1. Trigonometric Ratios for Acute Angles

In a **right-angled triangle**:

- **Sine (sin):**
$$\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$$

- **Cosine (cos):**
$$\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$$

- **Tangent (tan):**
$$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$$

Example:

If $\theta = 30°$ and the hypotenuse = 10 cm,

Find the opposite side.

$$\sin(30°) = \frac{\text{opposite}}{10}$$
$$\frac{1}{2} = \frac{\text{opposite}}{10} \Rightarrow \text{opposite} = 5 \text{ cm}$$

2. Solving Problems Using Pythagoras and Trigonometry

Pythagoras' Theorem (for right-angled triangle):
$$a^2 + b^2 = c^2$$
Where c is the **hypotenuse**.

Example:

Find the hypotenuse if the other two sides are 6 cm and 8 cm:

$$c^2 = 6^2 + 8^2 = 36 + 64 = 100 \Rightarrow c = 10 \text{ cm}$$

Use **trigonometry** (sin, cos, tan) to find unknown sides or angles as shown above.

3. Shortest Distance from Point to Line

- The **perpendicular distance** from a point to a line is the **shortest** possible distance.
- It's the length of the segment from the point that meets the line at a **right angle**.

Example: In a triangle with a point above a horizontal line, drop a perpendicular from the point to the line to calculate shortest distance using trigonometry or geometry.

4. Angles of Elevation and Depression

- **Angle of Elevation**: Looking **upward** from the horizontal.

- **Angle of Depression**: Looking **downward** from the horizontal.

Example (Elevation):
You stand 20 m from a building. The angle of elevation to the top is $40°$.
Find the height of the building.

Use:
$$\tan(40°) = \frac{\text{opposite}}{20}$$
$$\text{opposite} = 20 \times \tan(40°) \approx 20 \times 0.8391 = 16.8 \text{ m}$$

Extra: Bearings

- Measured from the **north**, clockwise.

- Always given as **3 digits** (e.g. $045°$, $135°$, $270°$).

Example: If a ship sails on a bearing of $120°$ for 10 km, you can use trigonometry to find the eastward and southward distances.