
UDAAN
2026
Trigonometry
MATHS
LECTURE-1
BY-RITIK SIR

Topics *to be covered*

A Trigonometric Ratios

RITIK SIR
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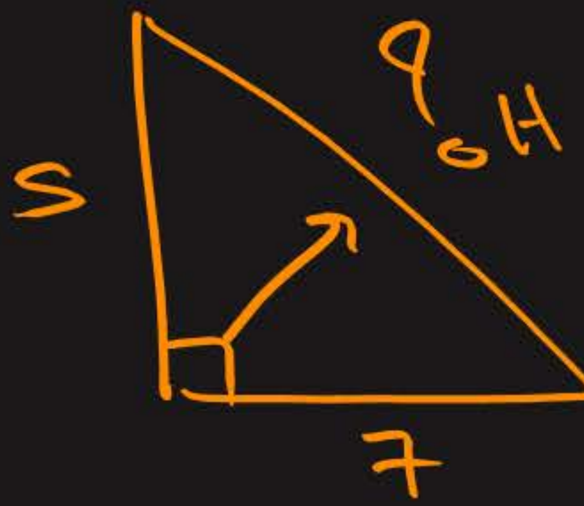
By "PT"

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

Q.



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

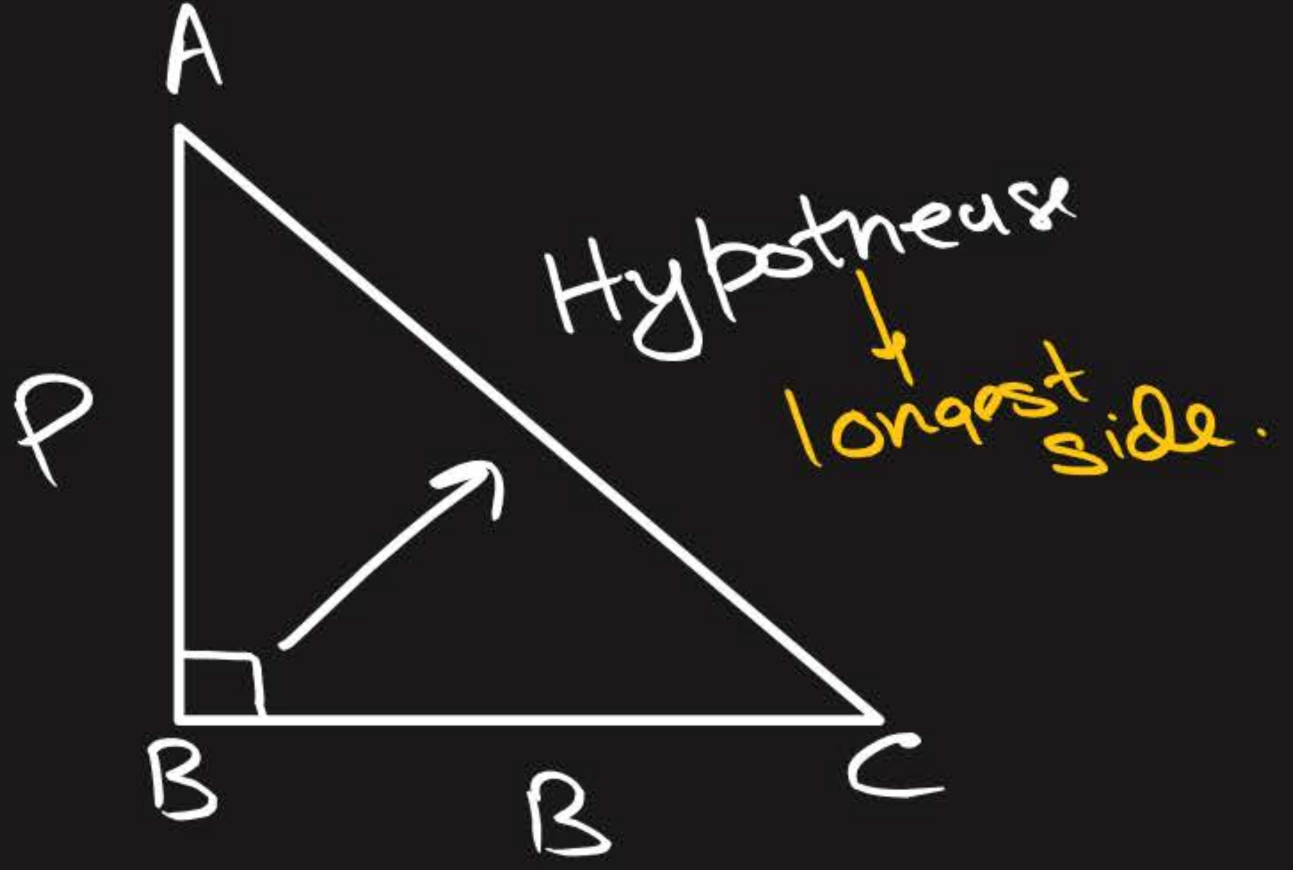
$$H^2 = 5^2 + 7^2$$

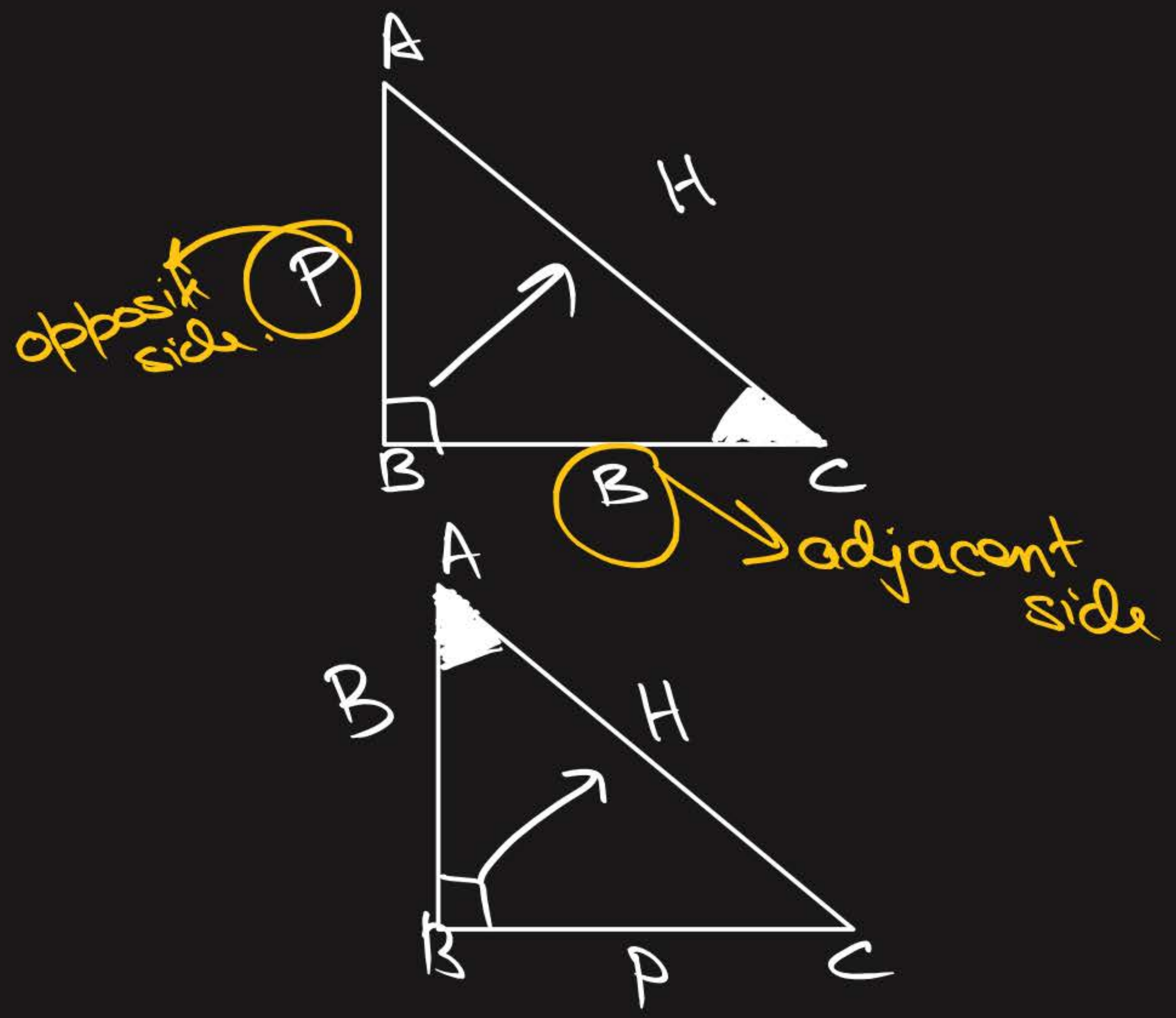
$$H^2 = 25 + 49$$

$$H^2 = 74$$

$$H = \pm\sqrt{74}$$

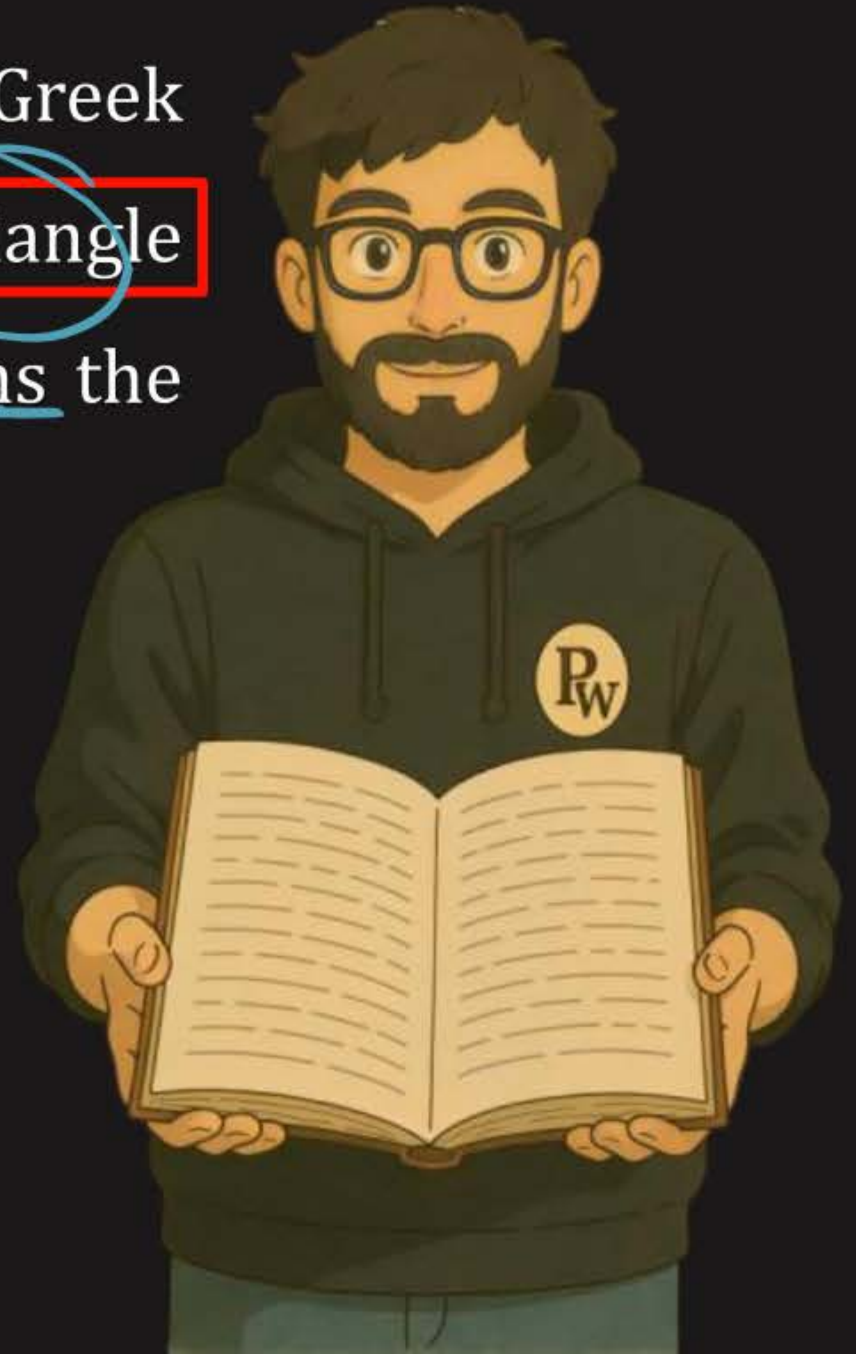
$$\boxed{H = \sqrt{74}}$$




A
H
P
opposit side.
B
C
B
adjacent side
A
B
H
B
P
C

Introduction

In this chapter, we intend to study an important branch of mathematics called "Trigonometry". The word "Trigonometry" is derived from the Greek words: (i) trigonon and, (ii) metron. The word trigonon means a triangle and the word metron means a measure. Hence, trigonometry means the science of measuring triangles.



