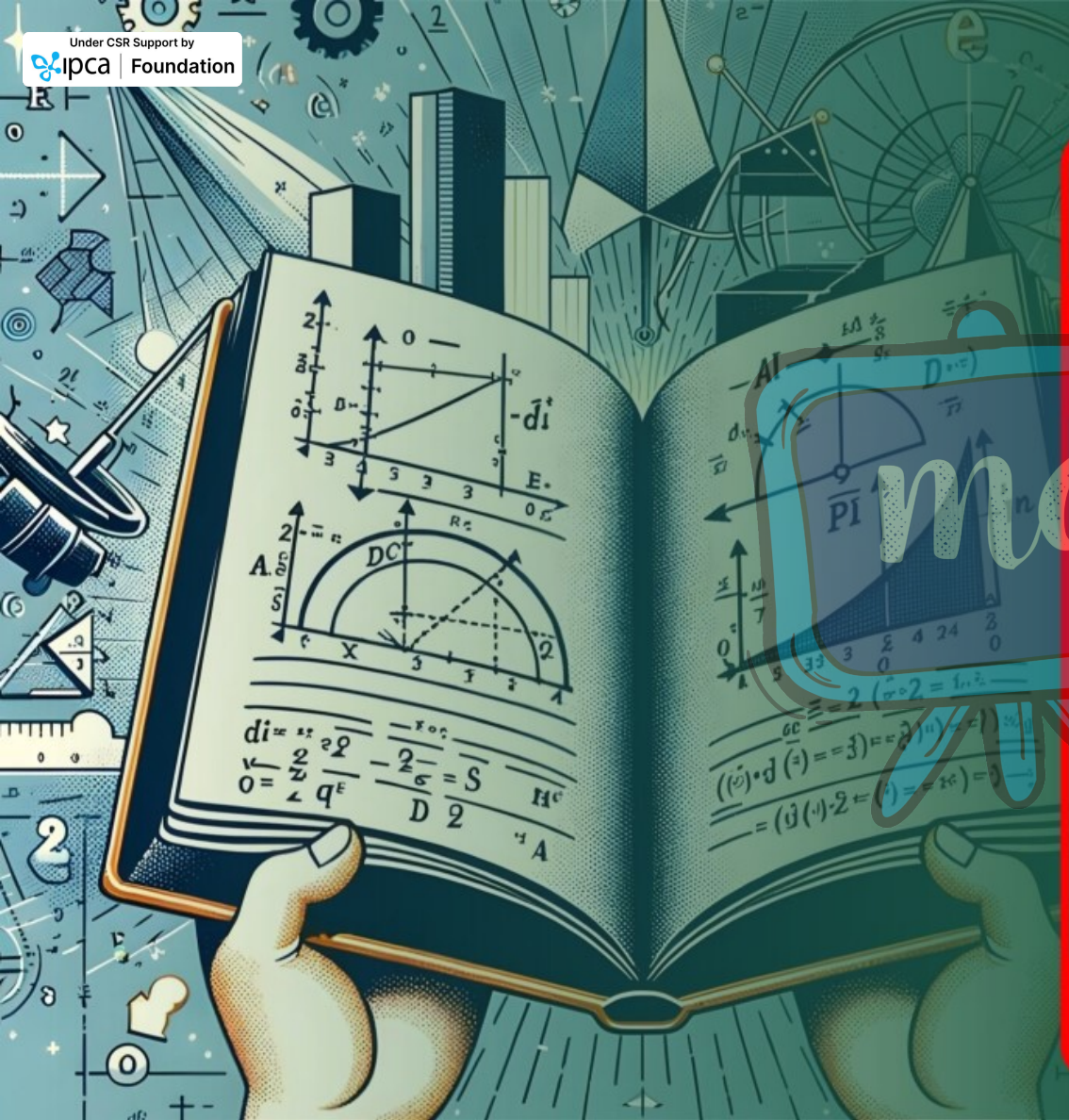


CLASS – 10

MATHEMATICS

Chapter – 8

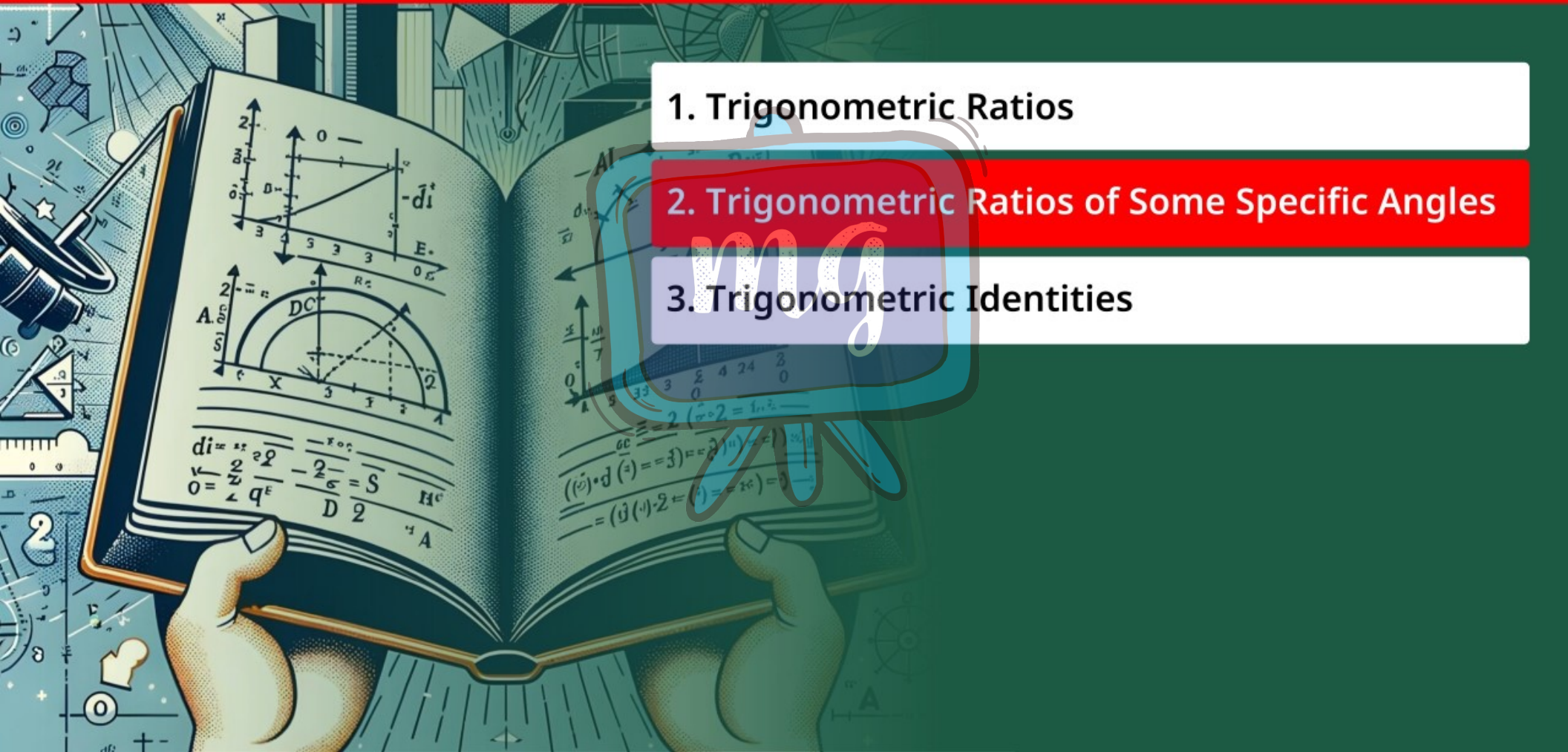
Introduction to Trigonometry

Part – 3

Trigonometric Ratios of Some Specific Angles

Shubham Tiwari

