TRIGONOMETRY

त्रिकोणमिति

SHEET-01

CLASS NOTES

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Trigonometry

	Pre	Mains
→ Ratio → Identity → Value → Misc	2-3	2-3

QUESTIONS BASED ON BASIC TRIGONOMETRIC RATIOS

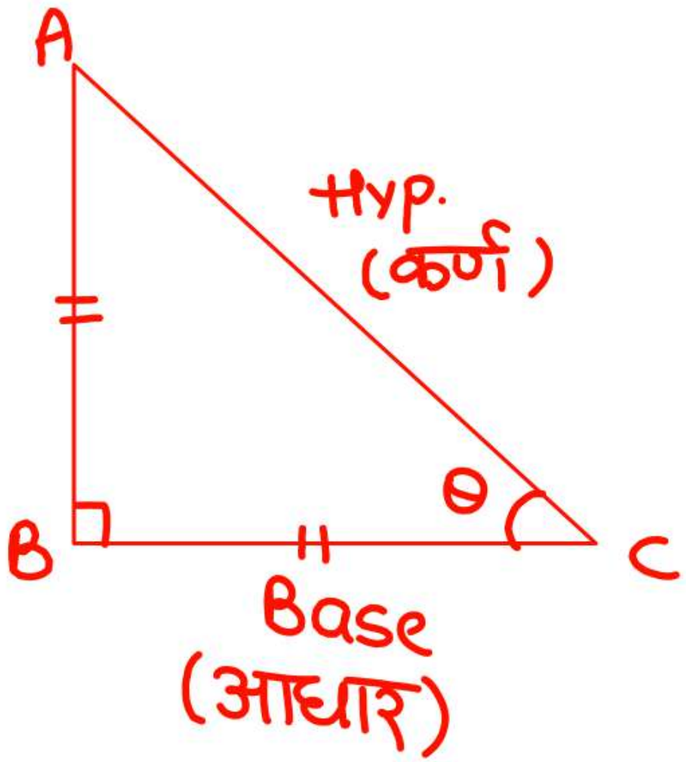
$\sin\theta = \frac{P}{H}$ $\quad$ $\operatorname{cosec}\theta = \frac{H}{P}$

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

$\tan\theta = \frac{P}{B}$ $\quad$ $\cot\theta = \frac{B}{P}$

$\sin\theta$ $\cos\theta$ $\tan\theta$

$\frac{P}{H}$ $\frac{B}{H}$ $\frac{P}{B}$



$$\sin\theta = \frac{P}{H} = \frac{3}{5}$$

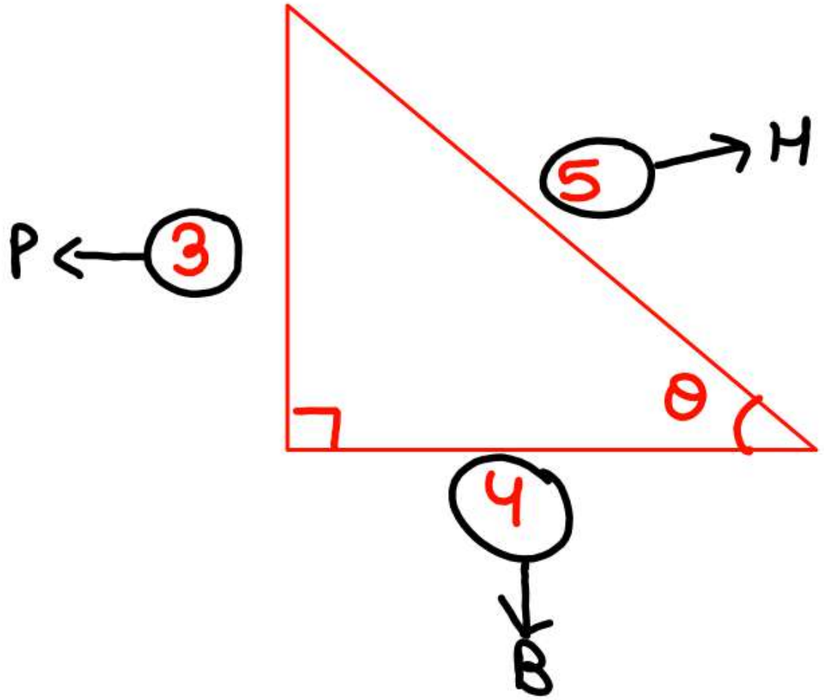
$$\cos\theta = \frac{B}{H} = \frac{4}{5}$$

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

$$\operatorname{cosec}\theta = \frac{H}{P} = \frac{5}{3}$$

$$\sec\theta = \frac{H}{B} = \frac{5}{4}$$

$$\cot\theta = \frac{B}{P} = \frac{4}{3}$$



$\sin\theta = \frac{P}{H} = \frac{5}{13}$

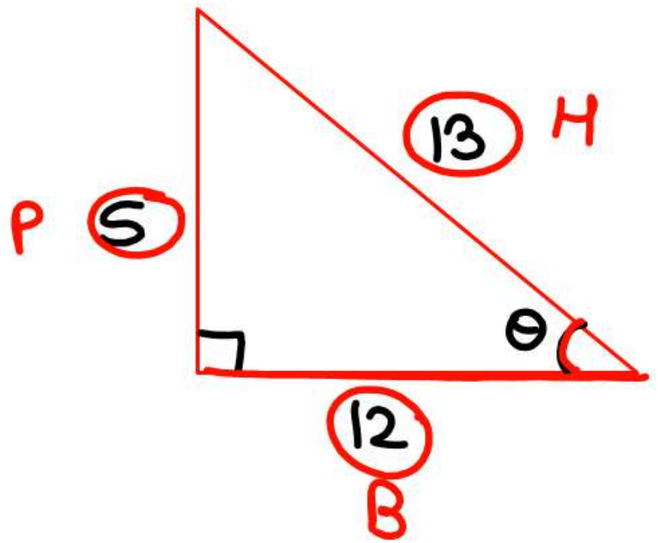
$\cos\theta = \frac{B}{H} = \frac{12}{13}$

$\tan\theta = \frac{P}{B} = \frac{5}{12}$

$\operatorname{cosec}\theta = \frac{13}{5}$

$\sec\theta = \frac{13}{12}$

$\cot\theta = \frac{12}{5}$



$$\sin\theta = \frac{P}{H} = \frac{12}{13}$$

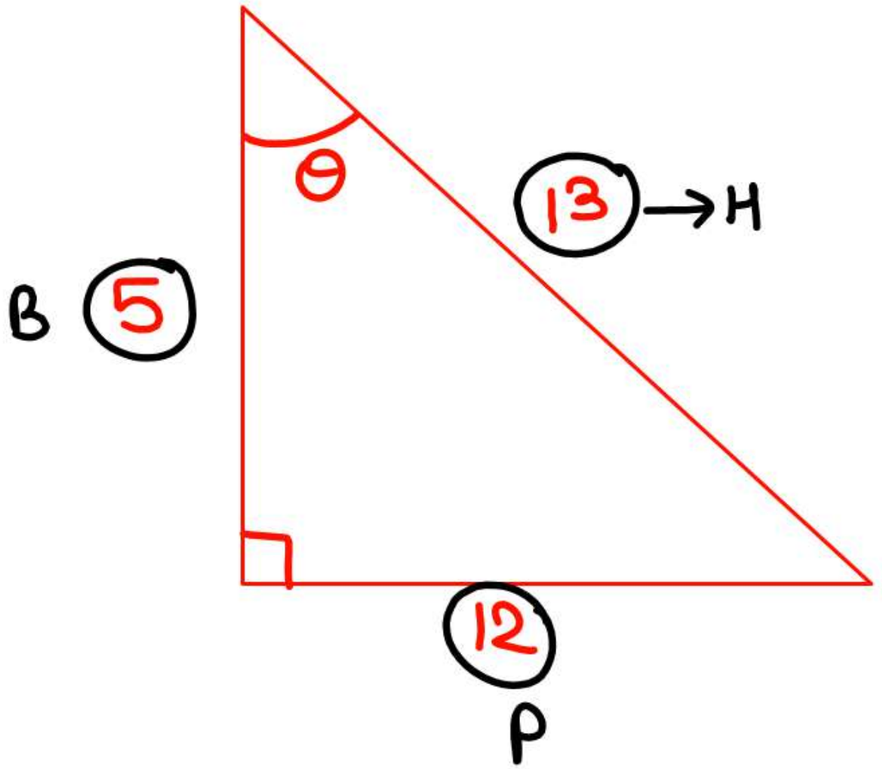
$$\cos\theta = \frac{B}{H} = \frac{5}{13}$$

$$\tan\theta = \frac{P}{B} = \frac{12}{5}$$

$$\operatorname{cosec}\theta = \frac{13}{12}$$

$$\sec\theta = \frac{13}{}$$

$$\cot\theta = \frac{5}{12}$$



$$\sin\theta = \frac{P}{H} = \frac{4}{5}$$

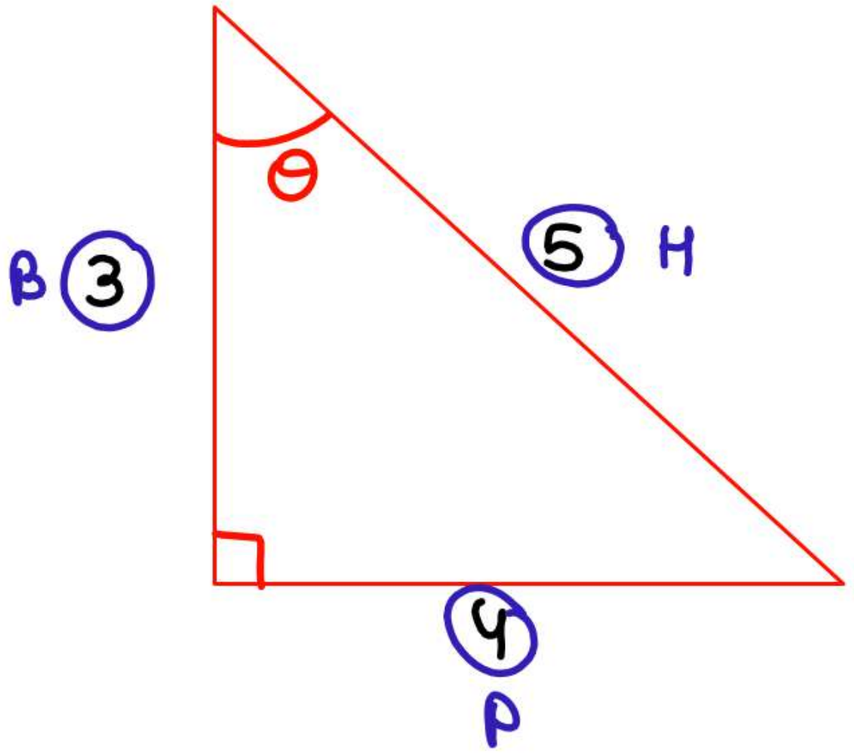
$$\cos\theta = \frac{B}{H} = \frac{3}{5}$$

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

$$\operatorname{cosec}\theta = \frac{5}{4}$$

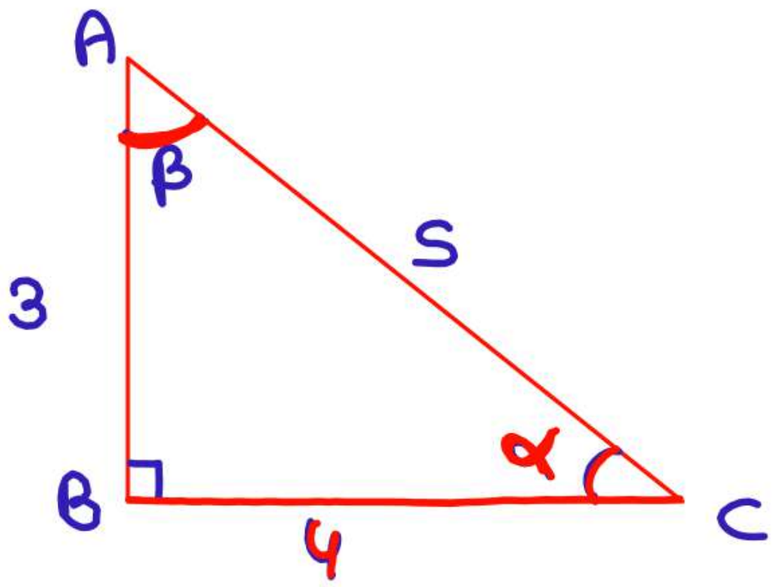
$$\sec\theta = \frac{5}{3}$$

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



⊙ $\sin\alpha + \sin\beta$

$$\frac{3}{5} + \frac{4}{5} = \frac{7}{5}$$



⊙ $\cos\alpha + \cos\beta$

$$\frac{4}{5} + \frac{3}{5} = \frac{7}{5}$$

⊙ $\sin^2\alpha + \tan^2\alpha + \sin\beta$

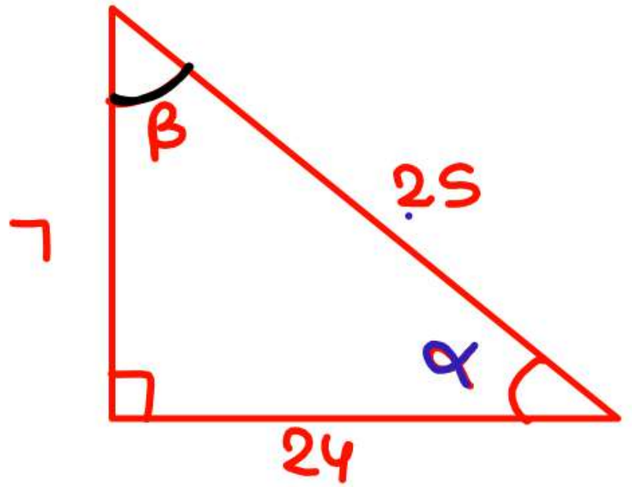
$$= \left(\frac{3}{5}\right)^2 + \left(\frac{3}{4}\right)^2 + \frac{4}{5}$$

$$= \frac{9}{25} + \frac{9}{16} + \frac{4}{5} = \frac{144 + 225 + 320}{400} = \frac{689}{400}$$

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

⊙ $\sin\alpha + \cos\beta = ?$

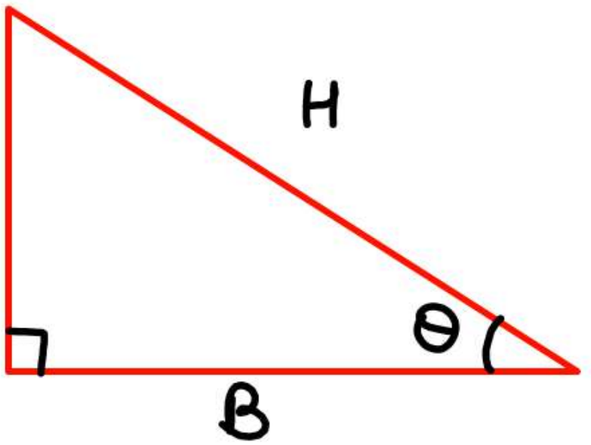
$= \frac{7}{25} + \frac{7}{25} = \frac{14}{25}$