$\text{sine}\,\theta$ $(\sin\theta) = \frac{P}{H}$

$\text{cosecant}\,\theta$ $(\text{cosec}\,\theta) = \frac{H}{P}$

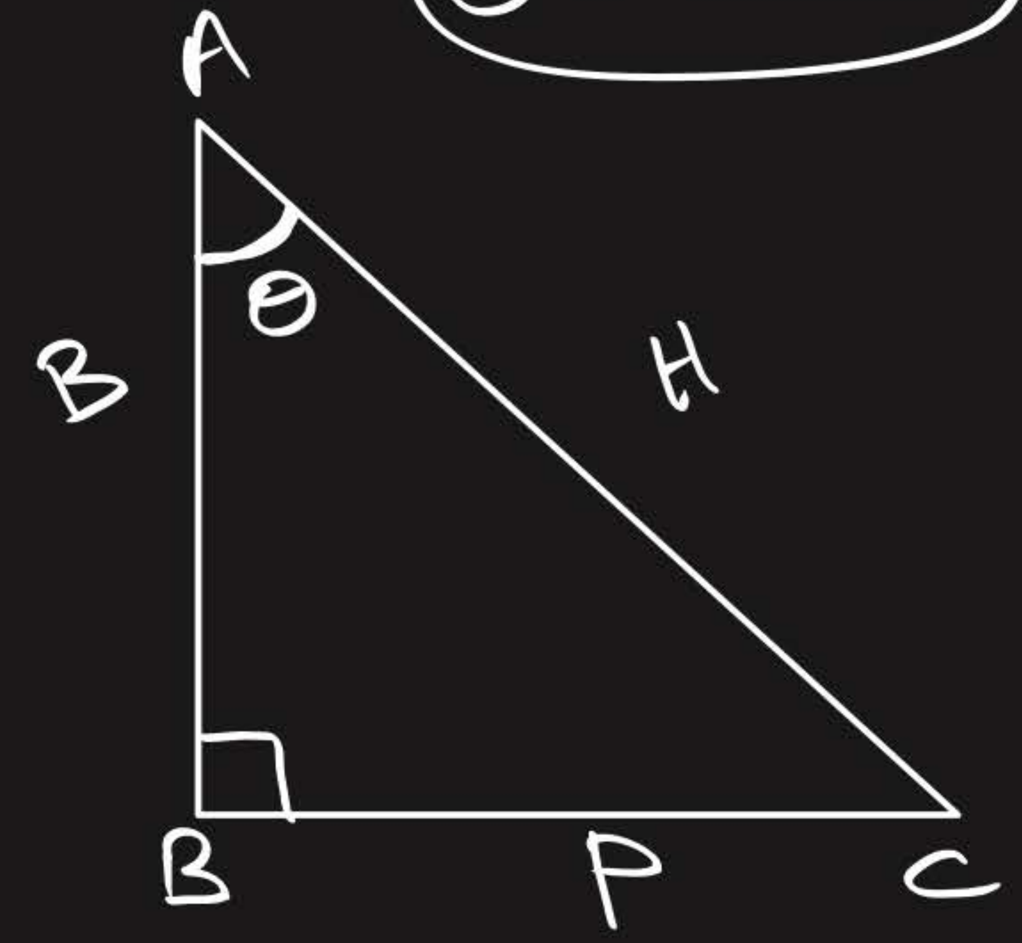
$\theta = \text{theta}$

$\text{cosine}\,\theta$ $(\cos\theta) = \frac{B}{H}$

$\text{secant}\,\theta$ $(\sec\theta) = \frac{H}{B}$

$\text{tangent}\,\theta$ $(\tan\theta) = \frac{P}{B}$

$\text{cotangent}\,\theta$ $(\cot\theta) = \frac{B}{P}$



$\operatorname{cosec}\theta$

P

H

$\sin\theta$

B

H

$\cos\theta$

$\sec\theta$

$\cot\theta$

P

B

$\tan\theta$

Trigonometric Ratios

The most important task of trigonometry is to find the remaining sides and angles of a triangle when some of its sides and angles are given. This problem is solved by using some ratios of the sides of a triangle with respect to its acute angles. These ratios of acute angles are called trigonometric ratios of angles.