OVERVIEW



1. Trigonometric Ratios
2. Trigonometric Ratios of Some Specific Angles
3. Trigonometric Identities

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COMPETENCY BASED LEARNING

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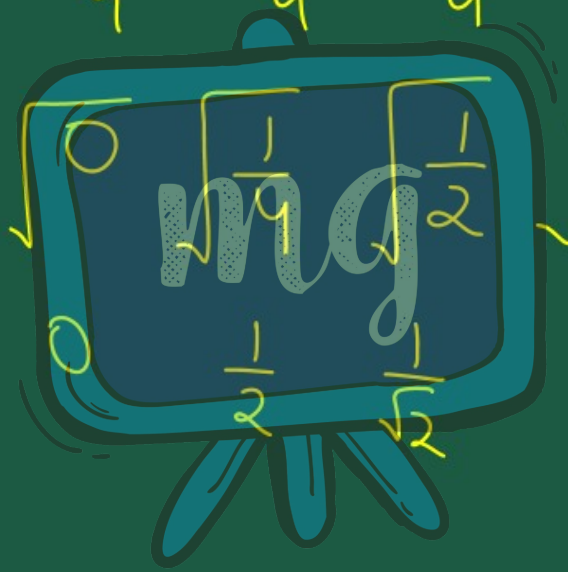
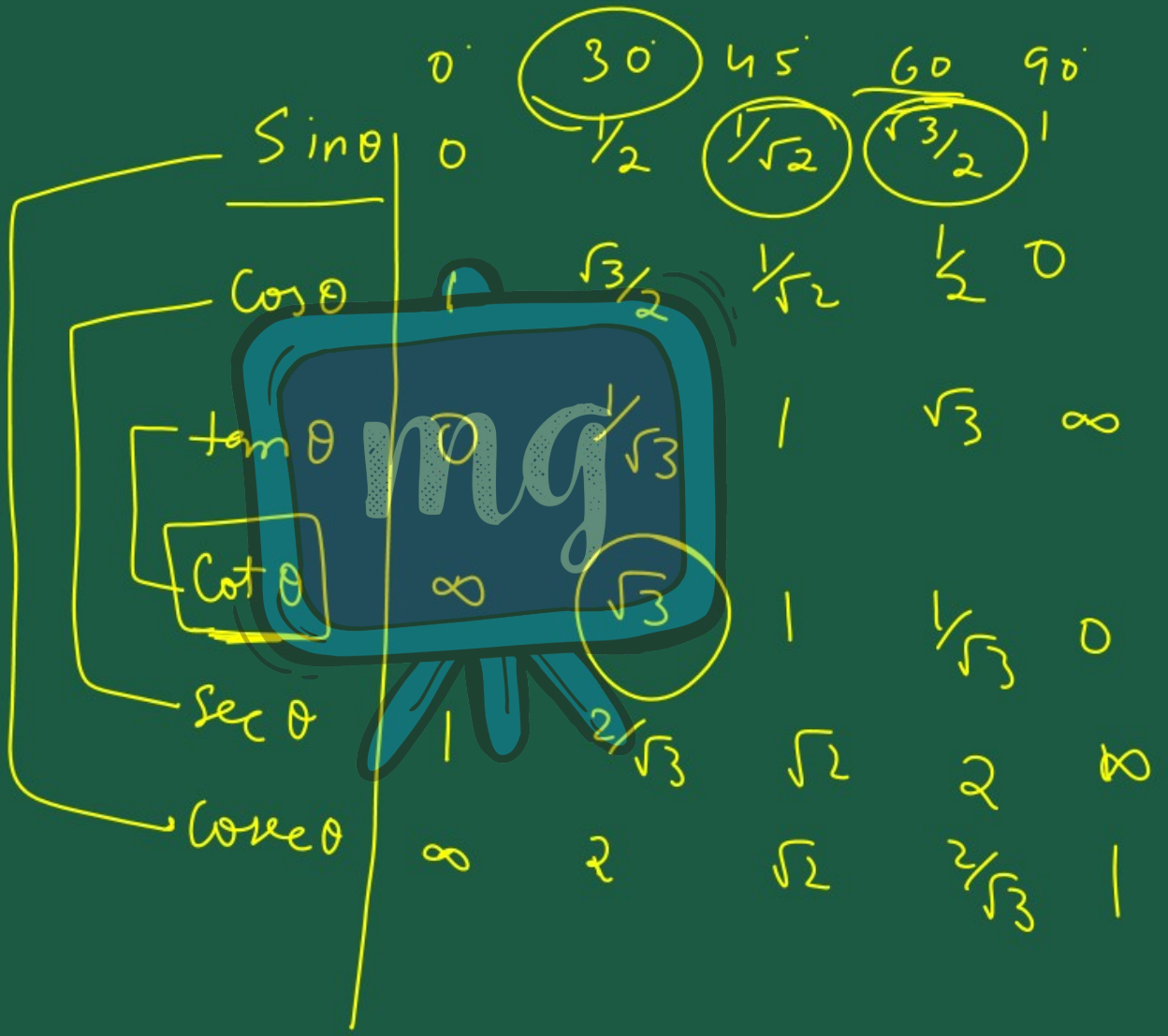
Ratio of the sides for some specific angles

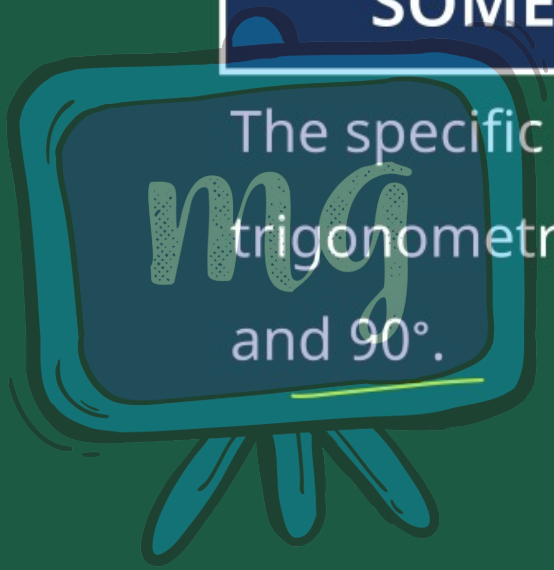
Geometric representation of trigonometric ratios