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

Pythagorus Theorem

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



Ex:- $(3)^2+(4)^2=(5)^2$

$9 + 16 = 25$

$(7)^2+(24)^2=(25)^2$

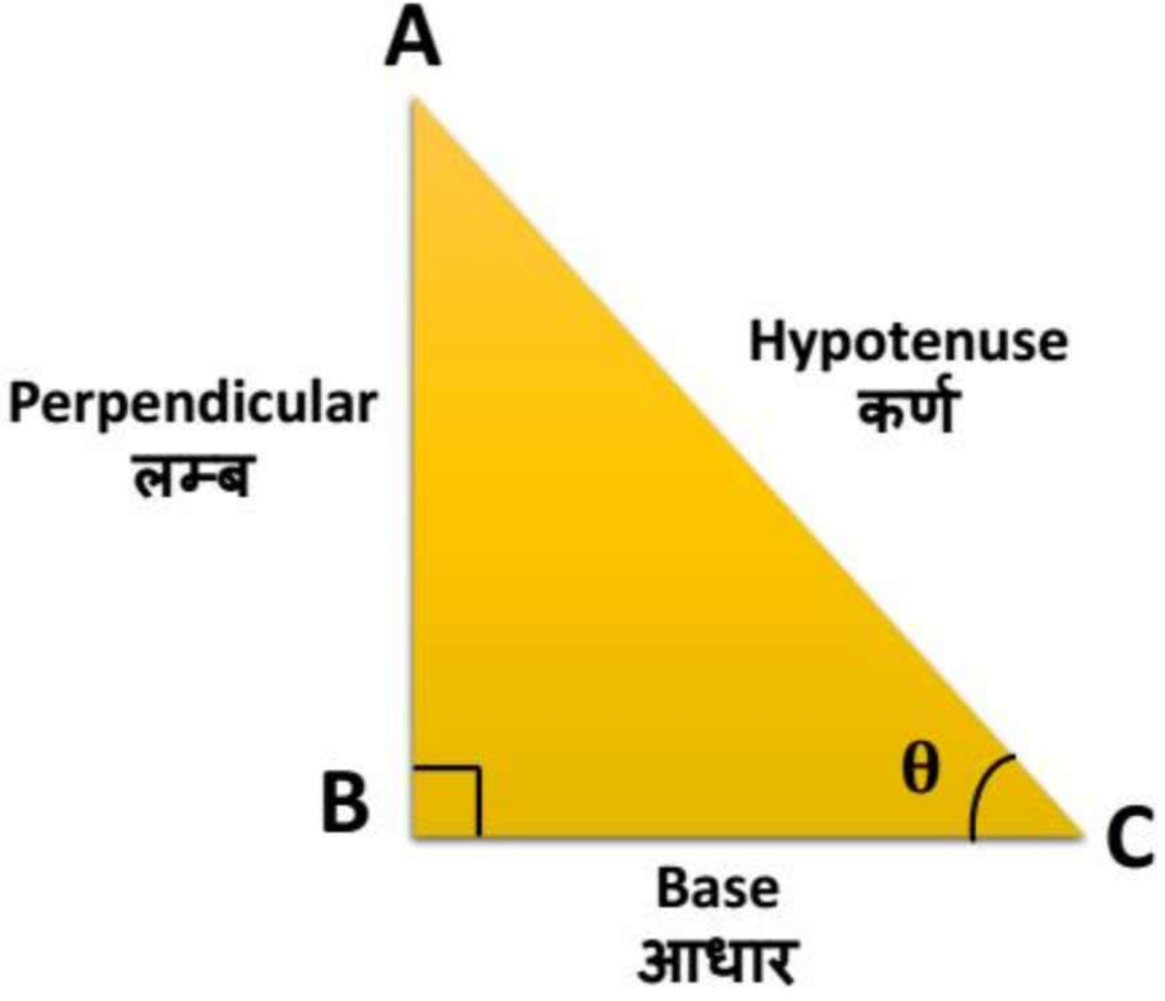
$49 + 576 = 625$

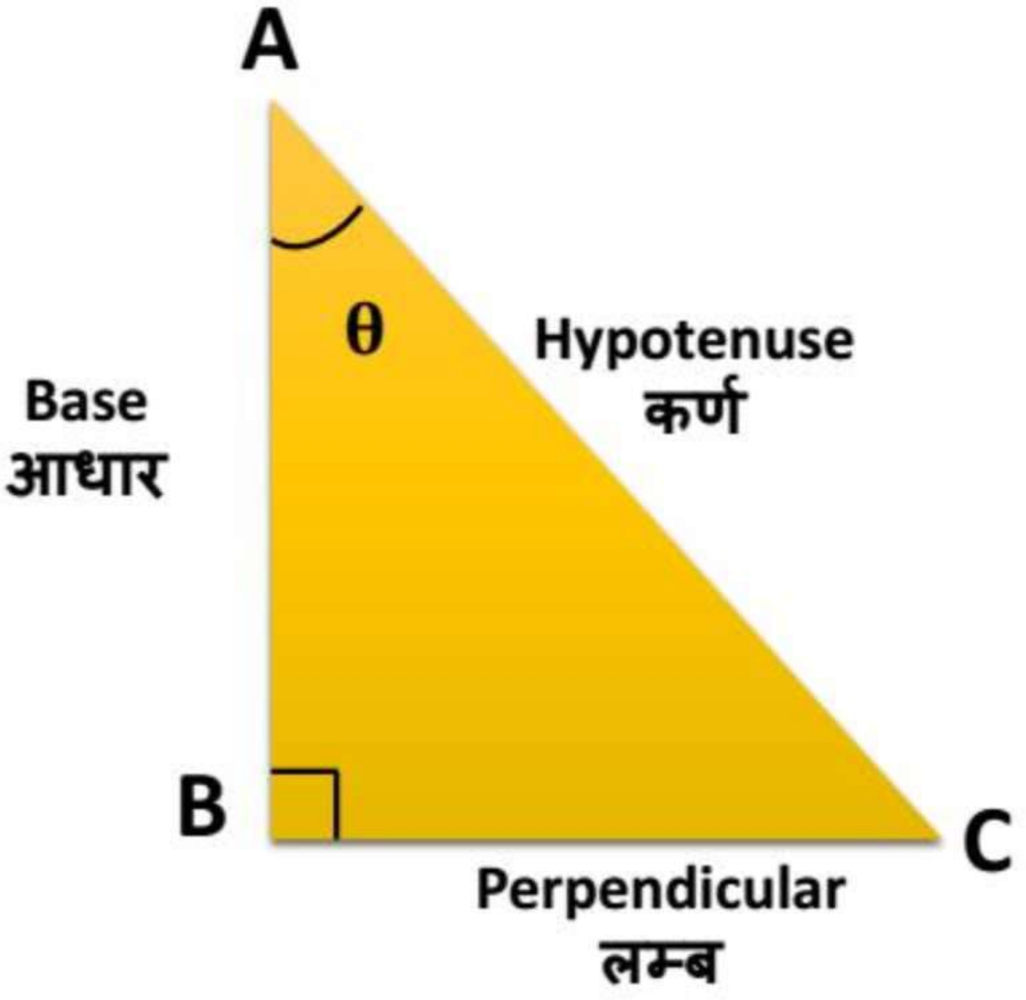
$625 = 625$

Pythagorean Triplets

- (3,4,5) → (6,8,10), (9,12,15), (12,16,20)
- (6,8,10)
- (5,12,13)
- (7,24,25)
- (8,6,10) · (8,15,17)
- (9,40,41)
- (11,60,61)

CONCEPT OF BASE AND PERPENDICULAR





HOW MANY TRIGONOMETRIC RATIOS ARE THERE?

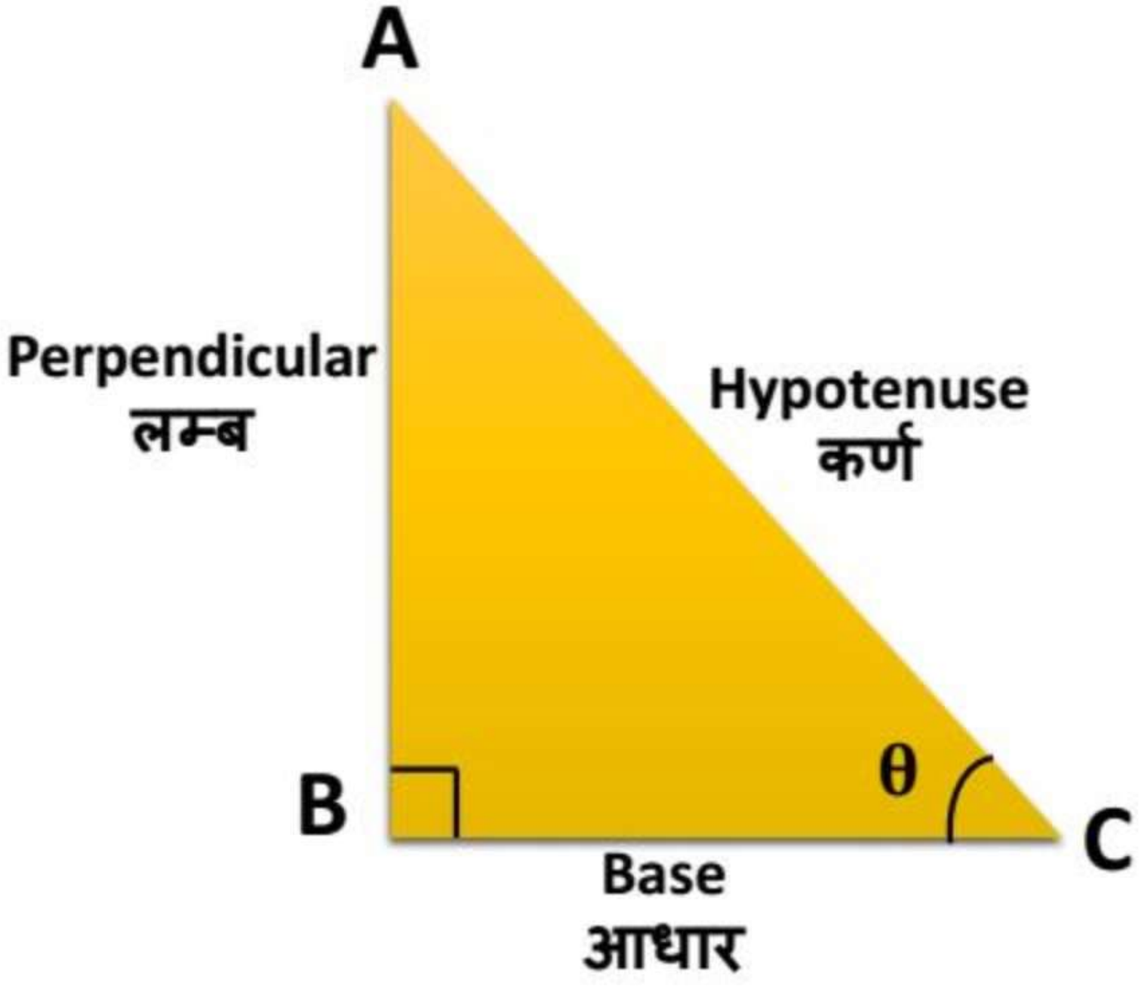
कितने त्रिकोणमितीय अनुपात होते हैं?

B → Base/आधार, P → Perpendicular/ लम्ब H → Hypotenuse/ कर्ण

(a) $\sin\theta = \frac{P}{H}$ (d) $\operatorname{cosec}\theta = \frac{H}{P}$

(b) $\cos\theta = \frac{B}{H}$ (e) $\sec\theta = \frac{H}{B}$

(c) $\tan\theta = \frac{P}{B}$ (f) $\cot\theta = \frac{B}{P}$



Note: It should be noted that (यह ध्यान दिया जाना चाहिए कि):

sin θ is an abbreviation for "sine of angle θ", it is not the product of sin and θ.

sin θ "कोण θ के ज्या" का संक्षिप्त नाम है, यह sin और θ का गुणनफल नहीं है।

And $\boldsymbol{sin^2\theta = (sin\theta)^2, sin^3\theta = (sin\theta)^3, cos^3\theta = (cos\theta)^3, etc.}$

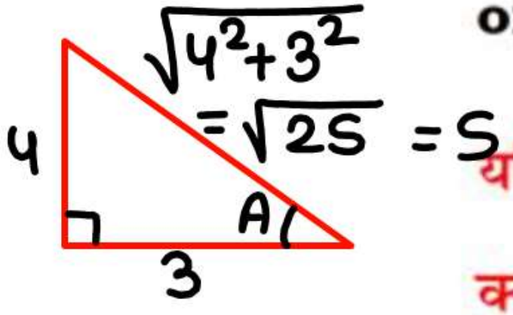
$$\text{cosec}\theta = \left(\frac{1}{\sin\theta}\right)$$

$$sec\theta = \left(\frac{1}{\cos\theta}\right)$$

$$\cot\theta = \left(\frac{1}{\tan\theta}\right)$$

$\tan A = \frac{4}{3} = \frac{P}{B}$

1. **If $\tan A = \frac{4}{3}, 0 \le A \le 90°$, then find the value of sin A.**



$\sin A = \frac{P}{H} = \frac{4}{5}$

यदि $\tan A = \frac{4}{3}, 0 \le A \le 90°$, है, तो sin A का मान क्या होगा?

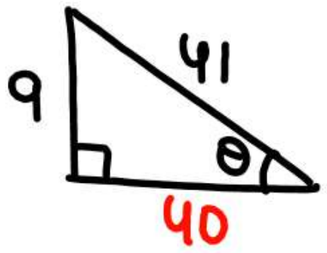
SSC CPO 03/10/2023 (Shift-01)

(a) $\frac{4}{5}$ (b) $\frac{3}{5}$

(c) $\frac{3}{4}$ (d) $\frac{4}{3}$

$\sin\theta = \frac{9 \to P}{41 \to H}$

2. **If $\sin\theta = \left(\frac{9}{41}\right)$, $0° < \theta < 90°$ then what is the value of $\cot\theta$?**



$\cot\theta = \frac{B}{P} = \frac{40}{9}$

यदि **$\sin\theta = \left(\frac{9}{41}\right)$, $0° < \theta < 90°$** तो **$\cot\theta$** का मान क्या होगा?

SSC CGL MAINS (08/08/2022 (Shift-01)

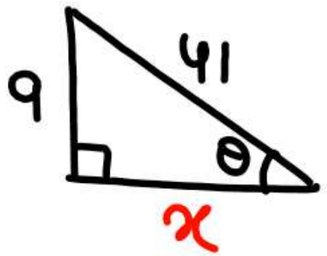
(a) $\frac{40}{9}$ (b) $\frac{35}{8}$

(c) $\frac{39}{9}$ (d) $\frac{47}{8}$

$\sin\theta = \frac{9 \to P}{41 \to H}$

2. If $\sin\theta = \left(\frac{9}{41}\right)$, $0° < \theta < 90°$ then what is the value of $\cot\theta$?

यदि $\sin\theta = \left(\frac{9}{41}\right)$, $0° < \theta < 90°$ तो $\cot\theta$ का मान क्या होगा?



$9^2 + x^2 = (41)^2$

$\Rightarrow x^2 = (41)^2 - (9)^2$

$\Rightarrow x^2 = 32 \times 50$

$\Rightarrow x^2 = 16 \times 2 \times 2 \times 25$

$\Rightarrow x = 4 \times 2 \times 5 = 40$

SSC CGL MAINS (08/08/2022 (Shift-01)

(a) $\frac{40}{9}$ (b) $\frac{35}{8}$

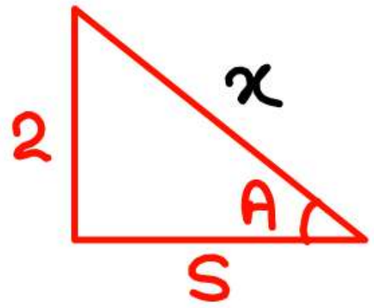
(c) $\frac{39}{9}$ (d) $\frac{47}{8}$

$\tan A = \frac{2 \to P}{5 \to B}$

$\frac{\sec^2 A}{\text{cosec}^2 A} = \left(\frac{\frac{H^2}{B^2}}{\frac{H^2}{P^2}}\right)$

$= \frac{H^2 \times P^2}{H^2 \times B^2}$

$= \frac{4}{25}$



3. If $\tan A = \frac{2}{5}$ find the value of $\frac{\sec^2 A}{\text{cosec}^2 A}$.

यदि $\tan A = \frac{2}{5}$ है, तो $\frac{\sec^2 A}{\text{cosec}^2 A}$ का मान ज्ञात कीजिए।

SSC CPO 03/10/2023 (Shift-3)

(a) $\frac{3}{5}$

(b) $\frac{4}{25}$

(c) $\frac{2}{5}$

(d) $\frac{9}{25}$

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

$\frac{\sec^2 A}{\text{cosec}^2 A} = \tan^2 A = \frac{4}{25}$

3. If $\tan A = \frac{2}{5}$ find the value of $\frac{\sec^2 A}{\text{cosec}^2 A}$.

यदि $\tan A = \frac{2}{5}$ है, तो $\frac{\sec^2 A}{\text{cosec}^2 A}$ का मान ज्ञात कीजिए।

SSC CPO 03/10/2023 (Shift-3)

(a) $\frac{3}{5}$

(b) $\frac{4}{25}$

(c) $\frac{2}{5}$

(d) $\frac{9}{25}$

$\frac{\sec\theta}{\text{cosec}\theta} = \left(\frac{\frac{1}{\cos\theta}}{\frac{1}{\sin\theta}}\right) = \frac{\sin\theta}{\cos\theta} = \tan\theta$

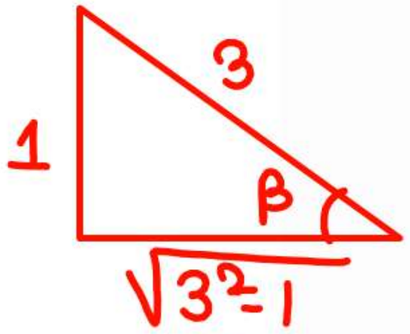
$(\sec\beta - \tan\beta)^2$

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

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

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

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



$\sqrt{3^2-1}$

$= \sqrt{8}$

$= 2\sqrt{2}$

4. If $\sin\beta = \frac{1}{3}$, $(\sec\beta - \tan\beta)^2$ is equal to:

यदि $\sin\beta = \frac{1}{3}$ है, तो $(\sec\beta - \tan\beta)^2$ किसके बराबर है?

SSC CPO 05/10/2023 (Shift-01)

(a) $\frac{1}{3}$

(b) $\frac{1}{2}$

(c) $\frac{2}{3}$

(d) $\frac{3}{4}$

$\sqrt{4\times 2}$

$\tan^2\theta \cdot \cos^2\theta$

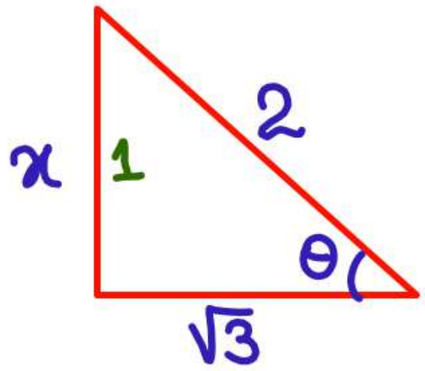
$= \frac{P^2}{B^2} \times \frac{B^2}{H^2}$

$= \frac{1}{4}$

5. If $\cos\theta = \frac{\sqrt{3}}{2}$, then $\tan^2\theta \cos^2\theta = ?$

B

H



$(x)^2 + (\sqrt{3})^2 = (2)^2$

$\Rightarrow x^2 + 3 = 4$

$\Rightarrow x^2 = 1$

$\Rightarrow x = 1$

यदि $\cos\theta = \frac{\sqrt{3}}{2}$ है, तो $\tan^2\theta \cos^2\theta = ?$

SSC CGL 14/07/2023 (Shift-1)

(a) $\frac{1}{\sqrt{3}}$

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

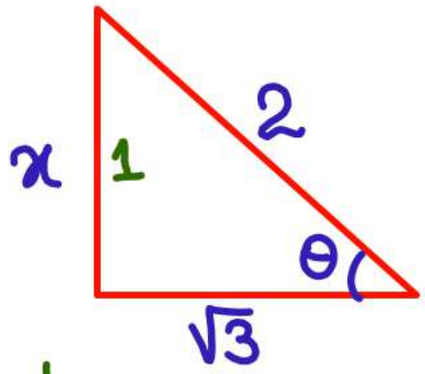
(d) $\sqrt{3}$

$\tan^2\theta \cdot \cos^2\theta$

$= \frac{P^2}{B^2} \times \frac{B^2}{H^2}$

$= \frac{1}{4}$

5. If $\cos\theta = \frac{\sqrt{3}}{2}$ (B, H), then $\tan^2\theta \cos^2\theta = ?$



यदि $\cos\theta = \frac{\sqrt{3}}{2}$ है, तो $\tan^2\theta \cos^2\theta = ?$

SSC CGL 14/07/2023 (Shift-1)

$x = \sqrt{(2)^2 - (\sqrt{3})^2}$

$= \sqrt{4-3}$

$= 1$

(a) $\frac{1}{\sqrt{3}}$

(b) $\frac{1}{4}$

(c) $\frac{1}{2}$

(d) $\sqrt{3}$

M-1

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

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

$\tan\theta = \frac{4}{5}$

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

यदि $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$ है तो $\frac{5\sin\theta + 2\cos\theta}{5\sin\theta + 3\cos\theta}$ का मान ज्ञात कीजिए।

SSC CGL 13/04/2022 (Shift- 02)

$$\text{Ans} = \frac{5\times\tan\theta + 2}{5\times\tan\theta + 3}$$

$$= \frac{5\times\frac{4}{5} + 2}{5\times\frac{4}{5} + 3} = \frac{6}{7}$$

(a) $\frac{4}{7}$

(b) $\frac{6}{7}$

(c) $\frac{2}{7}$

(d) $\frac{3}{7}$

M-1

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

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

$\text{Ans} = \frac{5\times4+2\times5}{5\times4+3\times5}$

$= \frac{30}{35} \frac{6}{7}$

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

$\frac{5\times\frac{P}{H} + 2\times\frac{B}{H}}{5\times\frac{P}{H} + 3\times\frac{B}{H}}$

यदि $5\sin\theta - 4\cos\theta = 0$, $0° < \theta < 90°$ है तो $\frac{5\sin\theta + 2\cos\theta}{5\sin\theta + 3\cos\theta}$ का मान ज्ञात कीजिए।

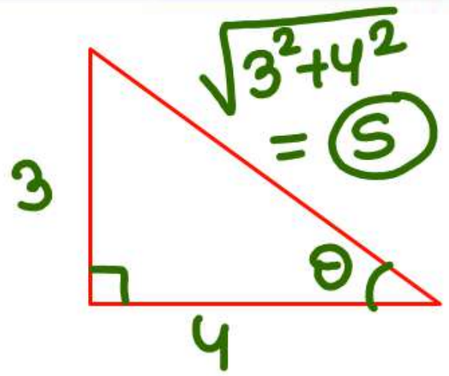
SSC CGL 13/04/2022 (Shift- 02)