$$\sin C = \frac{P}{H} = \boxed{\frac{4}{5}}$$

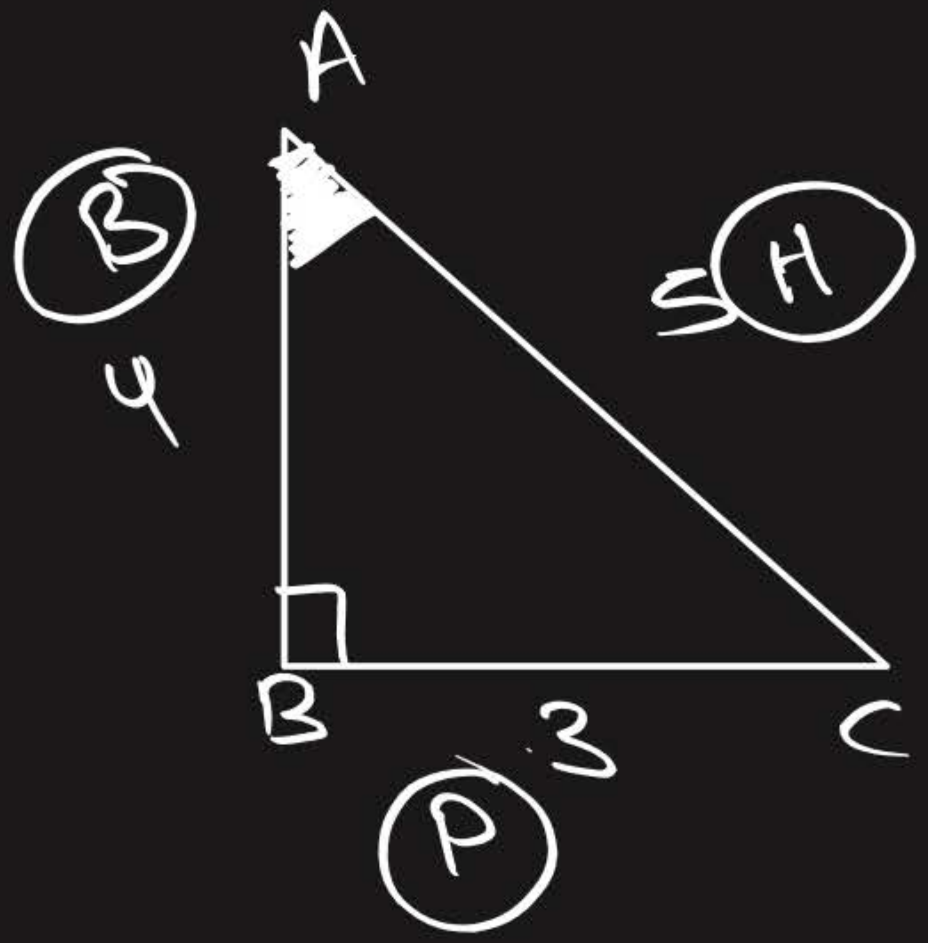
$$\cos C = \frac{B}{H} = \boxed{\frac{3}{5}}$$

