RPF SI & CONSTABLE 2024

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MATHS

Trigonometry

Part -3



LIVE STREAMING 23-10-2024 11:00AM

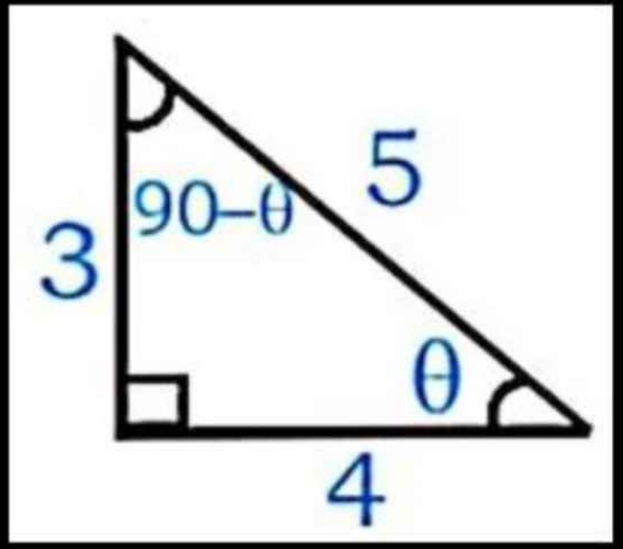
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Trigonometry Ratio Table (द्रिकोणमिति अनुपात तालिका)

Angle (In Degrees)	0°	30°	45°	60°	90°	180°	270°	360°
Angle (In Radians)	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0	1
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not Defined	0	Not Defined	0
cot	Not Defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0	Not Defined	0	Not Defined
sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not Defined	-1	Not Defined	1
cosec	Not Defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1	Not Defined	-1	Not Defined

Change of T-Ratio / त्रिकोणमिति-अनुपात का परिवर्तन $90°, 270°$ ... ($90°$ के odd multiple पर change) $180°, 360°$ .... no change ($90°$ के even multiple पर no change)

$\sin \leftrightarrow \cos, \tan \leftrightarrow \cot, \sec \leftrightarrow \text{cosec}$

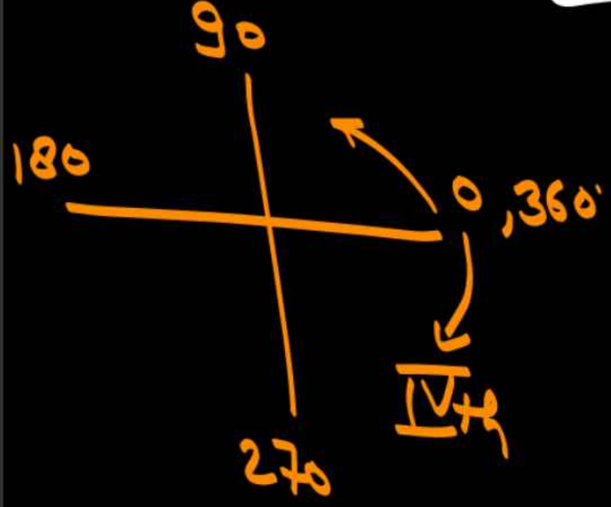


$$\sin(90° - \theta) = \frac{4}{5} = \cos\theta$$

$$\therefore \cos(90^\circ - \theta) = \sin\theta$$
$$\tan(90^\circ - \theta) = \cot\theta$$
$$\cot(90^\circ - \theta) = \tan\theta$$
$$\sec(90^\circ - \theta) = \operatorname{cosec}\theta$$
$$\operatorname{cosec}(90^\circ - \theta) = \sec\theta$$

IInd quad
Sin
Cosec

$\sin(90^\circ + \theta) = \cos\theta$
$\text{Cos}(90^\circ + \theta) = -\sin\theta$
$\text{Tan}(90^\circ + \theta) = -\cot\theta$
$\text{Cot}(90^\circ + \theta) = -\tan\theta$
$\text{Sec}(90^\circ + \theta) = -\text{cosec}\,\theta$
$\text{Cosec}(90^\circ + \theta) = \sec\theta$



