CHAPTER 08

Introduction to Trigonometry

Trigonometric ratios of some specific angles:

Trigonometric ratios of 45°:

For determining the trigonometric ratios of 45°, one angle should be 45° apart from 90°. The other angle is 45°. The triangle is right-angled isosceles triangle.

Now, let us consider the right – angled isosceles triangle in each equal side is considered as 'x' units. Then,

By Pythagoras theorem, we have

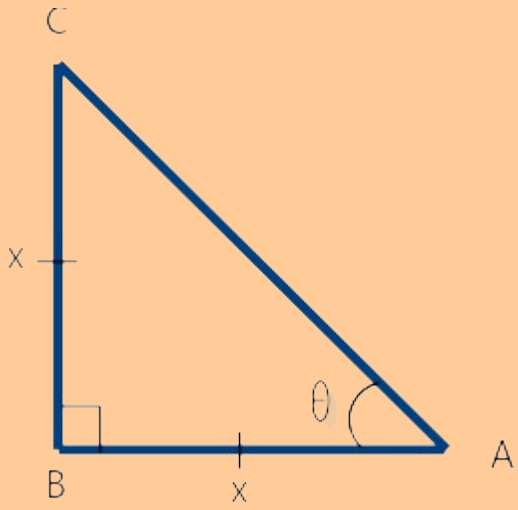
$AC^2 = AB^2 + BC^2$

$\Rightarrow AC^2 = x^2 + x^2$

$\Rightarrow AC^2 = 2x^2$

$\Rightarrow AC = \sqrt{2x^2}$

$\therefore AC = \sqrt{2}x$ = Hypotenuse



Let us consider the reference angle as $A = \theta = 45^\circ$ and the

T – ratios of angles are,

$$\text{Sin}45^\circ = \frac{\text{Opposite}}{\text{Hypotenuse}} = \frac{x}{\sqrt{2}x} = \frac{1}{\sqrt{2}}$$

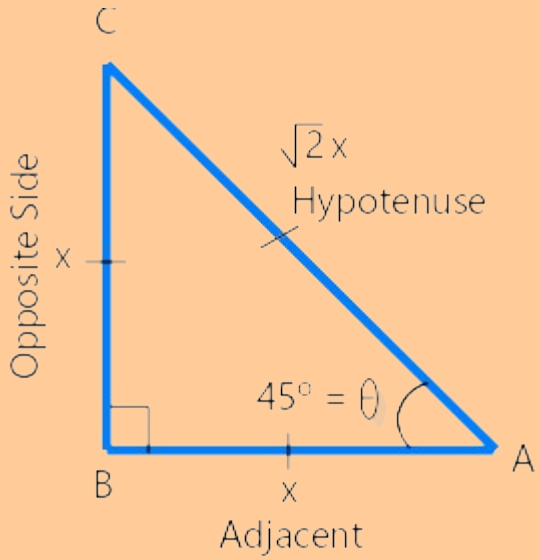
$$\Rightarrow \text{Cosec}45^\circ = \frac{\text{Hypotenuse}}{\text{Opposite}} = \frac{\sqrt{2}x}{x} = \sqrt{2}$$

$$\text{Cos}45^\circ = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{x}{\sqrt{2}x} = \frac{1}{\sqrt{2}}$$

$$\Rightarrow \text{Sec}\,45^\circ = \frac{\text{Hypotenuse}}{\text{Adjacent}} = \frac{\sqrt{2}x}{x} = \sqrt{2}$$

$$\text{Tan}45^\circ = \frac{\text{Opposite}}{\text{Adjacent}} = \frac{x}{x} = 1$$

$$\Rightarrow \text{Cot}\,45^\circ = \frac{\text{Adjacent}}{\text{Opposite}} = \frac{x}{x} = 1$$



Summary:

$$\text{Sin}\,45^\circ = \frac{1}{\sqrt{2}};\ \text{Cos}\,45^\circ = \frac{1}{\sqrt{2}};\ \text{Tan}\,45^\circ = 1$$

$$\text{Cosec}\,45^\circ = \sqrt{2};\ \text{Sec}\,45^\circ = \sqrt{2};\ \text{Cot}\,45^\circ = 1$$

Note:

- $\text{Sin}x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots\ldots\infty \left(x \in R\right)$
- $\text{Cos}\,x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots\ldots\infty \left(x \in R\right)$