Introduction to Trigonometry

OLYMPIAD Excellence Book

NOTES

FUNDAMENTALS

> Trigonometry is the study of relationship between the sides and an angle of a triangle.

TRIGONOMETRY RATIO

> Trigonometrically ratio of angle in a right angle $\triangle ABC$ are defined as follows



$$\sin\theta = \frac{AB}{AC} = \frac{P}{h}$$
$$\cos\theta = \frac{BC}{AC} = \frac{b}{h}$$
$$\tan\theta = \frac{AB}{BC} = \frac{p}{b}$$

The ratio $cosec\theta$, $sec\theta$ and $cot\theta$ are respectively the reciprocals of the $sin\theta$, $cos\theta$ and $tan\theta$.

i.e.,
$$\sin\theta = \frac{1}{\cos ec\theta}$$
, $\cos\theta = \frac{1}{\cos ec\theta}$ and $\tan\theta = \frac{1}{\cot\theta}$

$\angle \theta$	0°	30°	45 [°]	60°	90°
sinθ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos \theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
an heta	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
cos <i>ecθ</i>	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

Trigonometric ratio of some specific angles

s <i>ecθ</i>	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
$\cot \theta$	Not defined	√3	1	$\frac{1}{\sqrt{3}}$	0

TRIGONOMETRY IDENTITIES

- $\Rightarrow \sin^2\theta + \cos^2\theta = 1$
- \blacktriangleright sec² θ tan² θ = 1
- $\succ \quad \csc^2\theta \cot^2\theta = 1$
- > $Sin(90^{\circ} \theta) = cos\theta cos (90^{\circ} \theta) = sin\theta$
- $\succ \quad \sec(90^{\circ} \theta) = \csc\theta \ \csc\theta \ (90^{\circ} \theta) = \sec\theta$
- $\succ \quad \tan(90^{\circ} \theta) = \cot\theta \ \cot(90^{\circ} \theta) = \tan\theta$