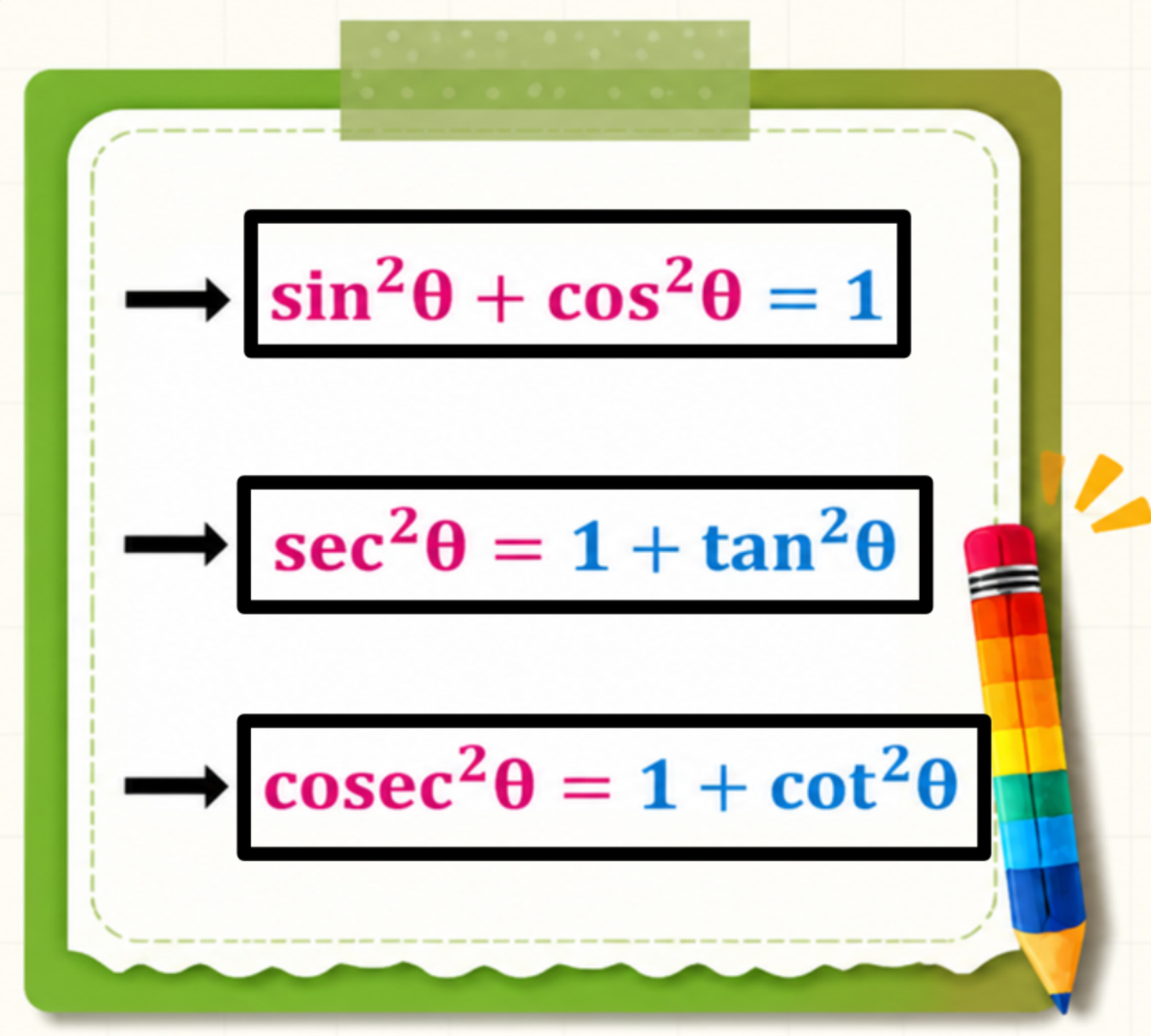


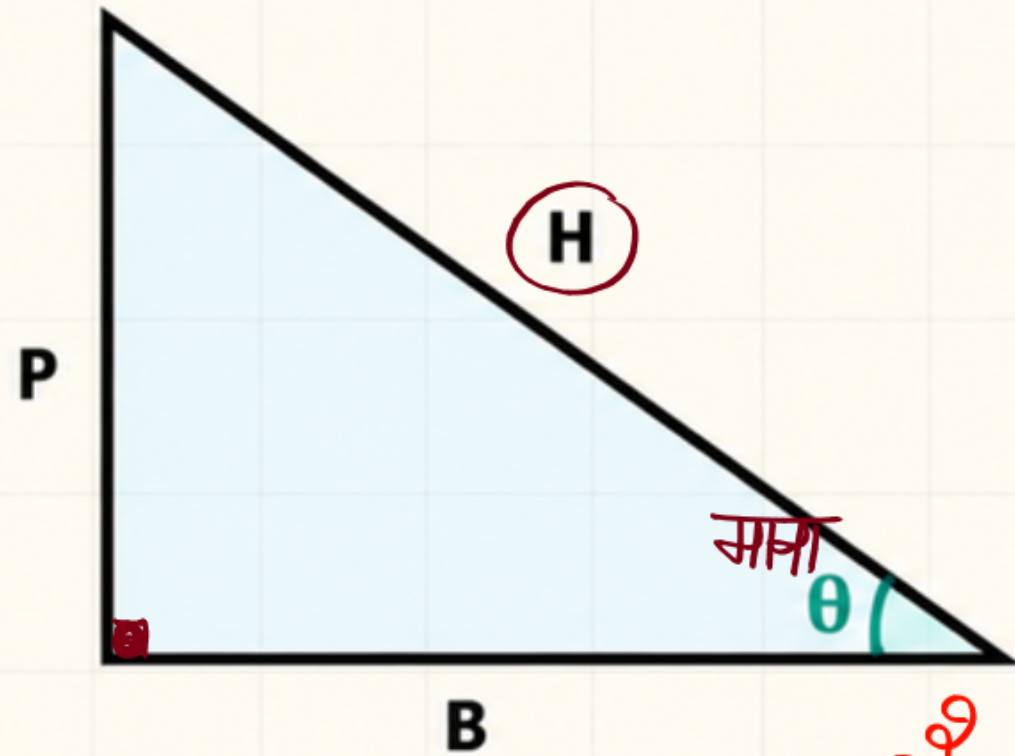

$$\rightarrow \sin^2\theta + \cos^2\theta = 1$$

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

$$\rightarrow \operatorname{cosec}^2\theta = 1 + \cot^2\theta$$

Basic Identity





$$P^2 + B^2 = H^2$$

$$\left(\frac{P}{H}\right)^2 + \left(\frac{B}{H}\right)^2 = 1$$

÷ H^2 से भाग देने पर

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

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

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

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

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

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

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

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

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

square on both sides

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

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

$$\sin^4 \theta + \cos^4 \theta = 1 - 2\sin^2 \theta \cdot \cos^2 \theta \quad (\text{V.V.Vim})$$

👉 $(a + b)^2 = a^2 + b^2 + 2ab$

$$(a^m)^n = a^{m \times n}$$

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

cube on both sides

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

$$\underline{\sin^6 \theta + \cos^6 \theta + 3\sin^2 \theta \cdot \cos^2 \theta} = 1$$

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

(V.V.Vim)