$$\tan C = \frac{P}{B} = \boxed{\frac{4}{3}}$$

$$\sin A = \frac{P}{H} = \boxed{\frac{3}{5}}$$

$$\cos A = \frac{B}{H} = \boxed{\frac{4}{5}}$$

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

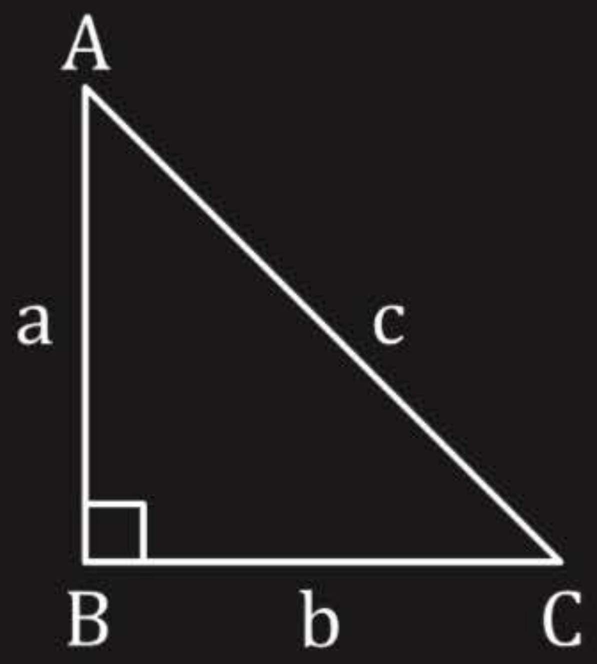


$\sin A = \frac{P}{H} = \boxed{\frac{b}{c}}$

$\cos C = \frac{B}{H} = \boxed{\frac{b}{c}}$

$\text{cosec}\, C = \frac{H}{P} = \boxed{\frac{c}{a}}$

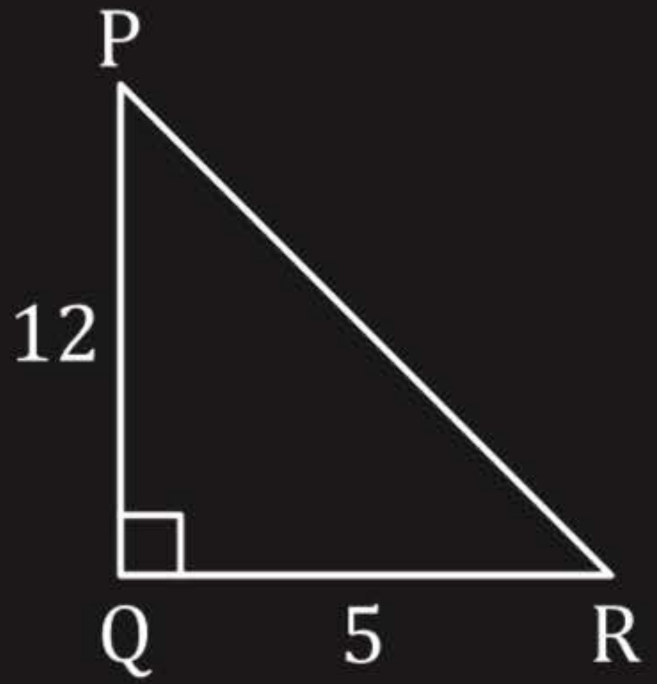
$\tan A = \frac{P}{B} = \boxed{\frac{b}{a}}$



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

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

sec R = $\frac{H}{B} = \boxed{\frac{13}{5}}$



$$H^2 = 5^2 + 12^2$$
$$= 25 + 144$$
$$H^2 = 169$$
$$H = \pm\sqrt{169}$$

$H = 13$

$\sin A \rightarrow$ sine of angle A.

$\operatorname{cosec} B \rightarrow$ cosec of angle B.

$\operatorname{cosec} B \neq \operatorname{cosec} \times B$

#Q. If $\sin A = 3/5$,

Find $\cos A = B/H = \frac{4\cancel{k}}{5\cancel{k}} = 4/5$

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

$\sec A = H/B = \frac{5\cancel{k}}{4\cancel{k}} = 5/4$

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

$P = 3k$
$H = 5k$

$B = 4k$

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

$(5k)^2 = (3k)^2 + B^2$

$25k^2 = 9k^2 + B^2$

$16k^2 = B^2$

$\pm\sqrt{16k^2} = B$

$\boxed{4k = B}$

$\sqrt{16k^2}$

$\sqrt{4 \times 4 \times k \times k}$

$4 \times k$

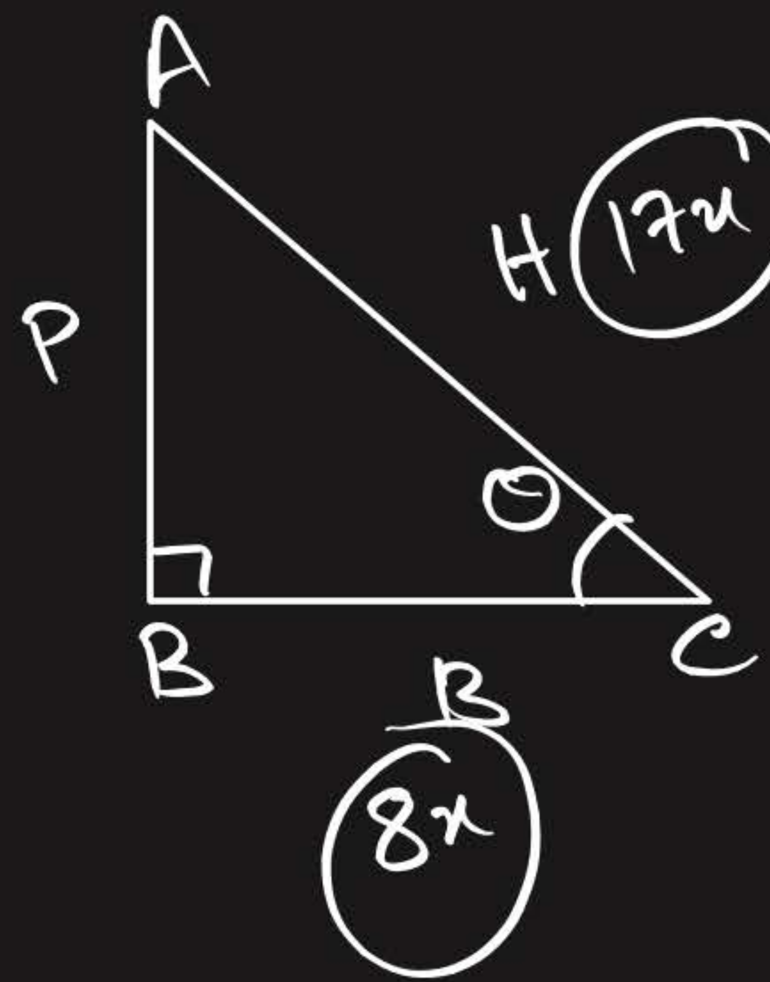
#Q. If $\cos\theta = \frac{8}{17}$, find the other five trigonometric ratios.