(a) $\frac{4}{7}$

(b) $\frac{6}{7}$

(c) $\frac{2}{7}$

(d) $\frac{3}{7}$



7. $\tan\theta = \frac{3}{4}$, find the value of expression $\frac{1+\sin\theta}{1-\sin\theta}$:

यदि $\tan\theta = \frac{3}{4}$ अभिव्यक्ति $\frac{1+\sin\theta}{1-\sin\theta}$ का मान ज्ञात कीजिए :

$$\frac{1+\frac{3}{5}}{1-\frac{3}{5}} = \frac{\frac{8}{5}}{\frac{2}{5}} = 4$$

SSC CHSL 09/08/2023 Shift-03

(a) 4
(b) 3
(c) 8
(d) 5

M-1

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

8. If $5\cot\theta = 3$, then find the value of $\frac{6\sin\theta - 3\cos\theta}{7\sin\theta + 3\cos\theta}$ is :

$\frac{\frac{6\sin\theta}{\sin\theta} - \frac{3\cos\theta}{\sin\theta}}{\frac{7\sin\theta}{\sin\theta} + \frac{3\cos\theta}{\sin\theta}}$

$= \frac{6 - 3\cot\theta}{7 + 3\cot\theta}$

$= \frac{6 - 3\times\frac{3}{5}}{7 + 3\times\frac{3}{5}} = \frac{\frac{21}{5}}{\frac{44}{5}} = \frac{21}{44}$

यदि $5\cot\theta = 3$ है तो $\frac{6\sin\theta - 3\cos\theta}{7\sin\theta + 3\cos\theta}$ का मान ज्ञात कीजिए।

SSC CGL 9/03/2020 (Shift- 02)

(a) $\frac{21}{44}$ (b) $\frac{44}{21}$

(c) $\frac{11}{40}$ (d) $\frac{20}{41}$

M-2

$\frac{\cos\theta}{\sin\theta} = \frac{B/H}{P/H} = \frac{B}{P} = \frac{3}{5}$

$\therefore$

$\frac{6\times5-3\times3}{7\times5+3\times3} = \frac{21}{44}$

8. If $5\cot\theta = 3$, then find the value of $\frac{6\sin\theta - 3\cos\theta}{7\sin\theta + 3\cos\theta}$ is :

यदि $5\cot\theta = 3$ है तो $\frac{6\sin\theta - 3\cos\theta}{7\sin\theta + 3\cos\theta}$ का मान ज्ञात कीजिए।

SSC CGL 9/03/2020 (Shift- 02)

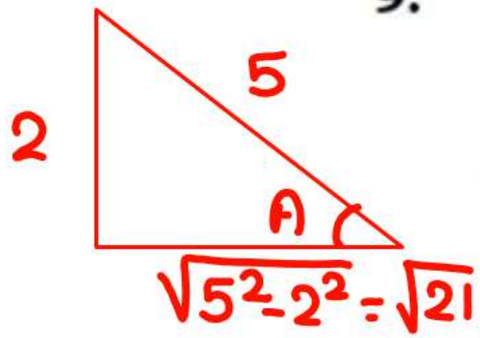
(a) $\frac{21}{44}$

(b) $\frac{44}{21}$

(c) $\frac{11}{40}$

(d) $\frac{20}{41}$

9. If $\sin A = \frac{2}{5}$, where A is an acute angle, what is the value of $\frac{5\sin A + 2\operatorname{cosec} A}{\sqrt{21}\sec A}$?



$$\frac{5\times\frac{2}{5}+2\times\frac{5}{2}}{\sqrt{21}\times\frac{5}{\sqrt{21}}}=\frac{7}{5}$$

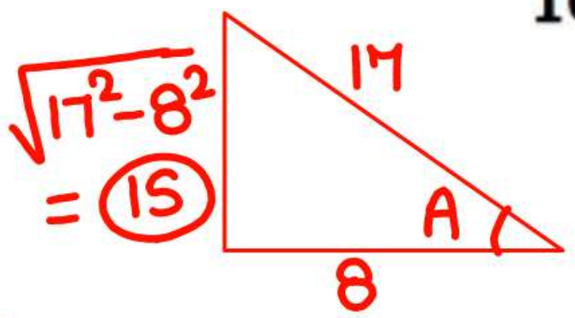
यदि $\sin A = \frac{2}{5}$ है, जहाँ A एक न्यूनकोण है, तो $\frac{5\sin A + 2\operatorname{cosec} A}{\sqrt{21}\sec A}$ का मान क्या है?

SSC CHSL 10/08/2023 (Shift-01)

(a) $\frac{5}{4}$ (b) $\frac{7}{5}$

(c) $\frac{4}{5}$ (d) $\frac{5}{7}$

10. If $\sec A = \frac{17}{8}$ (H/B), given that $A < 90°$, what is the value of the following? $\frac{34\sin A + 15\cot A}{68\cos A - 16\tan A}$



$$\frac{34 \times \frac{15}{17} + 15 \times \frac{8}{15}}{68 \times \frac{8}{17} - 16 \times \frac{15}{8}}$$

$$= \frac{38}{2} = 19$$

यदि $\sec A = \frac{17}{8}$ है तो $A < 90°$ का मान क्या है? दिया है $\frac{34\sin A + 15\cot A}{68\cos A - 16\tan A}$ (B/P)

SSC CGL 11/04/2022 (Shift- 03)

(a) 23
(b) 19 ✓
(c) 30
(d) 38

11. If $\tan B = \frac{5}{3}$, what is the value of $\frac{\text{cosec } B + \sin B}{\cos B - \sec B}$?

H.W

यदि $\tan B = \frac{5}{3}$ है तो $\frac{\text{cosec } B + \sin B}{\cos B - \sec B}$ का मान ज्ञात कीजिए।

SSC CGL 20/04/2022 (Shift- 02)

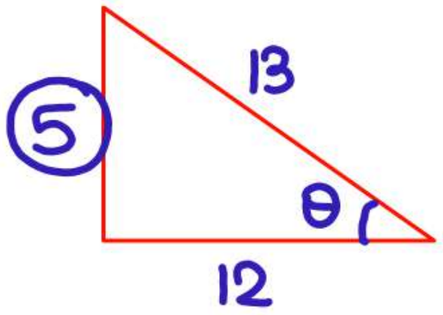
(a) $-\frac{177}{125}$

(b) $\frac{177}{125}$

(c) $-\frac{59}{15}$

(d) $\frac{59}{15}$

12. If $\cos\theta = \frac{12}{13}$, then the value of $\frac{\sin\theta(1-\tan\theta)}{\tan\theta(1+\operatorname{cosec}\theta)}$ is :



यदि $\cos\theta = \frac{12}{13}$ है तो $\frac{\sin\theta(1-\tan\theta)}{\tan\theta(1+\operatorname{cosec}\theta)}$ का मान ज्ञात कीजिए।

$$\frac{\frac{5}{13}\left(1-\frac{5}{12}\right)}{\frac{5}{12}\left(1+\frac{13}{5}\right)} = \frac{5\times12\times7\times8}{13\times5\times12\times18} = \frac{35}{234}$$

SSC CGL MAINS 03/02/2022

(a) $\frac{25}{78}$

(b) $\frac{35}{234}$

(c) $\frac{35}{108}$

(d) $\frac{25}{156}$

13. If $\left\{\frac{(3\sin\theta - \cos\theta)}{(\cos\theta + \sin\theta)}\right\} = 1$, then the value of $\cot\theta$ is:

$3\sin\theta - \cos\theta = \cos\theta + \sin\theta$

$\Rightarrow 3\sin\theta = 3\cos\theta$

$\Rightarrow 1 = \frac{\cos\theta}{\sin\theta} = \cot\theta$

यदि $\left\{\frac{(3\sin\theta - \cos\theta)}{(\cos\theta + \sin\theta)}\right\} = 1$ है, तो $\cot\theta$ का मान ज्ञात कीजिए।

SSC CGL 14/07/2023 (Shift-1)

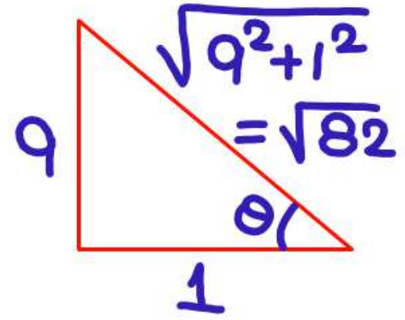
(a) 3
(b) 0
(c) 1
(d) 2

M-1

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

$\Rightarrow \sin\theta = 9\cos\theta$

$\Rightarrow \tan\theta = \frac{9}{1}$



$$\therefore \frac{\left(\frac{\sqrt{82}}{9}\right)^2}{2-\left(\frac{\sqrt{82}}{9}\right)^2} = \frac{\frac{82}{81}}{2-\frac{82}{81}} = \frac{82}{162-82} = \frac{82}{80} = \frac{41}{40}$$

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

यदि $\frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{4}{5}$ तो $\frac{\operatorname{cosec}^2\theta}{2 - \operatorname{cosec}^2\theta}$ का मान ज्ञात करें

SSC CHSL 09/08/2023 Shift-01

(a) $\frac{16}{25}$

(b) $\frac{40}{41}$

(c) $\frac{41}{40}$

(d) $\frac{31}{30}$

* $\frac{a}{b} = \frac{5}{3}$

$\frac{a+b}{a-b} = \frac{5+3}{5-3} = \frac{8}{2} = 4$

* $\frac{a+b}{a-b} = \frac{7}{3}$

$\frac{a}{b} = ?$

Soln $\frac{(a+b)+(a-b)}{(a+b)-(a-b)} = \frac{7+3}{7-3}$

$\Rightarrow \frac{2a}{a+b-a+b} = \frac{10}{4} = \frac{5}{2}$

$\Rightarrow \frac{2a}{2b} = \frac{5}{2}$

$* \quad \frac{a}{b} = \frac{5}{3}$

$\frac{a+b}{a-b} = \frac{5+3}{5-3} = \frac{8}{2} = 4$

$* \quad \frac{a+b}{a-b} = \frac{7}{3}$

$\frac{a}{b} = ?$

ans $\frac{a}{b} = \frac{5}{2}$

14. If $\frac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta}=\frac{4}{5}$, then the value of $\frac{\cos ec^2\theta}{2-\cos ec^2\theta}$ is:

यदि $\frac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta}=\frac{4}{5}$ तो $\frac{\cos ec^2\theta}{2-\cos ec^2\theta}$ का मान ज्ञात करें

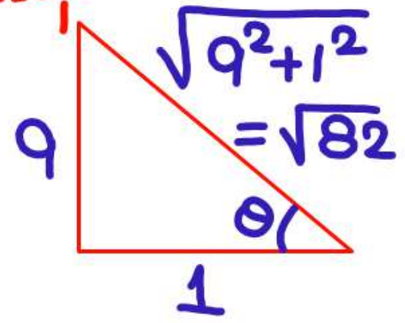
SSC CHSL 09/08/2023 Shift-01

(a) $\frac{16}{25}$ (b) $\frac{40}{41}$

(c) $\frac{41}{40}$ (d) $\frac{31}{30}$

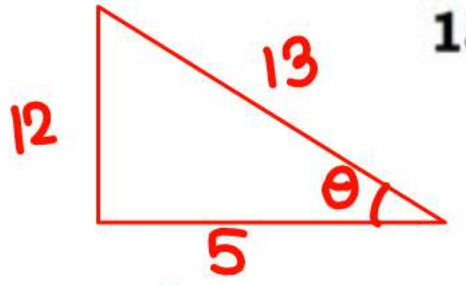
$\frac{m-2}{\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}=\frac{5}{4}}$

$\Rightarrow \frac{\sin\theta}{\cos\theta}=\frac{\frac{9}{2}}{\frac{1}{2}}=\frac{9}{1}$



$\therefore \frac{\left(\frac{\sqrt{82}}{9}\right)^2}{9-\left(\frac{\sqrt{82}}{9}\right)^2}=\frac{\frac{82}{81}}{9-\frac{82}{81}}$

$=\frac{82}{\frac{729-82}{81}}=\frac{82}{\frac{647}{81}}=\frac{41}{40}$



15. If $\sin\theta = \frac{P}{H}\frac{12}{13}$, $0 < \theta < 90°$, then $\frac{\sin^2\theta - \cos^2\theta}{2\sin\theta.\cos\theta} \times \frac{1}{\tan^2\theta} =$ _____.

यदि $\sin\theta = \frac{12}{13}$, $0 < \theta < 90°$ है तो $\frac{\sin^2\theta - \cos^2\theta}{2\sin\theta.\cos\theta} \times \frac{1}{\tan^2\theta} =$ _____.

$$\text{Ans} = \frac{\left(\frac{12}{13}\right)^2 - \left(\frac{5}{13}\right)^2}{2 \times \frac{12}{13} \times \frac{5}{13}} \times \frac{1}{\left(\frac{12}{5}\right)^2}$$

$$= \frac{144 - 25}{120} \times \frac{25}{144} \times 5$$

$$= \frac{119}{24} \times \frac{5}{144} = \frac{595}{3456}$$

SSC CHSL 08/06/2022 (Shift- 2)

(a) $\frac{295}{3456}$ (b) $\frac{290}{3542}$

(c) $\frac{695}{3542}$ (d) $\frac{595}{3456}$

16. If $\tan\theta = \frac{2}{\sqrt{11}}$, $0 < \theta < 90°$, then the value of $\frac{2\text{cosec}^2\theta - 3\sec^2\theta}{3\text{cosec}^2\theta + 4\sec^2\theta}$ is equal to :

यदि $\tan\theta = \frac{2}{\sqrt{11}}$, $0 < \theta < 90°$ है तो $\frac{2\text{cosec}^2\theta - 3\sec^2\theta}{3\text{cosec}^2\theta + 4\sec^2\theta}$ का मान ज्ञात कीजिए।

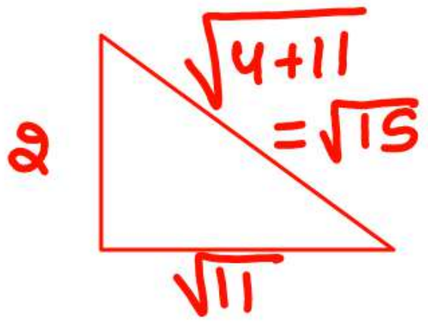
CHSL 26/10/2020 (Shift- 03)

(a) $\frac{11}{45}$

(b) $\frac{11}{49}$

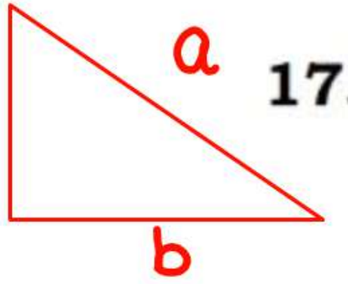
(c) $\frac{13}{49}$

(d) $\frac{10}{49}$



$$\frac{2\times\left(\frac{\sqrt{15}}{2}\right)^2 - 3\times\left(\frac{\sqrt{15}}{\sqrt{11}}\right)^2}{3\times\left(\frac{\sqrt{15}}{2}\right)^2 + 4\times\left(\frac{\sqrt{15}}{\sqrt{11}}\right)^2}$$

$$= \frac{\frac{2\times 15}{4} - \frac{3\times 15}{11}}{\frac{3\times 15}{4} + \frac{4\times 15}{11}} = \frac{\frac{1}{2} - \frac{3}{11}}{\frac{3}{4} + \frac{4}{11}} = \frac{\frac{5}{22}}{\frac{49}{44}} = \frac{10}{49}$$



17. If $\sec\theta = \frac{a}{b}$, $b \neq 0$, then $\frac{1-\tan^2\theta}{2-\sin^2\theta} = ?$

यदि $\sec\theta = \frac{a}{b}$, $b \neq 0$ है तो $\frac{1-\tan^2\theta}{2-\sin^2\theta} = ?$

CGL-2019 Tier-II (15/10/2020)

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

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

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

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

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

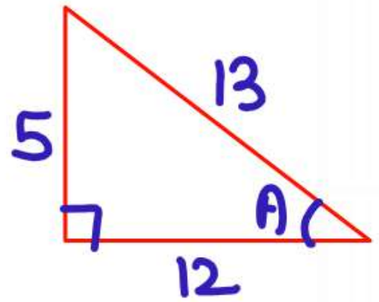
M-1

$12\sin A + 12\cos A = 17\cos A$

$\Rightarrow 12\sin A = 5\cos A$

$\Rightarrow \frac{\sin A}{\cos A} = \frac{5}{12}$

$\tan A = \frac{5}{12}$



$\text{Ans} = \frac{1 - \frac{12}{13}}{\frac{5}{13}} = \frac{\frac{1}{13}}{\frac{5}{13}} = \frac{1}{5}$

18. If $\frac{\sin A + \cos A}{\cos A} = \frac{17}{12}$, then the value of $\frac{1 - \cos A}{\sin A}$ is :

यदि $\frac{\sin A + \cos A}{\cos A} = \frac{17}{12}$ है तो $\frac{1 - \cos A}{\sin A}$ का मान ज्ञात कीजिए।

SSC CGL 07/03/2020 (Shift- 02)

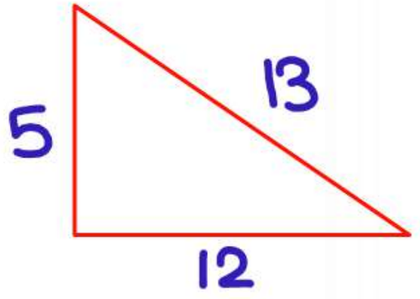
(a) -5

(b) 1

(c) $\frac{5}{12}$

(d) $\frac{1}{5}$

18. If $\frac{\sin A + \cos A}{\cos A} = \frac{17}{12}$, then the value of $\frac{1 - \cos A}{\sin A}$ is :



ans = $\frac{1 - \frac{12}{13}}{\frac{5}{13}} = \frac{\frac{1}{13}}{\frac{5}{13}} = \frac{1}{5}$

यदि $\frac{\sin A + \cos A}{\cos A} = \frac{17}{12}$ है तो $\frac{1 - \cos A}{\sin A}$ का मान ज्ञात कीजिए।

SSC CGL 07/03/2020 (Shift- 02)

(a) – 5

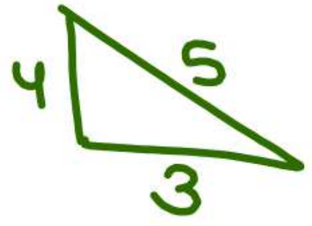
(b) 1

(c) $\frac{5}{12}$

(d) $\frac{1}{5}$

Q. $\dfrac{\overset{P\,4}{\sin\theta}+\overset{B\,3}{\cos\theta}}{\underset{B}{\cos\theta}} = \dfrac{4}{3}$

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



$\text{ans} = \left(\dfrac{4}{5}\right)^2 + \dfrac{3}{5}$

$= \dfrac{16}{25} + \dfrac{3}{5} = \dfrac{16+15}{25} = \dfrac{31}{25}$

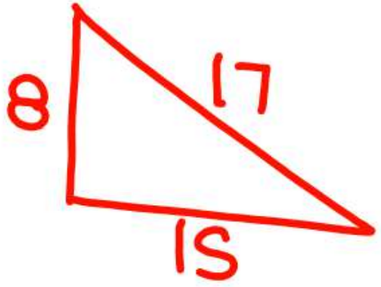
Q. $\dfrac{\overset{(8)P}{\sin\theta}+\overset{B(15)}{\cos\theta}}{\underset{P}{\sin\theta}} = \dfrac{23}{8}$

