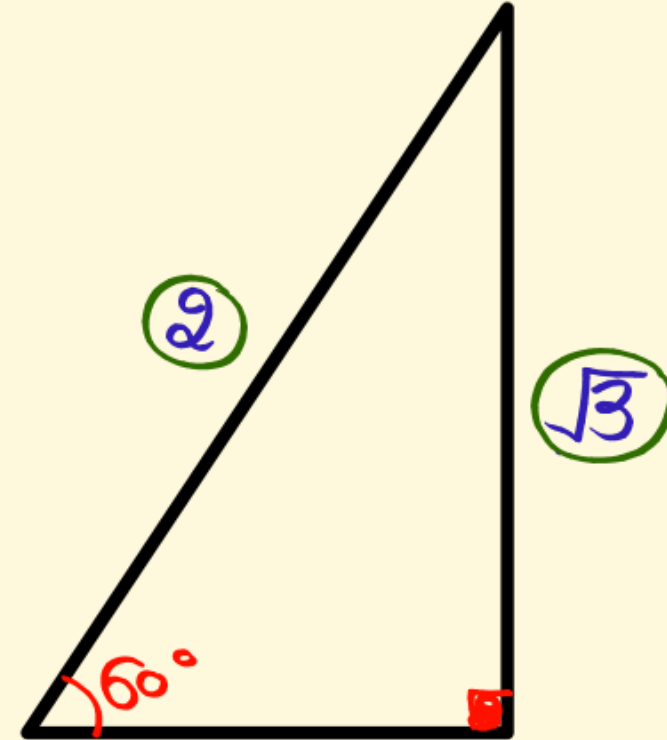


Trigonometry Ratio Table

$180^\circ = \pi$ रेडियन

Angle (in Degrees)	0°	30°	45°	60°	90°
Angle (in Radians)	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
Sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
Cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Tan = $\frac{\sin}{\cos}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not Defined
Cot	Not Defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
Sec = $\frac{1}{\cos}$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not Defined
Cosec = $\frac{1}{\sin}$	Not Defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

$$\sin 60^\circ = \frac{\sqrt{3}}{2} \rightarrow \begin{matrix} P \\ H \end{matrix}$$



47. $\sin \theta = \frac{8}{17}$, $\tan \alpha = \frac{15}{8}$, then find $\cos(\theta + \alpha) = ?$

यदि $\sin \theta = \frac{8}{17}$, $\tan \alpha = \frac{15}{8}$, तो $\cos(\theta + \alpha)$ ज्ञात कीजिए।

