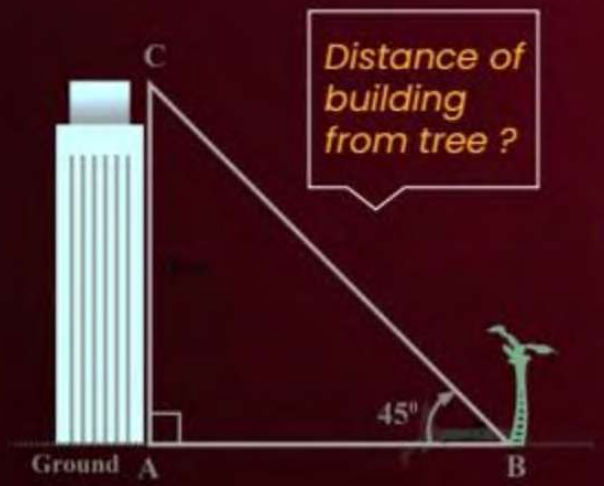
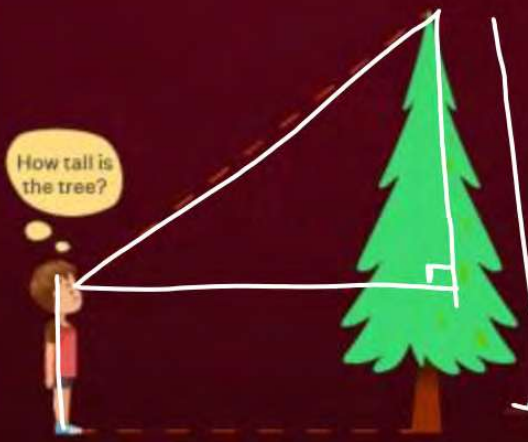
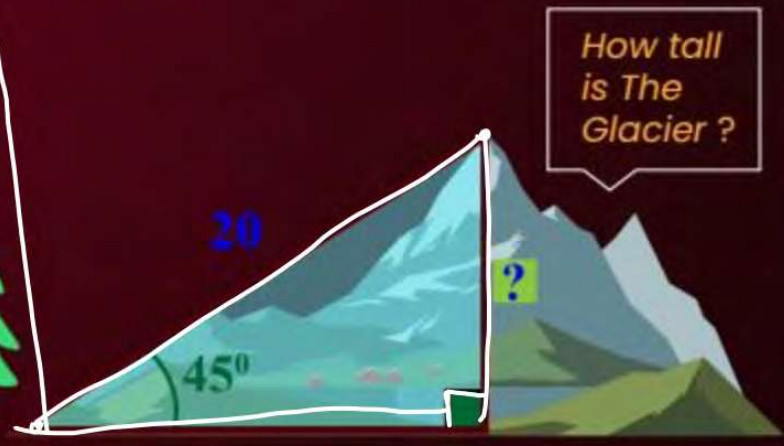
Trigonometry

- A branch of mathematics which deals with the problems related to right angled triangles.
- It is the study of relationship between the sides and angles of a right angled triangle.





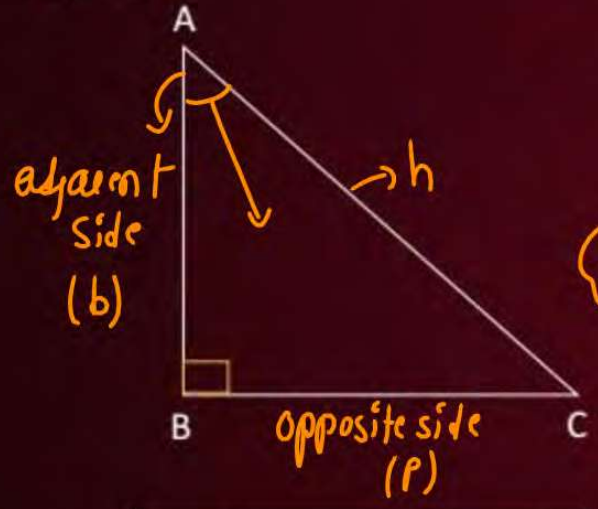


Pythagoras Theorem

$H^2 = P^2 + b^2$ → Base

Hypotenuse

perpendicular



$$AC^2 = AB^2 + BC^2$$

∠C
P = AB
b = BC
h = AC

∠A
P = BC
b = AB
h = AC

PBH

$\frac{P}{h}$ $\frac{B}{h}$ $\frac{P}{b}$

$\frac{h}{P}$ $\frac{h}{B}$ $\frac{b}{P}$

Q AC = 13m
BC = 5m
AB = ?

