



RAILWAY



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TRIGONOMETRY

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AADIL SIR



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$$\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} = b$$

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

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

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

1. यदि $\sec \theta + \operatorname{cosec} \theta = a$ और $\tan \theta + \cot \theta = b$ है, तो $\operatorname{cosec} 2\theta$ का मान ज्ञात कीजिए।

If $\sec \theta + \operatorname{cosec} \theta = a$ and $\tan \theta + \cot \theta = b$ then find the value of $\operatorname{cosec} 2\theta$

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

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

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

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

$$2 \operatorname{cosec} 2\theta = b$$

$$\operatorname{cosec} 2\theta = \frac{b}{2}$$

$$\sec \theta \operatorname{cosec} \theta = b$$

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

Sin A

2. $\frac{\sin A \cdot \cos(90^\circ - A)}{\cot(90^\circ + A) \cdot \cos(180^\circ + A)}$ को सरल कीजिए।

Simplify: $\frac{\sin A \cdot \cos(90^\circ - A)}{\cot(90^\circ + A) \cdot \cos(180^\circ + A)}$

B) $\sin A$

~~C) $\sin A$~~ $90-180$ $0-90$ D) $-\cos A$
S +

 $180-270$ $270-360$
tan cos

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

If $\cos x - \sin x = a$ and $\cos x + \sin x = b$ then find the value of $\frac{1-\tan x}{1+\tan x}$

A) $a^2 + b^2$

B) ab

C) $a^2 - b^2$

D) $-ab$

$$\cos^2 x - \sin^2 x = ab$$

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

$$(\cos x - \sin x) (\cos x + \sin x)$$

$$18A = 90$$

$$A = 5$$

4. यदि $\sin 6A = \cos 12A$ है, तो $\tan 9A + \cot 9A$ का मान ज्ञात कीजिए।

$$1 + 1 = 2$$

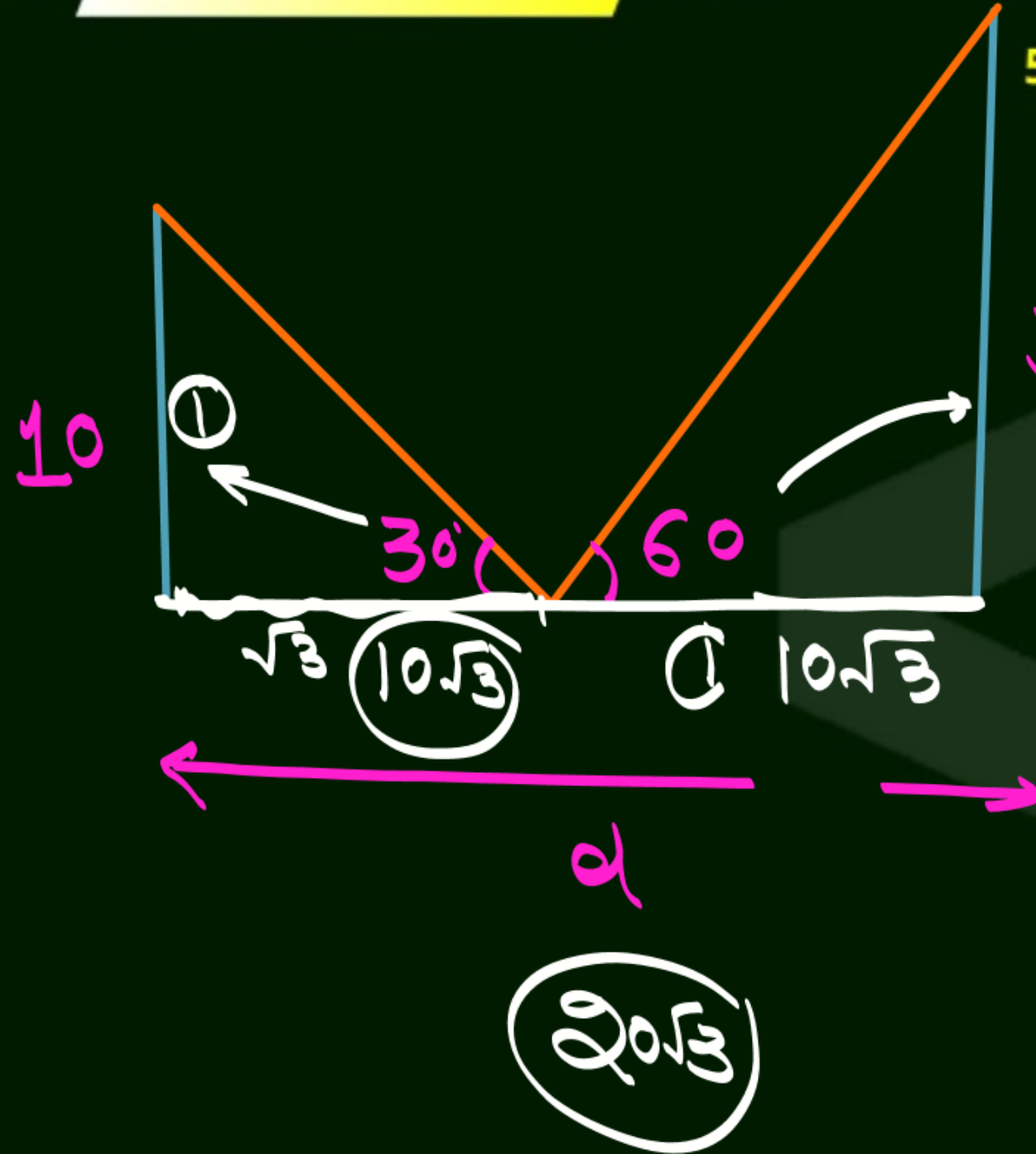
If $\sin 6A = \cos 12A$ then find the value of $\tan 9A + \cot 9A$