$\text{Cos}(0-\theta) = \text{Cos}\,\theta$
$\text{Sin}(0-\theta) =$
$\text{Tan}(0-\theta) =$

$\text{Cos}(-\theta) = \text{Cos}\,\theta$
$\text{Sin}(-\theta) = -\text{Sin}\,\theta$
$\text{Tan}(-\theta) = -\text{Tan}\,\theta$
$\text{Cot}(-\theta) = -\text{Cot}\,\theta$
$\text{Sec}(-\theta) = \text{Sec}\,\theta$
$\text{Cosec}(-\theta) = -\text{Cosec}\,\theta$

$$\cos(-60^\circ) = \cos 60^\circ = \frac{1}{2}$$

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

Formula form - (A + B)

$$\sin(A+B) = \sin A\cos B + \cos A\sin B$$
$$\sin(A-B) = \sin A\cos B - \cos A\sin B$$
$$\cos(A+B) = \cos A\cos B - \sin A\sin B$$
$$\cos(A-B) = \cos A\cos B + \sin A\sin B$$

$$\left\{\begin{array}{l} \sin 18^\circ = \frac{\sqrt{5}-1}{4}, \cos 18^\circ = \frac{\sqrt{10+2\sqrt{5}}}{4} \\ \cos 36^\circ = \frac{\sqrt{5}+1}{4}, \sin 36^\circ = \frac{\sqrt{10-2\sqrt{5}}}{4} \end{array}\right\}$$

$$\sin 75^\circ = \cos 15^\circ = \frac{\sqrt{3}+1}{2\sqrt{2}}$$

$$\sin 15^\circ = \cos 75^\circ = \frac{\sqrt{3}-1}{2\sqrt{2}}$$

$$\therefore \text{Tan } 75^\circ = \cot 15^\circ = \frac{\sqrt{3}+1}{\sqrt{3}-1} = 2+\sqrt{3}$$

$$\therefore \text{Tan } 15^\circ = \cot 75^\circ = \frac{\sqrt{3}-1}{\sqrt{3}+1} = 2-\sqrt{3}$$