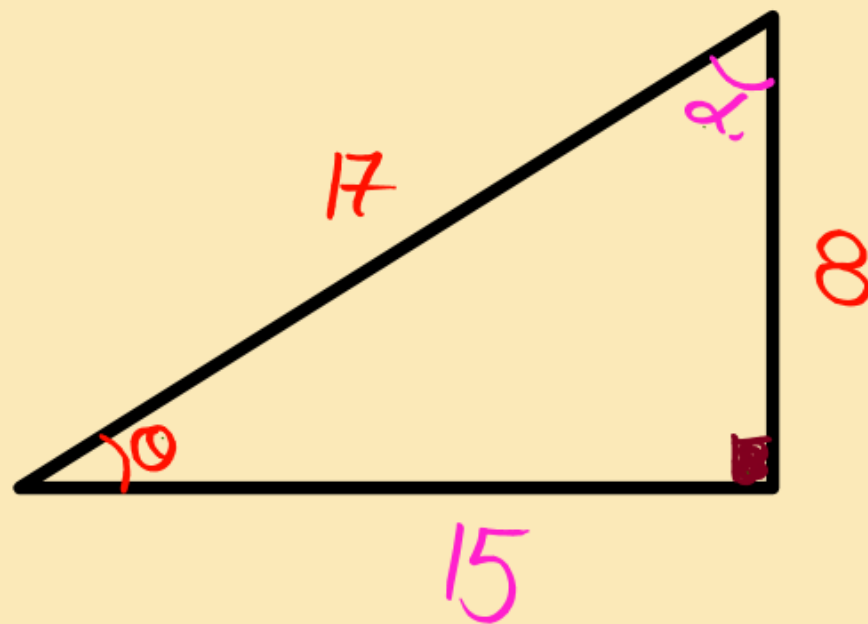
[A] 0

[C] $\frac{23}{17}$

[B] 1

[D] $\frac{15}{17}$

$\rightarrow 90^\circ = 0$



$$\theta + \alpha = 90^\circ$$



Test

48. 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] $\frac{c^2}{ab}$

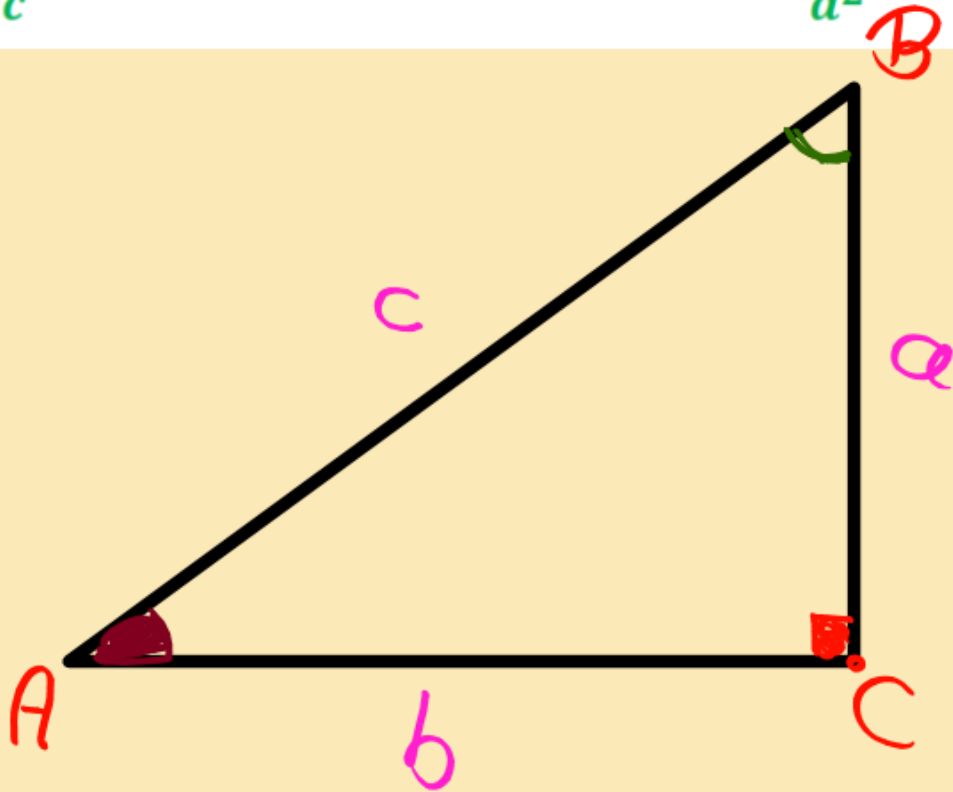
[C] $\frac{a^2}{bc}$ ✓

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

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

$$= \frac{c}{b} - \frac{b}{c}$$

$$= \frac{c^2 - b^2}{bc} = \frac{a^2}{bc}$$



49. In $\triangle ABC$, $AB = 20$ cm, $BC = 21$ cm and $AC = 29$ cm. What is the value of $\cot C + \operatorname{cosec} C - 2 \tan A$?