A) 1

B) -2

C) 2

D) 0



5. समतल भूमि पर 10 m और 30 m लंबाई के दो खंभे एक-दूसरे से d दूरी पर लंबवत खड़े हैं। उनके बीच स्थित एक बिंदु से, उनके आधारों को जोड़ने वाली रेखा के अनुदिश, लंबे और छोटे खंभों के शिखरों के उन्नयन कोण क्रमशः 60° और 30° हैं। खंभों के बीच की दूरी d ज्ञात कीजिए।

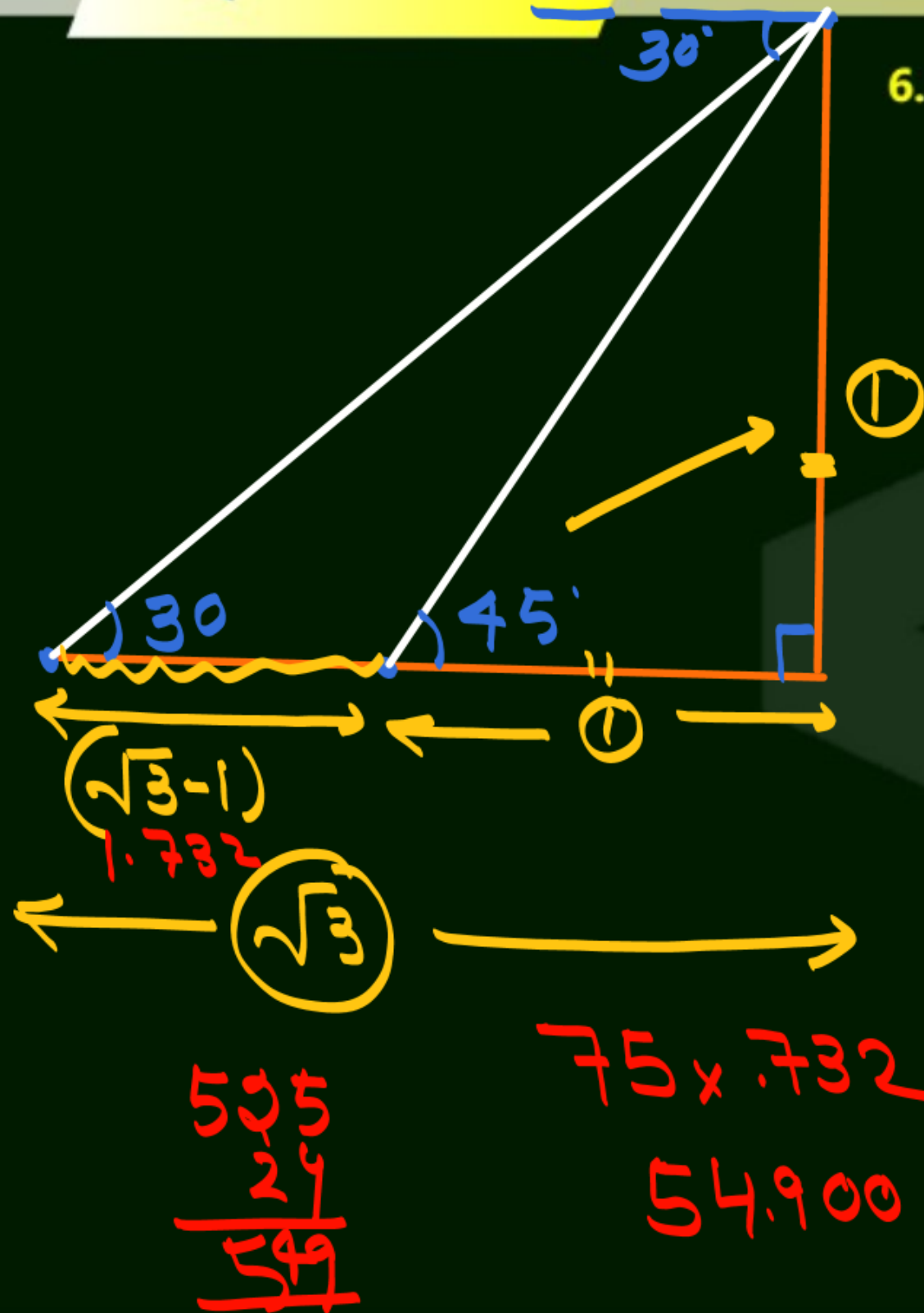
Two pillars of lengths 10 m and 30 m stand vertically on a flat ground at a distance of d from each other. From a point situated between them, along the line joining their bases, the angles of elevation of the tops of the longer and shorter pillars are 60° and 30° respectively. Find the distance d between the pillars.

A) $25\sqrt{3}$ मीटर

B) $10\sqrt{3}$ मीटर

C) $20\sqrt{3}$ मीटर

D) $30\sqrt{3}$ मीटर



6. 75 मीटर ऊँचे लाइटहाउस के शीर्ष से, दो जहाजों के अवनमन कोण 30° और 45° हैं। यदि दोनों जहाज लाइटहाउस के एक ही तरफ स्थित हैं तथा उसके आधार के साथ एक सीधी रेखा के अनुदिश हैं, तो दोनों जहाजों के बीच की दूरी ज्ञात कीजिए।

$\sqrt{3}=1.732$ का उपयोग कीजिए)

From the top of a 75 meter-high lighthouse, the angles of depression of two ships are 30° and 45° . If both ships are situated on the same side of the lighthouse and are along a straight line passing through its base, then find the distance between the two ships. $\sqrt{3}=1.732$

A) 54.9 मीटर

C) 58.4 मीटर

B) 52.5 मीटर

D) 61.2 मीटर

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

7. नीचे दिए गए व्यंजकों में से किसका मान $\cos^2\theta + \sin^2\theta$ के मान के बराबर है?

