

BCS Career SPARK

Engr. ALIF EMRAN (B.Sc in EEE, BUET)

ASP, 43rd BCS POLICE(recommended)

Former Assistant Engineer, DESCO (power division)

AD, BANGLADESH BANK (recommended)

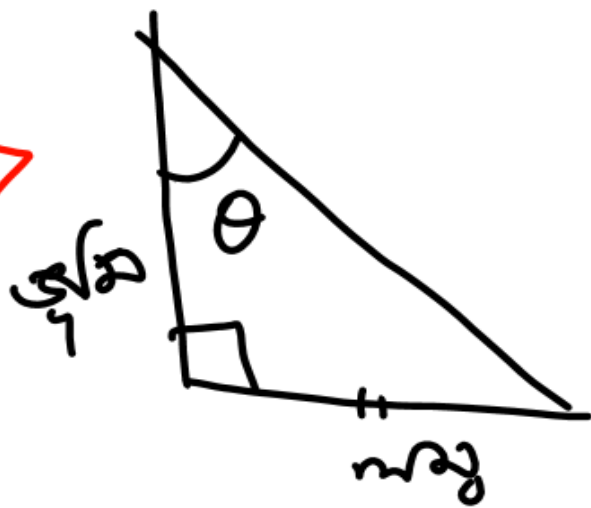
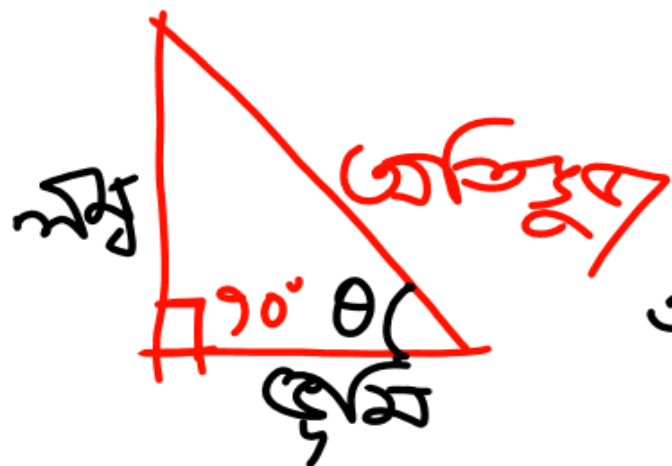
Assistant Engineer ,Bangladesh Railway(Gazetted)

প্রিত্যক্ষা/প্রিত্যক্ষা → Prelim
আফসান/আফসান → Prelim
Written ✓
(written) 5



Trigonometry

Basic



$$\textcircled{I} \sin^2 \theta + \cos^2 \theta = 1$$

$$\textcircled{II} \sec^2 \theta - \tan^2 \theta = 1$$

$$\textcircled{III} \csc^2 \theta - \cot^2 \theta = 1$$

* নামকরণী সূত্র

$$\textcircled{I} \sin \theta = \frac{\text{অক্ষ}}{\text{কেন্দ্রিক}} \rightarrow \csc \theta = \frac{1}{\sin \theta}$$

$$\textcircled{II} \cos \theta = \frac{\text{অক্ষ}}{\text{কেন্দ্রিক}} \rightarrow \sec \theta = \frac{1}{\cos \theta}$$

$$\textcircled{III} \tan \theta = \frac{\text{অক্ষ}}{\text{অক্ষ}} \rightarrow \cot \theta = \frac{1}{\tan \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

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



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$$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \text{cosec}\theta + \cot\theta = \sqrt{\frac{\sec\theta+1}{\sec\theta-1}}$$

$$L.S. = \sqrt{\frac{1+\cos\theta}{1-\cos\theta}}$$

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

$$= \frac{1+\cos\theta}{\sqrt{1-\cos^2\theta}}$$

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

$$= \frac{1+\cos\theta}{\sin\theta} = \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} = \text{cosec}\theta + \cot\theta = M.S.$$

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

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

[$\sqrt{1+\cos\theta}$ द्वारा $\sqrt{1-\cos\theta}$ का गुणन करने पर]



$$R.S = \sqrt{\frac{\sec\theta + 1}{\sec\theta - 1}}$$

$$= \sqrt{\frac{(\sec\theta + 1)^2}{(\sec\theta - 1)(\sec\theta + 1)}}$$

$$= \frac{\sec\theta + 1}{\sqrt{\sec^2\theta - 1}}$$

$$= \frac{\sec\theta + 1}{\sqrt{\tan^2\theta}}$$

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

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

$$= \frac{\left(\frac{1}{\cos\theta}\right)}{\left(\frac{\sin\theta}{\cos\theta}\right)} + \cot\theta = \frac{1}{\sin\theta} + \cot\theta$$

$$= \csc\theta + \cot\theta$$

$$= M.S$$

$$\textcircled{*} \sec^2\theta - \tan^2\theta = 1$$

$$\Rightarrow \boxed{\sec^2\theta - 1 = \tan^2\theta}$$

$$* \sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$$

$$\text{L.S.} = \sec^4 \theta - \sec^2 \theta$$

$$= (\sec^2 \theta)^2 - \sec^2 \theta$$

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

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

$$= \tan^4 \theta + \tan^2 \theta$$

$$= \text{R.S.}$$

$$\textcircled{A} \sec^2 \theta - \tan^2 \theta = 1$$

$$\boxed{\sec^2 \theta = 1 + \tan^2 \theta}$$

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

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

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

$$= \frac{\tan\theta + \sec\theta - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1}$$