$\tan\theta + \sin\theta = ?$

$= \dfrac{8}{15} + \dfrac{8}{17}$

$= \dfrac{136+120}{255}$

$= \dfrac{256}{255}$



$$\frac{a+b}{a-b} = \frac{5}{1}$$

$$\frac{a}{b} = \frac{3}{2}$$

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

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

SSC CGL 16/08/2021 (Shift- 01)

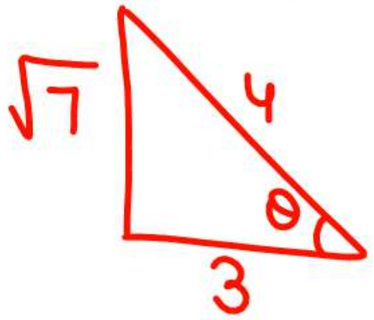
(a) $\frac{1}{3}$ (b) $-\frac{1}{3}$

(c) $-\frac{1}{9}$ (d) $\frac{1}{9}$

$\frac{\text{cosec}\,\theta}{\cot\theta} = \frac{4}{3}$

$\Rightarrow \frac{\frac{1}{\sin\theta}}{\frac{\cos\theta}{\sin\theta}} = \frac{4}{3} \Rightarrow \frac{1}{\cos\theta} = \frac{4}{3}$

$\Rightarrow \cos\theta = \frac{3}{4}$



$$\frac{4\times\left(\frac{\sqrt{7}}{4}\right)^2 - 1}{4\times\left(\frac{\sqrt{7}}{4}\right)^2 + 5} = \frac{4\times\frac{7}{16} - 1}{4\times\frac{7}{16} + 5} = \frac{\frac{12}{16}}{\frac{108}{16}} = \frac{1}{9}$$

Self Made Formula

* $\frac{\text{cosec}\theta}{\cot\theta} = \frac{\frac{1}{\sin\theta}}{\frac{\cos\theta}{\sin\theta}} = \sec\theta$

* $\frac{\sec\theta}{\tan\theta} = \frac{\frac{1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta}} = \text{cosec}\theta$

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

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

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

$\frac{\text{cosec}\theta}{\cot\theta} = \frac{4}{3}$

$\Rightarrow \sec\theta = \frac{4}{3} \Rightarrow \cos\theta = \frac{3}{4}$

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

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

SSC CGL 16/08/2021 (Shift- 01)

(a) $\frac{1}{3}$

(b) $-\frac{1}{3}$

(c) $-\frac{1}{9}$

(d) $\frac{1}{9}$

$= \frac{4(1-c^2) - 1}{4(1-c^2) + 5}$

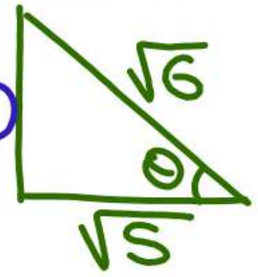
$= \frac{4\left(1 - \frac{9}{16}\right) - 1}{4\left(1 - \frac{9}{16}\right) + 5}$

$= 1\frac{12}{16} \Big/ 9\frac{108}{16} = \frac{1}{9}$

$\sin^2\theta = 5\tan^2\theta - 5\sin^2\theta$

$\Rightarrow 6\sin^2\theta = 5 \times \frac{\sin^2\theta}{\cos^2\theta}$

$\Rightarrow \cos^2\theta = \frac{5}{6}$ $\Rightarrow \cos\theta = \frac{\sqrt{5}}{\sqrt{6}}$



$$\frac{24\times\left(\frac{1}{\sqrt{6}}\right)^2 - 15\left(\frac{\sqrt{6}}{\sqrt{5}}\right)^2}{6\times\left(\frac{\sqrt{6}}{1}\right)^2 - 7\left(\frac{\sqrt{5}}{1}\right)^2}$$

$$= \frac{24\times\frac{1}{6} - 18\times\frac{6}{5}}{6\times 6 - 7\times 5} = \frac{-14}{1}$$

20. If $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$, θ is an acute angle, then the value of $\frac{24\sin^2\theta - 15\sec^2\theta}{6\operatorname{cosec}^2\theta - 7\cot^2\theta}$ is:

यदि $\frac{\sin^2\theta}{\tan^2\theta - \sin^2\theta} = 5$, θ है तो

$\frac{24\sin^2\theta - 15\sec^2\theta}{6\operatorname{cosec}^2\theta - 7\cot^2\theta}$ का मान ज्ञात कीजिए।

SSC CGL 23/08/2021 (Shift- 02)

(a) 2
(b) −14
(c) 14
(d) −2

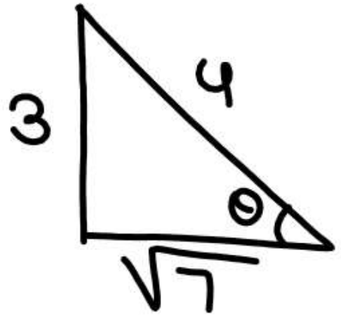
(Basic)

$7\sec\theta - 4\tan\theta = 5\sec\theta + 5\tan\theta$

$\Rightarrow 6\sec\theta = 9\tan\theta$

$\Rightarrow 3 \cancel{\times 6} \times \frac{1}{\cancel{\cos\theta}} = \frac{4}{\cancel{9}} \times \frac{\sin\theta}{\cancel{\cos\theta}}$

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



$$\text{Ans} = \frac{\frac{4}{3} + \left(\frac{\sqrt{7}}{3}\right)^2}{\frac{4}{3} - \left(\frac{\sqrt{7}}{3}\right)^2} = \frac{\frac{3+7}{9}}{\frac{3-7}{9}} = \frac{\frac{12+7}{9}}{\frac{12-7}{9}} = \frac{19}{5}$$

21. If $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{1}{7}$, θ lies in first quadrant, then the value of $\frac{\text{cosec}\,\theta + \cot^2\theta}{\text{cosec}\,\theta - \cot^2\theta}$ is:

यदि $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{1}{7}$, θ प्रथम चतुर्थांश में स्थित है तो $\frac{\text{cosec}\,\theta + \cot^2\theta}{\text{cosec}\,\theta - \cot^2\theta}$ का मान है।

SSC CGL MAINS 03/02/2022

(a) $\frac{19}{5}$ ✓

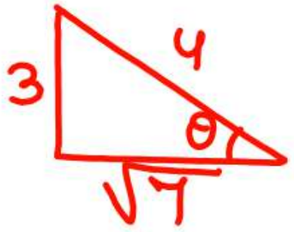
(b) $\frac{22}{3}$

(c) $\frac{37}{12}$

(d) $\frac{37}{19}$

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

$\Rightarrow \operatorname{cosec}\theta = \frac{4}{3}$



$3 \times \frac{4}{3} + \frac{7}{9} \times 9$

$3 \times \frac{4}{3} - \frac{7}{9} \times 9 = \frac{19}{5}$

21. If $\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{1}{7}$, θ lies in first quadrant, then the value of $\frac{\operatorname{cosec}\theta + \cot^2\theta}{\operatorname{cosec}\theta - \cot^2\theta}$ is:

यदि $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = \frac{7}{1}$, θ प्रथम चतुर्थांश में स्थित है तो $\frac{\operatorname{cosec}\theta + \cot^2\theta}{\operatorname{cosec}\theta - \cot^2\theta}$ का मान है।

SSC CGL MAINS 03/02/2022

(a) $\frac{19}{5}$

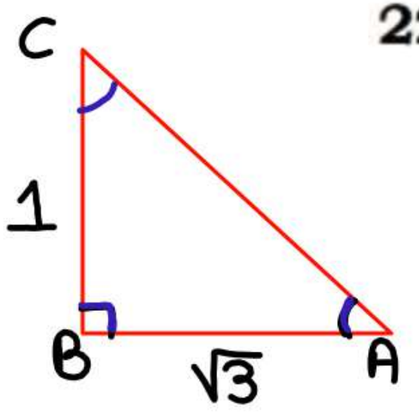
(b) $\frac{22}{3}$

(c) $\frac{37}{12}$

(d) $\frac{37}{19}$

* $\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$

* $\cos(x \pm y) = \cos x \cos y \pm \sin x \sin y$



22. **In a ΔABC, right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$, then sinA. cosC + cosA. sinC = _____.**

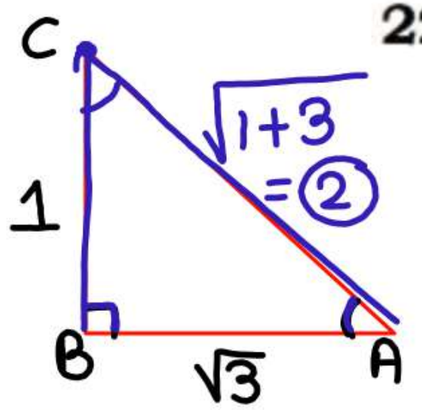
$\sin(A+C) = \sin 90^\circ = 1$

एक ΔABC में, B पर समकोण है, यदि $\tan A = \frac{1}{\sqrt{3}}$ है, तो sinA. cosC + cosA. sinC का मान ज्ञात कीजिए।

SSC CHSL 26/05/2022 (Shift- 1)

(a) 0 (b) 2

(c) – 1 (d) 1



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

$= \frac{1}{4} + \frac{3}{4}$

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

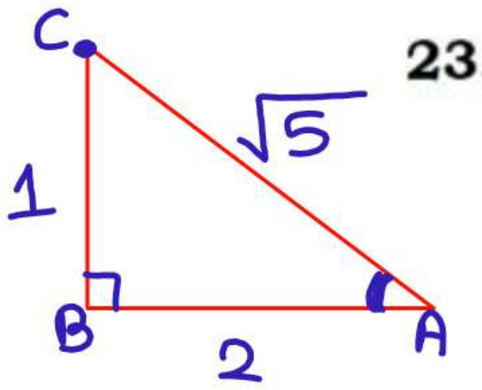
22. **In a ΔABC, right angled at B, if $\tan A = \frac{1}{\sqrt{3}}$, then $\sin A. \cos C + \cos A. \sin C =$ _____.**

एक ΔABC में, B पर समकोण है, यदि $\tan A = \frac{1}{\sqrt{3}}$ है, तो sinA. cosC + cosA. sinC का मान ज्ञात कीजिए।

SSC CHSL 26/05/2022 (Shift- 1)

(a) 0 **(b) 2**

(c) – 1 **(d) 1**



23. In ΔABC, right angled at B, if $\tan A = \frac{1}{2}$, then the value of $\frac{\sin A(\cos C + \cos A)}{\cos C(\sin C - \sin A)}$ is :

एक ΔABC में, B पर समकोण है, यदि $\tan A = \frac{1}{2}$ है, तो $\frac{\sin A(\cos C + \cos A)}{\cos C(\sin C - \sin A)}$ का मान ज्ञात कीजिए।

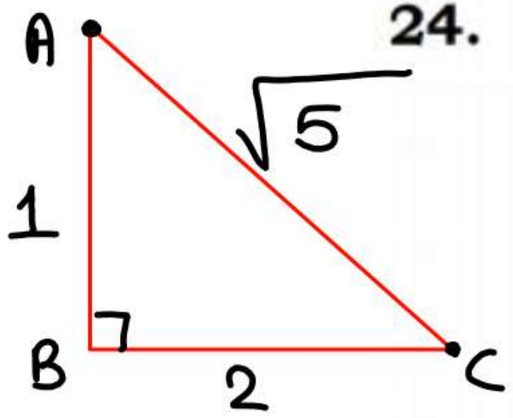
SSC CGL TIER-II (16/10/2020)

(a) $2\sqrt{5}$ (b) 3

(c) 2 (d) 1

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

$= \frac{3}{1}$



24. **In ΔABC, ∠B = 90° and AB : BC = 1 : 2. The value of cos A + tan C is:**

ΔABC में, ∠B = 90° और AB : BC = 1 : 2 है। cos A + tan C का मान_____ है।

SSC CPO 04/10/2023 (Shift-01)

$$\cos A + \tan C$$

$$= \frac{1}{\sqrt{5}} + \frac{1}{2}$$

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

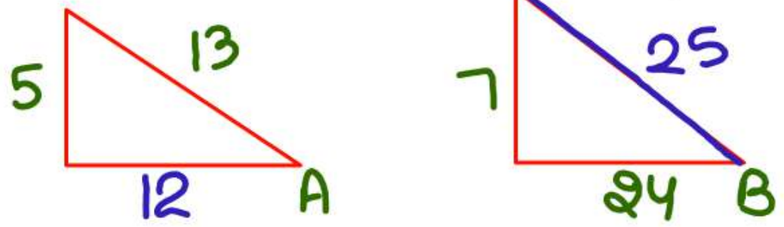
(a) $\frac{1+\sqrt{5}}{2\sqrt{5}}$

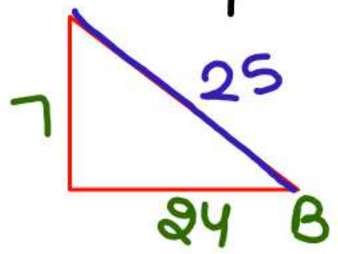
(b) $\frac{2\sqrt{5}}{2+\sqrt{5}}$

(c) $\frac{5+\sqrt{5}}{2\sqrt{5}}$

(d) $\frac{2+\sqrt{5}}{2\sqrt{5}}$

$\sin A = \frac{5}{13}$ $\cot B = \frac{24}{7}$





$$\frac{13}{12} \times \frac{24}{35} \times \frac{25}{7} \times \frac{5}{12} = \frac{65}{42}$$

25. If $\sin A = \frac{5}{13}$ and $7\cot B = 24$, then the value of $(\sec A \cos B)(\operatorname{cosec} B \tan A)$ is:

यदि $\sin A = \frac{5}{13}$ तथा $7\cot B = 24$ है तो $(\sec A \cos B)(\operatorname{cosec} B \tan A)$ का मान ज्ञात कीजिए।

SSC CGL MAINS/29/01/2022

(a) $\frac{13}{7}$

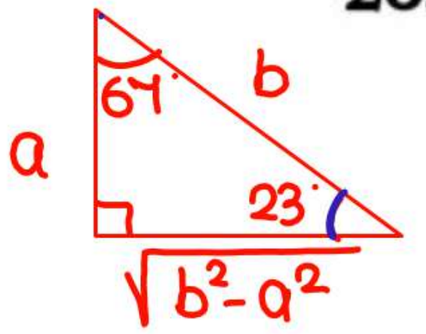
(b) $\frac{65}{42}$

(c) $\frac{15}{13}$

(d) $\frac{13}{14}$

26. If $\sin 23^\circ = \frac{a}{b}$, then the value of $\sec 23^\circ - \sin 67^\circ$ is _____.

यदि $\sin 23^\circ = \frac{a}{b}$ है, तो $\sec 23^\circ - \sin 67^\circ$ का मान क्या है?



$$\frac{b}{\sqrt{b^2-a^2}} - \frac{\sqrt{b^2-a^2}}{b}$$

$$= \frac{b^2-(b^2-a^2)}{b\sqrt{b^2-a^2}}$$

$$= \frac{b^2-b^2+a^2}{b\sqrt{b^2-a^2}}$$

CGL PRE, 14/07/2023 (Shift-3)

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

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

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

(d) $\frac{a^2}{b\sqrt{b^2-a^2}}$

27. If $\sec 31° = \frac{x}{1}$, then $\sin^2 59° + \frac{1}{\sec^2 31°} - \frac{1}{\sin^2 59° \operatorname{cosec}^2 59°}$ is equal to:

यदि $\sec 31° = x$ है तो $\sin^2 59° + \frac{1}{\sec^2 31°} - \frac{1}{\sin^2 59° \operatorname{cosec}^2 59°}$ का मान ज्ञात कीजिए।

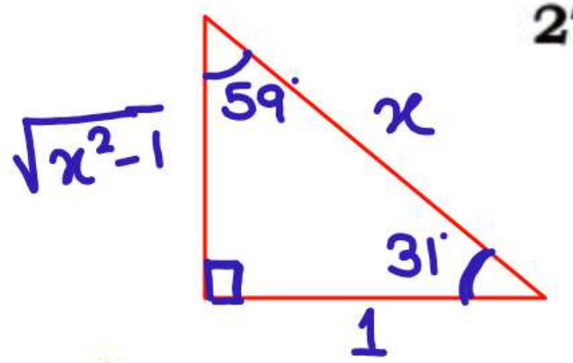
SSC CGL 24/08/2021 (Shift- 03)

(a) $\frac{x^2 - 2}{x}$

(b) $\frac{2 - x^2}{x^2}$

(c) $\frac{x^2 - 2}{x^2}$

(d) $\frac{2 - x^2}{x}$



$\sin^2 59° + \cos^2 31° - 1$

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

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

$= \frac{2}{x^2} - \frac{1}{1} = \frac{2 - x^2}{x^2}$

28. If $\sec\theta + \tan\theta = 2+\sqrt{5}$, then the value of $\sin\theta + \cos\theta$ is :

Hold

यदि $\sec\theta + \tan\theta = 2+\sqrt{5}$ है तो $\sin\theta + \cos\theta$ का मान ज्ञात कीजिए।

(a) $\frac{3}{\sqrt{5}}$

(b) $\sqrt{5}$

(c) $\frac{7}{\sqrt{5}}$

(d) $\frac{1}{\sqrt{5}}$

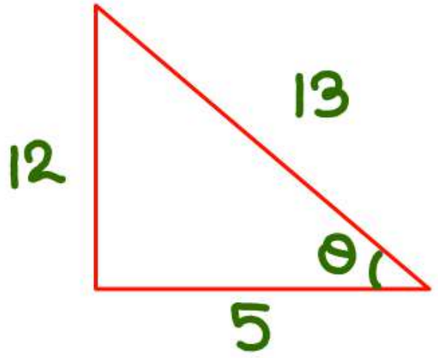
$\sec\theta + \tan\theta = \sqrt{5}+2$

$\sec\theta - \tan\theta = \sqrt{5}-2$

$\sec\theta = \frac{\sqrt{5}}{1}$

29. If $\sin\theta - \cos\theta = \frac{7}{13}$, $0 < \theta < 90°$, then the value of $\sin\theta + \cos\theta$ is :

यदि $\sin\theta - \cos\theta = \frac{7}{13}$, $0 < \theta < 90°$ है तो $\sin\theta + \cos\theta$ का मान ज्ञात कीजिए।