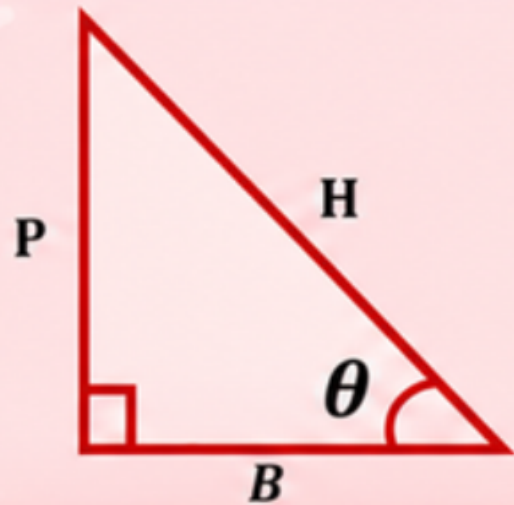

$$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$$

$$(\sin^2 \theta)^3 + (\cos^2 \theta)^3 + 3\sin^2 \theta \cdot \cos^2 \theta \underline{(\sin^2 \theta + \cos^2 \theta)} = 1$$

(1)



Basic Trigonometric Identities



$$H^2 = P^2 + B^2$$

$$\left(\frac{P}{H}\right)^2 + \left(\frac{B}{H}\right)^2 = 1 \longrightarrow \sin^2\theta + \cos^2\theta = 1$$

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

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

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

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

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

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

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

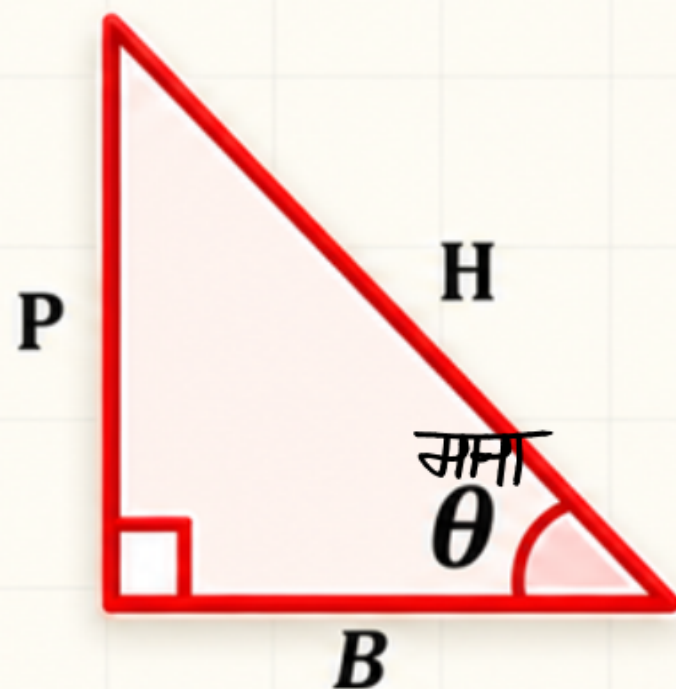
$$\sin^4\theta + \cos^4\theta = 1 - 2\sin^2\theta\cos^2\theta$$

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

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

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

2.



÷ B^2 से भाग देने पर

$$B^2 + P^2 = H^2$$

$$1 + \left(\frac{P}{B}\right)^2 = \left(\frac{H}{B}\right)^2$$

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

या

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

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

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

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

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

If, $\sec \theta + \tan \theta = \frac{7}{3}$

$\sec \theta - \tan \theta = \frac{3}{7}$

$\tan \theta - \sec \theta = -\frac{3}{7}$



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

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

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

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

$$\sec^2 \theta - 1^2$$



$$(\sec^2\theta - \tan^2\theta)^3 = 1^3$$

$$\sec^6\theta - \tan^6\theta - 3\sec^2\theta.\tan^2\theta = 1$$

$$\sec^6\theta - \tan^6\theta = 1 + 3\sec^2\theta.\tan^2\theta$$

$$(a-b)^3 = a^3 - b^3 - 3ab(a-b)$$



3.