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

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

$$= \tan\theta + \sec\theta$$

$$= R.S.$$

* $P = \sin \theta$, $Q = \cos \theta$ এবং $PQ = \frac{1}{2}$ হলে, $P+Q = ?$

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

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

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

$$\Rightarrow \sin 2\theta = 1$$

$$\Rightarrow \sin 2\theta = \sin 90^\circ$$

$$\Rightarrow 2\theta = 90^\circ$$

$$\Rightarrow \theta = 45^\circ$$

$$2 \sin A \cos A = \sin 2A$$

$$\therefore P+Q = \sin \theta + \cos \theta$$
$$= \sin 45^\circ + \cos 45^\circ$$

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

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



• $\sin^4 A + \sin^2 A = 1$ হলে প্রমাণ কর যে, $\tan^4 A - \tan^2 A = 1$

$$\Rightarrow \sin^4 A = 1 - \sin^2 A$$

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

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

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

$$\Rightarrow \tan^4 A = \sec^2 A$$

$$\Rightarrow \tan^4 A = 1 + \tan^2 A$$

$$\Rightarrow \tan^4 A - \tan^2 A = 1 \quad \checkmark$$

থাকবে

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

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

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

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



যদি $\operatorname{cosec} A = \frac{a}{b}$ হয়, যেখানে $a > b > 0$, তবে প্রমাণ কর যে, $\tan A = \frac{\pm b}{\sqrt{a^2 - b^2}}$

$$\Rightarrow \operatorname{Cosec}^2 A = \frac{a^2}{b^2}$$

$$\Rightarrow 1 + \cot^2 A = \frac{a^2}{b^2}$$

$$\Rightarrow \cot^2 A = \frac{a^2}{b^2} - 1$$

$$\Rightarrow \cot^2 A = \frac{a^2 - b^2}{b^2}$$

$$\Rightarrow \frac{1}{\tan^2 A} = \frac{a^2 - b^2}{b^2}$$

$$\therefore \tan^2 A = \frac{b^2}{a^2 - b^2}$$

$$\tan A = \frac{\pm b}{\sqrt{a^2 - b^2}}$$

$$\operatorname{Cosec}^2 A - \cot^2 A = 1$$

$$\operatorname{Cosec}^2 A = 1 + \cot^2 A$$



• $\tan\theta = \frac{x}{y}$, $x \neq y$ হলে, $\frac{x\sin\theta + y\cos\theta}{x\sin\theta - y\cos\theta}$ এর মান নির্ণয় কর

$$\Rightarrow \frac{\sin\theta}{\cos\theta} = \frac{x}{y}$$

$$\Rightarrow \frac{x\sin\theta}{y\cos\theta} = \frac{x^2}{y^2} \quad \left[\text{উভয় পক্ষকে } \frac{x}{y} \text{ দ্বারা গুণ} \right]$$

$$\Rightarrow \frac{x\sin\theta + y\cos\theta}{x\sin\theta - y\cos\theta} = \frac{x^2 + y^2}{x^2 - y^2} \quad (\text{যেতন-বিয়তন})$$

(Ans)



• $x = \tan\theta + \sec\theta$ হলে প্রমাণ করুন যে, $\sin\theta = \frac{x^2-1}{x^2+1}$

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

সুতরাং, $\tan\theta + \sec\theta = x$

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

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

$\Rightarrow \frac{(\sin\theta + 1)^2}{\cos^2\theta} = x^2$

$\Rightarrow \frac{(1 + \sin\theta)^2}{1 - \sin^2\theta} = x^2$

$\Rightarrow \frac{(1 + \sin\theta)^2}{(1 + \sin\theta)(1 - \sin\theta)} = x^2$

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

$\Rightarrow \frac{(1 + \sin\theta) + (1 - \sin\theta)}{(1 + \sin\theta) - (1 - \sin\theta)} = \frac{x^2 + 1}{x^2 - 1}$

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

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

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

[যেহেতু-সিদ্ধান্ত]
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• $a \cos \theta - b \sin \theta = c$ হলে, প্রমাণ কর যে, $a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$ ~~$\neq \neq \neq$~~

ধরি, $a \sin \theta + b \cos \theta = x$ (ii)

(i)² + (ii)² : $(a \cos \theta - b \sin \theta)^2 + (a \sin \theta + b \cos \theta)^2 = c^2 + x^2$