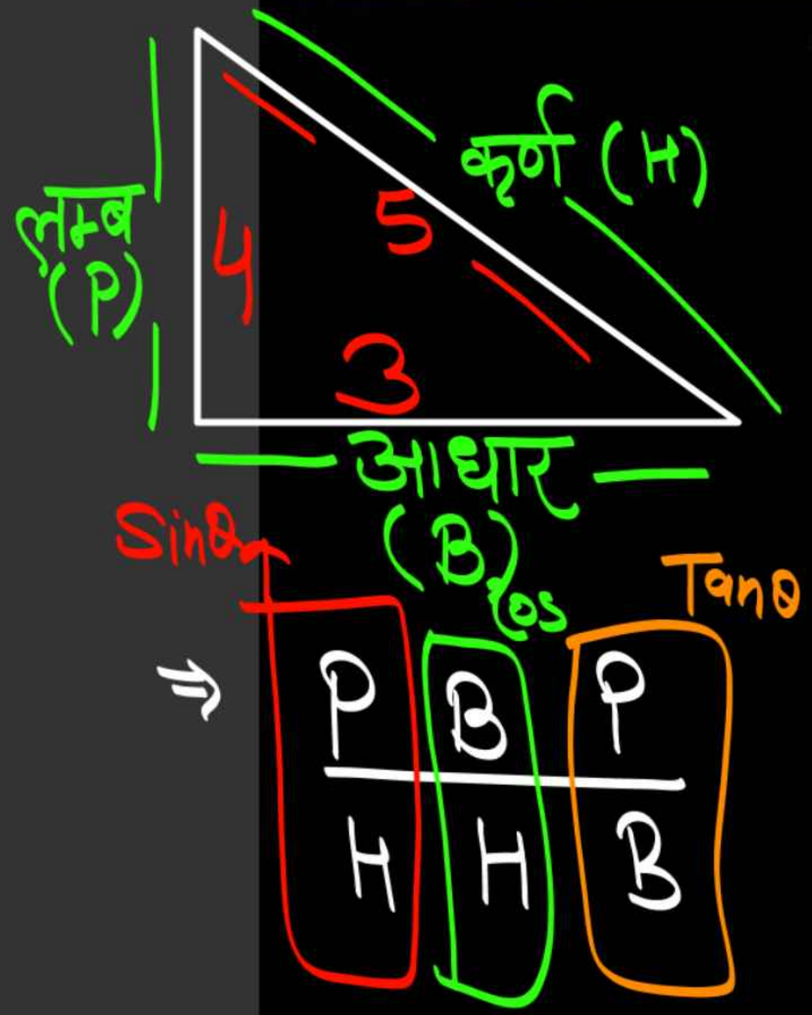
$\sin 75^\circ$

$= \sin(45^\circ+30^\circ) = \sin 45^\circ \cdot \cos 30^\circ + \cos 45^\circ \cdot \sin 30^\circ$

$\Rightarrow \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \cdot \frac{1}{2}$

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

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

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

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

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

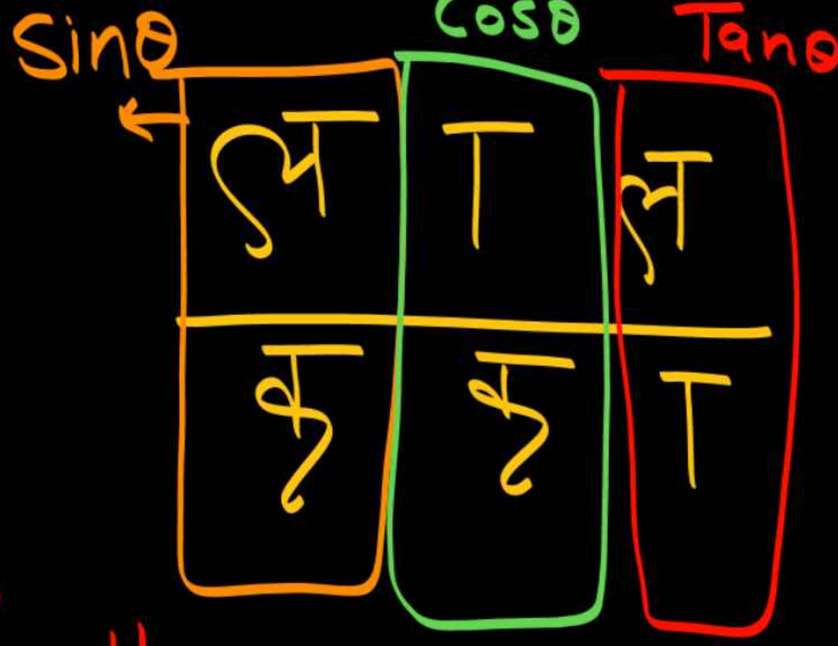
(c) $\frac{3}{4}$

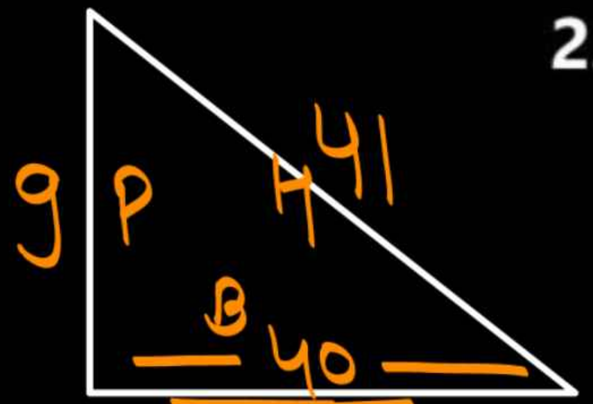
(d) $\frac{4}{3}$

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

$\sin A = ?$

$\sin A = \frac{\text{लम्ब}}{\text{कर्ण}} = \frac{4}{5}$





$\sqrt{41^2-9^2}$

$=\sqrt{50\times32}$

$\Rightarrow\sqrt{1600}$

$\Rightarrow 40$

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?