$$\operatorname{cosec}^2 \theta = 1 + \cot^2 \theta$$

$$(\cot^2 \theta + 1 = \operatorname{cosec}^2 \theta)$$

$$\cot^2 \theta = \operatorname{cosec}^2 \theta - 1 \rightarrow \cot^2 \theta = (\operatorname{cosec} \theta - 1)(\operatorname{cosec} \theta + 1)$$

$$\frac{\cot \theta}{(\operatorname{cosec} \theta + 1)} = \frac{(\operatorname{cosec} \theta - 1)}{\cot \theta}$$

$$\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$$

$$(\operatorname{cosec} \theta + \cot \theta) \cdot (\operatorname{cosec} \theta - \cot \theta) = 1$$

$$(\operatorname{cosec} \theta + \cot \theta) = \frac{1}{(\operatorname{cosec} \theta - \cot \theta)}$$





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

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

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

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

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



$$(tan\theta + cot\theta) \rightarrow \frac{1}{sin\theta \cdot cos\theta} = sec\theta \cdot csc\theta = 2 csc 2\theta$$

$$tan\theta + cot\theta = \frac{S}{C} + \frac{C}{S} = \frac{S^2 + C^2}{S \cdot C} = \frac{1}{S \cdot C} = \frac{2}{2SC} = \frac{2}{sin 2\theta}$$

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



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

$$\frac{1 + \tan^2 \theta + \cot^2 \theta + 1}{1}$$



36. 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

[A] $3\frac{177}{529}$ ✗

[C] $1\frac{200}{529}$ ✗

[B] $2\frac{16}{529}$ ✗

[D] $3\frac{384}{529}$ ✓

$$\begin{aligned} &= \sec^2\theta - 1 \\ &= \frac{2500}{529} - 1 = \frac{1971}{529} \end{aligned}$$

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

37. If $\cos\theta = \frac{7}{3\sqrt{6}}$ and θ 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 θ न्यून कोण है, तो $27 \sin^2\theta - \frac{3}{2}$ का मान ज्ञात करें।

[A] 12

[B] 15

[C] 1

[D] 9

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

$$= 1$$

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

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

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

38. If $\sin \theta = \frac{5}{6}$, the value of $\cot \theta \cdot \sin \theta \cdot \cos \theta$ is _____.

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

SSC CHSL 2023 PRE

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

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

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

39. 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] $\frac{6}{25}$
[C] 1

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

[B] $\frac{2}{5}$
[D] $\frac{3}{5}$

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

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

40. 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] $\frac{-5}{9}$

$$\sec A = \frac{5}{4}$$

$$\begin{aligned} & \frac{9 \times \frac{5}{5}}{80 \times \frac{1}{4} \times \frac{9}{4}} \\ &= \frac{5}{9} \end{aligned}$$

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

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

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

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

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

$$\sin A = \frac{3}{5}$$

$$= \frac{3}{4} \times \frac{\operatorname{cosec}^2 A}{\sec^2 A}$$

$$= \frac{3}{4} \times \frac{1}{\cos^2 A}$$

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

#



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

SSC CGL 2020 PRE, RRB NTPC GRADUATE LEVEL CBT-1 2025

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

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

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

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

(RRB NTPC 12th 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।

(RRB GROUP-D 2025)

[A] $\frac{64}{9}$

[C] $\frac{80}{27}$

~~[B] $\frac{256}{81}$~~

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

$$\frac{1-\sec^2 A}{1-\operatorname{cosec}^2 A} = \frac{\sec^2 A - 1}{\operatorname{cosec}^2 A - 1}$$