Which of the following expressions has a value equal to the value of $\cos^2\theta + \sin^2\theta$?

A) ~~$1 + \tan^2(\theta) - (1 - \sec^2\theta)$~~

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

B) ~~$\operatorname{cosec}^2\theta + \sec^2(\theta)$~~

C) ~~$\operatorname{cosec}^2(\theta) + \cot^2(\theta)$~~

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

$2 - (\sec^2\theta + \tan^2\theta)$

$$2\cos^2 x = \frac{3}{2}$$

$$\cos^2 x = \frac{3}{4}$$

$$\cancel{\cos} x = \frac{\sqrt{3}}{2} = \cancel{\cos} 30$$

$$\boxed{x = 30}$$

8. यदि $2\cos^2 x - 1 = \frac{1}{2}$, जहाँ $0^\circ < x < 90^\circ$ है, तो $\sec 2x + \operatorname{cosec} x + \cot^2 x$ का मान ज्ञात कीजिए।

If $2\cos^2 x - 1 = \frac{1}{2}$, where $0^\circ < x < 90^\circ$, then find the value of $\sec 2x + \operatorname{cosec} x + \cot^2 x$

A) 11

B) 5

C) 9

D) 7

$$\sec 60 + \operatorname{cosec} 30 + \cot^2 30$$

$$2 + 2 + 3$$

$$\boxed{7}$$

$$\tan \theta = \frac{2 \leftarrow P}{1 \leftarrow B} \quad H = \sqrt{4+1} = \sqrt{5}$$

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

9. यदि $\tan \theta = 2$ और θ प्रथम चतुर्थांश में है, तो $\sec \theta$ का मान कितना होगा?

If $\tan \theta = 2$ and θ is in the first quadrant, then what will be the value of $\sec \theta$?

A) $\sqrt{2}$

B) 2

C) $\sqrt{3}$

D) $\sqrt{5}$

10. यदि $4\sin \theta + \operatorname{cosec} \theta = 4$, $0^\circ < \theta < 90^\circ$ है, तो $\sin 3\theta + \cos 3\theta$ का मान ज्ञात कीजिए।

30, 45, 60

If $4\sin \theta + \operatorname{cosec} \theta = 4$, where $0^\circ < \theta < 90^\circ$, then find the value of $\sin 3\theta + \cos 3\theta$.

A) -1

B) 0

C) 1

D) 2

$$4\sin \theta + \frac{1}{\sin \theta} = 4$$

$$4 \times \frac{1}{2} + 2 = 4 \quad \theta = 30^\circ$$

$$\sin 90 + \cos 90 \\ 1 + 0 = 1$$

11. यदि $\sin\theta + \cos\theta = \sqrt{2} \cos\theta$, जहाँ $0^\circ < \theta < 90^\circ$ है, तो $\tan \theta$ का मान कितना है?

If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$, where $0^\circ < \theta < 90^\circ$, then what is the value of $\tan \theta$?