$\Rightarrow a^2 \cos^2 \theta - 2ab \cos \theta \sin \theta + b^2 \sin^2 \theta + a^2 \sin^2 \theta + 2ab \sin \theta \cos \theta + b^2 \cos^2 \theta = c^2 + x^2$

$\Rightarrow a^2 (\cos^2 \theta + \sin^2 \theta) + b^2 (\sin^2 \theta + \cos^2 \theta) = c^2 + x^2$

$\Rightarrow a^2 \cdot 1 + b^2 \cdot 1 = c^2 + x^2$

$\Rightarrow x^2 = a^2 + b^2 - c^2$

$x = \pm \sqrt{a^2 + b^2 - c^2}$

$\therefore a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$



• $\frac{\sin\theta}{x} = \frac{\cos\theta}{y}$ হলে, প্রমাণ করুন যে, $\sin\theta - \cos\theta = \frac{x-y}{\sqrt{x^2+y^2}}$

$$\Rightarrow y \sin\theta = x \cos\theta$$

$$\Rightarrow y^2 \sin^2\theta = x^2 \cos^2\theta$$

$$\Rightarrow y^2 (1 - \cos^2\theta) = x^2 \cos^2\theta$$

$$\Rightarrow y^2 - y^2 \cos^2\theta = x^2 \cos^2\theta$$

$$\Rightarrow y^2 = x^2 \cos^2\theta + y^2 \cos^2\theta$$

$$\Rightarrow y^2 = (\cos^2\theta) \cdot (x^2 + y^2)$$

$$\therefore \cos^2\theta = \frac{y^2}{x^2 + y^2}$$

$$\cos\theta = \frac{y}{\sqrt{x^2 + y^2}}$$

$$\Rightarrow y^2 \sin^2\theta = x^2 (1 - \sin^2\theta)$$

$$\Rightarrow y^2 \sin^2\theta = x^2 - x^2 \sin^2\theta$$

$$\Rightarrow (\sin^2\theta) (y^2 + x^2) = x^2$$

$$\Rightarrow \sin^2\theta = \frac{x^2}{x^2 + y^2}$$

$$\Rightarrow \sin\theta = \frac{x}{\sqrt{x^2 + y^2}}$$



$$L.S. = \sin \theta - \cos \theta$$

$$= \frac{x}{\sqrt{x^2 + y^2}} - \frac{y}{\sqrt{x^2 + y^2}}$$

$$= \frac{x - y}{\sqrt{x^2 + y^2}}$$

$$= R.S.$$

• $\text{Cot}A - \text{Cosec}A = \frac{1}{p}$ হলে, প্রমাণ করুন $\text{Sec}A = \frac{p^2+1}{p^2-1}$

$$\Rightarrow \frac{\text{Cos}A}{\text{Sin}A} - \frac{1}{\text{Sin}A} = \frac{1}{p}$$

$$\Rightarrow \frac{\text{Cos}A - 1}{\text{Sin}A} = \frac{1}{p}$$

$$\Rightarrow \frac{(\text{Cos}A - 1)^2}{\text{Sin}^2A} = \frac{1}{p^2}$$

$$\Rightarrow \frac{\text{Sin}^2A}{(1 - \text{Cos}A)^2} = \frac{p^2}{1}$$

$$\Rightarrow \frac{1 - \text{Cos}^2A}{(1 - \text{Cos}A)^2} = \frac{p^2}{1}$$

$$\Rightarrow \frac{(1 - \text{Cos}A)(1 + \text{Cos}A)}{(1 - \text{Cos}A)^2} = \frac{p^2}{1}$$

$$\Rightarrow \frac{1 + \text{Cos}A}{1 - \text{Cos}A} = \frac{p^2}{1}$$

$$\Rightarrow \frac{1 + \text{Cos}A + 1 - \text{Cos}A}{1 + \text{Cos}A - 1 + \text{Cos}A} = \frac{p^2 + 1}{p^2 - 1}$$

$$\Rightarrow \frac{2}{2\text{Cos}A} = \frac{p^2 + 1}{p^2 - 1}$$

$$\Rightarrow \frac{1}{\text{Cos}A} = \frac{p^2 + 1}{p^2 - 1}$$

$$\therefore \text{Sec}A = \frac{p^2 + 1}{p^2 - 1}$$

(proved)

[যেজন-বিজ্ঞান]



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- $A = \cos\theta + \sin\theta$, $B = \cos\theta - \sin\theta$ দুইটি ত্রিকোণমিতিক রাশি এবং যদি $A = \sqrt{2}(A - \sin\theta)$ হয়, তবে প্রমাণ করুন যে, $B = \sqrt{2}(A - \cos\theta)$