$= \sin\theta + \cos\theta$

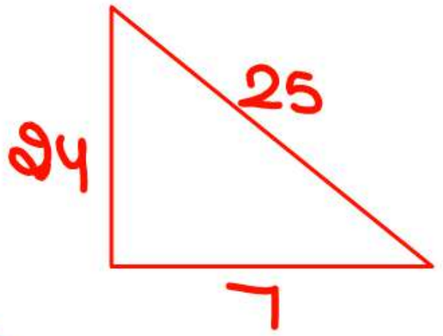
$= \frac{12}{13} + \frac{5}{13} = \frac{17}{13}$

(a) $\frac{17}{13}$ (b) $\frac{13}{17}$

(c) $\frac{1}{13}$ (d) $\frac{1}{17}$

① $\frac{P}{H}\sin\theta - \frac{B}{H}\cos\theta = \frac{14}{25}$

$\sin\theta + \cos\theta = ?$



$\frac{P}{H} + \frac{B}{H}$

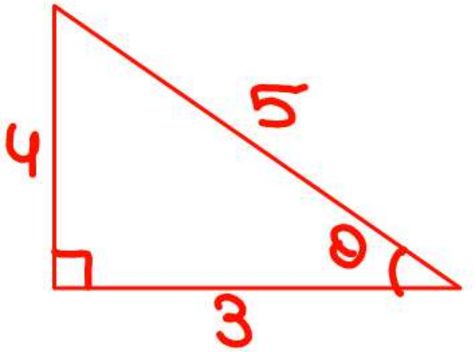
$= \frac{24}{25} + \frac{7}{25} = \frac{31}{25}$

$\sin\theta - \cos\theta = \frac{1}{5}$

$\sin\theta + \cos\theta = ?$

ans $\frac{4}{5} + \frac{3}{5}$

$= \frac{7}{5}$



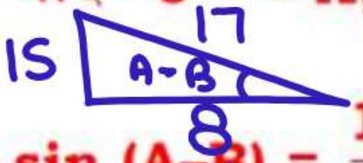
* $\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$

* $\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$

* $\tan(x+y) = \dfrac{\tan x + \tan y}{1 - \tan x \tan y}$

30. If $0° < A, B < 45°$, $\cos(A+B) = \frac{24}{25}$ and $\sin(A-B) = \frac{15}{17}$, then $\tan 2A = ?$

यदि $0° < A, B < 45°$, $\cos(A+B) = \frac{24}{25}$ तथा $\sin(A-B) = \frac{15}{17}$ है तो $\tan 2A$ का मान ज्ञात कीजिए।



SSC CGL 06/03/2020 (Shift- 02)

(a) 0

(b) 1

(c) $\frac{416}{87}$

(d) $\frac{213}{4}$

$\tan 2A = \tan\{A+B+A-B\}$

$= \tan\{(A+B)+(A-B)\}$

$= \frac{\tan(A+B)+\tan(A-B)}{1-\tan(A+B)\tan(A-B)}$

$= \frac{\frac{7}{24}+\frac{15\times 3}{8\times 3}}{1-\frac{7}{24}\times\frac{15}{8}} = \frac{\frac{52}{24}}{\frac{64-35}{64}}$

$= \frac{52\times 64^{8}}{24_{3}\times 29} = \frac{416}{87}$

QUESTIONS BASED ON VALUES OF TRIGONOMETRIC RATIOS

	0°	30°	45°	60°	90°
Sinθ	$\sqrt{\frac{0}{4}}=0$	$\sqrt{\frac{1}{4}}=\frac{1}{2}$	$\sqrt{\frac{2}{4}}=\frac{1}{\sqrt{2}}$	$\sqrt{\frac{3}{4}}=\frac{\sqrt{3}}{2}$	$\sqrt{\frac{4}{4}}=1$
cosθ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tanθ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}=1.732$	N.D
Cosecθ	$\frac{1}{0}=$ N.D	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
Secθ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	N.D
Cotθ	$\frac{1}{0}=$ N.D	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

	0°	30°	45°	60°	90°
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1

only $0-90^\circ$

Q. $\sin 10^\circ < \sin 20^\circ$ — θ बड़ा value बड़ी

Q. $\sin 70^\circ < \sin 80^\circ$

Q. $\cos 23^\circ > \cos 44^\circ$ — θ छोटा value बड़ी

Q $\cos 37^\circ > \cos 40^\circ$

Q. $\sin 1 \quad \sin 10^\circ$

Q. $\sin 1^c$ $\sin 10^\circ$

Soln $\sin 57^\circ > \sin 10^\circ$

π (rad) $= 180^\circ$

$1^c = \frac{180^\circ}{\pi}$

$1^c = \frac{90}{\cancel{180} \times 7}{\cancel{22}\ 11}$

$1^c = \frac{630}{11} = 57.22\ldots$

31. Evaluate the follwing:/निम्नलिखित का मूल्यांकन करें:

$\sin 60° + \tan 30° + \cos 45°$

NTPC CBT-02 15/06/2022 (Shift-01)

(a) $\frac{5\sqrt{2}+3\sqrt{3}}{4}$ **(b)** $\frac{3\sqrt{2}+5\sqrt{3}}{4}$

(c) $\frac{5\sqrt{2}+3\sqrt{3}}{6}$ **(d)** $\frac{3\sqrt{2}+5\sqrt{3}}{6}$

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

$= \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{3} + \frac{\sqrt{2}}{2} = \frac{3\sqrt{3}+2\sqrt{3}+3\sqrt{2}}{6} = \frac{5\sqrt{3}+3\sqrt{2}}{6}$

32. What is the value of sin30° + cos30° + tan30°

sin30° + cos30° + tan30° का मान क्या है?

SSC CGL 14/07/2023 (Shift-3)

(a) $\frac{5+\sqrt{3}}{2\sqrt{3}}$

(b) $\frac{5-\sqrt{3}}{2\sqrt{3}}$

(c) $\frac{5+\sqrt{3}}{\sqrt{3}}$

(d) $\frac{5-\sqrt{3}}{\sqrt{3}}$

$$\frac{1}{2}+\frac{\sqrt{3}}{2}+\frac{1}{\sqrt{3}}$$

$$= \frac{\sqrt{3}+3+2}{2\sqrt{3}}$$

$$= \frac{5+\sqrt{3}}{2\sqrt{3}}$$

33. Find the value of the given expression.

दिए गए व्यंजक का मान ज्ञात करें।

$$\frac{4}{3}\tan^2 45^\circ + 3\cos^2 30^\circ - 2\sec^2 30^\circ - \frac{3}{4}\cot^2 60^\circ$$

$$\frac{4}{3}\times(1)^2+3\times\left(\frac{\sqrt{3}}{2}\right)^2-2\times\left(\frac{2}{\sqrt{3}}\right)^2-\frac{3}{4}\times\left(\frac{1}{\sqrt{3}}\right)^2$$

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

$$= \frac{16+27-32-3}{12}$$

$$= \frac{8}{12} = \frac{2}{3}$$

SSC CGL 18/07/2023 (Shift-04)

(a) $\frac{2}{3}$ ✓

(b) $\frac{3}{2}$

(c) $\frac{\sqrt{2}}{3}$

(d) $\frac{3}{\sqrt{2}}$

34. **If $\sqrt{3}\tan\theta = 3\sin\theta$, then what is the value of $\sin^2\theta - \cos^2\theta$?**

यदि $\sqrt{3}\tan\theta = 3\sin\theta$ है तो $\sin^2\theta - \cos^2\theta$ का मान ज्ञात कीजिए।

SSC CGL MAINS (08/08/2022 (Shift- 01)

(a) $\frac{1}{2}$ (b) $\frac{1}{5}$

(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

$\sqrt{3} \times \frac{\sin\theta}{\cos\theta} = 3\sin\theta$

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

M-1

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

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

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

34. If $\sqrt{3}\tan\theta = 3\sin\theta$, then what is the value of $\sin^2\theta - \cos^2\theta$?

यदि $\sqrt{3}\tan\theta = 3\sin\theta$ है तो $\sin^2\theta - \cos^2\theta$ का मान ज्ञात कीजिए।

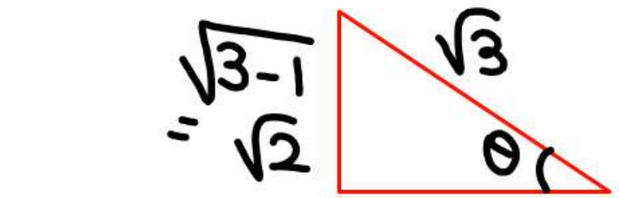
SSC CGL MAINS (08/08/2022 (Shift- 01)

(a) $\frac{1}{2}$ (b) $\frac{1}{5}$

(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

$\sqrt{3} \times \frac{\sin\theta}{\cos\theta} = 3\sin\theta$

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



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

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

35. If $2k\sin 30°\cos 30°\cot 60°$ $= \frac{\cot^2 30°\sec 60°\tan 45°}{\text{cosec}^2 45°\text{cosec}30°}$, then find the value of k.

यदि $2k\sin 30°\cos 30°\cot 60°$ $= \frac{\cot^2 30°\sec 60°\tan 45°}{\text{cosec}^2 45°\text{cosec}30°}$ है तो k का मान ज्ञात कीजिए।

$\frac{2kx1}{2} \times \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{3}} = \frac{3 \times 2 \times 1}{2 \times 2}$

$k = 3$

SSC CGL 12/04/2022 (Shift- 03)

(a) $\frac{3}{2}$

(b) 3

(c) 1

(d) 6

36. If A = 10°, what is the value of $\dfrac{12\sin 3A + 5\cos (5A - 5)^\circ}{9\sin \dfrac{9A}{2} - 4\cos (5A + 10)^\circ}$

यदि A = 10° है तो $\dfrac{12\sin 3A + 5\cos (5A - 5)^\circ}{9\sin \dfrac{9A}{2} - 4\cos (5A + 10)^\circ}$ का मान ज्ञात कीजिए।

SSC CGL 18/04/2022 (Shift- 03)

$$\frac{12\sin 30^\circ + 5\cos 45^\circ}{9\sin 45^\circ - 4\cos 60^\circ}$$

$$= \frac{12 \times \frac{1}{2} + 5 \times \frac{1}{\sqrt{2}} \times \sqrt{2}}{\sqrt{2} \times 9 \times \frac{1}{\sqrt{2}} - 4 \times \frac{1}{2}}$$

$$= \frac{12 + 5\sqrt{2}}{9\sqrt{2} - 4} = \frac{6\sqrt{2} + 5}{9 - 2\sqrt{2}}$$

(a) $\dfrac{6\sqrt{2} + 5}{(9 + 2\sqrt{2})}$

(b) $\dfrac{6\sqrt{2} - 5}{(9 - 2\sqrt{2})}$

(c) ✓ $\dfrac{6\sqrt{2} + 5}{(9 - 2\sqrt{2})}$

(d) $\dfrac{(9 - 2\sqrt{2})}{6\sqrt{2} + 5}$

37. If $3\tan\theta = 2\sqrt{3}\sin\theta$, $0° < \theta < 90°$, then the value of $\dfrac{\text{cosec}^2 2\theta + \cot^2 2\theta}{\sin^2\theta + \tan^2 2\theta}$ is:

यदि $3\tan\theta = 2\sqrt{3}\sin\theta$, $0° < \theta < 90°$ है तो $\dfrac{\text{cosec}^2 2\theta + \cot^2 2\theta}{\sin^2\theta + \tan^2 2\theta}$ का मान ज्ञात कीजिए।

SSC CGL MAINS 29/01/2022

(a) $\frac{4}{13}$

(b) $\frac{20}{39}$

(c) $\frac{4}{3}$

(d) $\frac{20}{27}$

$\sqrt{3}\,3\frac{\sin\theta}{\cos\theta} = 2\sqrt{3}\sin\theta$

$\Rightarrow \frac{\sqrt{3}}{2} = \cos\theta$

$\theta = 30°$

$$\frac{\text{Cosec}^2 60° + \cot^2 60°}{\sin^2 30° + \tan^2 60°}$$

$$= \frac{\left(\frac{2}{\sqrt{3}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2}{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{1}\right)^2} = \frac{\frac{4}{3}+\frac{1}{3}}{\frac{1}{4}+\frac{3}{1}} = \frac{\frac{5}{3}}{\frac{13}{4}} = \frac{20}{39}$$

$\sin^2(2x-10)=\frac{3}{4}$

$\sin(2x-10)=\frac{\sqrt{3}}{2}=\sin 60^\circ$

$2x-10=60^\circ$

$\Rightarrow 2x=70^\circ$ ~~35°~~

38. If $4\sin^2(2x-10)^\circ = 3, 0 \le (2x-10) \le 90$, then find the value of $\dfrac{\sin^4(x-5)^\circ+\cos^4(x-5)^\circ}{1-2\sin^2(3x-15)^\circ\cos^2(3x-15)^\circ}$.

यदि $4\sin^2(2x-10)^\circ = 3, 0 \le (2x-10) \le 90$ है तो $\dfrac{\sin^4(x-5)^\circ+\cos^4(x-5)^\circ}{1-2\sin^2(3x-15)^\circ\cos^2(3x-15)^\circ}$ का मान ज्ञात कीजिए।

$=\dfrac{\sin^4 30^\circ+\cos^4 30^\circ}{1-2\sin^2 90^\circ\cos^2 90^\circ}$

$=\dfrac{\left(\frac{1}{2}\right)^4+\left(\frac{\sqrt{3}}{2}\right)^4}{1-0}$

$=\frac{1}{16}+\frac{9}{16}=\frac{10}{16}=\frac{5}{8}$

SSC CGL 17/08/2021 (Shift- 03)

(a) 1

(b) $\frac{5}{8}$

(c) $-\frac{5}{8}$

(d) -1

$\sin(3x-15)=\frac{1}{2}$

$\therefore 3x-15=30$

$\Rightarrow 3x=45$

$\cos^2 45+\cot^2 30$

$=\frac{1}{2}+3$

$=\frac{7}{2}$

39. **If $2\sin(3x-15°)=1, 0°<(3x-15)<90°$, then find the value of $\cos^2(2x+15)°+\cot^2(x+15)°$.**

यदि $2\sin(3x-15°)=1, 0°<(3x-15)<90°$ है तो $\cos^2(2x+15)°+\cot^2(x+15)°$ का मान ज्ञात कीजिए।

SSC CGL 16/08/2021 (Shift- 02)

(a) 1

(b) $\frac{5}{2}$

(c) $-\frac{7}{2}$

(d) $\frac{7}{2}$

40. If (2 cos A + 1) (2 cos A – 1) = 0, 0° < A ? 90°, then find the value of A.

$(x+y)(x-y)$

यदि **(2 cos A + 1) (2 cos A – 1) = 0, 0° < A ? 90°** है तो **A** का मान ज्ञात कीजिए।

SSC CGL 21/04/2022 (Shift- 01)

(a) 90° **(b) 45°**

(c) 30° **(d) 60°**

$(2\cos A)^2 - (1)^2 = 0$

$\Rightarrow 4\cos^2 A - 1 = 0$

$\Rightarrow 4\cos^2 A = 1$

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

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

$\sin(x+30^\circ) = \frac{2}{2\times\sqrt{3}}$ $\sqrt{3}$

$\therefore \sin(x+30^\circ) = \frac{\sqrt{3}}{2}$

$x+30 = 60^\circ$

$\Rightarrow x = 30^\circ$

41. If $\sin(x + 30^\circ) = \frac{3}{\sqrt{12}}$, then the value of $x\ (0 < x < 90^\circ)$ is :

4×3

यदि $\sin(x + 30^\circ) = \frac{3}{\sqrt{12}}$ है तो $x\ (0 < x < 90^\circ)$ का मान ज्ञात कीजिए।

SSC CHSL 26/10/2020 (Shift- 02)

(a) 60° (b) 15°

(c) 45° (d) 30° ✓

$\cos^2\theta = 3\cot^2\theta - 3\cos^2\theta$

$\Rightarrow 4\cos^2\theta = 3\cot^2\theta$

$\Rightarrow 4\cos^2\theta = \frac{3\cos^2\theta}{\sin^2\theta}$

$\Rightarrow \sin^2\theta = \frac{3}{4}$ $\Rightarrow \sin\theta = \frac{\sqrt{3}}{2}$

$\theta = 60^\circ$

42. **If $0^\circ < \theta < 90^\circ$ and $\cos^2\theta = 3(\cot^2\theta - \cos^2\theta)$, then the value of $\left(\frac{1}{2}\sec\theta + \sin\theta\right)^{-1}$ is :**

यदि $0^\circ < \theta < 90^\circ$ तथा $\cos^2\theta = 3(\cot^2\theta - \cos^2\theta)$ है तो $\left(\frac{1}{2}\sec\theta + \sin\theta\right)^{-1}$ का मान ज्ञात कीजिए।

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

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

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

SSC CGL 04/06/2019 (Shift- 02)

(a) $\sqrt{3}+2$

(b) $2(2-\sqrt{3})$

(c) $2(\sqrt{3}-1)$

(d) $\sqrt{3}+1$

$\cos^2\theta = 3\cot^2\theta + 3\sin^2\theta - 3$

$\Rightarrow \cos^2\theta = 3\cot^2\theta + 3(1-\cos^2\theta) - 3$

$\Rightarrow \cos^2\theta = 3\cot^2\theta + 3 - 3\cos^2\theta - 3$

$\Rightarrow 4\cos^2\theta = 3\cos^2\theta$

$\sin^2\theta$

$\Rightarrow \sin^2\theta = \frac{3}{4}$ $\Rightarrow \sin\theta = \frac{\sqrt{3}}{2}$

$\theta = 60°$

$\text{Ans} = \sqrt{3} + \frac{2\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$

$= \frac{\sqrt{3}+2\sqrt{3}}{3}$

$= \frac{3\sqrt{3}+2\sqrt{3}}{3} = \frac{5\sqrt{3}}{3}$

43. **If** $\frac{\cos^2\theta}{\cot^2\theta + \sin^2\theta - 1} = 3,\ 0° < \theta < 90°$, **then the value of** $(\tan\theta + \text{cosec}\,\theta)$ **is:**

यदि $\frac{\cos^2\theta}{\cot^2\theta + \sin^2\theta - 1} = 3,\ 0° < \theta < 90°$ है तो $(\tan\theta + \text{cosec}\,\theta)$ का मान ज्ञात कीजिए।

SSC CGL 13/08/2021 (Shift- 01)

(a) $2\sqrt{3}$

(b) $\frac{5\sqrt{3}}{3}$

(c) $3\sqrt{3}$

(d) $\frac{4\sqrt{3}}{3}$

$\cos(A-B)=\frac{\sqrt{3}}{2}$

$A-B=30^\circ$

$\therefore 60-B=30^\circ$

$\Rightarrow 60-30=B$

$\Rightarrow 30=B$

44. If $\cos(A-B)=\frac{\sqrt{3}}{2}$ and $\sec A = 2$, $0^\circ \leq A \leq 90^\circ$, $0^\circ \leq B \leq 90^\circ$, then what is the measure of B?