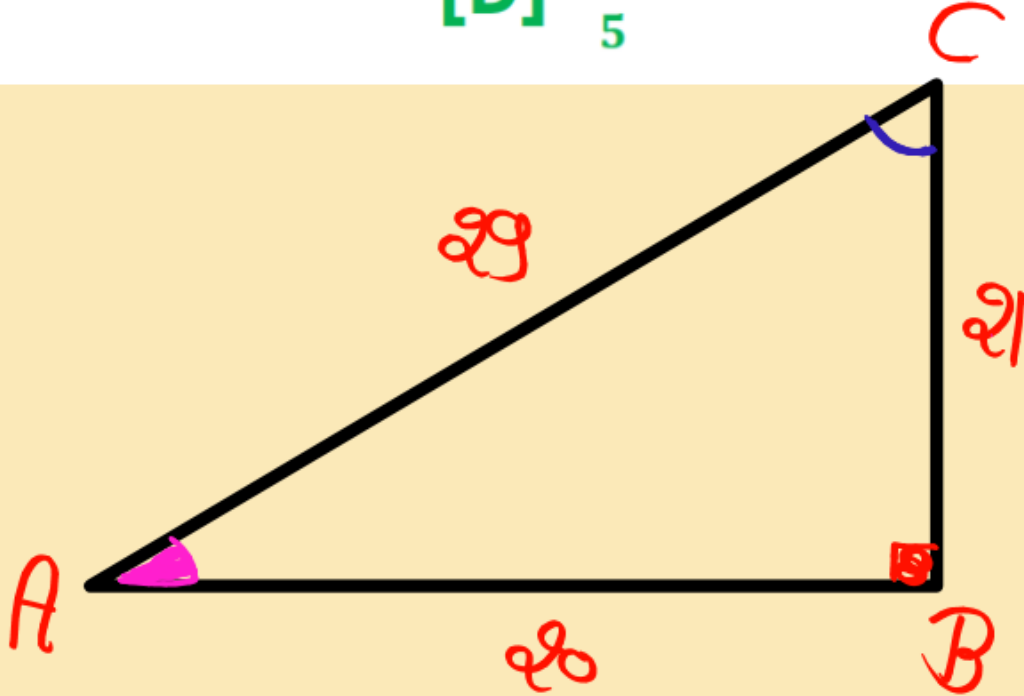
$\triangle ABC$ में, $AB = 20$ cm, $BC = 21$ cm और $AC = 29$ cm है। $\cot C + \operatorname{cosec} C - 2 \tan A$ का मान ज्ञात करें।

[A] $\frac{9}{20}$

[B] $\frac{7}{20}$

[C] $\frac{2}{5}$

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



$$= \frac{21}{20} + \frac{29}{20} - 2 \times \frac{21}{20}$$

$$= \frac{50 - 42}{20}$$

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

50. The sides of a right-angled triangle, right-angled at B, are 6, 8 and 10 units. C is the vertex opposite to the side with length 8 units. What is the value of $\tan^2 A + \cos^2 C$?
- एक समकोण त्रिभुज की भुजाएँ, B पर समकोण हैं, 6, 8 और 10 इकाइयाँ हैं। C भुजा के विपरीत शीर्ष है जिसकी लंबाई 8 इकाई है। $\tan^2 A + \cos^2 C$ का मान क्या है?

(SSC SELECTION POST XII GRADUATE LEVEL)

