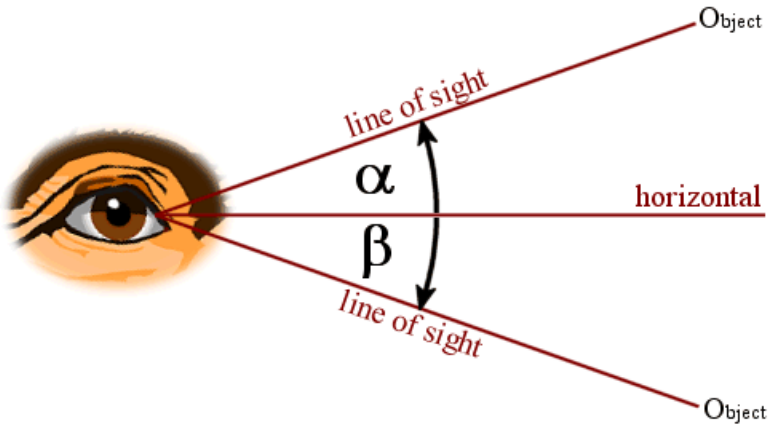
Solving Problems: Applying Trigonometry

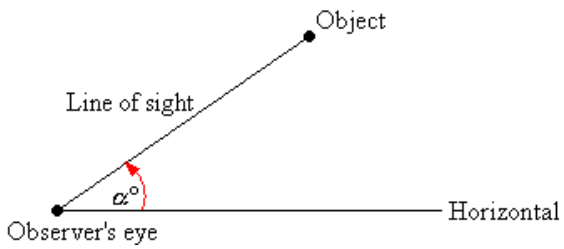
In mathematics, vocabulary is often introduced to provide information more compactly. The following vocabulary occurs often in trigonometric problems.

- **Angle of Elevation**
- **Angle of Depression**



Definition:

- **Angle of Elevation – the angle formed by the horizontal line at your eye level and your line of sight to an object higher than you are.**



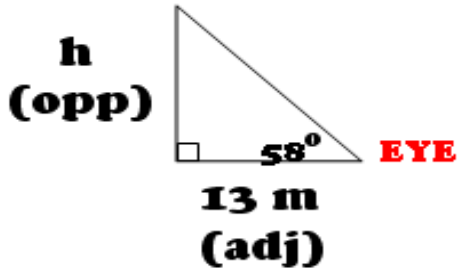
It is normally measured up from the horizontal.

Example:

1)

From ground level, to view the top of a building, you must look up 58° from the horizontal at a point 13 meters from the foot of a building. How high is the building?

Diagram:



$$\tan 58^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 58^\circ = \frac{h}{13}$$

$$13 \tan 58^\circ = h$$

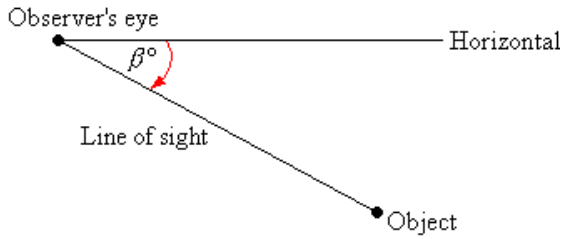
$$13(1.6003) = h$$

$$20.8 \text{ m} = h$$

The building is 20.8 m high.

Definition:

Angle of Depression – the angle between the horizontal and the direction you must look down in order to see an object.

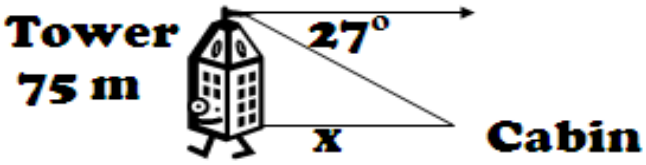


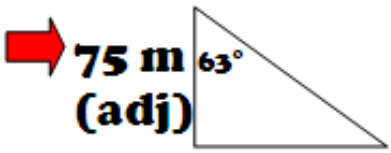
The angle of depression is only normally used to find the angle inside of the triangle that you are going to work with.

Example:

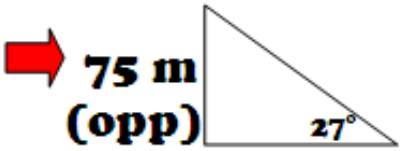
2)

From the top of a fire tower, a cabin is observed when looking down from the horizontal at a 27° angle. If the tower is 75 m high, find the distance from the cabin to the tower.





OR



$\tan 63^\circ = \frac{\text{opp}}{\text{adj}}$

$\tan 63^\circ = \frac{x}{75}$

$75 \tan 63^\circ = x$

$75(1.9626) = x$

$147.2 \text{ m} = x$

$\tan 27^\circ = \frac{\text{opp}}{\text{adj}}$

$\tan 27^\circ = \frac{75}{x}$

$\frac{x \tan 27^\circ}{\tan 27^\circ} = \frac{75}{\tan 27^\circ}$

$x = \frac{75}{0.5095}$

$x = 147.2 \text{ m}$

The cabin is 147.2 m from the tower.