यदि $\cos\theta = \frac{\sqrt{3}}{2}$ तथा $\sec A = 2$, $0^\circ \leq A \leq 90^\circ$, $0^\circ \leq B \leq 90^\circ$ है तो कोण B का मान ज्ञात कीजिए।

$\sec 60^\circ = 2$

SSC CGL 11/04/2022 (Shift- 02)

(a) 60°
(b) 0°
(c) 30°
(d) 90°

$\sin\left(\frac{2A+B}{2}\right) = \frac{\sqrt{3}}{2}$

$\frac{2A+B}{2} = 60^\circ$

$\boxed{2A+B = 120^\circ}$

$\cos\left(\frac{2A-B}{2}\right) = \frac{\sqrt{3}}{2}$

$\frac{2A-B}{2} = 30^\circ$

$\boxed{2A-B = 60}$

$\oplus$

$\cancel{4}A = \cancel{180}\ 45^\circ$

$A = 45^\circ$

$90 - B = 60^\circ$

$30 = B$

ans $= \sin 3(15^\circ)$

$= \sin 45^\circ = \frac{1}{\sqrt{2}}$

45. If $\sin\left(\frac{2A+B}{2}\right) = \cos\left(\frac{2A-B}{2}\right) = \frac{\sqrt{3}}{2}, 0^\circ, \frac{2A+B}{2} < 90$ and $0^\circ < \frac{2A+B}{2} < 90^\circ$ then find the value of $\sin[3(A-B)]$.

यदि $\sin\left(\frac{2A+B}{2}\right) = \cos\left(\frac{2A-B}{2}\right) = \frac{\sqrt{3}}{2}, 0^\circ, \frac{2A+B}{2} < 90$ तथा $0^\circ < \frac{2A+B}{2} < 90^\circ$ है तो $\sin[3(A-B)]$ का मान ज्ञात कीजिए।

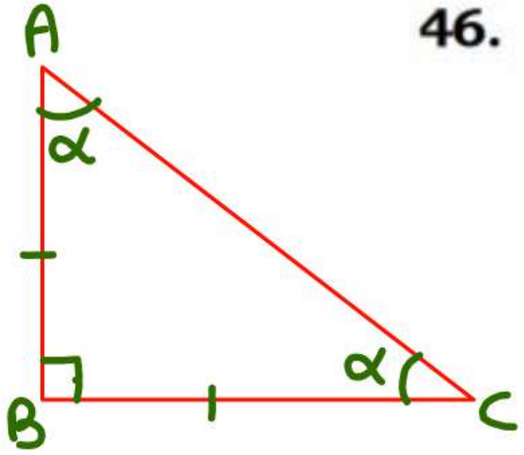
SSC CGL 16/08/2021 (Shift- 03)

(a) 1

(b) $\frac{1}{\sqrt{2}}$

(c) $\frac{1}{2}$

(d) $\frac{\sqrt{3}}{2}2$



46. If triangle ABC is a right isosceles triangle, right angled at B, then find the value of

$$\frac{\sin(A-C)+\sin(A+C)-2\sin B}{\cot A+\cot B+\cot C}.$$

यदि त्रिभुज ABC एक समकोण समद्विबाहु त्रिभुज है, जो B पर समकोण है, तो $\frac{\sin(A-C)+\sin(A+C)-2\sin B}{\cot A+\cot B+\cot C}$ का मान ज्ञात कीजिए।

NTPC CBT-1 08/04/2021 (Shift-03)

(a) $\frac{1}{2}$

(b) $-\frac{1}{2}$

(c) $\frac{3}{2}$

(d) 0

$90+2\alpha=180$

$2\alpha=90$

$\alpha=45°$

$$\frac{\sin 0+\sin 90-2\sin 90}{\cot 45+\cot 90+\cot 45}$$

$$=\frac{0+1-2}{1+0+1}=\frac{-1}{2}$$

47. If $\tan^2 A - 6\tan A + 9 = 0, 0 < A < 90°$, What is the value of $6\cot A + 8\sqrt{10}\cos A$?

यदि $\tan^2 A - 6\tan A + 9 = 0, 0 < A < 90°$ है तो $6\cot A + 8\sqrt{10}\cos A$ का मान ज्ञात कीजिए।

SSC CGL 20/04/2022 (Shift- 02)

(a) $10\sqrt{10}$ (b) $8\sqrt{10}$

(c) 10 (d) 14

let $\tan A = x$

$x^2 - 6x + 9 = 0$

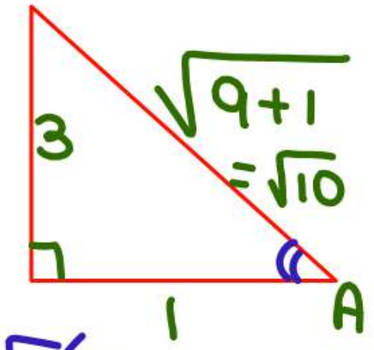
$\Rightarrow x^2 - 3x - 3x + 9 = 0$

$\Rightarrow x(x-3) - 3(x-3) = 0$

$\Rightarrow (x-3)(x-3) = 0$

$\Rightarrow x = 3$

$\therefore \tan A = \frac{3}{1}$



$2 \quad 6 \times \frac{1}{3} + 8\sqrt{10} \times \frac{1}{\sqrt{10}}$

$= 2 + 8$

$= 10$

47. If $\tan^2 A - 6\tan A + 9 = 0$, $0 < A < 90°$, What is the value of $6\cot A + 8\sqrt{10}\cos A$?

यदि $\tan^2 A - 6\tan A + 9 = 0$, $0 < A < 90°$ है तो $6\cot A + 8\sqrt{10}\cos A$ का मान ज्ञात कीजिए।

SSC CGL 20/04/2022 (Shift- 02)

(a) $10\sqrt{10}$ (b) $8\sqrt{10}$

(c) 10 (d) 14

let $\tan A = x$

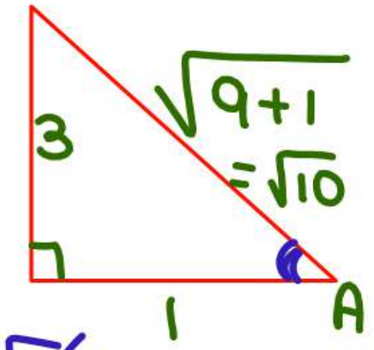
$x^2 - 6x + 9 = 0$

$+3, +3$

$x = 3$

$\tan A = \frac{3}{1}$

$\therefore \tan A = \frac{3}{1}$



$2 \quad 6 \times \frac{1}{3} + 8\sqrt{10} \times \frac{1}{\sqrt{10}}$

$= 2 + 8$

$= 10$

Q. $x^2 - 5x + 6 = 0$

$\pm\frac{2}{1}, \pm\frac{3}{1}$

Q. $x^2 - 7x + 12 = 0$

$\pm\frac{4}{1} \quad \pm\frac{3}{1}$

$x = 4, 3$

Use option

(b) $3\times\frac{2}{\sqrt{3}}+4\times\frac{\sqrt{3}}{2}-4\sqrt{3}$

$= 2\sqrt{3}+2\sqrt{3}-4\sqrt{3}$

$= 4\sqrt{3}-4\sqrt{3}$

$= 0$

48. **If $3\sec\theta + 4\cos\theta - 4\sqrt{3} = 0$ where θ is an acute angle than the value of θ is:**

यदि $3\sec\theta + 4\cos\theta - 4\sqrt{3} = 0$ जहां θ एक न्यूनकोण है तो θ का मान ज्ञात कीजिए।

SSC CGL 13/08/2021 (Shift- 03)

(a) 20°
(b) 30°
(c) 60°
(d) 45°

$$\frac{3}{\cos\theta} + 4\cos\theta - 4\sqrt{3} = 0$$

$$\Rightarrow 3 + 4\cos^2\theta - 4\sqrt{3}\cos\theta = 0$$

Let $\cos\theta = x$

$$4x^2 - 4\sqrt{3}x + 3 = 0$$

$$x = \frac{+2\sqrt{3}}{4} \quad \frac{+2\sqrt{3}}{4}$$

$$x = \frac{\sqrt{3}}{2}$$

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

48. **If $3\sec\theta + 4\cos\theta - 4\sqrt{3} = 0$ where θ is an acute angle than the value of θ is:**

यदि $3\sec\theta + 4\cos\theta - 4\sqrt{3} = 0$ जहां θ एक न्यूनकोण है तो θ का मान ज्ञात कीजिए।

SSC CGL 13/08/2021 (Shift- 03)

(a) 20°
(b) 30°
(c) 60°
(d) 45°

$\alpha = 0$ $\beta = 90^\circ$

$\sin\alpha + \cos\beta$

$= 0 + 0 = 0$

$\alpha = 90^\circ$ $\beta = 0^\circ$

$\sin\alpha + \cos\beta$

$= 1 + 1$

$= 2$

49. If $\sin\alpha + \sin\beta = \cos\alpha + \cos\beta = 1$, then $\sin\alpha + \cos\beta = ?$

1 + 0 0 + 1

यदि $\sin\alpha + \sin\beta = \cos\alpha + \cos\beta = 1$ है तो $\sin\alpha + \cos\beta = ?$

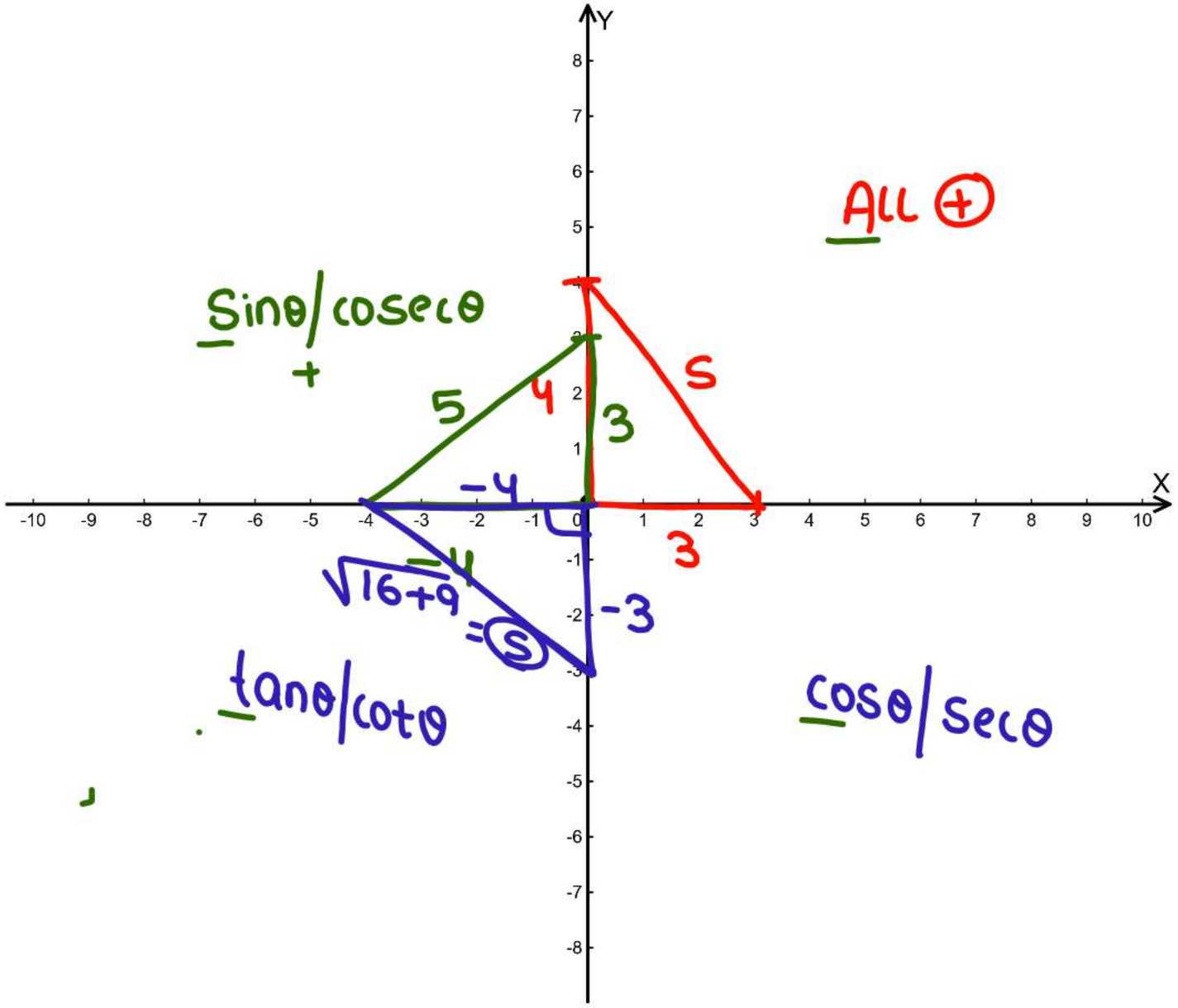
0 + 1 1 + 0

SSC CGL 23/08/2021 (Shift- 02)

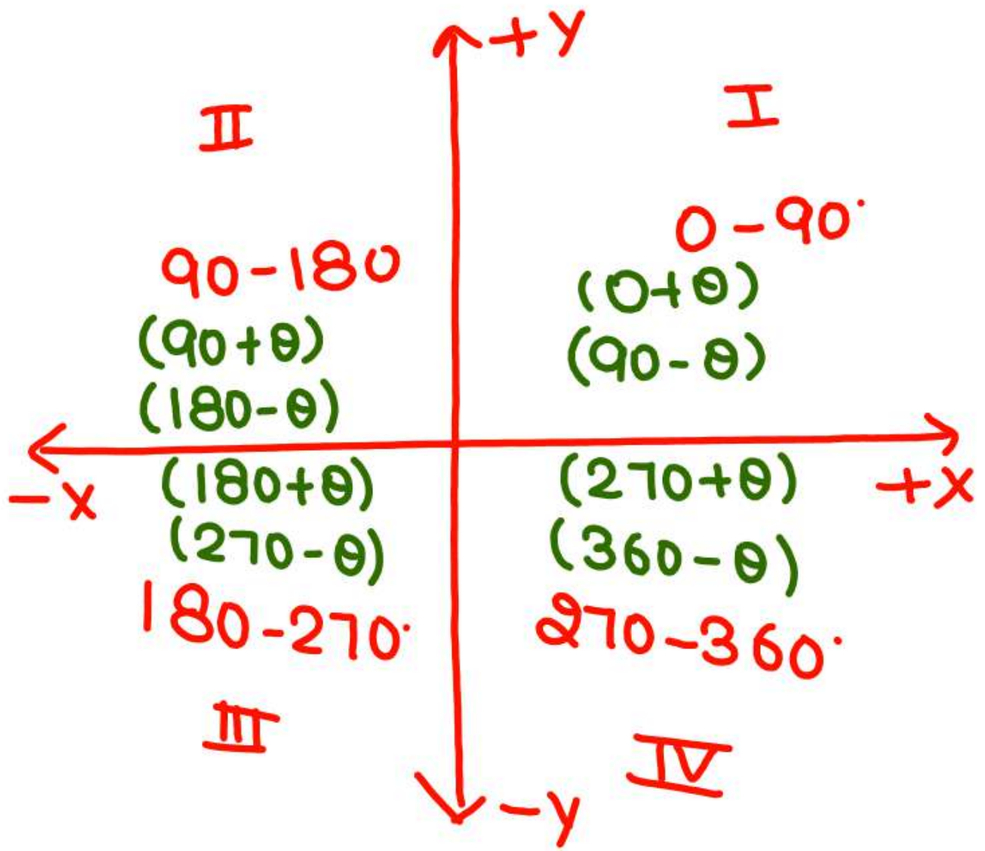
(a) 2 (b) 0

(c) 1 (d) −1

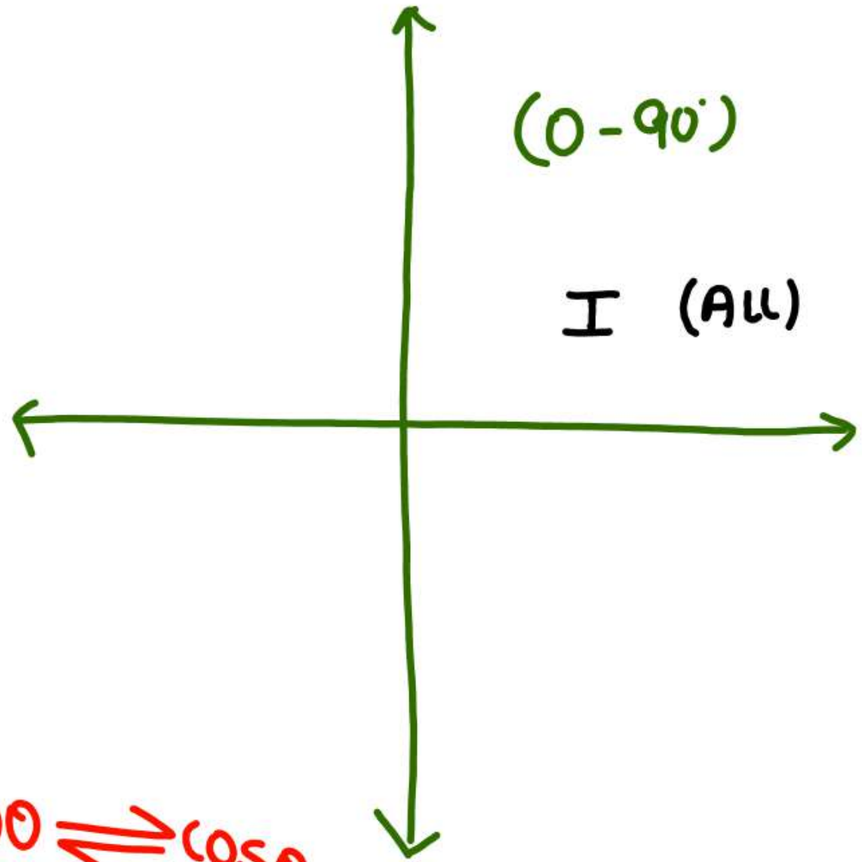
यह गलत है।



Y
X
All +
Sinθ/cosecθ
+
5
4
3
5
-4
3
-4
-3
√16+9 = 5
tanθ/cotθ
cosθ/secθ


+y
II
I
0-90°
90-180
(0+θ)
(90+θ)
(90-θ)
(180-θ)
-x
(180+θ)
(270+θ)
+x
(270-θ)
(360-θ)
180-270°
270-360°
III
IV
-y

* $\sin(90-\theta) = +\cos\theta$
* $\cos(90-\theta) = +\sin\theta$
* $\tan(90-\theta) = +\cot\theta$
* $\operatorname{cosec}(90-\theta) = +\sec\theta$
* $\sec(90-\theta) = +\operatorname{cosec}\theta$
* $\cot(90-\theta) = +\tan\theta$