Comment Box

# AB = 8m
BC = 6m
AC = ?

$AC^2 = AB^2 + BC^2$

$AC^2 = 8^2 + 6^2$

$AC^2 = 64 + 36$

$AC^2 = 100$

$AC = \sqrt{100} = \sqrt{10 \times 10}$

AC = 10m

Trigonometric Ratio's

Trigonometric Ratio's

- Sin $\frac{P}{H}$ — Sine
- Cos $\frac{B}{H}$
- Tan $\frac{P}{B}$ — tangent
- Cot $\frac{B}{P}$ — Co-tangent
- Sec $\frac{H}{B}$ — Secant
- Cosec $\frac{H}{P}$ — co-secant

$\frac{\sin A}{\cos A} = \frac{P/H}{B/H} = \frac{P}{B}$

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

$\frac{1}{\sin} = \text{cosec}$

$\frac{1}{\text{cosec}} = \sin$

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

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

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

$\sin \times \frac{1}{\cos} = \tan A$

PBP

HHB

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

$\sec A \times \cos A = 1$

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

$\tan A \times \cot A = 1$

$\frac{H}{P} = \frac{1}{\frac{P}{H}}$ ∴ ①

Where
P = Perpendicular
B = Base
H = Hypotenuse

Reciprocal Ratio's

$\text{Sin}\theta = \frac{1}{\text{Cosec}\theta}$

$\text{Cosec}\theta = \frac{1}{\text{Sin}\theta}$

$\text{Cos}\theta = \frac{1}{\sec\theta}$

$\text{Sec}\theta = \frac{1}{\text{Cos}\theta}$

$\text{Tan}\theta = \frac{1}{\text{Cot}\theta}$

$\text{Cot}\theta = \frac{1}{\text{Tan}\theta}$

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

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

PBP
HHB

QUESTION

In Triangle ABC, right-angled at B, If $\tan A = \frac{1}{\sqrt{3}}$, Then what is the value of

(i) $\sin A \cos C + \cos A \sin C$

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

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

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

$H^2 = P^2 + b^2$

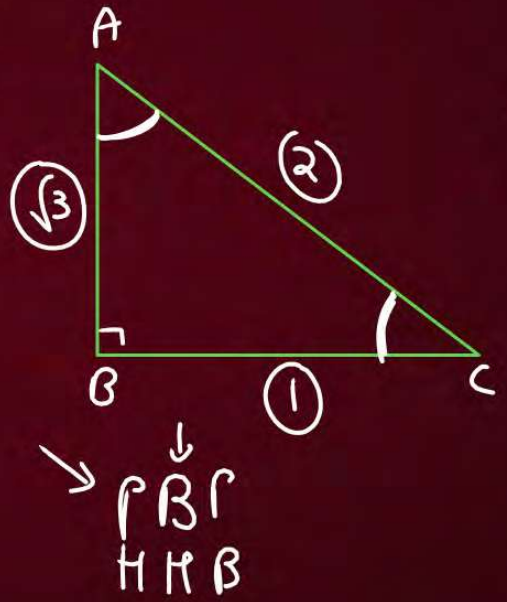
$h^2 = 1^2 + (\sqrt{3})^2$

$h^2 = 1 + 3$

$h^2 = 4$

$h = \sqrt{4}$

$(h = 2)$



$\tan A = \frac{1}{\sqrt{3}} = \frac{P}{B}$

P B P ↙ tan

H H B

↘ P B ↓ P

H H B

A. 1

B. 0

C. 2

D. None of these

Trigonometry Table

$\angle A$	$0°$	$30°$	$45°$	$60°$	$90°$
sin A	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos A	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan A	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
cosec A	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
cot A	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