(a) $\frac{40}{9}$

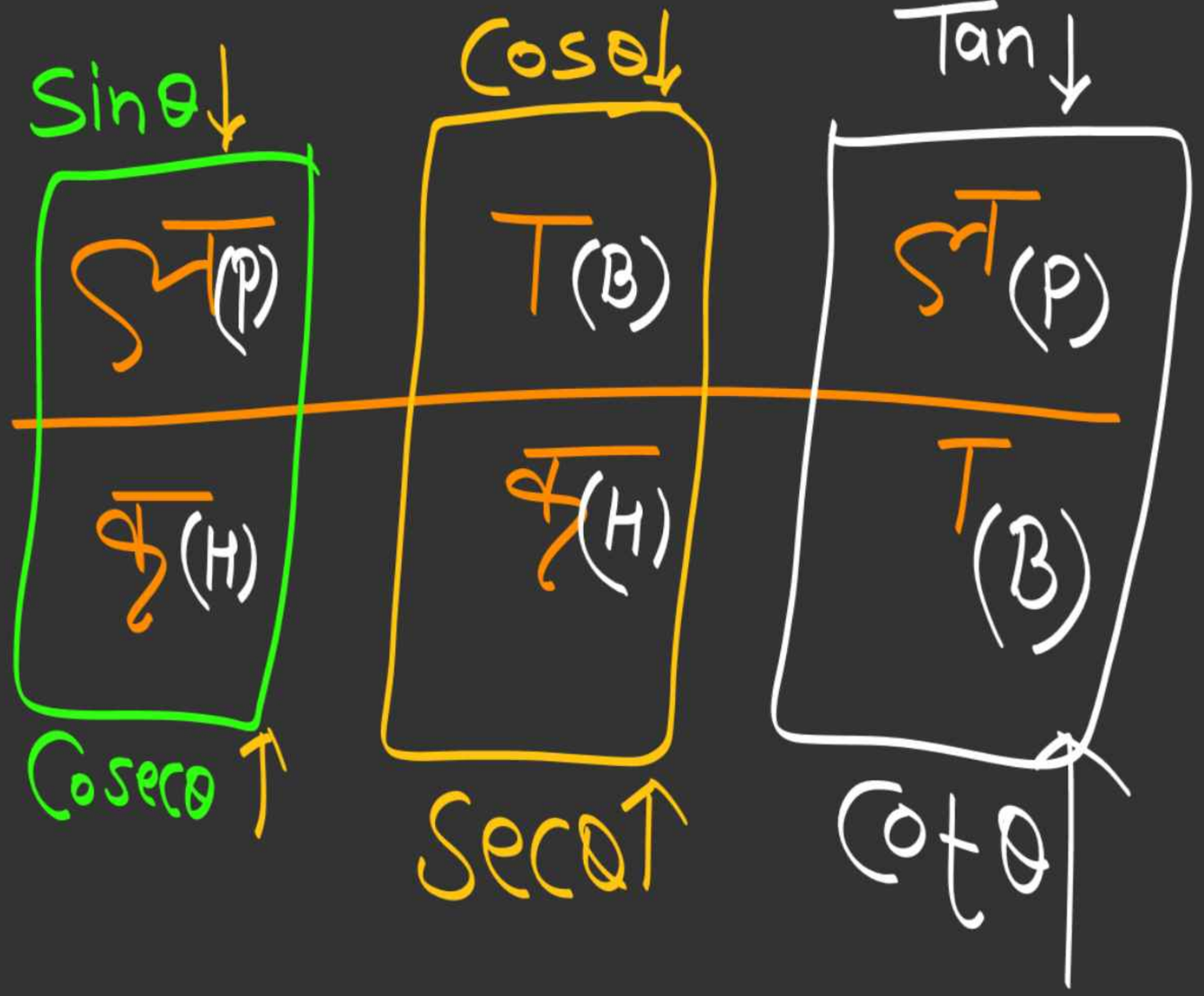
(b) $\frac{35}{8}$

(c) $\frac{39}{9}$

(d) $\frac{47}{8}$

$\tan\theta=\frac{\text{लम्ब}}{\text{आधार}}$ $\cot\theta=\frac{\text{आधार}}{\text{लम्ब}}$

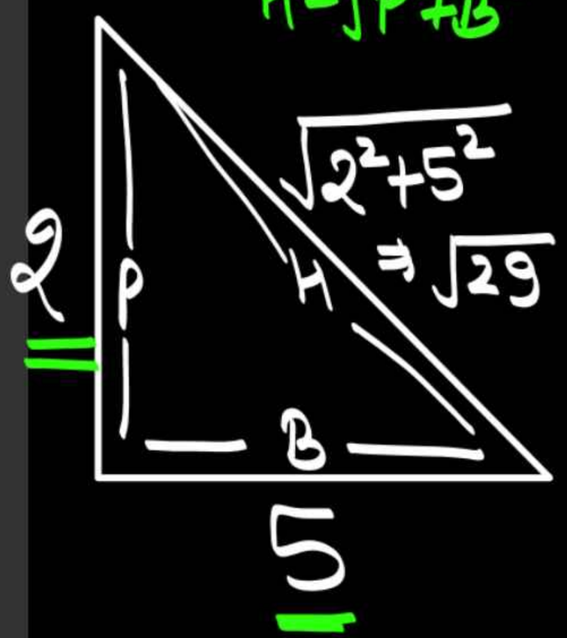
$\Rightarrow\frac{40}{9}$


Sinθ
Cosθ
Tan
सम (P)
T (B)
सम (P)
कर्ण (H)
कर्ण (H)
T (B)
Coseco
Seco
Cot θ

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

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।



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

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