$$= \frac{\tan^2 A}{\cot^2 A} = \tan^4 A$$

$$= \left(\frac{4}{3}\right)^4$$

45. 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] $\frac{9}{4}$

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

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

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

$$\frac{\frac{1}{\sin^2 A} + \frac{1}{\cos^2 A}}{\sin^2 A + \cos^2 A}$$

$$= \frac{1}{\sin^2 A \cos^2 A} = \sec^2 A = \frac{15}{10}$$

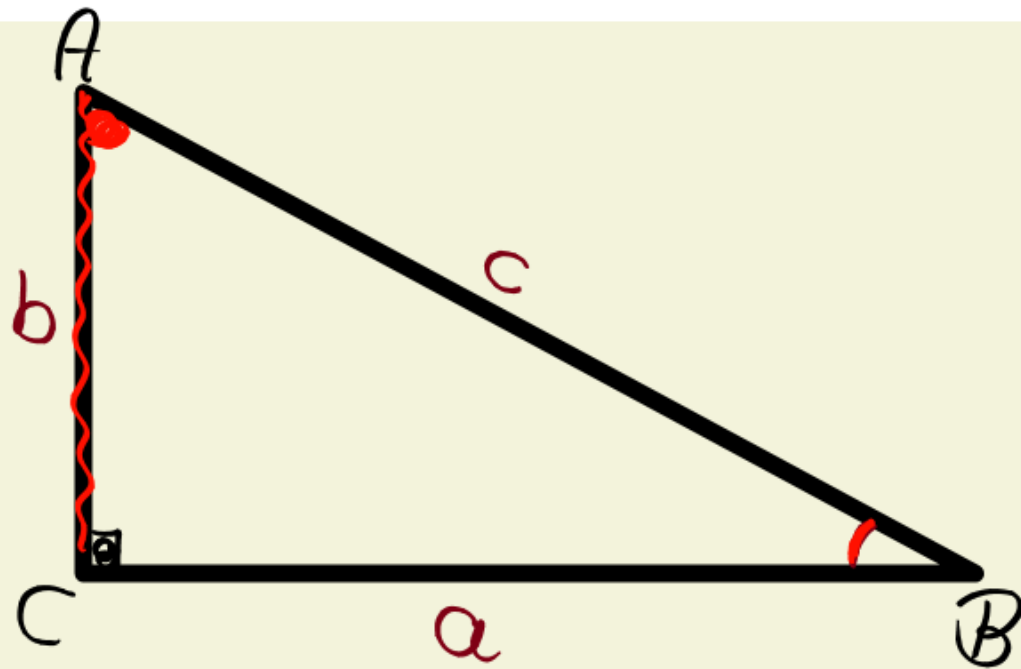


46. In $\triangle ABC$, $\angle C = 90^\circ$ and $AB = c$, $BC = a$, $CA = b$, then find the value of $(\operatorname{cosec} B - \cos A)$?
 $\triangle ABC$ में, $\angle C = 90^\circ$ तथा $AB = c$, $BC = a$, $CA = b$ हो, तो $(\operatorname{cosec} B - \cos A)$ का मान ज्ञात कीजिए।

[A] $\frac{c^2}{ab}$
[C] $\frac{a^2}{bc}$

[B] $\frac{b^2}{ca}$
[D] $\frac{bc}{a^2}$

$$\begin{aligned} & \frac{c}{b} - \frac{b}{c} \\ &= \frac{c^2 - b^2}{bc} = \frac{a^2}{bc} \end{aligned}$$



