CBSE Class 10 Math
Revision Notes
CHAPTER 09
SOME APPLICATIONS OF TRIGONOMETRY

1. Heights and Distances

2. Miscellaneous Questions

1. Trigonometric Ratios: In ΔABC, $\angle B = 90^o$, for angle 'A'

$sin\ A\ = \frac{Perpendicular}{Hypotenuse}$

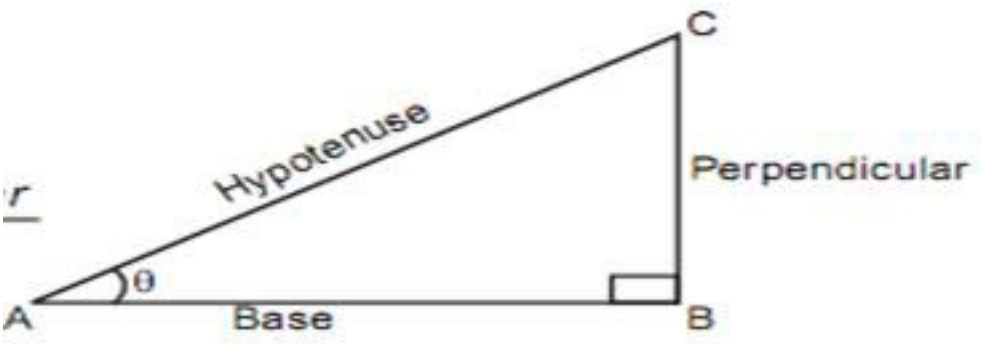
$cos\ A = \frac{Base}{Hypotenuse}$

$\tan\ A\ = \frac{\text{P}\,erpendicular}{Base}$

$cot\ A = \frac{Base}{Perpendicular}$

$sec\ A\ = \frac{Hypotenuse}{Base}$

$cosec\ A\ = \frac{Hypotenuse}{Perpendicular}$



2. Reciprocal Relations :

$\sin\theta = \frac{1}{cosec\ \theta}$, $cosec\ \theta = \frac{1}{\sin\theta}$

$\cos\ \theta = \frac{1}{sec\ \theta}$, $sec\ \theta = \frac{1}{\cos\theta}$

$\tan\ \theta = \frac{1}{\cot\ \theta}$, $\cot\ \theta = \frac{1}{\tan\theta}$

3. Quotient Relations :

$\tan\theta = \frac{\sin\theta}{\cos\theta}$, $\cot\theta = \frac{\cos\theta}{\sin\theta}$

4. Indentities:

$$\sin^2\theta + \cos^2\theta = 1$$

(a) $\Rightarrow \sin^2\theta = 1 - \cos^2\theta$

$\Rightarrow \cos^2\theta = 1 - \sin^2\theta$

$\Rightarrow \quad \sin\theta = \sqrt{1 - \cos^2\theta}$

$\Rightarrow \quad \cos\theta = \sqrt{1 - sin^2\theta}$

$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

(b) $\Rightarrow \cot^2\theta = \operatorname{cosec}^2\theta - 1$

$\Rightarrow cosec^2\theta - \cot^2\theta = 1$

$\Rightarrow \quad \cot\theta = \sqrt{\operatorname{cosec}^2\theta - 1}$

$\Rightarrow \quad \operatorname{cosec}\theta = \sqrt{1 + \cot^2\theta}$

$$1 + \tan^2\theta = \sec^2\theta$$

(c) $\Rightarrow \tan^2\theta = \sec^2\theta - 1$

$\Rightarrow \sec^2\theta - \tan^2\theta = 1$

$\Rightarrow \quad \tan\theta = \sqrt{\sec^2\theta - 1}$

$\Rightarrow \quad \sec\theta = \sqrt{1 + \tan^2\theta}$

5.Trigonometric Ratios of Some Specific Angles

$\angle A$	$0°$	$30°$	$45°$	$60°$	$90°$
sin A	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos A	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan A	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
cosec A	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
cot A	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

6. Trigonometric Ratios of Complementary Angles

$\sin\,(90^o - \theta) = \cos\,\theta$

$\cos\,(90^o - \theta) = \sin\,\theta$

$\tan\,(90^o - \theta) = \cot\,\theta$

$\cot\,(90^o - \theta) = \tan\,\theta$

$\sec\,(90^o - \theta) = cosec\,\theta$

$cosec\,(90^o - \theta) = \sec\,\theta$

1. **Line of Sight** : The line of sight is the line drawn from the eyes of an observer to a point in the object viewed by the observer.

2. **Angle of Elevation** : The angle of elevation is the angle formed by the line of sight with the horizontal, when it is above the horizontal level i.e., the case when we raise our head to look at the object.

3. **Angle of Depression** : The angle of depression is the angle formed by the line of sight with

the horizontal when it is below the horizontal i.e., case when we lower our head to look at the object.