	$\frac{0}{4}$	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$
$\sin\theta$	$\sqrt{\frac{0}{4}}$	$\sqrt{\frac{1}{4}}$	$\sqrt{\frac{2}{4}}$	$\sqrt{\frac{3}{4}}$	$\sqrt{1}$
	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1

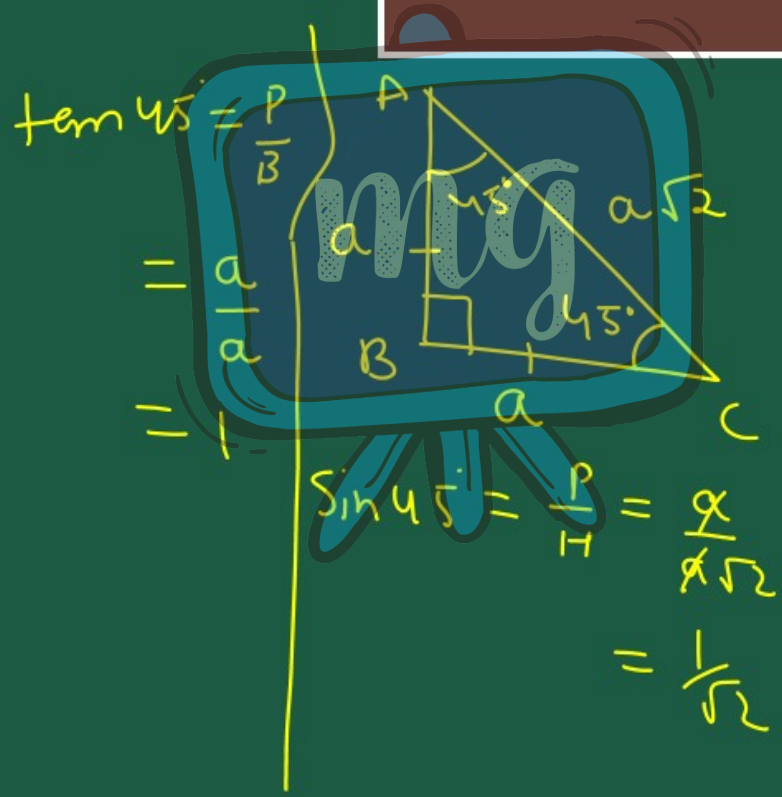


TRIGONOMETRIC RATIOS OF SOME SPECIFIC ANGLES



The specific angles that are defined for trigonometric ratios are 0°, 30°, 45°, 60° and 90°.