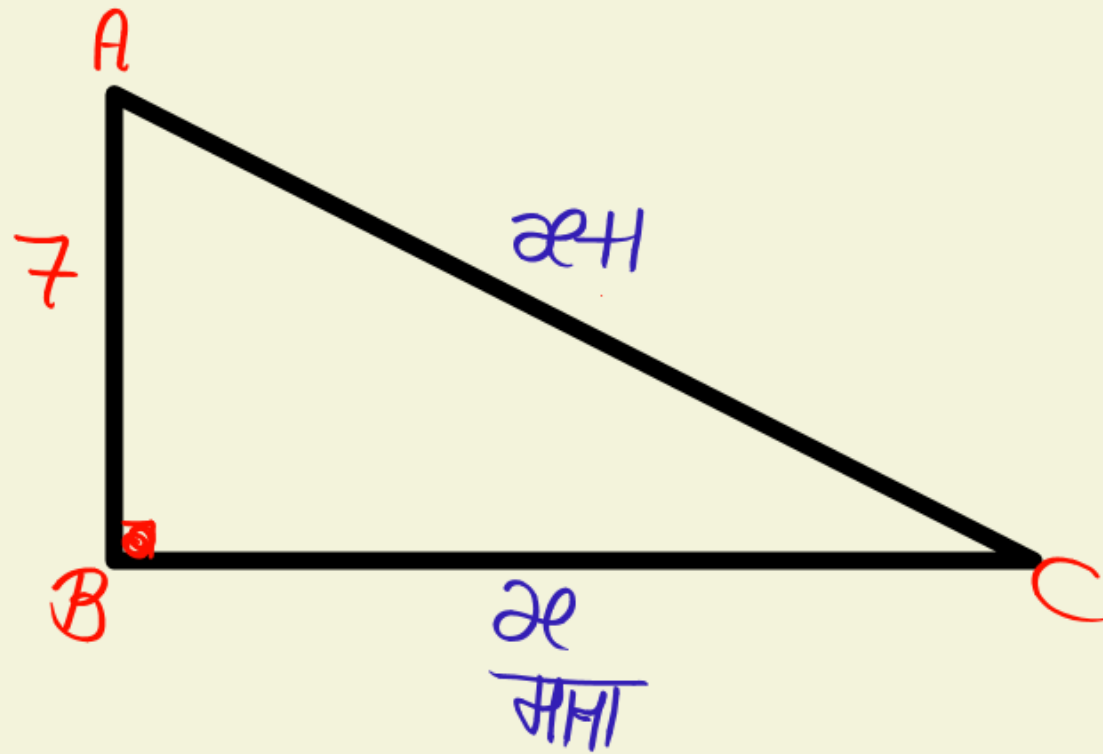
47. In a triangle ABC, right angled at B, $AB = 7$ and $(AC - BC) = 1\text{cm}$. The value of $(\sec A + \cot C)$ is:

ΔABC में B पर समकोण है, $AB = 7\text{cm}$ और $(AC - BC) = 1\text{cm}$ है। $(\sec A + \cot C)$ का मान है:

[A] $\frac{4}{3}$
[C] $\frac{175}{24}$

[B] $\frac{3}{4}$
[D] 7

$AC = BC + 1$



$$(x+1)^2 = x^2 + 7^2$$

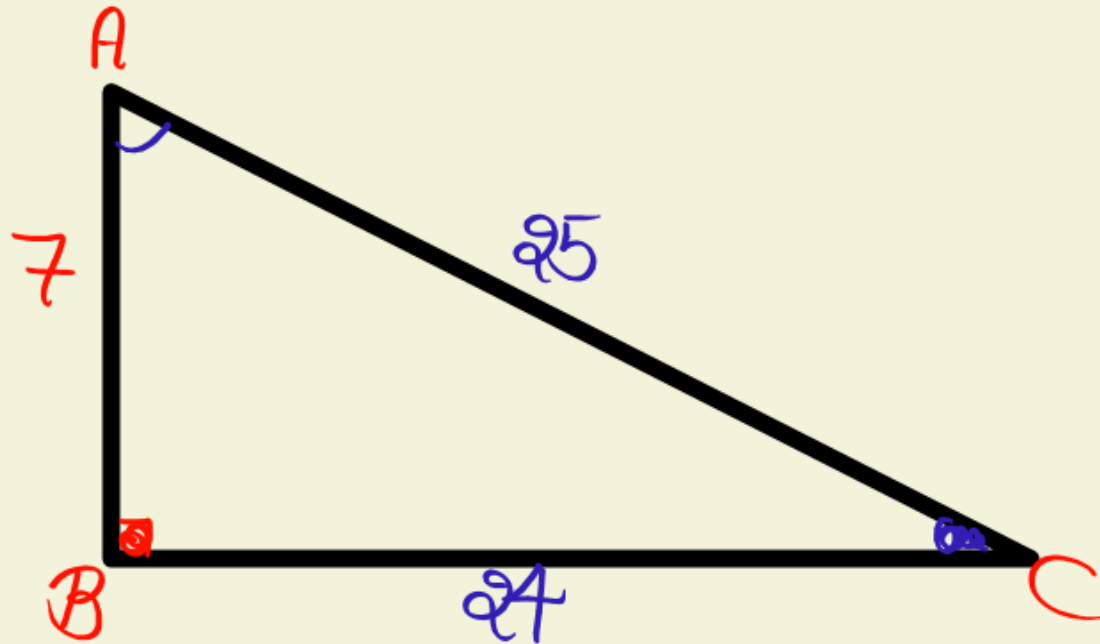
47. In a triangle ABC, right angled at B, $AB = 7$ and $(AC - BC) = 1\text{cm}$. The value of $(\sec A + \cot C)$ is:

