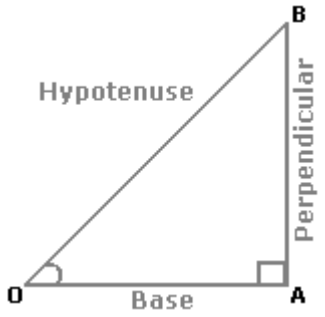
Height and Distance

1. *Trigonometry*:

   In a right angled $\triangle$OAB, where $\angle$BOA = θ,

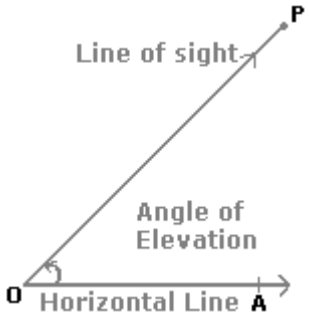


   i. $\sin\theta = \frac{\text{Perpendicular}}{\text{Hypotenuse}} = \frac{AB}{OB}$;
   ii. $\cos\theta = \frac{\text{Base}}{\text{Hypotenuse}} = \frac{OA}{OB}$;
   iii. $\tan\theta = \frac{\text{Perpendicular}}{\text{Base}} = \frac{AB}{OA}$;
   iv. $\text{cosec}\,\theta = \frac{1}{\sin\theta} = \frac{OB}{AB}$;
   v. $\sec\theta = \frac{1}{\cos\theta} = \frac{OB}{OA}$;
   vi. $\cot\theta = \frac{1}{\tan\theta} = \frac{OA}{AB}$;

2. *Trigonometrical Identities:*
   i. $\sin^2\theta + \cos^2\theta = 1$.
   ii. $1 + \tan^2\theta = \sec^2\theta$.
   iii. $1 + \cot^2\theta = \text{cosec}^2\theta$.
3. *Values of T-ratios:*

θ	0°	$(\pi/6)$ 30°	$(\pi/4)$ 45°	$(\pi/3)$ 60°	$(\pi/2)$ 90°
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{2}$	1
$\cos\theta$	1	$\frac{3}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{3}$	1	3	not defined

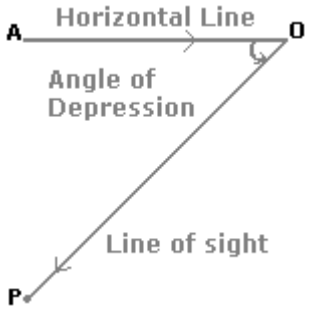
4. *Angle of Elevation:*



Suppose a man from a point O looks up at an object P, placed above the level of his eye. Then, the angle which the line of sight makes with the horizontal through O, is called the *angle of elevation* of P as seen from O.

∴ Angle of elevation of P from O = ∠AOP.

5. *Angle of Depression:*



Suppose a man from a point O looks down at an object P, placed below the level of his eye, then the angle which the line of sight makes with the horizontal through O, is called the *angle of depression* of P as seen from O.