TRIGONOMETRIC RATIOS OF 45°



in Δ ABC

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

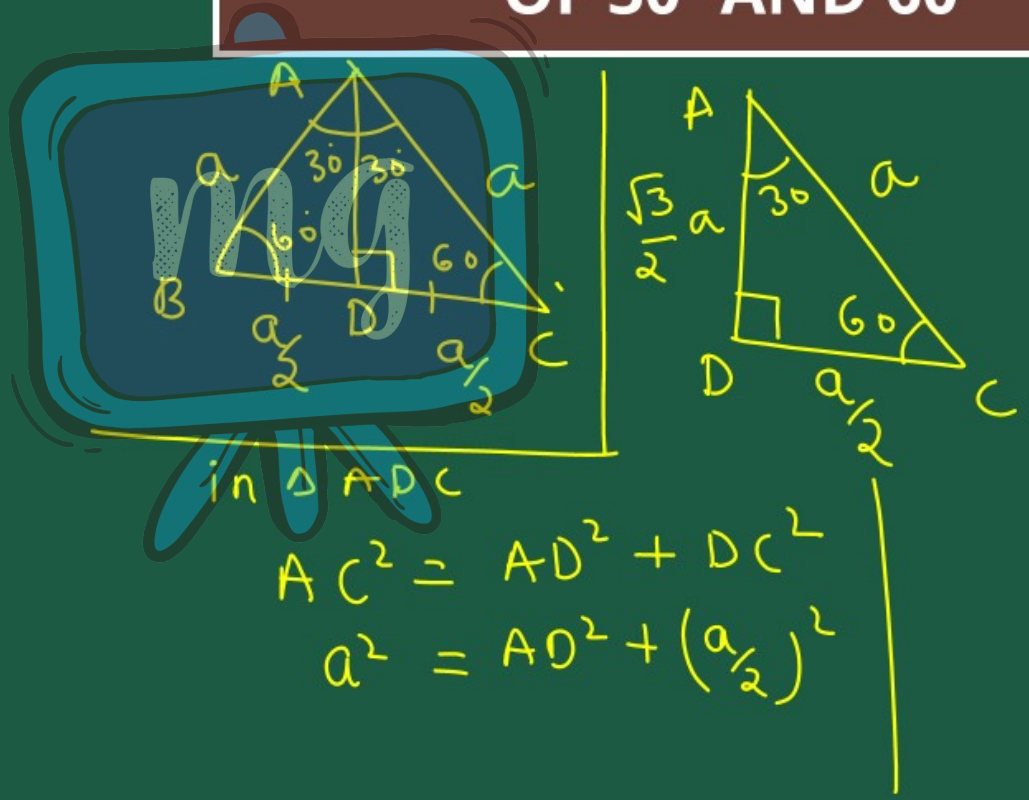
$AC^2 = a^2 + a^2$

$AC^2 = 2a^2$

$AC = \sqrt{2a^2}$

$AC = \sqrt{2} \times a$

TRIGONOMETRIC RATIOS OF 30° AND 60°



$$AC^2 = AD^2 + DC^2$$

$$a^2 = AD^2 + \left(\frac{a}{2}\right)^2$$

$$a^2 - \frac{a^2}{4} = AD^2$$

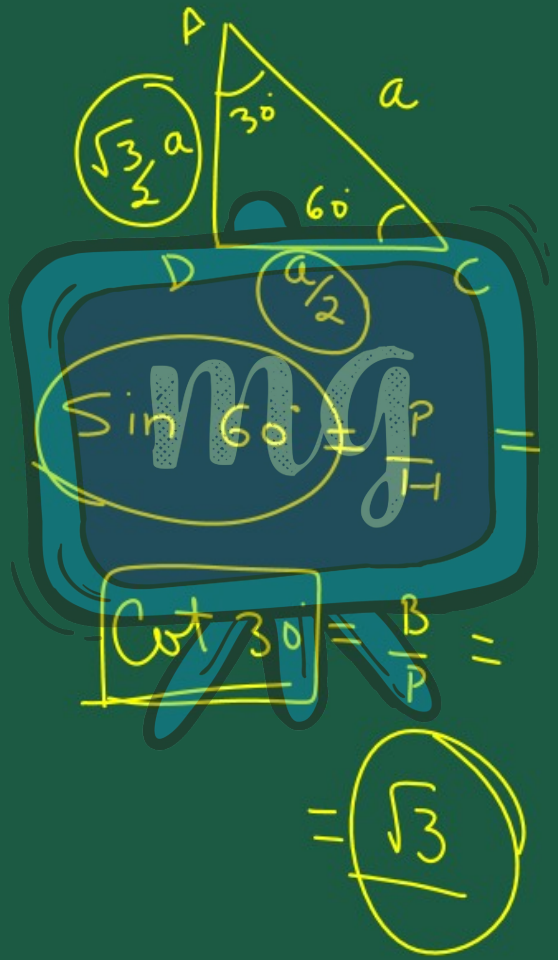
$$\frac{4a^2 - a^2}{4}$$

$$\frac{3a^2}{4} = AD^2$$

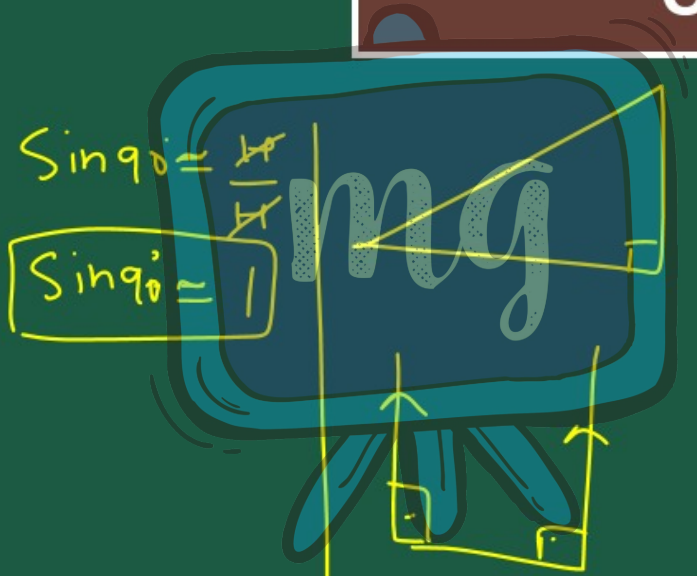
$$\frac{\sqrt{3}}{2}a = AD$$

$$AD = \sqrt{\frac{3}{4}a^2}$$

$$AD = \sqrt{3}\,\frac{a}{2}$$



TRIGONOMETRIC RATIOS OF 0° AND 90°



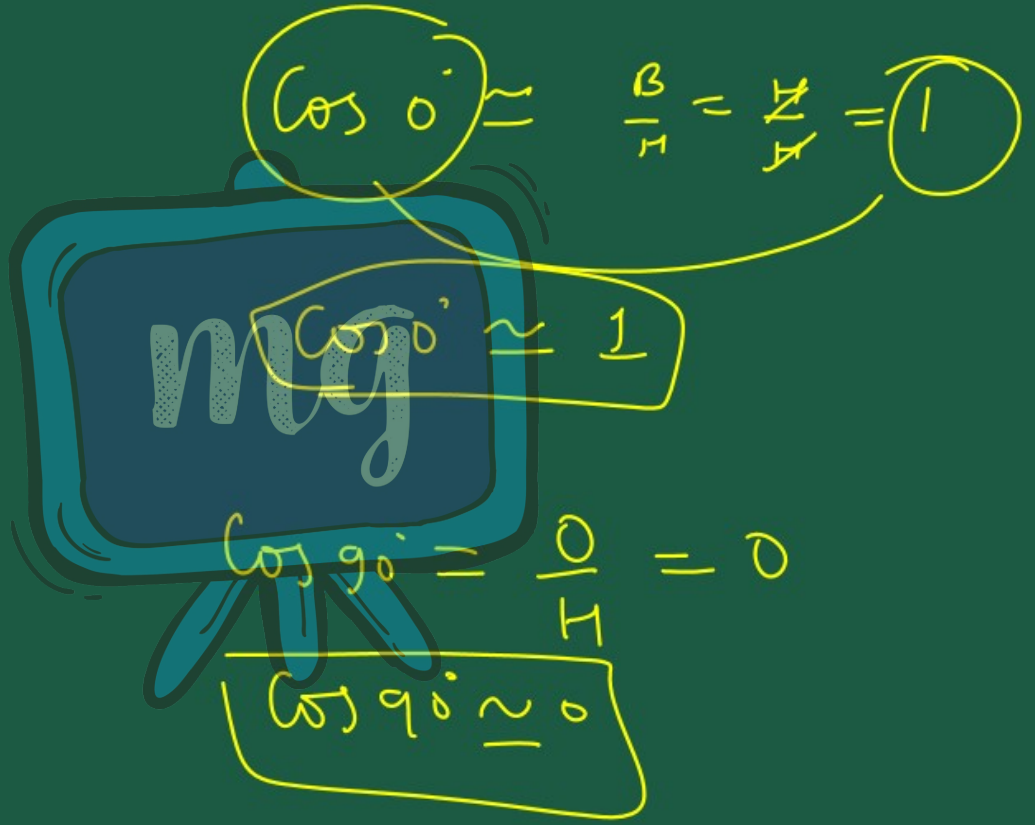
$\sin 90^\circ = \frac{H}{H}$