$\theta = 45°$

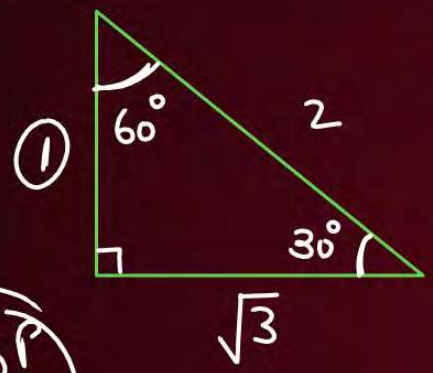
$\sin\theta - \cos\theta = 0$

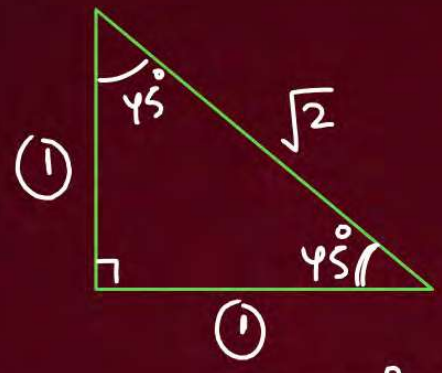
$\tan^4\theta = ?$

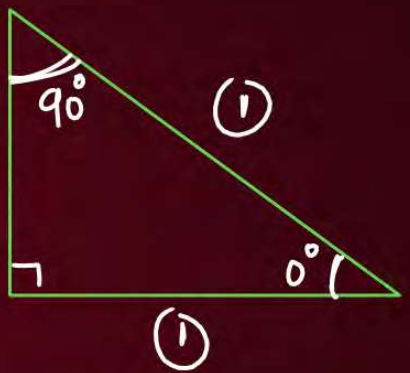
$\tan^4 45°$

$(1)^4 = 1$

Trick To Learn Trigonometry Table







PBP
HHB

$\sin 30^\circ = \frac{1}{2}$

$\tan 30^\circ = \frac{1}{\sqrt{3}}$

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

$\cot 45^\circ = \frac{1}{1} = 1$

$\sin 0^\circ = \frac{0}{1} = 0$

$\sin 90^\circ = \frac{1}{1} = 1$

QUESTION

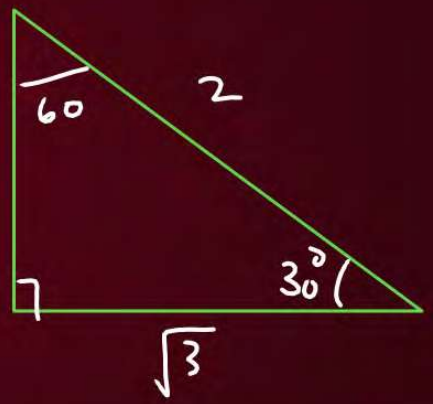
What is the value of $sin60^0cos30^0 + sin30^0cos60^0$

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

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

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

PBP
HHB



A 0

B 1

C 2

D None of these

Trigonometric Identities

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

P B P
H H B

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

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

$\operatorname{cosec}^2\theta = 1 + \cot^2\theta$

① $\frac{H^2}{H^2} = \frac{P^2}{H^2} + \frac{B^2}{H^2}$

$1 = \left(\frac{P}{H}\right)^2 + \left(\frac{B}{H}\right)^2$

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

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

$\left(\frac{H}{B}\right)^2 = \left(\frac{P}{B}\right)^2 + 1$

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

③ $\frac{H^2}{P^2} = \frac{P^2}{P^2} + \frac{B^2}{P^2}$

$\left(\frac{H}{P}\right)^2 = 1 + \left(\frac{B}{P}\right)^2$

$\operatorname{cosec}^2\theta = 1 + \cot^2\theta$

① → $\sin^2\theta + \cos^2\theta$ ✓

② $1 \rightarrow \sec^2\theta - \tan^2\theta$ ✓

③ $1 \rightarrow \operatorname{cosec}^2\theta - \cot^2\theta$ ✓

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

QUESTION

Choose the correct option for $\frac{1+tan^2A}{1+Cot^2A} =$

A Sec^2A

B -1

C Tan^2A

D Cot^2A

$$\frac{Sec^2A}{Cosec^2A} \Rightarrow \frac{\frac{1}{\cos^2A}}{\frac{1}{\sin^2A}} \Rightarrow \frac{1}{\cos^2A} \times \frac{\sin^2A}{1} = \frac{\sin^2A}{\cos^2A} \Rightarrow \tan^2A$$

QUESTION

Prove that $(sinA + cosecA)^2 + (cosA + secA)^2 = 7 + tan^2A + cot^2A$

$(\sin A)^2 + (\operatorname{cosec} A)^2 + 2\sin A \operatorname{cosec} A + \cos^2 A + \sec^2 A + 2\cos A \sec A$

$\sin^2 A + \operatorname{cosec}^2 A + 2 + \cos^2 A + \sec^2 A + 2$

$\sin^2 A + \cos^2 A + 2 + 2 + \operatorname{cosec}^2 A + \sec^2 A$

$5 + \operatorname{cosec}^2 A + \sec^2 A$

$5 + 1 + \cot^2 A + 1 + \tan^2 A$

$7 + \tan^2 A + \cot^2 A$ HP