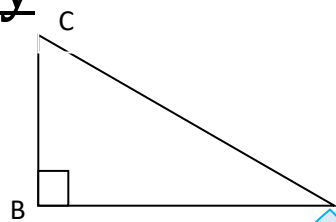


## Trigonometry

### Trigonometrical Ratios

There are 6 trigonometrical ratios relating to the three sides of a right-angled triangle.



1. Sine (sin) =  $\frac{\text{Perpendicular}}{\text{Hypotenuse}} \Rightarrow \sin A = \frac{BC}{AC}$  &  $\sin C = \frac{AB}{AC}$
2. Cosine (Cos) =  $\frac{\text{Base}}{\text{Hypotenuse}} \Rightarrow \cos A = \frac{AB}{AC}$  &  $\cos C = \frac{BC}{AC}$
3. Tangent (tan) =  $\frac{\text{Perpendicular}}{\text{Base}} \Rightarrow \tan A = \frac{BC}{AB}$  &  $\tan C = \frac{AB}{BC}$
4. Cotangent (cot) =  $\frac{\text{Base}}{\text{Perpendicular}} \Rightarrow \cot A = \frac{AB}{BC}$  &  $\cot C = \frac{BC}{AB}$
5. Secant (sec) =  $\frac{\text{Hypotenuse}}{\text{Base}} \Rightarrow \sec A = \frac{AC}{AB}$  &  $\sec C = \frac{AC}{BC}$
6. Cosecant (cosec) =  $\frac{\text{Hypotenuse}}{\text{Perpendicular}} \Rightarrow \text{cosec } A = \frac{AC}{BC}$  &  $\text{cosec } C = \frac{AC}{AB}$

### Relations between different Trigonometrical Ratios

1.  $\sin A = \frac{1}{\text{cosec } A} \Rightarrow \sin A * \text{cosec } A = 1 \Rightarrow \text{cosec } A = \frac{1}{\sin A}$
2.  $\cos A = \frac{1}{\sec A} \Rightarrow \cos A * \sec A = 1 \Rightarrow \sec A = \frac{1}{\cos A}$
3.  $\tan A = \frac{1}{\cot A} \Rightarrow \tan A * \cot A = 1 \Rightarrow \cot A = \frac{1}{\tan A}$
4.  $\tan A = \frac{\sin A}{\cos A}$
5.  $\cot A = \frac{\cos A}{\sin A}$

	0	30	45	60	90
sin	0	1/2	1/√2	√3/2	1
cos	1	√3/2	1/√2	1/2	0
tan	0	1/√3	1	√3	∞
cot	∞	√3	1	1/√3	0
sec	1	2/√3	√2	2	∞
cosec	∞	2	√2	2/√3	1

### Trigonometric Ratios of Complementary Angles

$$\left. \begin{array}{l} \sin(90-A) = \cos A \\ \tan(90-A) = \cot A \\ \sec(90-A) = \text{cosec } A \end{array} \right\} \begin{array}{l} \cos(90-A) = \sin A \\ \cot(90-A) = \tan A \\ \text{cosec}(90-A) = \sec A \end{array}$$

### Square Relation

1.  $\sin^2 A + \cos^2 A = 1$
2.  $\sec^2 A - \tan^2 A = 1$
3.  $\text{cosec}^2 A - \cot^2 A = 1$