$\sin 90^\circ = 1$

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

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

$\sin 0^\circ = 0$



TRIGONOMETRY TABLE

∠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
cot A	Not Defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not Defined
cosec A	Not Defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

Note

- Form the table above you can observe that as ∠A increases form 0° to 90°, sin A increases from 0 to 1 and cos A decreases from 1 to 0.

Example : 6

In Δ ABC, right-angled at B, AB = 5 cm and $\angle ACB = 30°$ (see Fig.). Determine the lengths of the sides BC and AC.

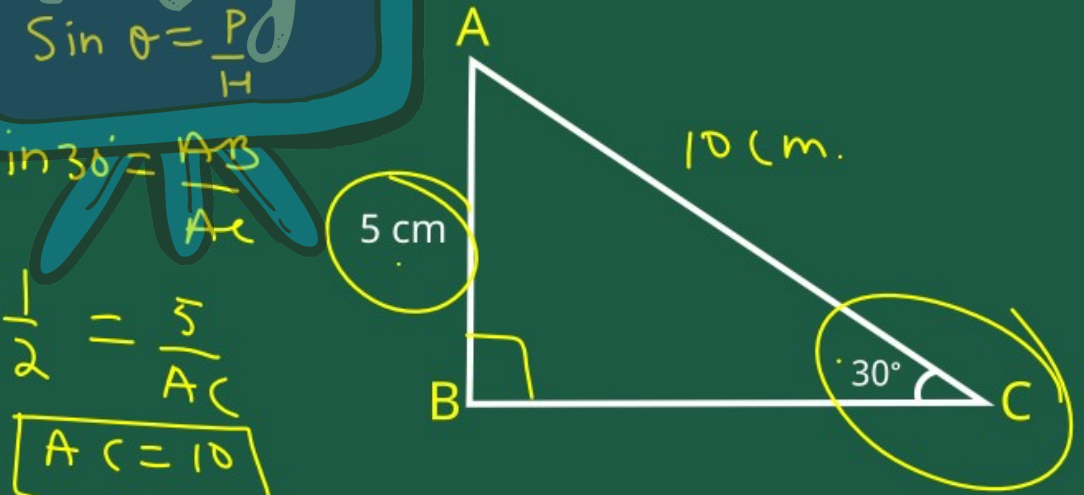
Solu:

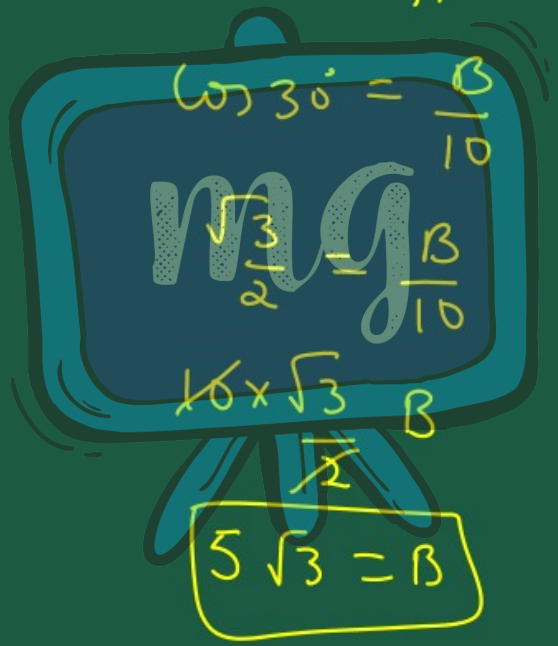
$\sin\theta = \frac{P}{H}$

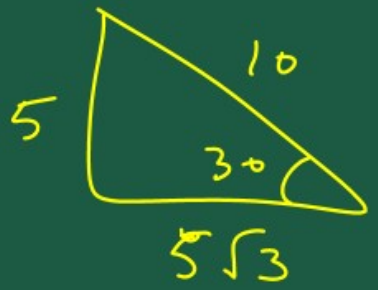
$\sin 30° = \frac{AB}{AC}$

$\frac{1}{2} = \frac{5}{AC}$

$AC = 10$

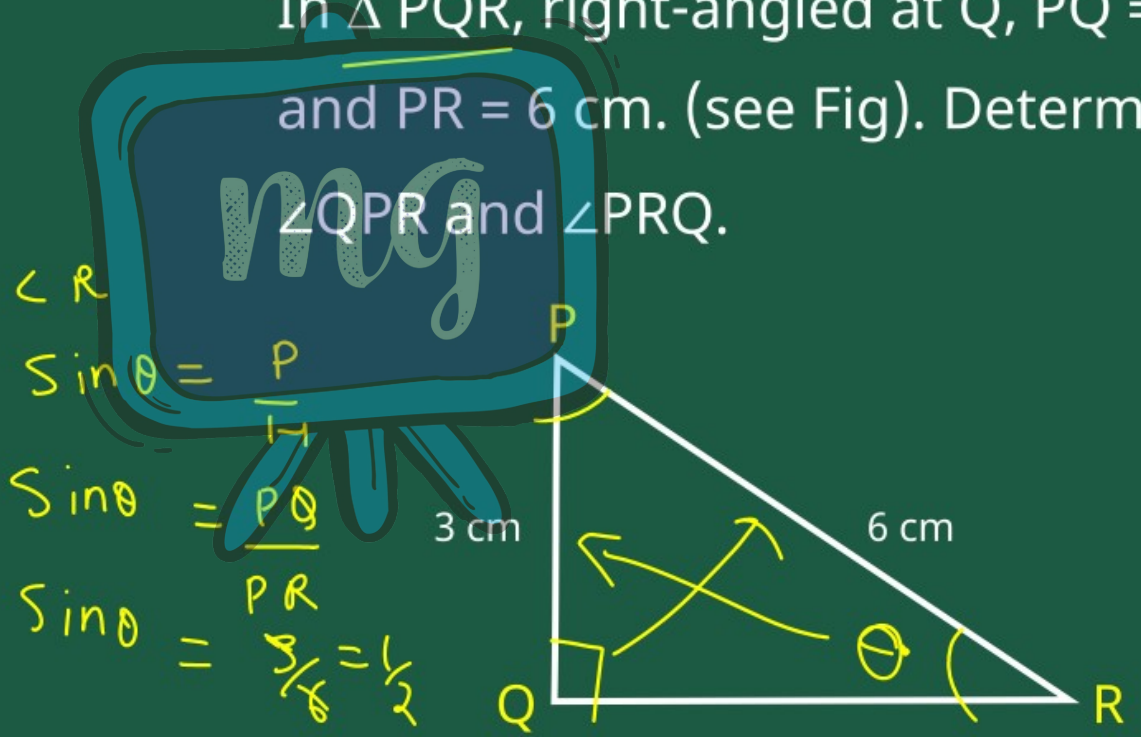


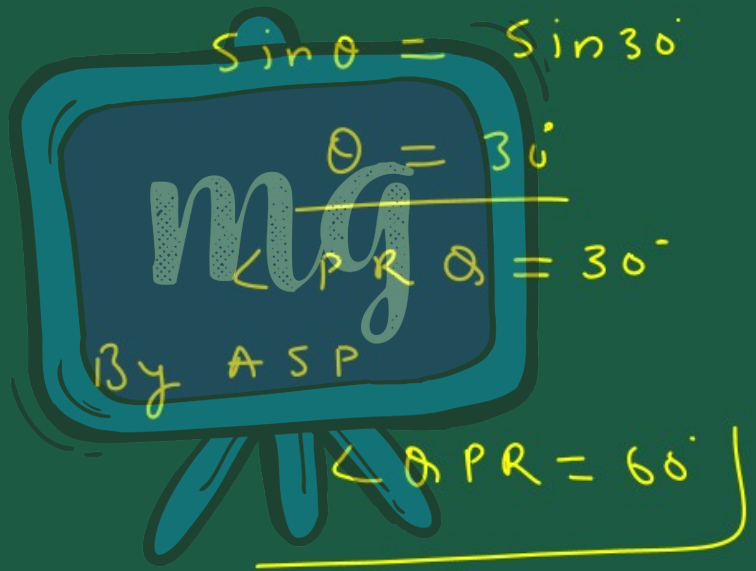




Example : 7

In Δ PQR, right-angled at Q, PQ = 3 cm and PR = 6 cm. (see Fig). Determine $\angle$QPR and $\angle$PRQ.





Example : 8

If $\sin(A-B)=\frac{1}{2}$, $\cos(A+B)=\frac{1}{2}$, $0^\circ < A+B \leq 90^\circ$, $A > B$, find A and B.

Solu.

$\sin(A-B)=\frac{1}{2}$

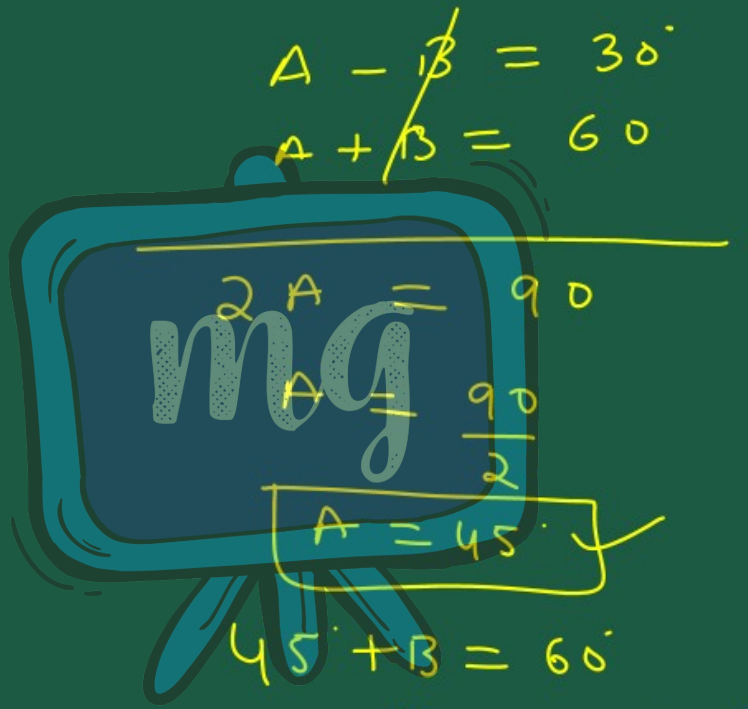
$\sin(A-B)=\sin 30^\circ$

$A-B=30^\circ$ — (1)

$A+B=60$ — (2)

$\cos(A+B)=\frac{1}{2}$

$\cos(A+B)=\cos 60^\circ$



$$A - B = 30^\circ$$

$$A + B = 60^\circ$$

$$2A = 90^\circ$$

$$A = \frac{90^\circ}{2}$$

$$A = 45^\circ$$

$$45^\circ + B = 60^\circ$$

$$B = 60^\circ - 45^\circ$$

$$B = 15^\circ$$

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LEARNING OUTCOMES

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1. Trigonometric ratios of 45°
2. Trigonometric ratios of 30°and 60°
3. Trigonometric ratios of 0°and 90°

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ASSESSMENT

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1 | $(\sin 30° + \cos 30°) - (\sin 60° + \cos 60°)$

A -1

B 0

C 1

D $\frac{1}{2}$

$\sin 30 + \cos 30$

$- \sin 60 - \cos 60$

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

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

ASSESSMENT

2 Value of $\frac{\tan 30°}{\tan 60°}$ is :

A $\frac{1}{\sqrt{2}}$

B $\frac{1}{3}$

C $\frac{\sqrt{3}}{2}$

D 1

$\frac{1/\sqrt{3}}{\sqrt{3}/1}$

$\frac{1}{\sqrt{3}} \times \frac{1}{\sqrt{3}} = \frac{1}{3}$