 12th, 2025]

[A] $\sec^2 A$

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

[C] $\operatorname{cosec}^2 A$

[D] $\sec A$

$\sec A + \sec A$



65. If $\cos 40^\circ = a$, then find $\cos 100^\circ$?

यदि $\cos 40^\circ = a$ है, तो $\cos 100^\circ$ ज्ञात कीजिये?

☒ [A] $1 - 2a^2$

[B] $2a^2 + 1$

[C] $2a^2 - 1$

[D] $2a^2$

$\cos(180^\circ - 80^\circ)$

$\cos 100^\circ = \cos(180^\circ - 80^\circ)$

$= -\cos 80^\circ$

$= -(\sin 10^\circ)$

$= -\sin 10^\circ$