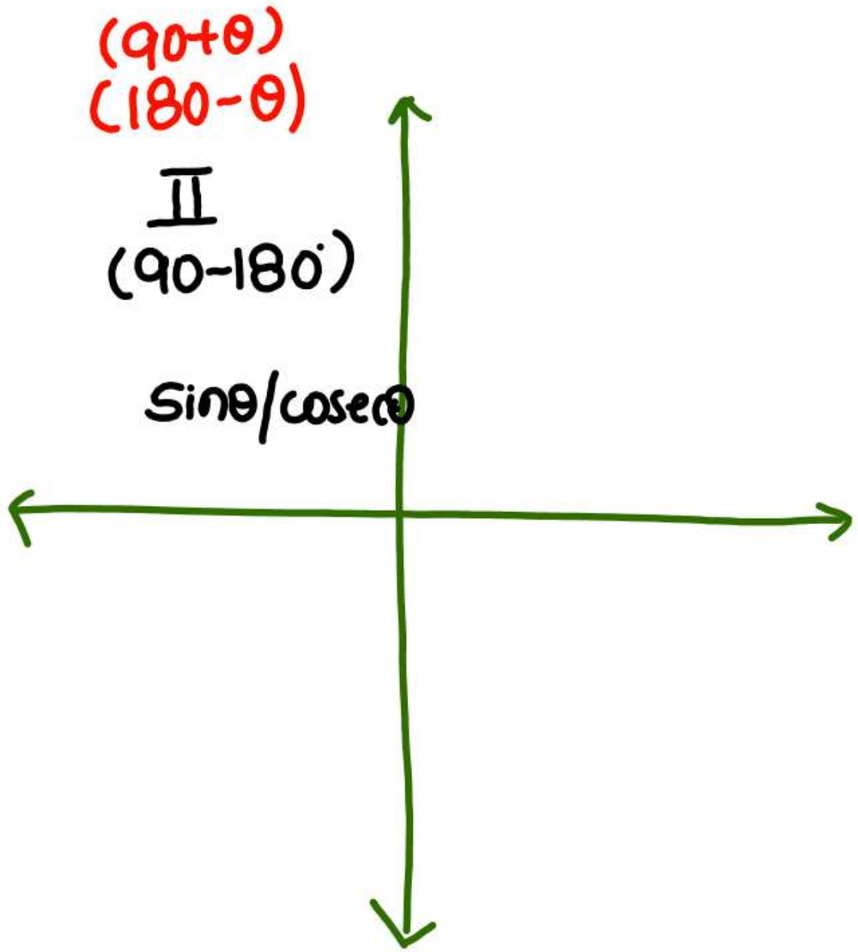


$\sin\theta \rightleftharpoons \cos\theta$

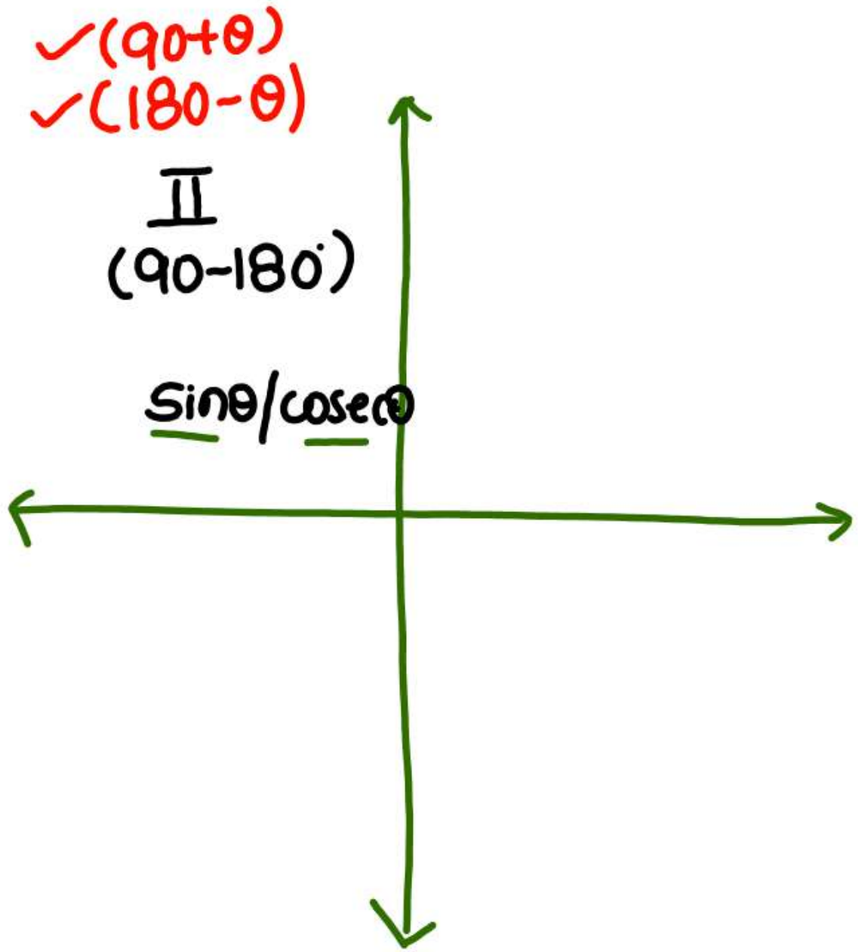
$\tan\theta \rightleftharpoons \cot\theta$

$\operatorname{cosec}\theta \rightleftharpoons \sec\theta$

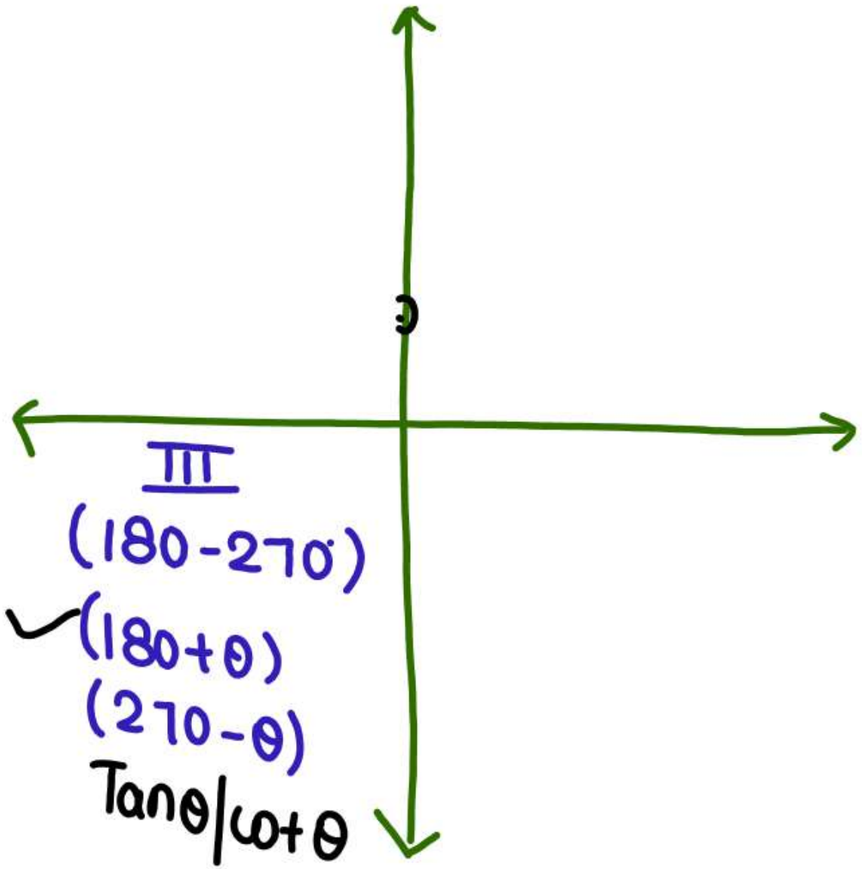
* $\sin(90+\theta) = +\cos\theta$
* $\cos(90+\theta) = -\sin\theta$
* $\tan(90+\theta) = -\cot\theta$
* $\operatorname{cosec}(90+\theta) = +\sec\theta$
* $\sec(90+\theta) = -\operatorname{cosec}\theta$
* $\cot(90+\theta) = -\tan\theta$



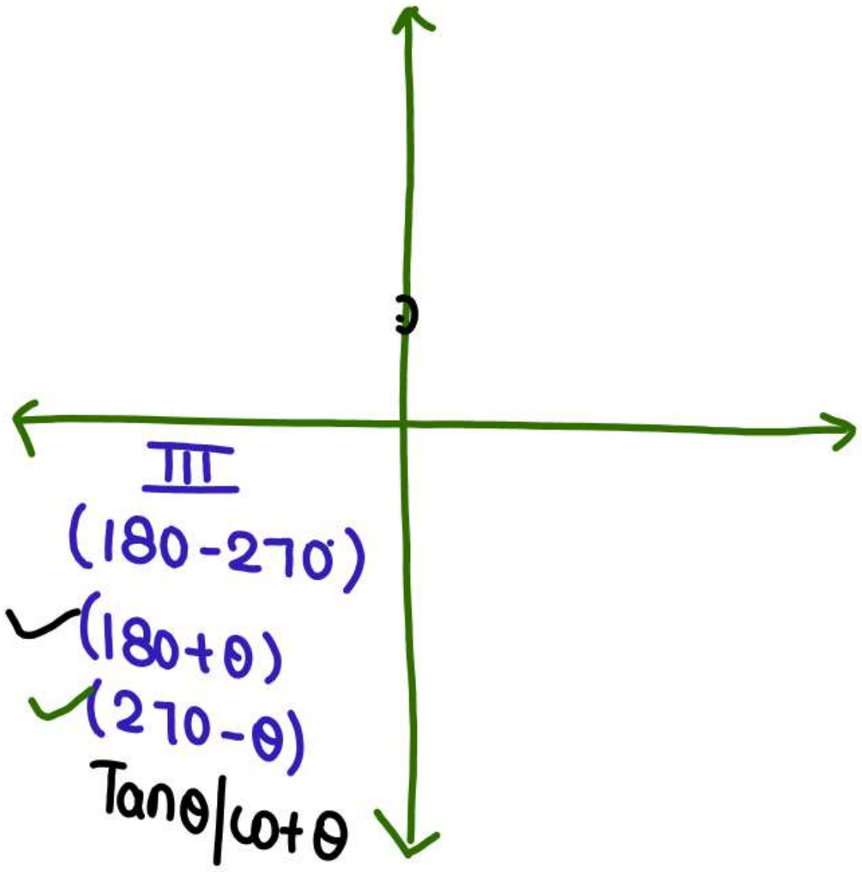
* $\sin(180-\theta) = +\sin\theta$
* $\cos(180-\theta) = -\cos\theta$
* $\tan(180-\theta) = -\tan\theta$
* $\operatorname{cosec}(180-\theta) = +\operatorname{cosec}\theta$
* $\sec(180-\theta) = -\sec\theta$
* $\cot(180-\theta) = -\cot\theta$



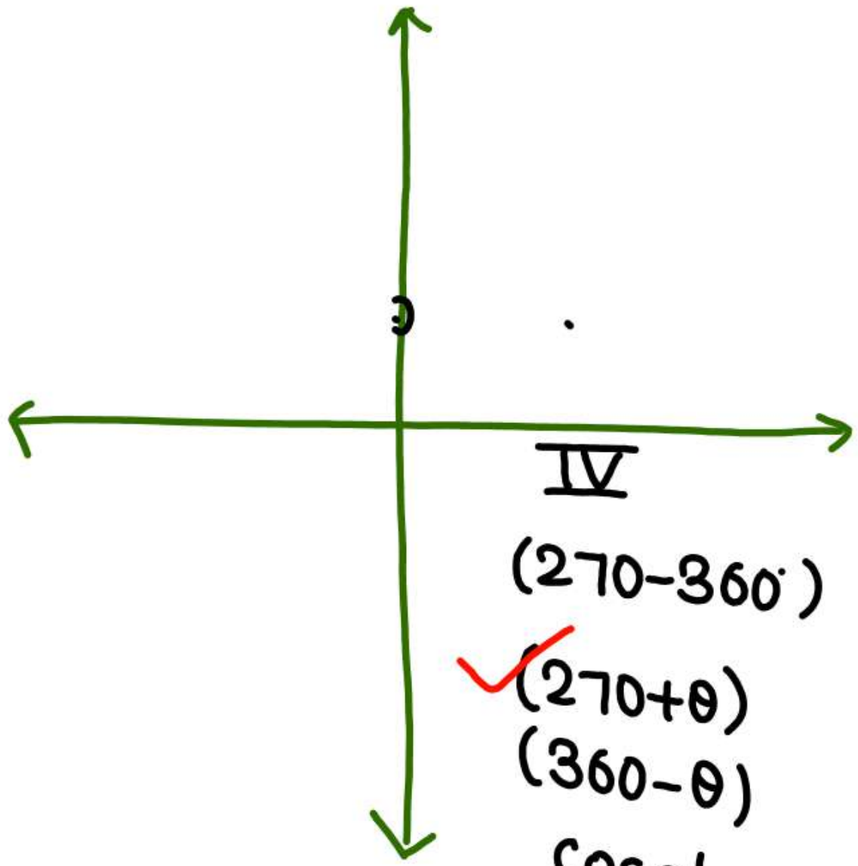
* $\sin(180+\theta) = -\sin\theta$
* $\cos(180+\theta) = -\cos\theta$
* $\tan(180+\theta) = +\tan\theta$
* $\operatorname{cosec}(180+\theta) = -\operatorname{cosec}\theta$
* $\sec(180+\theta) = -\sec\theta$
* $\cot(180+\theta) = +\cot\theta$



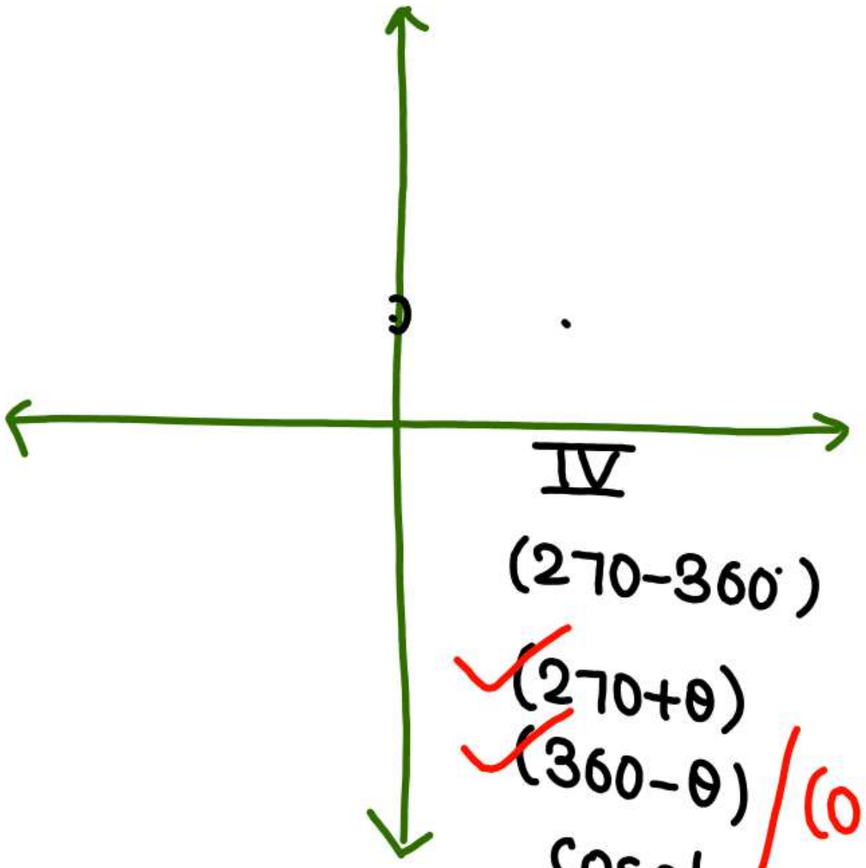
* $\sin(270-\theta) = -\cos\theta$
* $\cos(270-\theta) = -\sin\theta$
* $\tan(270-\theta) = +\cot\theta$
* $\operatorname{cosec}(270-\theta) = -\sec\theta$
* $\sec(270-\theta) = -\operatorname{cosec}\theta$
* $\cot(270-\theta) = +\tan\theta$



* $\sin(270+\theta) = -\cos\theta$
* $\cos(270+\theta) = +\sin\theta$
* $\tan(270+\theta) = -\cot\theta$
* $\operatorname{cosec}(270+\theta) = -\sec\theta$
* $\sec(270+\theta) = +\operatorname{cosec}\theta$
* $\cot(270+\theta) = -\tan\theta$



* $\sin(360-\theta) = \sin(-\theta) = -\sin\theta$
* $\cos(360-\theta) = \cos(-\theta) = +\cos\theta$
* $\tan(360-\theta) = \tan(-\theta) = -\tan\theta$
* $\text{cosec}(360-\theta) = \text{cosec}(-\theta) = -\text{cosec}\,\theta$
* $\sec(360-\theta) = \sec(-\theta) = +\sec\theta$
* $\cot(360-\theta) = \cot(-\theta) = -\cot\theta$



IV

$(270-360^\circ)$

$(270+\theta)$

$(360-\theta)$ / $(0-\theta)=(-\theta)$

$\cos\theta/\sec\theta$

50. Sin (– A) = ?

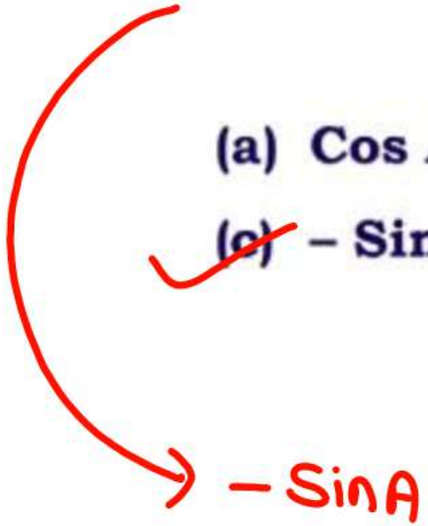
SSC CHSL 24/05/2022 (Shift- 02)

(a) Cos A

(b) – Cos A

(c) – Sin A

(d) Sin A



$+\cot\theta = \frac{2}{\sqrt{3}}$

ans $= 2\sqrt{3}\tan\theta + 1$

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

$= 3 + 1$

$= 4$

51. If $\tan(90 - \theta) = \frac{2}{\sqrt{3}}$, then the value of $2\sqrt{3}\tan\theta + 1$ is:

यदि $\tan(90 - \theta) = \frac{2}{\sqrt{3}}$, तो $2\sqrt{3}\tan\theta + 1$ का मान ज्ञात कीजिए।

SSC CHSL, 11/08/2023 (Shift-2)

(a) 4 ✓
(b) 5
(c) 3
(d) 6

52. What is the simplified value of

$$\cos^2(90^\circ-\theta)-\left[\frac{\{\cos(90^\circ-\theta)\cos\theta\}}{\cot\theta}\right]$$

का सरलीकृत मान क्या है?