ΔABC में B पर समकोण है, $AB = 7\text{cm}$ और $(AC - BC) = 1\text{cm}$ है। $(\sec A + \cot C)$ का मान है:

[A] $\frac{4}{3}$
[C] $\frac{175}{24}$

[B] $\frac{3}{4}$
[D] 7

$\frac{25}{7} + \frac{24}{7}$





48. If $\tan x = 7/5$, then the value of $\frac{9\sin x - 8.4\cos x}{15\sin x + 21\cos x}$ is?

यदि $\tan x = 7/5$ है, तो $\frac{9\sin x - 8.4\cos x}{15\sin x + 21\cos x}$ का मान क्या है?

[A] 0

[B] 0.1 ✓

[C] 1

[D] 0.5

$$\tan x = \frac{7}{5}$$

$$\frac{63 - 42}{105 + 105} = \frac{1}{10}$$

$$\Rightarrow \frac{\sin x}{\cos x} = \frac{7}{5}$$

49. If $\cot\theta = \sqrt{11}$, then the value of $\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta}$ is?

यदि $\cot\theta = \sqrt{11}$, तो $\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta}$ का मान क्या है?

$= \frac{680}{8170}$
SSC CGL Pre 2024, (RRB NTPC 12th LEVEL 2025)

[A] $3/5$

[C] $4/5$

$\frac{11-1}{11+1}$

[B] $5/6$

[D] $6/7$

तो $\frac{6800}{8170} = \frac{\sqrt{11}}{1}$

50. If $\tan\theta = \frac{2}{\sqrt{13}}$, then the value of $\frac{3\operatorname{cosec}^2\theta + 2\sec^2\theta}{5\operatorname{cosec}^2\theta - 4\sec^2\theta}$ will be:

यदि $\tan\theta = \frac{2}{\sqrt{13}}$, तो $\frac{3\operatorname{cosec}^2\theta + 2\sec^2\theta}{5\operatorname{cosec}^2\theta - 4\sec^2\theta}$ का मान होगा:

[A] $\frac{41}{45}$

[B] $\frac{47}{49}$

[C] $\frac{46}{53}$

[D] $\frac{5}{7}$

$\frac{39+8}{65-16}$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{2}{\sqrt{13}}$

51. If $\cot \alpha = \frac{P}{Q}$, then find $\frac{P \cos \alpha - Q \sin \alpha}{P \cos \alpha + Q \sin \alpha} - \frac{P^2 - Q^2}{P^2 + Q^2} + 3$?

यदि $\cot \alpha = \frac{P}{Q}$, तो $\frac{P \cos \alpha - Q \sin \alpha}{P \cos \alpha + Q \sin \alpha} - \frac{P^2 - Q^2}{P^2 + Q^2} + 3$ ज्ञात कीजिए?

SSC CHSL PRE 2024

[A] $\frac{P^2}{P^2 + Q^2}$

[B] $\frac{P}{Q}$

[C] 0

[D] 3

$$\frac{\cos \alpha}{\sin \alpha} = \frac{P}{Q}$$