$$\cos\theta = \frac{8}{17} = \frac{B}{H}$$

$B = 8x$
$H = 17x$

$P = ?$

$$H^2 = P^2 + B^2$$
$$(17x)^2 = P^2 + (8x)^2$$
$$289x^2 = P^2 + 64x^2$$
$$225x^2 = P^2$$
$$\pm\sqrt{225x^2} = P$$
$$\boxed{15x = P}$$



$$\sin\theta = \frac{P}{H} = \frac{15x}{17x} = \boxed{\frac{15}{17}}$$

$$\operatorname{cosec}\theta = \frac{H}{P} = \frac{17\cancel{x}}{15\cancel{x}} = \boxed{\frac{17}{15}}$$

$$\cot\theta = \frac{B}{P} = \frac{8\cancel{x}}{15\cancel{x}} = \boxed{\frac{8}{15}}$$

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

$a = 3k$

$b = 5k$

?

Shreya = 15 years.

Ritik = 50 years.

$$\frac{S}{R} = \frac{3}{10}$$

$S = 3 \times 5$

$R = 10 \times 5$

#Q. If cosec A = $\sqrt{10}$, find other five trigonometric ratios. of $\angle A$

$\text{cosec} A = \frac{\sqrt{10}}{1} = \frac{H}{P}$

$\boxed{\begin{matrix} H = \sqrt{10} \\ P = 1 \end{matrix}}$ $\boxed{B = 3}$

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

$(\sqrt{10})^2 = (1)^2 + B^2$

$10 = 1 + B^2$

$9 = B^2$

$\pm\sqrt{9} = B$

$\sin A = \frac{P}{H} = \frac{1}{\sqrt{10}}$

$\cos A = \frac{B}{H} = \frac{3}{\sqrt{10}}$

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

#Q. $\boxed{\text{In a } \Delta ABC}$ right $\boxed{\text{angle at C,}}$ if tan A = $1/\sqrt{3}$, find the value of sin A cos B + cos A sin B.

CBSE 2008

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

$\angle A$

$P = 1$
$B = \sqrt{3}$
$H = ?$

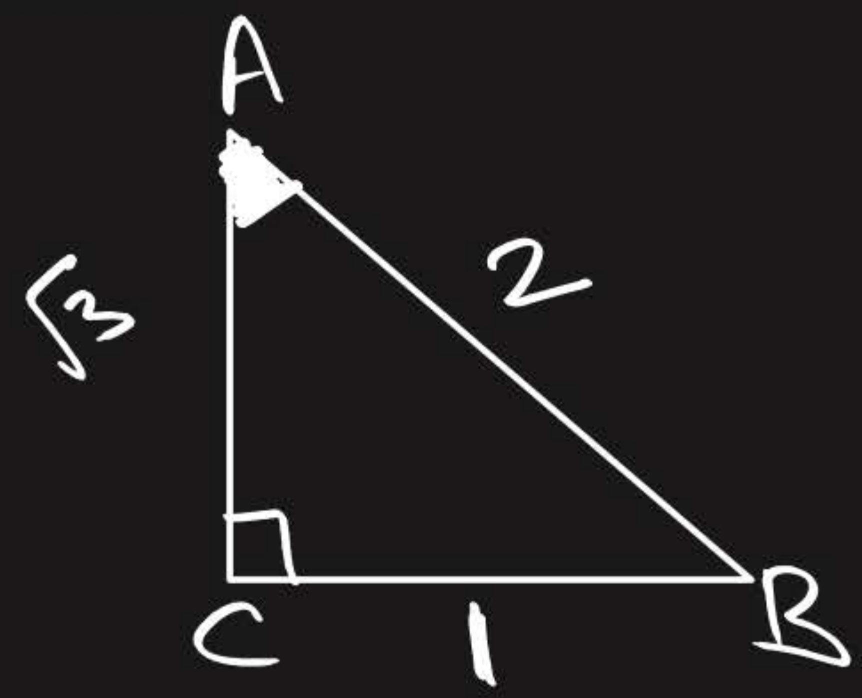
$H^2 = P^2 + B^2$
$H^2 = (1)^2 + (\sqrt{3})^2$
$= 1 + 3$
$H^2 = 4$
$H = \pm\sqrt{4}$
$\boxed{H = 2}$