এখানে, $A = \sqrt{2}(A - \sin\theta)$

$$\Rightarrow \cos\theta + \sin\theta = \sqrt{2}(\cos\theta + \sin\theta - \sin\theta)$$

$$\Rightarrow \cos\theta + \sin\theta = \sqrt{2}\cos\theta$$

$$\Rightarrow \sin\theta = \sqrt{2}\cos\theta - \cos\theta$$

$$\Rightarrow \sin\theta = (\sqrt{2} - 1)\cos\theta$$

$$\Rightarrow (\sqrt{2} + 1)\sin\theta = (\sqrt{2} + 1)(\sqrt{2} - 1)\cos\theta$$

$$\Rightarrow \sqrt{2}\sin\theta + \sin\theta = (2 - 1)\cos\theta$$

$$\Rightarrow \sqrt{2}\sin\theta + \sin\theta = \cos\theta$$

$$\Rightarrow \sqrt{2}\sin\theta = \cos\theta - \sin\theta$$

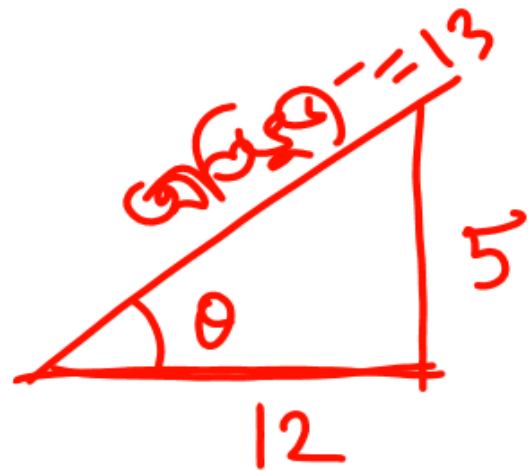
$$\Rightarrow \sqrt{2}\sin\theta = B$$

$$\Rightarrow B = \sqrt{2}(\sin\theta + \cos\theta - \cos\theta)$$

$$\therefore B = \sqrt{2}(A - \cos\theta)$$



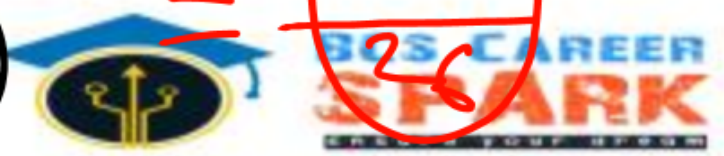
• $\tan\theta = \frac{5}{12}$ এবং $\cos\theta$ ঋণাত্মক হলে, প্রমাণ কর যে, $\frac{\sin\theta + \cos(-\theta)}{\sec(-\theta) + \tan\theta} = \frac{51}{26}$