[A] ~~125/400~~

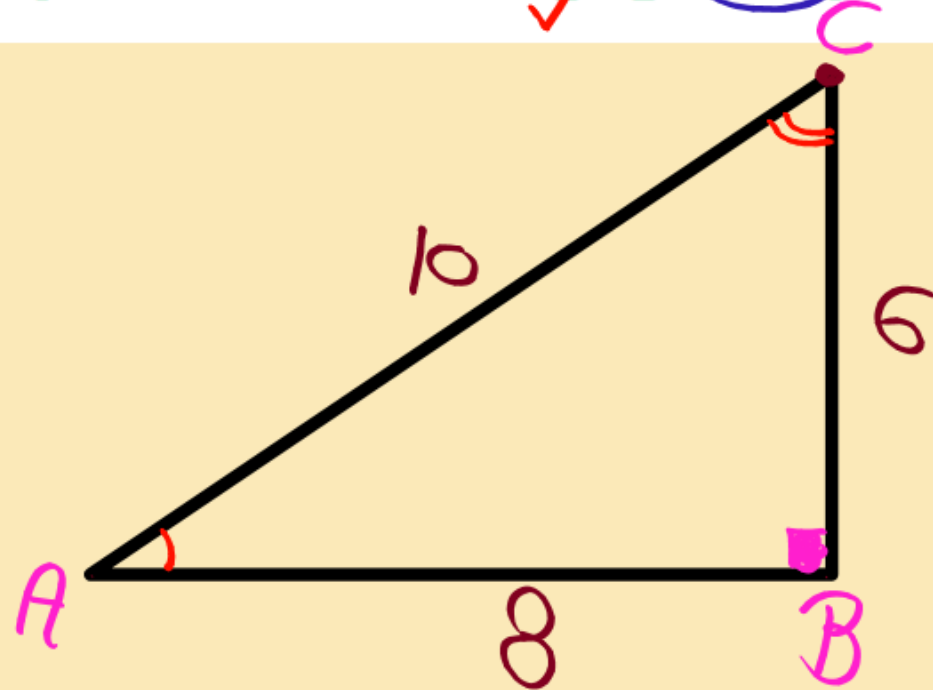
[B] ~~321/400~~

[C] ~~325/400~~

[D] 369/400

$$\left(\frac{6}{8}\right)^2 + \left(\frac{6}{10}\right)^2$$

$$\frac{9}{16} + \frac{9}{25}$$



=

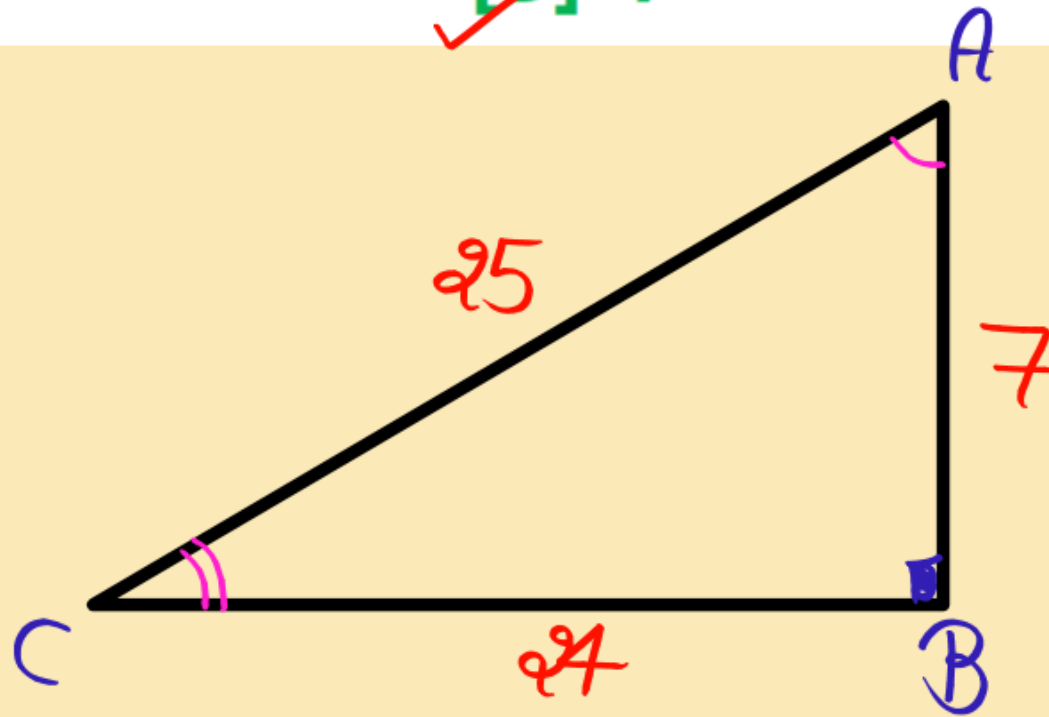
51. In a triangle ABC, right angled at B, $AB = 7$ and $(AC - BC) = 1\text{cm}$. The value of $(\sec A + \cot C)$ is:

