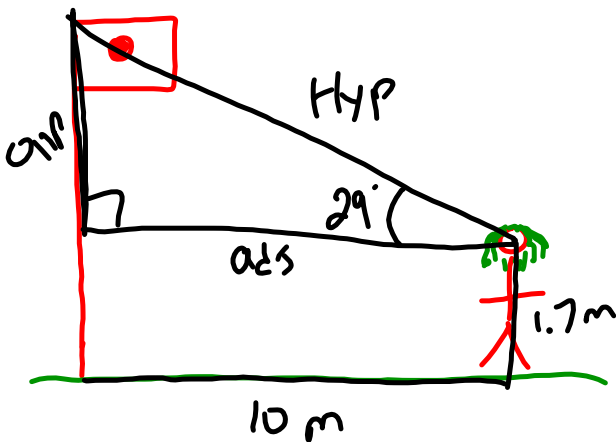


Warm Up:

Sheila stood 10m from the base of a flagpole. If Sheila is 1.7m tall, and the angle of elevation to the top of the flagpole is 29° , how tall is the flagpole (to the nearest tenth of a meter)?



Have : $adj = 10m$
angle 29°

Need : opp

Use: $\tan \theta = \frac{O}{A}$

$$\tan 29 = \frac{x}{10}$$

$$x = 10 \tan 29$$

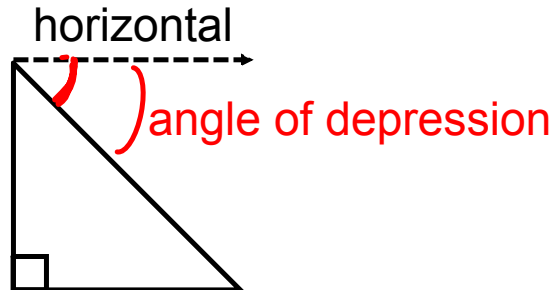
$$x = 5.5m$$

$$\begin{aligned} \text{Height of flagpole} &= 5.5 + 1.7 \\ &= 7.2 \end{aligned}$$

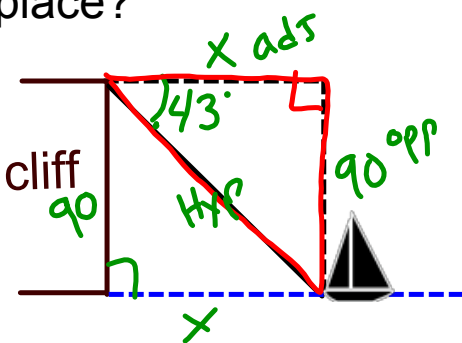
∴ the height of the flagpole is 7.2m

Applications-Angle of Depression

The angle of depression is the angle of view from the horizontal down to the object being viewed



Ex.1 The highest point along the cliff of the Cathedral Bluffs in Toronto is 90 m above the shore. From the top of the cliff a surveyor spots a boat out in the lake, at an angle of depression of 43° . How far is the boat from the shore, to one decimal place?



Have: opp = 90
angle 43°

Need: ads

Use: $\tan \theta = \frac{O}{A}$

$$\frac{\tan 43^\circ}{1} = \frac{90}{x}$$

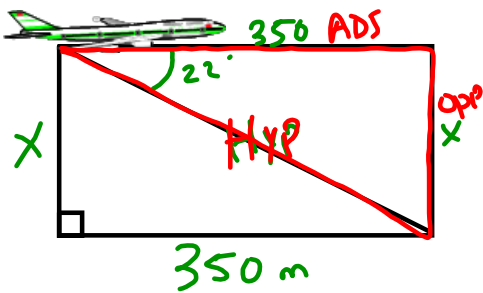
∴ the boat is 96.5 m from shore

$$\frac{x \tan 43^\circ}{\tan 43^\circ} = \frac{90}{\tan 43^\circ}$$

$$x = \frac{90}{\tan 43^\circ}$$

$$x = 96.5$$

Ex.2 Suppose a plane is coming down for a landing at the Region of Waterloo International Airport. The angle of depression is 22° . The plane is 350 m from the landing point along the ground. How high is the plane?



Have : ads 350
Angle 22°

Need : opp

use : $\tan \theta = \frac{O}{A}$

$$\tan 22 = \frac{x}{350}$$

$$x = 141.4$$

\therefore the plane is

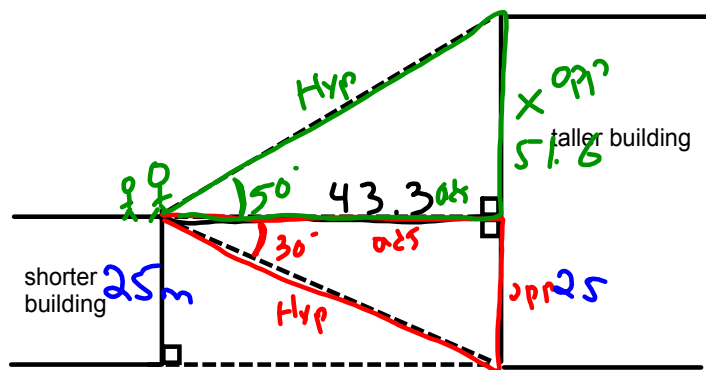
$$x = 350 \tan 22$$

141.4 m above the ground

Ex.3 Two students want to determine the heights of two buildings. They stand on the roof of the shorter building. The students use a clinometer to measure the angle of elevation to the top of the taller building as 50° .

From the same position, the students measure the angle of depression to the base of the taller building as 30° .

They measure the horizontal distance between the two buildings to be 43.3 m. How tall is each building?



$$\tan \theta = \frac{O}{A}$$

$$\tan 30 = \frac{x}{43.3}$$

$$x = 43.3 \tan 30$$

$$x = 25$$

Taller building

$$\begin{aligned} \text{Height} &= 25 + 51.6 \\ &= 76.6 \end{aligned}$$

$$\tan \theta = \frac{O}{A}$$

$$\tan 50 = \frac{x}{43.3}$$

$$x = 43.3 \tan 50$$

$$x = 51.6$$

\therefore the smaller building is 25m and the taller building is 76.6m