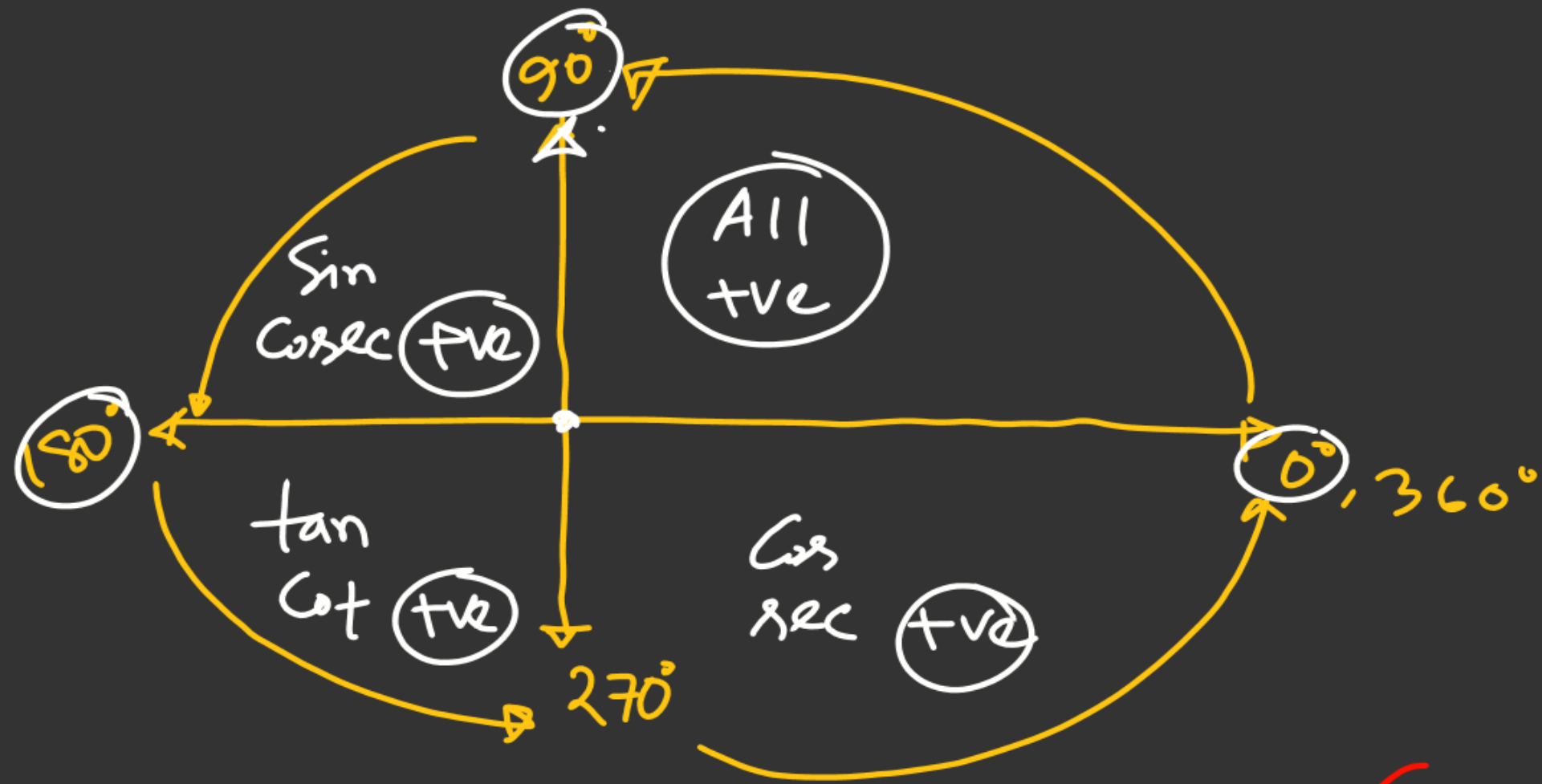


$$\tan\theta = \frac{\text{পাশ}}{\text{ভূমি}}$$

পীথাগোরাস, অতিভুজ² = পশ² + ভূমি²
 \Rightarrow অতিভুজ² = $5^2 + 12^2$
 $= 169$
 অতিভুজ = 13

$$\begin{aligned} \text{L.S.} &= \frac{\sin\theta + \cos\theta}{\sec\theta + \tan\theta} \\ &= \frac{\left(-\frac{5}{13}\right) + \left(-\frac{12}{13}\right)}{\left(-\frac{13}{12}\right) + \frac{5}{12}} \\ &= \frac{\left(\frac{-5-12}{13}\right)}{\left(\frac{-13+5}{12}\right)} \\ &= \left(\frac{-17}{13}\right) \times \left(\frac{12}{-8}\right) = \frac{51}{26} \end{aligned}$$





$$\left\{ \begin{array}{l} \sin(-\theta) = -\sin\theta \\ \operatorname{cosec}(-\theta) = -\operatorname{cosec}\theta \\ \tan(-\theta) = -\tan\theta \\ \cot(-\theta) = -\cot\theta \end{array} \right.$$

$$\left\{ \begin{array}{l} \cos(-\theta) = \cos\theta \\ \sec(-\theta) = \sec\theta \end{array} \right.$$

sin, cosec



tan, cot



cos, sec



• $\sqrt{2}\cos(A-B) = 1$, $2\sin(A+B) = \sqrt{3}$ এবং A, B সূক্ষকোণ হলে, A ও B এর মান নির্ণয় কর।

$$\Rightarrow \cos(A-B) = \frac{1}{\sqrt{2}}$$

$$\Rightarrow \underline{\cos(A-B)} = \underline{\cos 45^\circ}$$

$$\boxed{A-B = 45^\circ}$$

(i)

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

$$\Rightarrow \underline{\sin(A+B)} = \underline{\sin 60^\circ}$$

$$\boxed{A+B = 60^\circ}$$

(ii)

$$\textcircled{i} + \textcircled{ii}: 2A = 105^\circ$$

$$A = \frac{105}{2} = 52\frac{1}{2}^\circ$$

$$\textcircled{ii} - \textcircled{i}: 2B = 15^\circ$$

$$B = \frac{15}{2} = 7\frac{1}{2}^\circ$$

$$A = 52\frac{1}{2}^\circ$$

$$B = 7\frac{1}{2}^\circ$$

Ans

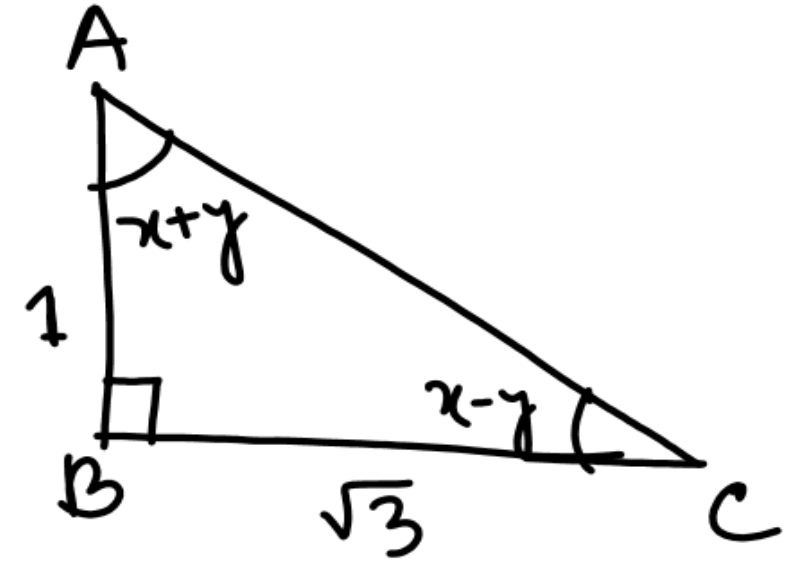


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	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞

सिद्ध करें
 $A+B=90^\circ$

- চিত্রে বর্ণিত ত্রিভুজ হতে $AC=?$ $\tan A + \tan C = ?$ এবং x ও y এর মান কত?



$$7\sin^2\theta + 3\cos^2\theta = 4 \text{ হলে, } \tan\theta = ?$$

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

$$\Rightarrow 4\sin^2\theta + 3(\sin^2\theta + \cos^2\theta) = 4$$

$$\Rightarrow 4\sin^2\theta + 3 \times 1 = 4$$

$$\Rightarrow 4\sin^2\theta = 1$$

$$\Rightarrow \sin^2\theta = \frac{1}{4}$$

$$\Rightarrow \frac{1}{\operatorname{cosec}^2\theta} = \frac{1}{4}$$

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

$$\Rightarrow \operatorname{cosec}^2\theta = 4$$

$$\Rightarrow 1 + \cot^2\theta = 4$$

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

$$\cot\theta = \pm\sqrt{3}$$

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

(Ans)



সমাধান কর: $\frac{\cos A - \sin A}{\cos A + \sin A} = \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$

$\Rightarrow \frac{(\cancel{\cos A} - \cancel{\sin A}) + (\cancel{\cos A} + \cancel{\sin A})}{(\cancel{\cos A} - \cancel{\sin A}) - (\cancel{\cos A} + \cancel{\sin A})} = \frac{(\cancel{\sqrt{3}} - 1) + (\cancel{\sqrt{3}} + 1)}{(\cancel{\sqrt{3}} - 1) - (\cancel{\sqrt{3}} + 1)}$ [যেখান-বিদ্যেওন]

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

$\Rightarrow -\frac{\cos A}{\sin A} = -\sqrt{3}$

$\Rightarrow \frac{\sin A}{\cos A} = \frac{1}{\sqrt{3}}$

$\Rightarrow \tan A = \tan 30^\circ$

$A = 30^\circ$



• সমাধান কর: $2\sin^2\theta + 3\cos\theta + 3 = 0$, θ সূক্ষ্মকোণ।

$$\Rightarrow 2(1 - \cos^2\theta) + 3\cos\theta + 3 = 0$$

$$\Rightarrow 2 - 2\cos^2\theta + 3\cos\theta + 3 = 0$$

$$\Rightarrow -2\cos^2\theta + 3\cos\theta + 5 = 0$$

$$\Rightarrow 2\cos^2\theta - 3\cos\theta - 5 = 0$$

$$\Rightarrow 2\cos^2\theta - 5\cos\theta + 2\cos\theta - 5 = 0$$

$$\Rightarrow \cos\theta(2\cos\theta - 5) + 1(2\cos\theta - 5) = 0$$

$$\Rightarrow (2\cos\theta - 5)(\cos\theta + 1) = 0$$

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

$$2\cos\theta - 5 = 0 \quad \text{কেন্দ্র,}$$

$$\cos\theta = -1$$

$$\cos\theta \neq \frac{5}{2}$$

$$\cos\theta \neq -1$$

θ সূক্ষ্মকোণ

\therefore প্রদত্ত সমীকরণের
সমাধান নেই।

$$-1 \leq \sin\theta \leq 1$$

$$-1 \leq \cos\theta \leq 1$$

সমাধান কর; $\tan^2\theta - (1+\sqrt{3})\tan\theta + \sqrt{3} = 0$

✓ θ নির্ণয়

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

$$\Rightarrow \tan\theta(\tan\theta - 1) - \sqrt{3}(\tan\theta - 1) = 0$$

$$\Rightarrow (\tan\theta - 1)(\tan\theta - \sqrt{3}) = 0$$

$$\tan\theta - 1 = 0$$

$$\Rightarrow \tan\theta = 1$$

$$\Rightarrow \tan\theta = \tan 45^\circ$$

$$\theta = 45^\circ$$

$$\tan\theta = \sqrt{3}$$

$$= \tan\theta = \tan 60^\circ$$

$$\theta = 60^\circ$$



$0 < \theta < 2\pi$ হলে, $2(\sin\theta\cos\theta + \sqrt{3}) = \sqrt{3}\cos\theta + 4\sin\theta$ এর সমাধান নির্ণয় করুন।

$$2\sin\theta\cos\theta + 2\sqrt{3} = \sqrt{3}\cos\theta + 4\sin\theta$$

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

$$\Rightarrow 2\sin\theta(\cos\theta - 2) - \sqrt{3}(\cos\theta - 2) = 0$$

$$\Rightarrow \underline{(\cos\theta - 2)} \underline{(2\sin\theta - \sqrt{3})} = 0$$