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

$$= \frac{25}{7} + \frac{24}{7} = \frac{49}{7} = 7$$



$$(7, 24, 25)$$

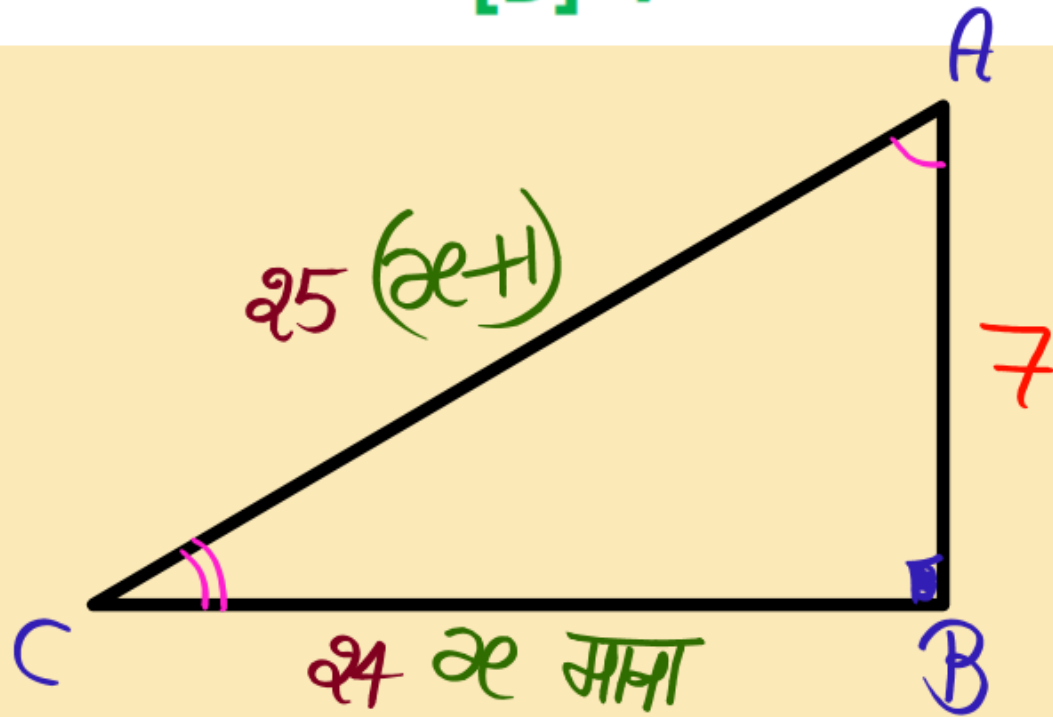
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ΔABC में B पर समकोण है, $AB = 7\text{cm}$ और $(AC - BC) = 1\text{cm}$ है। $(\sec A + \cot C)$ का मान है:

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

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

$AC = BC + 1$



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

$$\cancel{x^2} + x + 1 = \cancel{x^2} + 7^2$$

$$x = 48$$

$$x = 24$$

Ratio से Ratio

#



52. If $5\sin\theta - 4\cos\theta = 0$, $0^\circ < \theta < 90^\circ$, then the value of $\frac{5\sin\theta - 2\cos\theta}{5\sin\theta + 3\cos\theta}$ is:

यदि $5\sin\theta - 4\cos\theta = 0$, $0^\circ < \theta < 90^\circ$ है, तो $\frac{5\sin\theta - 2\cos\theta}{5\sin\theta + 3\cos\theta}$ का मान है:

[A] $\frac{3}{7}$
[C] $\frac{5}{8}$

✓ [B] $\frac{2}{7}$
[D] $\frac{3}{8}$

$$= \frac{2680}{7680}$$

$$5\sin\theta = 4\cos\theta$$

52. If $5\sin\theta - 4\cos\theta = 0$, $0^\circ < \theta < 90^\circ$, then the value of $\frac{7\sin\theta - 2\cos\theta}{9\sin\theta + 3\cos\theta}$ is:

यदि $5\sin\theta - 4\cos\theta = 0$, $0^\circ < \theta < 90^\circ$ है, तो $\frac{7\sin\theta - 2\cos\theta}{9\sin\theta + 3\cos\theta}$ का मान है:

[A] $\frac{3}{7}$
[C] $\frac{5}{8}$

[B] $\frac{2}{7}$
[D] $\frac{3}{8}$

$$\frac{28-10}{36+15} = \frac{18}{51} = \frac{6}{17}$$

$$5\sin\theta = 4\cos\theta$$

$$\frac{\sin\theta}{\cos\theta} = \frac{4}{5}$$

53. If $\tan x = 7/5$, then the value of $\frac{9\sin x - \frac{42}{5}\cos x}{15\sin x + 21\cos x}$ is?

यदि $\tan x = 7/5$ है, तो $\frac{9\sin x - \frac{42}{5}\cos x}{15\sin x + 21\cos x}$ का मान क्या है?

[A] 0

☒ [B] 0.1

[C] 1

[D] 0.5

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

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

$$= \frac{21}{210} = \frac{1}{10}$$

54. 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?

SSC CGL Pre 2024

[A] $3/5$

[C] $4/5$

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

~~[B] $5/6$~~

[D] $6/7$

$$\cot\theta = \frac{\cos\theta}{\sin\theta} = \sqrt{11}$$

55. 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] $\frac{41}{45}$

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

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

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

$$\frac{\sec\theta}{\operatorname{cosec}\theta} = \frac{2}{\sqrt{13}}$$

$$\frac{39+8}{65-16} = \frac{47}{49}$$

56. If $\cot A = \frac{5}{12}$, then find the value of $\frac{\sqrt{\sec A - \operatorname{cosec} A}}{\sqrt{\sec A + \operatorname{cosec} A}} - \sqrt{\frac{17}{7}}$.

