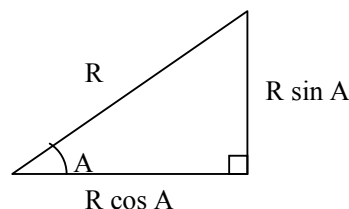


Grade 8-12: Trigonometry

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{\sin A}{\cos A}$$



How to find sine, cosine or tangent of an obtuse angle

$$\sin(180^\circ - A) = \sin A \quad \text{e.g. } \sin 150^\circ = \sin 30^\circ$$

$$\cos(180^\circ - A) = -\cos A$$

$$\tan(180^\circ - A) = -\tan A$$

Formula for $\triangle ABC$

Sine Rule:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine Rule:

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Area of Triangle:

$$\Delta = \frac{1}{2} bc \sin A$$

How to find unknown Side / Angle

1. Identify the relevant triangle
2. If it is a right-angled triangle, use

Pythagoras Theorem or

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

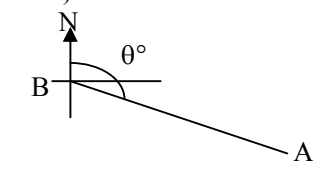
3. If it is not a right-angled triangle, use Sine Rule or Cosine Rule. [Use sine rule if 2 angles are involved, use cosine rule if only one angle is involved.]

4. Sometimes, use the formula for area of triangle:

$$\frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} bc \sin A$$

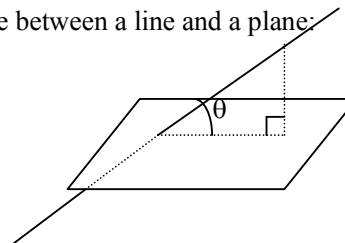
Bearing:

Bearing of A from B = θ° ,
(from B \Rightarrow place compass at B)



3-D Trigonometry

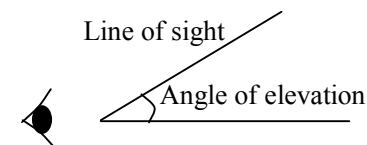
Angle between a line and a plane:



Drop a \perp from a point on the line to the plane.
Angle between the line and the plane = θ

Angles of Elevation and Depression

Angle between the line of sight (view up) and a horizontal plane
- **Angle of elevation**



Horizontal

- **Angle of Depression**