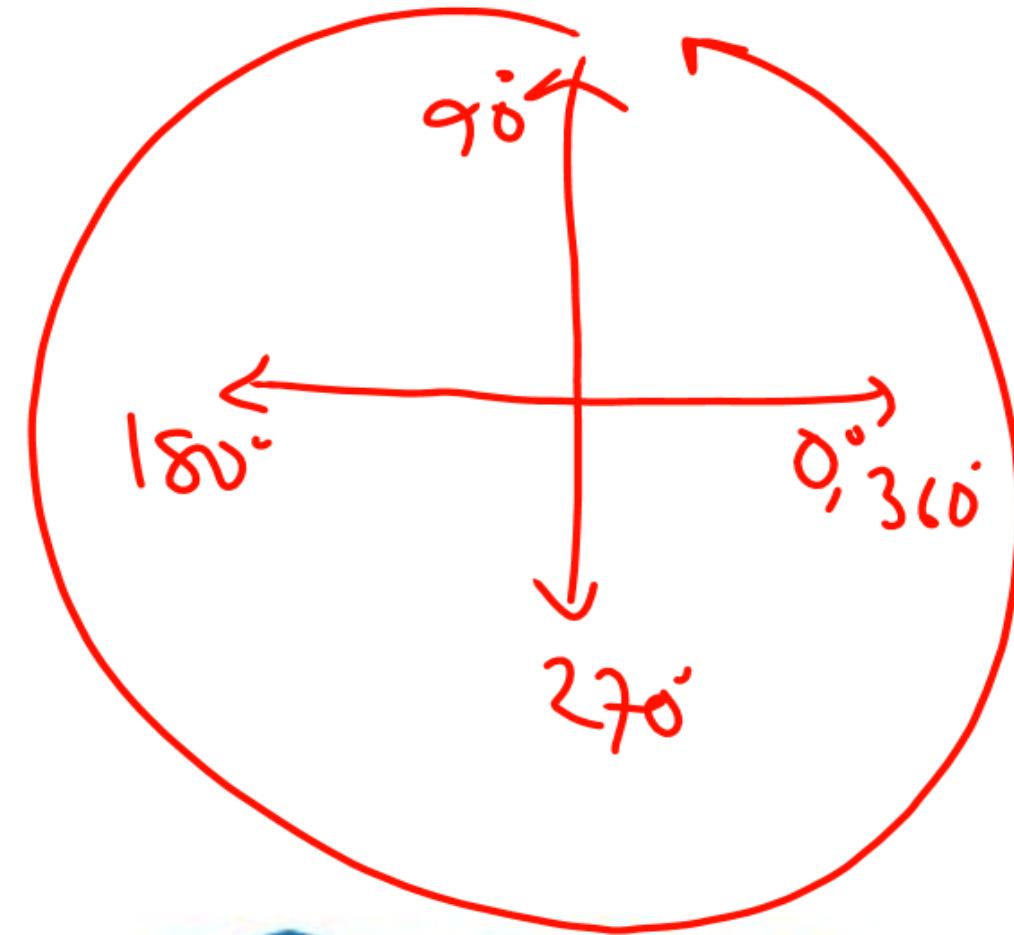
$$\therefore \cos\theta \neq 2$$

$$[-1 \leq \cos\theta \leq 1]$$

$$\therefore 2\sin\theta - \sqrt{3} = 0$$

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

π (180°)
 2π (360°)



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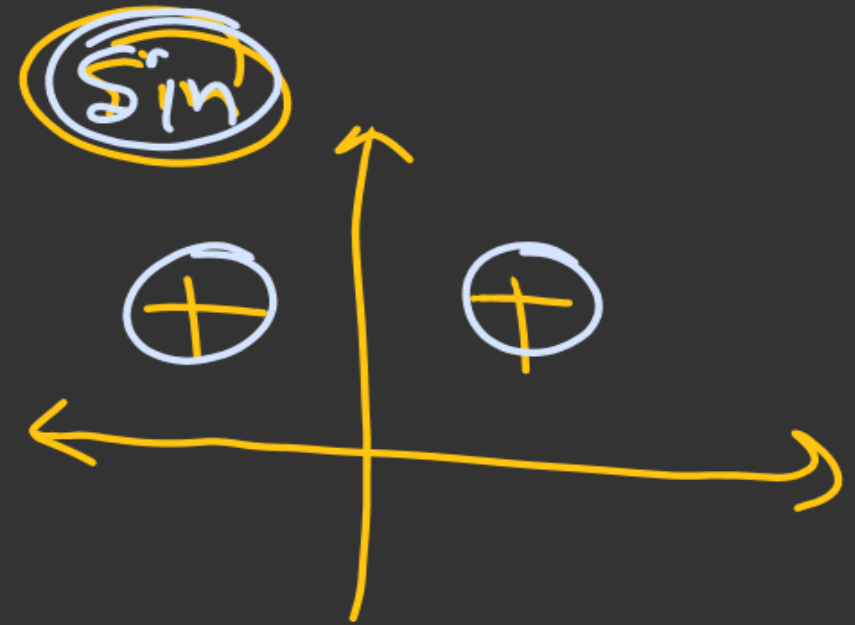
$$\sin \theta = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \sin \theta = \boxed{\sin 60^\circ} \text{ or } \sin(180 - 60)$$
$$\Rightarrow \sin \theta = \sin 60^\circ \text{ or } \sin 120^\circ$$