यदि $\cot A = \frac{5}{12}$ है, तो $\frac{\sqrt{\sec A - \operatorname{cosec} A}}{\sqrt{\sec A + \operatorname{cosec} A}} - \sqrt{\frac{17}{7}}$ का मान ज्ञात कीजिए।

SSC CHSL PRE 2024

[A] $\frac{25}{\sqrt{119}}$

[B] 0

$= \sqrt{\frac{7}{17}} - \sqrt{\frac{17}{7}}$

[C] $-\frac{10}{\sqrt{119}}$

[D] $\frac{10}{\sqrt{119}}$

$= \frac{-10}{\sqrt{119}}$

$\frac{\operatorname{cosec} A}{\sec A} = \frac{5}{12}$

57. 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] $\frac{P^2}{P^2 + Q^2}$

[C] 0

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

[D] 3

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

~~$\frac{P^2 - Q^2}{P^2 + Q^2} - \frac{P^2 - Q^2}{P^2 + Q^2} + 3$~~

☆ ☆ C & D based ÷

$$\text{if, } \frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d}$$

या

$$\text{यदि } \frac{a+b}{a-b} = \frac{x}{y} \text{ तो } \frac{a}{b} = \frac{x+y}{x-y}$$

$$\text{if } \frac{a+b}{a-b} = \frac{11}{4}$$

$$\text{तो } \frac{a}{b} = \frac{11+4}{11-4} = \frac{15}{7}$$



58. If $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 11$, then the value of $\frac{25\tan^2\theta - 3}{36\cot^2\theta - 2} - 1$ is.

यदि $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = \frac{11}{1}$ है, तो $\frac{25\tan^2\theta - 3}{36\cot^2\theta - 2} - 1$ का मान ज्ञात कीजिए।

RRB TECHNICIAN GRADE-3 2025

[A] 1

[B] $\frac{2}{9}$

[C] $\frac{11}{9}$

[D] $\frac{10}{23}$

$$\frac{36-3}{25-2} - 1$$

$$= \frac{33}{23} - 1$$

$$\Rightarrow \frac{\sin\theta}{\cos\theta} = \frac{11+1}{11-1}$$

$$\tan\theta = \frac{6}{5}$$

59. If $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 12$, then the value of $\frac{12\tan^2\theta - 3}{169\cot^2\theta + 1}$ is:

यदि $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 12$ है, तो $\frac{12\tan^2\theta - 3}{169\cot^2\theta + 1}$ का मान ज्ञात कीजिए।

RRB NTPC GRADUATE LEVEL CBT-1 2024

[A] $-\frac{83}{21}$
[C] $-\frac{83}{61}$

[B] $\frac{83}{21}$
[D] $\frac{83}{61}$



60. If $\frac{\sin x - \cos x}{\sin x + \cos x} = \frac{2}{5}$, then the value of $\frac{1 + \cot^2 x}{1 - \cot^2 x}$?

यदि $\frac{\sin x - \cos x}{\sin x + \cos x} = \frac{2}{5}$, तो $\frac{1 + \cot^2 x}{1 - \cot^2 x}$ का मान क्या होगा?

[A] 2.25

[B] 1.45

[C] 3.75

[D] 5.25

$$\begin{aligned} \frac{S+C}{S-C} &= \frac{5}{2} \\ \Rightarrow \frac{S}{C} &= \frac{5+2}{5-2} \\ \tan x &= \frac{7}{3} \\ \cot x &= \frac{3}{7} \end{aligned}$$

$$\begin{aligned} &= \frac{1 + \frac{9}{49}}{1 - \frac{9}{49}} \\ &= \frac{\frac{58}{49}}{\frac{40}{49}} = \frac{29}{20} \end{aligned}$$

61. If $\frac{\sec \theta + \tan \theta}{\sec \theta - \tan \theta} = 2\frac{51}{79}$ then the value of $\sin \theta$ is equal to:

यदि $\frac{\sec \theta + \tan \theta}{\sec \theta - \tan \theta} = \frac{209}{79}$ है, तो $\sin \theta$ का मान ज्ञात कीजिए।