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

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

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

$\sec A \Rightarrow \frac{\text{कर्ण}}{\text{आधार}} \frac{H}{B}$

$\Rightarrow \frac{\left(\frac{\sqrt{29}}{5}\right)^2}{\left(\frac{\sqrt{29}}{2}\right)^2} \Rightarrow \frac{\frac{29}{25}}{\frac{29}{4}}$

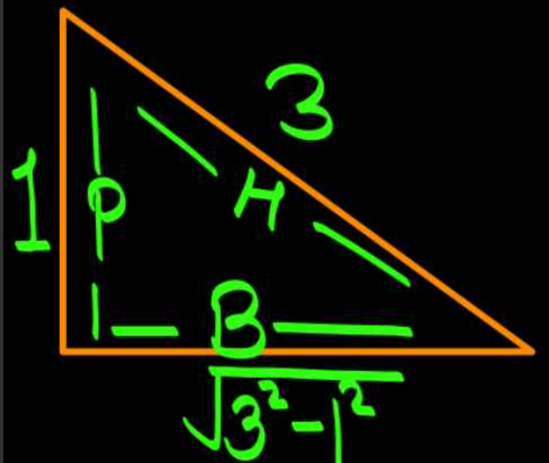
$\text{Cosec}A = \frac{\text{कर्ण (H)}}{\text{लम्ब (P)}}$

$\Rightarrow \frac{29}{25} \times \frac{4}{29}$

$\Rightarrow \frac{4}{25}$

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?