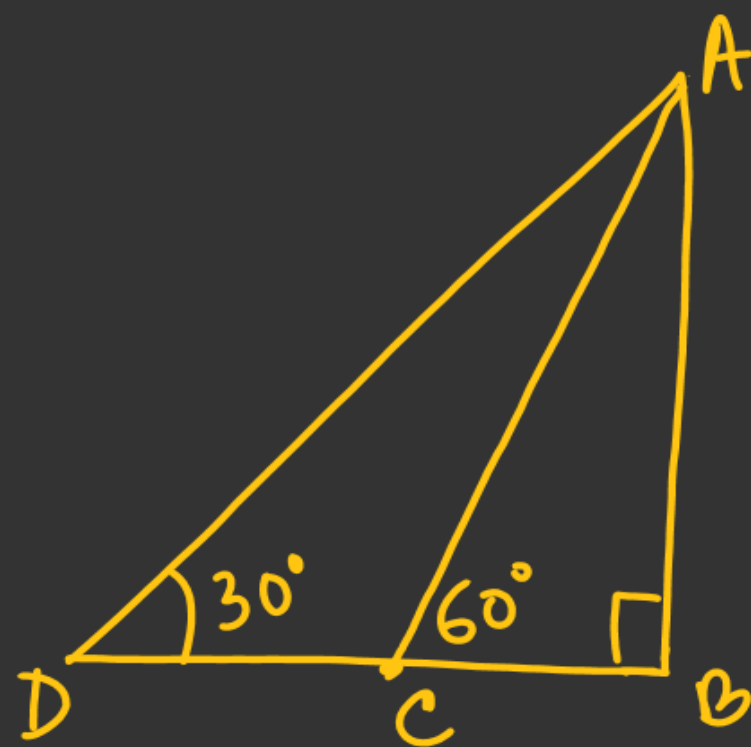
$\angle \theta \in [360^\circ]$
सर्वोत्तर

$$\Rightarrow \theta = 60^\circ, 120^\circ$$

Ans.



द्वि → सर्वोत्तर
20 → $(180 - \theta)$
60 → $(180 + \theta)$
80 → $(360 - \theta)$



(i) $\angle CAD = ?$

(ii) prove that,

$$BC : AD = 1 : 2\sqrt{3}$$

12.728 মিটার উচ্চতাবিশিষ্ট একটি দেয়ালের ছাদের সঙ্গে লাগানো মই ভূমির সাথে 45° কোণ উৎপন্ন করে। মইটির দৈর্ঘ্য কত?

একটি গাছ এমনভাবে ভেঙ্গে গেল যে, তার ভাঙ্গা অংশ দন্ডায়মান অংশের সাথে 30° কোণ করে গাছের গোড়া থেকে 10 মিটার দূরে মাটি স্পর্শ করে। গাছটির সম্পূর্ণ দৈর্ঘ্য কত?

64 মিটার লম্বা একটি খুঁটি ভেঙে গিয়ে সম্পূর্ণ বিচ্ছিন্ন না হয়ে ভূমির সাথে 60° কোণ উৎপন্ন করে। খুঁটিটির ভাঙা অংশের দৈর্ঘ্য নির্ণয় করুন।

কোন স্থান থেকে একটি মিনারের দিকে 25 মিটার এগিয়ে এলে মিনারের শীর্ষবিন্দুর উন্নতি কোণ 30° থেকে 45° হয়। মিনারটির উচ্চতা নির্ণয় করুন

একটি নদীর তীরে কোন এক স্থানে দাঁড়িয়ে একজন লোক দেখলো যে, ঠিক সোজাসুজি অপর তীরে অবস্থিত একটি স্তম্ভের উন্নতি কোণ 60° , ঐ স্থান থেকে ২০ মিটার পিছিয়ে গিয়ে দেখলো যে, স্তম্ভটির উন্নতি কোণ 30° হয়েছে। স্তম্ভটির উচ্চতা ও নদীর বিস্তার নির্ণয় করুন।

- দুইটি মাইল পোস্টের মধ্যবর্তী কোনো স্থানের উপরে একটি বেলুন উডছে। বেলুনের স্থানে ঐ মাইল পোস্ট দুইটির অবনতি কোণ যথাক্রমে 30° ও 60° হলে, বেলুনটির উচ্চতা মিটারে নির্ণয় কর।