A) $\frac{1}{\sqrt{3}}$

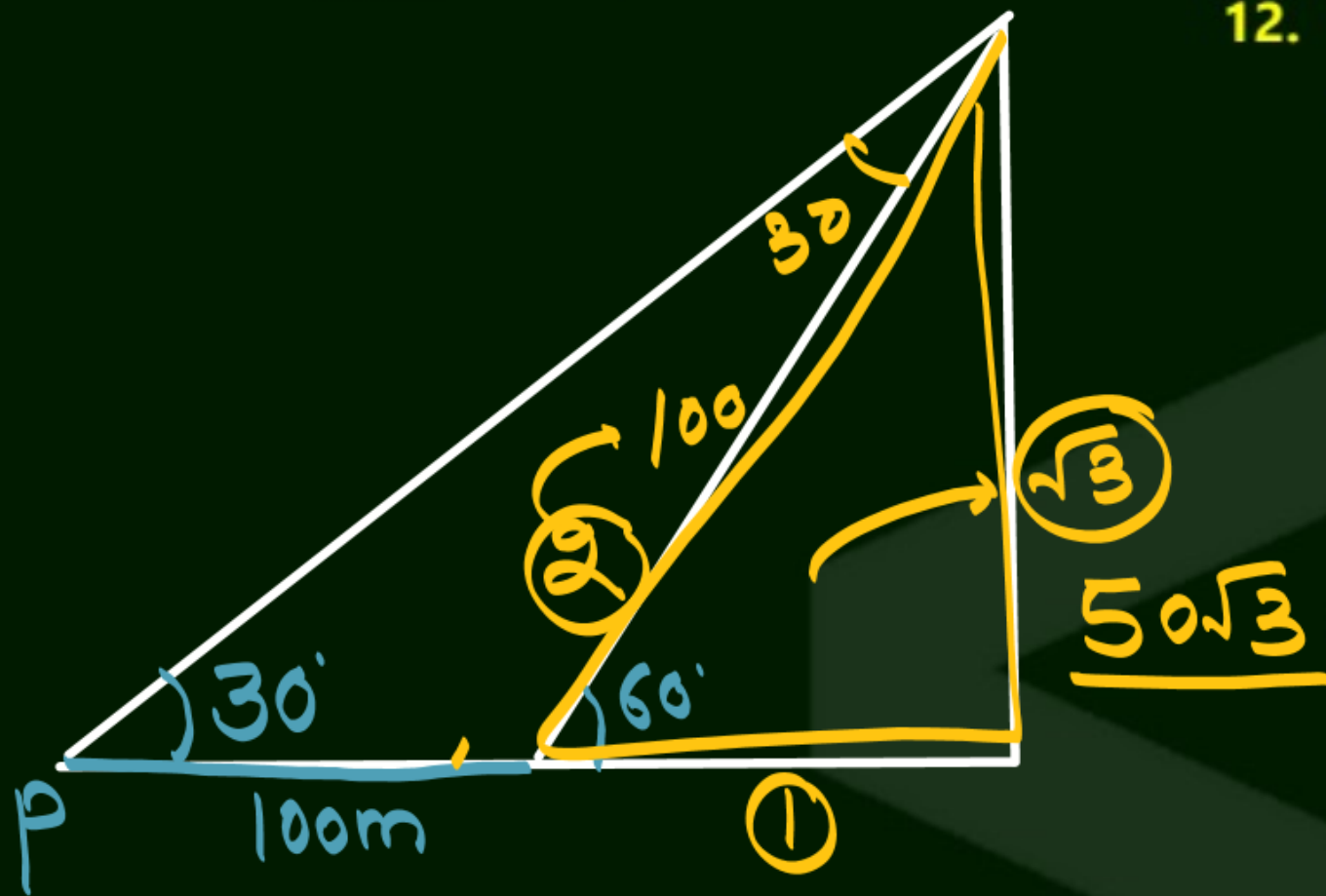
B) 1

C) $\sqrt{3}$

D) $\sqrt{2}-1$

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

$\tan\theta = \sqrt{2}-1$



12. समतल भूमि पर एक ऊर्ध्वाधर मीनार खड़ी है। बिंदु P से, उसके शिखर का उन्नयन कोण 30° है। बिंदु P और मीनार के आधार (foot) को जोड़ने वाली रेखा के अनुदिश मीनार के 100 m निकट जाने पर उन्नयन कोण 60° हो जाता है। मीनार की ऊँचाई ज्ञात कीजिए।

A vertical tower stands on a flat ground. From a point P, the angle of elevation of its top is 30° . Moving 100 m closer to the tower along the line joining point P and the foot of the tower, the angle of elevation becomes 60° . Find the height of the tower.

