## Introduction to trigonometry - Points to Remember

## 1. Angle and Triangle:



An angle is considered as the figure obtained by rotating a given ray about its endpoint. The revolving ray is called the generating line of the angle. The initial position OA is called the initial side and the final position OB is called the terminal side of the angle. The measure of an angle is the amount of rotation from the initial side to the terminal side. If ABC is a right triangle right-angled at $B$ and $\angle B A C=\theta$, then with reference to angle $\theta$,

Base $=\mathrm{AB}$, Perpendicular $=\mathrm{BC}$ and, Hypotenuse $=\mathrm{AC}$

## 2. Trigonometric Ratios:

(i) $\sin \theta=$ Perpendicular Hypotenuse
(ii) $\cos \theta=$ Base Hypotenuse
(iii) $\tan \theta=$ Perpendicular Base
(iv) $\operatorname{cosec} \theta=$ Hypotenuse Perpendicular
(v) $\sec \theta=$ Hypotenuse Base
(vi) $\cot \theta=$ Base Perpendicular
3. Reciprocal Relationship of Trigonometric Ratios:
(i) $\operatorname{cosec} \theta=1 \sin \theta$
(ii) $\sec \theta=1 \cos \theta$
(iii) $\cot \theta=1 \tan \theta$

## 4. Ratio Identity:

(i) $\tan \theta=\sin \theta \cos \theta$
(ii) $\cot \theta=\cos \theta \sin \theta$

## 5. Trigonometric Ratios of Specific Angles:

| Ratios $\mid$ Angle | $0^{\circ}$ | $30^{\circ}$ | $45^{\circ}$ | $60^{\circ}$ | $90^{\circ}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\sin \theta$ | 0 | 12 | 12 | 32 | 12 |
| $\cos \theta$ | 1 | 32 | 12 | 12 | 0 |
| $\tan \theta$ | 0 | 13 | 1 | 3 | Not defined |
| $\operatorname{cosec} \theta$ | Not defined | 2 | 2 | 23 | 1 |
| $\sec \theta$ | 1 | 23 | 2 | 2 | Not defined |
| $\cot \theta$ | Not defined | 3 | 1 | 13 | 0 |

## 6. Range of Trigonometric Functions:

The values of $\sin \theta$ and $\cos \theta$ never exceed 1 , whereas the positive values of $\sec \theta$ and $\operatorname{cosec} \theta$ are always greater than or equal to 1 .

## 7. Trigonometric Ratios of Complementary Angles:

If $\theta$ is an acute angle, then
(i) $\sin \left(90^{\circ}-\theta\right)=\cos \theta, \cos \left(90^{\circ}-\theta\right)=\sin \theta$
(ii) $\tan \left(90^{\circ}-\theta\right)=\cot \theta, \cot \left(90^{\circ}-\theta\right)=\tan \theta$
(iii) $\sec \left(90^{\circ}-\theta\right)=\operatorname{cosec} \theta, \operatorname{cosec}\left(90^{\circ}-\theta\right)=\sec \theta$

## 9. Standard Trigonometric Identities:

(i) $\sin 2 \theta+\cos 2 \theta=1$
(ii) $\sec 2 \theta-\tan 2 \theta=1$
(iii) $\operatorname{cosec} 2 \theta-\cot 2 \theta=1$