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

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

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

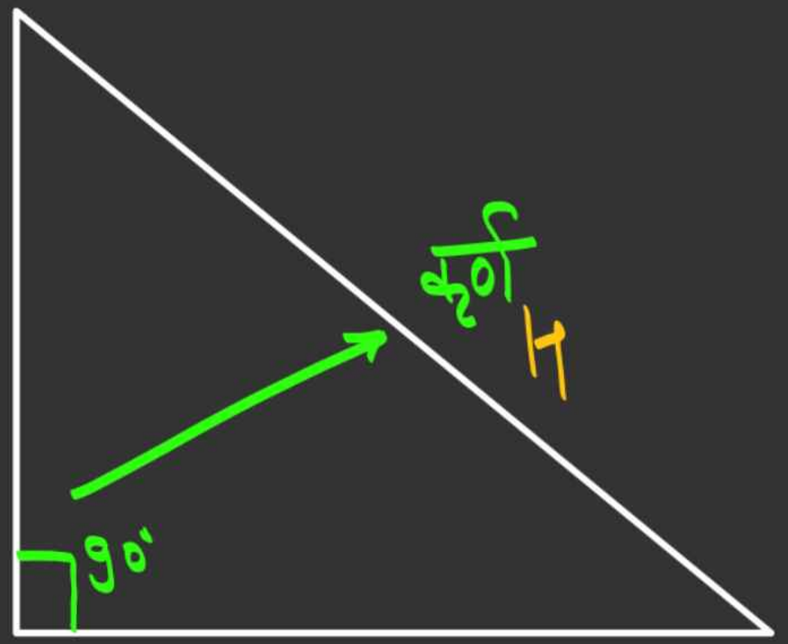
(d) $\frac{3}{4}$

$\left(\frac{\text{कर्ण}}{\text{आधार}} - \frac{\text{लम्ब}}{\text{आधार}}\right)^2$ $\frac{\text{भाजक}}{\text{फल}}$

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

$\Rightarrow \left(\frac{2}{2\sqrt{2}}\right)^2 \Rightarrow \left(\frac{1}{\sqrt{2}}\right)^2 \Rightarrow \frac{1}{2}$

पाइथागोरस ही प्रमेय



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

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

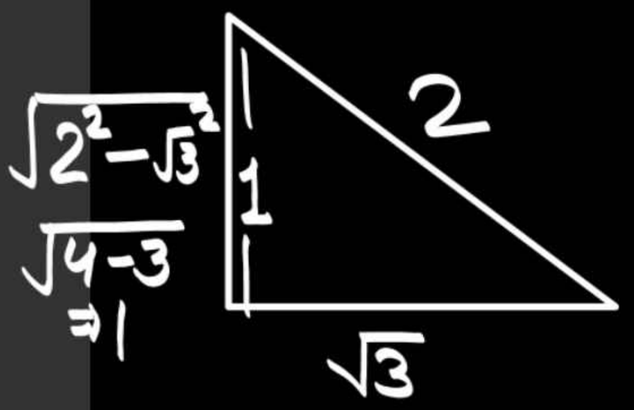
$$P^2 = H^2 - B^2$$

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

$$B^2 = H^2 - P^2$$

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

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

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

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

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

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

(d) $\sqrt{3}$

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

$\left(\frac{\text{लम्ब}}{\text{आधार}}\right)^2 \times \left(\frac{\text{आधार}}{\text{कर्ण}}\right)^2$

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

Sin Cos tan

लं | ले

कर्ण

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:

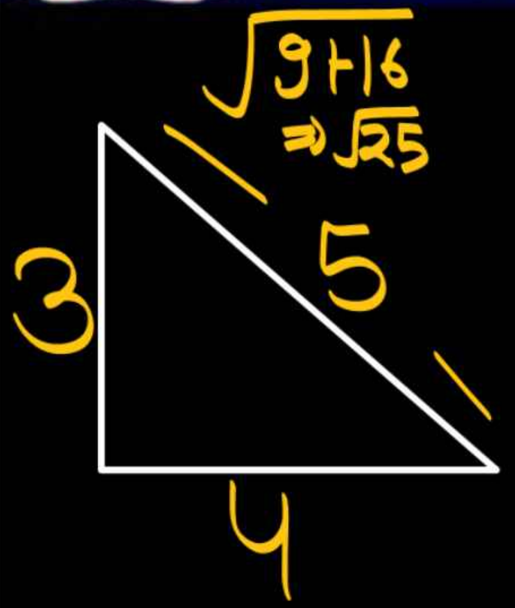
यदि $5\sin\theta - 4\cos\theta = 0, 0° < \theta < 90°$ है तो $\frac{5\sin\theta+2\cos\theta}{5\sin\theta+3\cos\theta}$ का मान ज्ञात कीजिए।