- [A] $\frac{65}{144}$ [B] $\frac{35}{72}$
 [C] $\frac{91}{144}$ [D] $\frac{39}{72}$

$$\frac{1}{\sin \theta} = \frac{144}{65}$$

Ans

$$2 + \frac{51}{79} = \frac{209}{79}$$

$$\frac{209}{130}$$

62. If $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{1}{9}$, θ lies in the first quadrant, then the value of $\frac{\sin\theta - \tan^2\theta}{\sin\theta + \tan^2\theta}$ is:

यदि $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{1}{9}$ है, θ प्रथम चतुर्थांश में है, तो $\frac{\sin\theta - \tan^2\theta}{\sin\theta + \tan^2\theta}$ का मान ज्ञात कीजिए।

(SSC CGL MAINS 2024)

[A] $-\frac{13}{27}$

[C] $\frac{13}{27}$

~~[B]~~ $-\frac{11}{29}$

[D] $\frac{11}{29}$

$$\frac{\frac{4}{5} - \frac{16}{9}}{\frac{4}{5} + \frac{16}{9}} = -\frac{44}{116}$$

सिद्धि-

$$\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = \frac{9}{1}$$

$$\frac{\sec\theta}{\tan\theta} = \frac{10}{8}$$

$$\Rightarrow \sec\theta = \frac{5}{4} \rightarrow H \quad 3 \rightarrow B$$

63. If $\frac{\operatorname{cosec}\theta + \cot\theta}{\operatorname{cosec}\theta - \cot\theta} = 7$, then the value of $\frac{4\sin^2\theta + 5}{4\sin^2\theta - 1}$ is:

यदि $\frac{\operatorname{cosec}\theta + \cot\theta}{\operatorname{cosec}\theta - \cot\theta} = 7$ है, तो $\frac{4\sin^2\theta + 5}{4\sin^2\theta - 1}$ का मान ज्ञात करें।

[A] 15

[B] 3

[C] 9

[D] 12

64. If $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{3}{5}$, then the value of $\frac{\operatorname{cosec}\theta + \cot\theta}{\operatorname{cosec}\theta - \cot\theta}$ is: -

यदि $\frac{\sec\theta \ominus \tan\theta}{\sec\theta \oplus \tan\theta} = \frac{3}{5}$ है, तो $\frac{\operatorname{cosec}\theta \oplus \cot\theta}{\operatorname{cosec}\theta - \cot\theta}$ का मान बताइए।

[A] $31 + 8\sqrt{15}$

[C] $27 + \sqrt{15}$

[B] $33 + 4\sqrt{15}$

[D] $24 + \sqrt{15}$

Handwritten solution:

$$\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = \frac{5}{3}$$

Let $\sec\theta = x$ and $\tan\theta = y$

$$\frac{x + y}{x - y} = \frac{5}{3}$$

$$3(x + y) = 5(x - y)$$

$$3x + 3y = 5x - 5y$$

$$3y + 5y = 5x - 3x$$

$$8y = 2x$$

$$4y = x$$

$$\sec\theta = 4 \Rightarrow \cot\theta = \sqrt{15}$$

Now, $\frac{\operatorname{cosec}\theta + \cot\theta}{\operatorname{cosec}\theta - \cot\theta} = \frac{\frac{1}{\sec\theta} + \cot\theta}{\frac{1}{\sec\theta} - \cot\theta} = \frac{\frac{1}{4} + \sqrt{15}}{\frac{1}{4} - \sqrt{15}}$

$$= \frac{(1 + 4\sqrt{15})^2}{(1 - 4\sqrt{15})^2}$$

$$= \frac{1 + 15 + 8\sqrt{15}}{1 + 15 - 8\sqrt{15}}$$

$$= \frac{16 + 8\sqrt{15}}{16 - 8\sqrt{15}}$$

$$= \frac{16 + 8\sqrt{15}}{16 - 8\sqrt{15}} \times \frac{16 + 8\sqrt{15}}{16 + 8\sqrt{15}} = \frac{(16 + 8\sqrt{15})^2}{(16)^2 - (8\sqrt{15})^2}$$

$$= \frac{256 + 256\sqrt{15} + 960}{256 - 960} = \frac{1216 + 256\sqrt{15}}{-704} = -\frac{1216 + 256\sqrt{15}}{704}$$

$$= -\frac{1216}{704} - \frac{256\sqrt{15}}{704} = -\frac{17}{10} - \frac{\sqrt{15}}{2.75}$$