- A) $75\sqrt{3}$ मीटर B) $25\sqrt{3}$ मीटर
C) $150\sqrt{3}$ मीटर D) $50\sqrt{3}$ मीटर

$$\cos A = \frac{4}{5} \quad p = 3$$

13. यदि $\cos A = \frac{4}{5}$ है, तो $\frac{\sin^2 A - 5\cos^2 A + \sec^2 A}{\tan^2 A}$ का मान ज्ञात कीजिए।

If $\cos A = \frac{4}{5}$, then find the value of $\frac{\sin^2 A - 5\cos^2 A + \sec^2 A}{\tan^2 A}$

A) $-\frac{451}{225}$

B) $\frac{23}{225}$

C) $\frac{109}{225}$

D) $-\frac{511}{225}$

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

$$\frac{-\frac{71}{25} - \frac{80}{25} + \frac{25}{16}}{\frac{9}{16}} = \frac{-1136 + 625}{25 \times 16} = \frac{-511}{225}$$

$$\cot A = \frac{2-B}{1-P} \quad H = \sqrt{5}$$

$$H = \sqrt{B^2 + P^2}$$

$$\operatorname{Cosec} A = \frac{H}{P} = \frac{\sqrt{5}}{1}$$

14. यदि $2 \cot A = 4$ है, तो $\frac{\operatorname{cosec}^2 A + 1}{\operatorname{cosec}^2 A - 1}$ का मान ज्ञात कीजिए।

If $2 \cot A = 4$, then find the value of $\frac{\operatorname{cosec}^2 A + 1}{\operatorname{cosec}^2 A - 1}$.

A) 1.5

B) 1

C) 4

D) 2.5

$$\frac{5+1}{5-1} = \frac{6}{4} = 1.5$$

$$\sin A = \frac{5}{7} = \frac{P}{H} \quad B = \sqrt{49 - 25}$$

$$\sqrt{24}$$

$$\textcircled{2\sqrt{6}}$$

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

15. यदि $\sin A = \frac{5}{7}$ है, तो $\frac{5 \operatorname{cosec} A - 7 \sin A}{2\sqrt{6} \sec A + 7 \cos A}$ का मान ज्ञात कीजिए।

If $\sin A = \frac{5}{7}$, then find the value of $\frac{5 \operatorname{cosec} A - 7 \sin A}{2\sqrt{6} \sec A + 7 \cos A}$

A) $\frac{9}{23}$

~~B) $\frac{11}{73}$~~

C) $\frac{3}{19}$

D) $\frac{11}{46}$

$$= \frac{20}{7 + \frac{24}{7}} = \frac{2 \times 7}{73} = \textcircled{\frac{14}{73}}$$

16. $15 + \frac{12}{\cot^2 A} - \frac{12}{\cot^2 A}$ को सरल कीजिए।

Simplify: $15 + \frac{12}{\cot^2 A} - \frac{12}{\cot^2 A}$

A) 4

B) 3

☒ C) 5

D) 7

15

17. $(\cos^2 67^\circ - \sin^2 23^\circ) + 4 \cos 30^\circ$ का मान ज्ञात कीजिए।

7. $(\cos^2 67^\circ - \sin^2 23^\circ) + 4 \cos 30^\circ$ का मान ज्ञात कीजिए।

~~A) $2\sqrt{3}$~~

B) $3\sqrt{2}$

c) $\sqrt{3}$

D) $5\sqrt{2}$

4x2
2/3 2/3

18. $\frac{\sin^2 A}{1 - \cos A} + \frac{\sin^2 A}{1 + \cos A}$ को सरल कीजिए।

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

A) 3

B) 2

C) 4

D) 1

$$\sin^2 A \left(\frac{1}{1 - \cos A} + \frac{1}{1 + \cos A} \right)$$

$$\cancel{\sin^2 A} \left(\frac{\cancel{1 + \cos A} + \cancel{1 - \cos A}}{\cancel{\sin^2 A}} \right) \text{ (2)}$$

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