SSC CHSL 31/05/2022 (Shift- 3)

(a) 4 (b) 2

(c) 0 (d) 1

$= \sin^2\theta - \left[\frac{\sin\theta \times \cos\theta \times \sin\theta}{\cos\theta}\right]$

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

$= 0$

53. Find the value of

$$\frac{\sin(90^\circ-\theta)\cos(90^\circ-\theta)\cot(90^\circ-\theta)}{\cos^2\theta-1}$$

का मान ज्ञात कीजिए।

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

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

Group D 19/09/2022 (Shift-01)

(a) $\tan\theta$ (b) 0

(c) -1 (d) $2\sin\theta\cos\theta$

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

$$= -1$$

$\sin 10^\circ = \cos 80^\circ$

$\sin 20^\circ = \cos 70^\circ$

$\sin 23 = \cos 67^\circ$

$\cos 25^\circ = \sin 65^\circ$

$\cos 40^\circ = \sin 50$

$\sin\theta \rightleftharpoons \cos\theta$

$\tan\theta \rightleftharpoons \cot\theta$

$\operatorname{cosec}\theta \rightleftharpoons \sec\theta$

54. The following expression is equal to

नीचे दिया गया व्यंजक बराबर है।

$\cot 85^\circ + \cos 75^\circ$

SSC CGL 20/07/2023 (Shift- 02)

(a) $\tan 85^\circ + \sin 75^\circ$ **(b) $\tan 85^\circ - \sin 75^\circ$**

(c) $\tan 5^\circ + \sin 15^\circ$ **(d) $\tan 5^\circ - \sin 15^\circ$**

$\cot(90-5)+\cos(90-15^\circ)$

$= \tan 5 + \sin 15^\circ$

54. The following expression is equal to

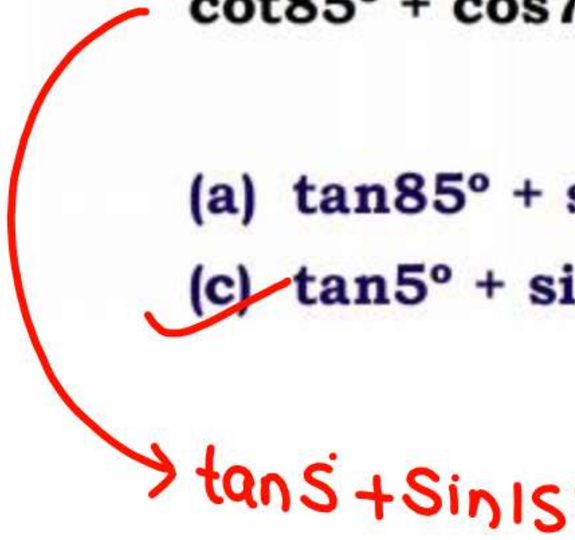
नीचे दिया गया व्यंजक बराबर है।

cot85° + cos75°

SSC CGL 20/07/2023 (Shift- 02)

(a) tan85° + sin75° **(b) tan85° – sin75°**

(c) tan5° + sin15° **(d) tan5° – sin15°**



$\cos(270^\circ) = \cos(90\times2+90^\circ)$
$= 0^\circ$

$\cos450^\circ = \cos90^\circ = 0$

$\cos120^\circ = \cos(90+30^\circ)$
$= -\sin30^\circ = -\frac{1}{2}$

$\cos240^\circ = \cos(90\times2+60^\circ)$
$= -\cos60$
$= -\frac{1}{2}$

55. Find θ, if $\cos\theta = -\frac{\sqrt{3}}{2}$

यदि $\cos\theta = -\frac{\sqrt{3}}{2}$ है, तो θ का मान ज्ञात करें।

SSC CHSL 02/06/2022 (Shift- 2)

(a) $\frac{3\pi}{2} = \frac{3\times180}{2} = 270^\circ$ (b) $\frac{5\pi}{2} = 450^\circ$

(c) $\frac{2\pi}{3} = 120^\circ$ (d) $\frac{4\pi}{3} = 240^\circ$

90

T

$\sin180^\circ = 0$
$\cos180^\circ = -1$

$\cos 150^\circ = \cos(90+60^\circ)$

$= -\sin 60^\circ = -\frac{\sqrt{3}}{2}$

$\cos 210^\circ = \cos(90\times2+30^\circ)$

$= -\cos 30^\circ$

$= -\frac{\sqrt{3}}{2}$

55. Find θ, if $\cos\theta = -\frac{\sqrt{3}}{2}$

यदि $\cos\theta = -\frac{\sqrt{3}}{2}$ है, तो θ का मान ज्ञात करें।

SSC CHSL 02/06/2022 (Shift- 2)

(a) $\frac{3\pi}{2}$

(b) $\frac{5\pi}{2}$

(c) $\frac{2\pi}{3}$

(d) $\frac{4\pi}{3}$

$\frac{\pi}{180^\circ}\times 150^\circ = \frac{5\pi}{6}$

$\frac{\pi}{180^\circ}\times 210^\circ = \frac{7\pi}{6}$

56. $\tan(\pi + \theta) = ?$

SSC CHSL 08/06/2022 (Shift- 1)

(a) $\sec\theta$ (b) $\text{cosec}\theta$

(c) $\cot\theta$ (d) $\tan\theta$

$= \tan(180+\theta)$

$= +\tan\theta$

90-180	0-90
180-270	
tanθ/cotθ	

$$\sin C + \sin D = 2\sin\left(\frac{C+D}{2}\right)\cos\left(\frac{C-D}{2}\right)$$

$$\sin C - \sin D = 2\cos\left(\frac{C+D}{2}\right)\sin\left(\frac{C-D}{2}\right)$$

Q. $\sin 70^\circ + \sin 50^\circ$

Ans $2\sin\left(\frac{70+50}{2}\right)\cos\left(\frac{70-50}{2}\right)$

$= 2\sin 60^\circ \cos 10^\circ$

$= 2 \times \frac{\sqrt{3}}{2} \cos 10^\circ$

$= \sqrt{3}\cos 10^\circ$

Q. $\sin 130^\circ + \sin 50^\circ$

Ans $= 2\sin 90^\circ \cdot \cos 40^\circ$

$= 2 \times 1 \times \cos 40^\circ$

$= 2\cos 40^\circ$

Q. $\sin 70^\circ - \sin 50^\circ$

Ans $= 2\cos\left(\frac{70+50}{2}\right)\sin\left(\frac{70-50}{2}\right)$

$= 2\cos 60^\circ \cdot \sin 10^\circ$

$= 2 \times \frac{1}{2} \sin 10^\circ$

$= \sin 10^\circ$

57. The value of sin 73° + cos137° is

sin73° + cos137° का मान क्या होगा?

SSC CHSL 10/06/2022 (Shift- 3)

(a) sin 13° **(b) cos 13°**

(c) cos 18° **(d) sin 18°**

$\sin 73^\circ + \cos(90+47^\circ)$

$= \sin 73^\circ - \sin 47^\circ$

$= 2\cos\left(\frac{73+47}{2}\right)\sin\left(\frac{73-47}{2}\right)$

$= 2\cos 60^\circ \sin 13^\circ$

$= 2 \times \frac{1}{2} \sin 13$

57. The value of sin 73° + cos137° is

sin73° + cos137° का मान क्या होगा?

SSC CHSL 10/06/2022 (Shift- 3)

(a) sin 13°
(b) cos 13°
(c) cos 18°
(d) sin 18°

$\sin 73^\circ + \cos(90+47^\circ)$

$= \sin 73^\circ - \sin 47^\circ$

$= 2\cos 60^\circ \sin 13^\circ$

$= 2 \times \frac{1}{2} \sin 13$

58. The value of $\sin^2\frac{2\pi}{3} + \cos^2\frac{5\pi}{6} - \tan^2\frac{3\pi}{4}$ is:

$\sin^2\frac{2\pi}{3} + \cos^2\frac{5\pi}{6} - \tan^2\frac{3\pi}{4}$ का मान क्या है?

SSC Phase X 03/08/2022 (Shift- 02)

(a) $\frac{1}{2}$

(b) $\frac{1}{4}$

(c) 4

(d) 2

$\sin^2 120^\circ + \cos^2 150^\circ - \tan^2 135^\circ$

$= \sin^2(90+30) + \cos^2(90+60) - \tan^2(90+45^\circ)$

$= \cos^2 30 + \sin^2 60 - \cot^2 45^\circ$

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

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

$\frac{\pi}{3} = 60^\circ \quad \frac{\pi}{4} = 45^\circ$

$\frac{\pi}{6} = 30^\circ$

59. Simplify. $\frac{1}{\cos x}\sqrt{\frac{\cos(\pi + x)\cos(-x)}{\sin(\pi - x)\cos\left(\frac{\pi}{2} + x\right)}}$

$\sin(-\theta) = -\sin\theta$
$\cos(-\theta) = \cos\theta$

$= \frac{1}{\cos x}\sqrt{\frac{+\cos x \times \cos x}{\sin x \times (+\sin x)}}$

$\frac{1}{\cos x}\sqrt{\frac{\cos(\pi + x)\cos(-x)}{\sin(\pi - x)\cos\left(\frac{\pi}{2} + x\right)}}$ सरल करें

$= \frac{1}{\cos x} \times \frac{\cos x}{\sin x}$

$= \operatorname{cosec} x$

SSC Phase X 04/08/2022 (Shift- 03)

(a) tan x
(b) cot x
(c) sec x
(d) cosec x ✓

60. If $\cos x = -\frac{\sqrt{3}}{2}$ and $\pi < x < \frac{3\pi}{2}$, then the value of $2\cot^2 x + 3\sec^2 x$ is :

SSC CHSL 08/07/2019 (Shift- 02)

(a) 10
(b) 4
(c) 8
(d) 16

$180^\circ < x < 270^\circ$

$2\cot^2 210 + 3\sec^2 210^\circ$

$= 2\cot^2(90\times 2+30)+3\sec^2(90\times 2+30^\circ)$

$= 2\cot^2 30^\circ + 3\sec^2 30^\circ$

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

$= 10$

$x = 150^\circ$ or 210°

61. Find x if $\cos x = -\frac{1}{2}$. , $\frac{\pi}{2} < x < \pi$

SSC CHSL 15/10/2020 (Shift- 03)

(a) $\frac{3\pi}{2}$ 270°

(b) $\frac{2\pi}{3}$ 120°

(c) $\frac{5\pi}{6}$ 150°

(d) $\frac{4\pi}{3}$ 240°

$\cos 270° = 0$

$\cos 120° = \cos(90+30°)$

$= -\sin 30° = -\frac{1}{2}$

$\cos 150° = \cos(90+60°)$

$= -\sin 60° = -\frac{\sqrt{3}}{2}$

$\cos 240° = \cos(90\times2+60°)$

$= -\cos 60°$

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

61. Find x if $\cos x = -\frac{1}{2}$. , $\frac{\pi}{2} < x < \pi$

SSC CHSL 15/10/2020 (Shift- 03)

(a) $\frac{3\pi}{2}$ 270°

(b) $\frac{2\pi}{3}$ 120°

(c) $\frac{5\pi}{6}$ 150°

(d) $\frac{4\pi}{3}$ 240°

$\cos 270° = 0$

$\cos 120° = \cos(90+30°)$

$= -\sin 30° = -\frac{1}{2}$

$\cos 150° = \cos(90+60°)$

$= -\sin 60° = -\frac{\sqrt{3}}{2}$

$\cos 240° = \cos(90\times2+60°)$

$= -\cos 60°$

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

$\tan 240^\circ$

$= \tan(90 \times 2 + 60^\circ)$

$= +\tan 60^\circ$

$= \sqrt{3}$

62. If $\cos x = -\frac{1}{2}$, x lies in third quadrant, then tanx = ?

120°, 240°

यदि $\cos x = -\frac{1}{2}$, x तीसरे चतुर्थांश में स्थित है, तो tanx = ?

SSC CGL 17/07/2023 (Shift-03)

(a) $\sqrt{3}$

(b) $\frac{\sqrt{3}}{2}$

(c) $\frac{2}{\sqrt{3}}$

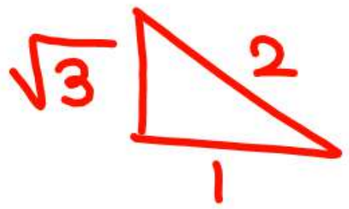
(d) $\frac{1}{\sqrt{3}}$

$\cos x = -\frac{1}{2}$ → B, 2 → H

62. If $\cos x = -\frac{1}{2}$, x lies in third quadrant, then tanx = ?

S	A
T	Cos

यदि $\cos x = -\frac{1}{2}$, x तीसरे चतुर्थांश में स्थित है, तो tanx = ?



$\sin\theta = -\frac{\sqrt{3}}{2}$

$\tan\theta = +\frac{\sqrt{3}}{1}$

SSC CGL 17/07/2023 (Shift-03)

(a) $\sqrt{3}$

(b) $\frac{\sqrt{3}}{2}$

(c) $\frac{2}{\sqrt{3}}$

(d) $\frac{1}{\sqrt{3}}$

63. **Find the exact value of cos120°.**

cos120° का सटीक मान ज्ञात कीजिए।

SSC CGL 18/07/2023 (Shift-04)

(a) –0.5 (b) 0

(c) 0.5 (d) 1

$= \cos(120°)$

$= \cos(90 \times 1 + 30°)$

$= -\sin 30°$

$= -\frac{1}{2} = -0.5$

$90 \,)\, 120 \,(\, 1$

$\underline{90}$

$30°$

90-180 | 0-90°

64. Find the value of the following?

$$\cos^2(270 - \phi) - \sin^2(180 - \phi) + \sin^2\left(\frac{\pi}{2}\right)\sin^2(270 - \phi).$$

निम्न का मान ज्ञात कीजिए?

$\sin^2\phi - \sin^2\phi + 1 \times \cos^2\phi$

$= \cos^2\phi$

RRB NTPC 08/01/2021 (Shift-01)

(a) $\cos^2\phi$

(b) $\sin^2\left(\frac{\pi}{2}\right)$

(c) $\sin^2(\phi) - 1$

(d) $\sin^2(\phi)$

$$= \left(\frac{+\sin A}{+\operatorname{cosec} A}\right) + \left(\frac{+\cos A}{+\sec A}\right)$$

$$= (\sin A \times \sin A) + (\cos A \cos A)$$

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

$$= 1$$

65. What is the value of

$[\cos(90° + A) \div \sec(270° - A)] + [\sin(270° + A) \div \operatorname{cosec}(630° - A)]$

$\operatorname{cosec}(270° - A)$ का मान ज्ञात कीजिए।

(a) 3 sec A **(b) tanA secA**

(c) 0 **(d) 1**

S	A
T	C

$$630° - 360° = 270°$$

66. What is the value of sin(–405°)?

sin(–405°) का मान ज्ञात करें।

SSC SSC 20/07/2023 (Shift-03)

$= -\sin 405^\circ$

$= -\{\sin(90\times4+45^\circ)\}$

$= -\{+\sin 45^\circ\}$

$= -\frac{1}{\sqrt{2}}$

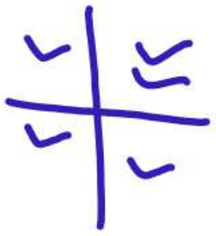
(a) $\frac{\sqrt{5}}{2}$

(b) $\frac{1}{2}$

(c) $\frac{-1}{2}$

(d) $\frac{-1}{\sqrt{2}}$

$90\overline{)405}(4$
360
45



$= -\{\tan 1125^\circ\}$

$= -\{\tan(90 \times 12 + 45^\circ)\}$

$= -\{+\tan 45^\circ\}$

$= \underline{-1}$

67. Find the value of tan(–1125°).

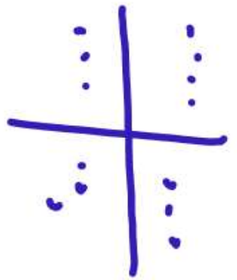
tan(–1125°) का मान ज्ञात कीजिए।

SSC CGL 25/07/2023 (Shift-2)

(a) 1 (b) $\frac{1}{2}$

(c) –1 (d) 0

$$\begin{array}{r} 90)1125(12 \\ 90 \\ \hline 225 \\ -180 \\ \hline 45 \end{array}$$



68. **Find the value of tan4384° + cot6814° = ?**

tan4384° + cot6814° का मान ज्ञात कीजिए।

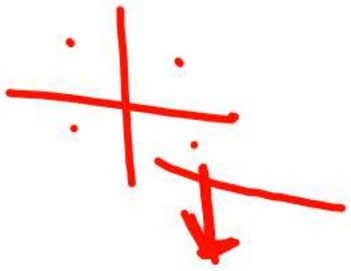
SSC CGL 26/07/2023 (Shift-3)

(a) −1
(b) 2
(c) 0
(d) 1

$\tan(90\times48+64^\circ)+\cot(90\times75+64^\circ)$

$= +\tan 64^\circ - \tan 64^\circ$

$= 0$



68. Find the value of tan4384° + cot6814° = ?

tan4384° + cot6814° का मान ज्ञात कीजिए।

SSC CGL 26/07/2023 (Shift-3)

(a) −1 (b) 2

(c) 0 (d) 1

$\tan 64^\circ + \cot 334^\circ$

$= \tan 64 + \cot(90 \times 3 + 64^\circ)$

$= \tan 64 - \tan 64$

$= \underline{\underline{0}}$

$$\begin{array}{r|r} & 18 \\ 360)\,4384\,(12 & 360)\,6814\,(\\ 360 & 360 \\ \hline 784 & 3214 \\ 720 & 2880 \\ \hline 64^\circ & 334 \end{array}$$

sin	All
tan	cos

69. Find the value of

$\cos 570^\circ \sin 510^\circ + \sin(-330^\circ)\cos(-390^\circ)$

360

का मान ज्ञात कीजिए।

(a) 1 **(b) 0**

(c) 2 **(d) NOT**

$\cos 210^\circ \times \sin 150^\circ - \sin 330^\circ \cos 30^\circ$

$= \cos(90\times 2+30^\circ) \times \sin(90\times 1+60^\circ) - \sin(90\times 3+60^\circ)\cos 30^\circ$

$= (-\cos 30^\circ) \times \cos 60^\circ - (-\cos 60^\circ)\cos 30^\circ$

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

$= 0$

$\cos(90+\theta)$

$= -\sin\theta$

S	A

70. Find is the value of

$$\sin\frac{7\pi}{4}\ \sin\frac{\pi}{4}\ \sin\frac{3\pi}{4}\ \sin\frac{5\pi}{4}.$$

$\pi = 180^\circ$

$\frac{\pi}{4} = \frac{180}{4} = 45^\circ$

$\sin\frac{7\pi}{4}\ \sin\frac{\pi}{4}\ \sin\frac{3\pi}{4}\ \sin\frac{5\pi}{4}$ का मान ज्ञात करें।

$\sin(7\times45^\circ)\cdot\sin45^\circ\cdot\sin(3\times45^\circ)\cdot\sin(5\times45^\circ)$

$= \sin315^\circ\cdot\sin45^\circ\cdot\sin135^\circ\cdot\sin225^\circ$

$= \sin(90\times3+45^\circ)\cdot\frac{1}{\sqrt{2}}\cdot\sin(90+45)\cdot\sin(90\times2+45^\circ)$

$= -\cos45^\circ\times\frac{1}{\sqrt{2}}\times\cos45^\circ\times(-\sin45^\circ)$

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

$= +\frac{1}{4}$

S	All
T	Cos

RRB JE 22/05/2019 (Shift-02)

(a) $\frac{1}{4}$ ✓

(b) $\frac{3}{16}$

(c) $\frac{1}{8}$

(d) $\frac{1}{16}$