$\sin A = \frac{P}{H} = \boxed{\frac{1}{2}}$

$\cos B = \frac{B}{H} = \boxed{\frac{1}{2}}$

$\cos A = \frac{B}{H} = \boxed{\frac{\sqrt{3}}{2}}$

$\sin B = \frac{P}{H} = \boxed{\frac{\sqrt{3}}{2}}$



$= \sin A \cdot \cos B + \cos A \sin B$

$= \frac{1}{2} \cdot \frac{1}{2} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{2} = \frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$ Ans.

#Q. If cosec A = 2, find the value of $\frac{1}{\tan A} + \frac{\sin A}{1+\cos A}$.

$\text{cosec}A = \boxed{\frac{2}{1} = \frac{H}{P}}$

$H = 2$

$P = 1$

$B = ?$

$\boxed{B = \sqrt{3}}$

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

$(2)^2 = (1)^2 + B^2$

$4 = 1 + B^2$

$3 = B^2$

$\pm\sqrt{3} = B$

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

$\sin A = \frac{P}{H} = \boxed{\frac{1}{2}}$

$\cos A = \frac{B}{H} = \boxed{\frac{\sqrt{3}}{2}}$

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

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

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

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

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

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

$$= 2 \text{ Ans//}$$

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

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

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

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

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

#Q. In a ΔABC, right angled at B, if $AB = 12$ and $BC = 5$, find:

(i) $\sin A$ and $\tan A$

(ii) $\cos C$ and $\cot C$

#GPh

#Q. If $\sin\theta = \frac{4}{5}$, find the value of $\frac{4\tan\theta - 5\cos\theta}{\sec\theta + 4\cot\theta}$.

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

$P = 4$

$H = 5$

$B = 3$

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

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

$$\sec\theta = \frac{H}{B} = \boxed{\frac{5}{3}}$$

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

$$= \frac{4 \cdot \frac{4}{3} - \cancel{5} \cdot \frac{3}{\cancel{5}}}{\frac{5}{3} + \cancel{4} \cdot \frac{3}{\cancel{4}}}$$

$$= \frac{\frac{16}{3} - \frac{3}{1}}{\frac{5}{3} + \frac{3}{1}}$$

$$= \frac{\frac{16-9}{3}}{\frac{5+9}{3}} = \frac{7}{\cancel{3}} \Big/ \frac{14}{\cancel{3}}$$

$$\frac{7}{14} = \frac{1}{2}$$

Ans

#Q. If $\sin\theta = \frac{a^2-b^2}{a^2+b^2}$, find the values of other five trigonometric ratios of $\angle\theta$.

$$\sin\theta = \boxed{\frac{a^2-b^2}{a^2+b^2} = \frac{P}{H}}$$

$$\boxed{\begin{aligned} P &= a^2-b^2 \\ H &= a^2+b^2 \\ B &= ? \end{aligned}}$$

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

$$(a^2+b^2)^2 = (a^2-b^2)^2 + B^2$$

$$(a^2)^2 + (b^2)^2 + 2a^2b^2 = (a^2)^2 + (b^2)^2 - 2a^2b^2 + B^2$$

$$\cancel{a^4} + \cancel{b^4} + 2a^2b^2 = \cancel{a^4} + \cancel{b^4} - 2a^2b^2 + B^2$$

$$2a^2b^2 + 2a^2b^2 = B^2$$

$$4a^2b^2 = B^2$$

$$\pm\sqrt{4a^2b^2} = B$$

$$\sqrt{2\cdot 2\cdot a\cdot a\cdot b\cdot b} = B$$

$$B = 2ab$$

$$\cos\theta = \frac{B}{H} = \boxed{\frac{2ab}{a^2+b^2}}$$

$$\tan\theta = \frac{P}{B} = \boxed{\frac{a^2-b^2}{2ab}}$$


WORK HARD
DREAM BIG
NEVER GIVE UP

Thank You