(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:

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

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

$\frac{\text{लाल}}{\text{काला}}$

$\frac{1+\frac{3}{5}}{1-\frac{3}{5}}$

$\frac{\frac{8}{5}}{\frac{2}{5}} \Rightarrow \frac{8}{2} \Rightarrow 4$

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

$$\sin 60^\circ + \tan 30^\circ + \cos 45^\circ$$

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

$\frac{(5\sqrt{2}+2\sqrt{3})\times\sqrt{6}}{2\sqrt{6}\times\sqrt{6}}$

$\frac{5\sqrt{12}+2\sqrt{18}}{2\times6}$

$\Rightarrow \frac{5\sqrt{2\times2\times3}+2\sqrt{3\times3\times2}}{12}$

$\Rightarrow \frac{5\times2\sqrt{3}+2\times3\sqrt{2}}{12}$

$\Rightarrow \frac{10\sqrt{3}+6\sqrt{2}}{12} \Rightarrow \frac{5\sqrt{3}+3\sqrt{2}}{6}$

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

$\Rightarrow \frac{\sqrt{3}}{2}+\frac{\sqrt{2}+\sqrt{3}}{\sqrt{6}}$

$\Rightarrow \frac{\sqrt{18}+2\sqrt{2}+2\sqrt{3}}{2\sqrt{6}} \Rightarrow \frac{3\sqrt{2}+2\sqrt{2}+2\sqrt{3}}{2\sqrt{6}}$

$\sqrt{18}=\sqrt{2\times3\times3}$

$\Rightarrow 3\sqrt{2}$

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9. What is the value of $\sin 30^\circ + \cos 30^\circ + \tan 30^\circ$

$\sin 30^\circ + \cos 30^\circ + \tan 30^\circ$ **का मान क्या है?**

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

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

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

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

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

$\Rightarrow \frac{(1+\sqrt{3})}{2}+\frac{1}{\sqrt{3}}$

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

10. Find the value of the given expression.

दिए गए व्यंजक का मान ज्ञात करें।

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

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

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

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

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

11. **Find the exact value of** $\cos 120°$.

$\cos 120°$ **का सटीक मान ज्ञात कीजिए।**

(a) -0.5

(b) 0

(c) 0.5

(d) 1

$\cos(90+30)$

$= -\sin 30$

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

12. 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?

(a) $\cos^2\phi$

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

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

(d) $\mathbf{sin}^2(\phi)$

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

13. What is the value of $[\cos(90^\circ + A) + \sec(270^\circ - A)] + [\sin(270^\circ + A) + \text{cosec}(630^\circ - A)]$ का मान ज्ञात कीजिए।

(a) $3 \sec A$

(b) $\tan$ **Ase c** A

(c) 0

(d) 1

14. What is the value of $\sin(-405^\circ)$?

$\sin(-405^\circ)$ का मान ज्ञात करें।

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

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

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

(d) $\frac{-1}{\sqrt{2}}$

15. **Find the value of** $\tan(-1125^\circ)$.

$\tan(-1125^\circ)$ **का मान ज्ञात कीजिए।**

(a) 1

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

(c) -1

(d) 0

16. **Find the value of** $\tan 4384^\circ + \cot 6814^\circ = ?$

$\tan 4384^\circ + \cot 6814^\circ$ **का मान ज्ञात कीजिए।**

(a) -1

(b) 2

(c) 0

(d) 1