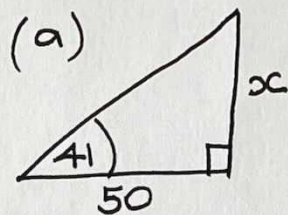


## Angles of Elevation and Depression

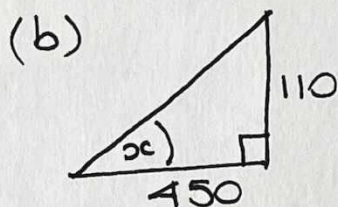
(a) Mercy stands 50 m away from the foot of a tower. When she looks to the top of the tower, the angle of elevation is  $41^\circ$ . Find the height of the tower.



$$\tan 41 = \frac{x}{50}$$

$$x = 43.5 \text{ m}$$

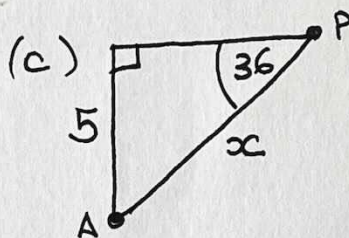
(b) Rob is a passenger on a boat. The boat is 450 m from the foot of a cliff, which is 110 m high. Find the angle of elevation of the top of the cliff from the boat.



$$\tan x = \frac{110}{450}$$

$$x = 13.7^\circ$$

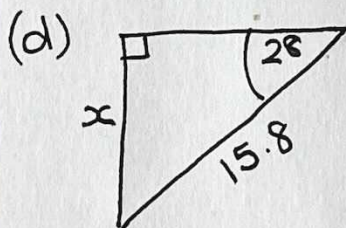
(c) Talha is on plane, looking down at the airport with an angle of depression of  $36^\circ$ . The height of the plane from the ground is 5 km. Find the distance from the plane to the airport.



$$\sin 36 = \frac{5}{x}$$

$$x = 8.5 \text{ km}$$

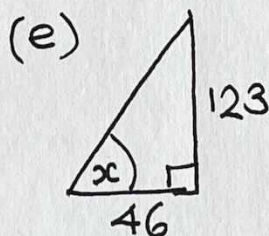
(d) A pigeon flies down to the ground from the top of a tree at an angle of depression of  $28^\circ$ . The distance the pigeon flies is 15.8 m. How tall is the tree?



$$\sin 28 = \frac{x}{15.8}$$

$$x = 7.4 \text{ m}$$

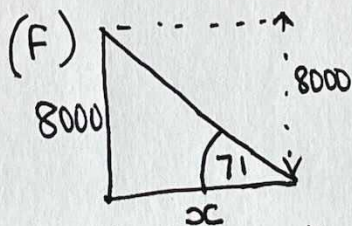
(e) Salisbury cathedral spire is 123 m tall. Guy stands 46 m from the cathedral spire. What is the angle of elevation of the top of the spire from where Guy is standing?



$$\tan x = \frac{123}{46}$$

$$x = 69.5^\circ$$

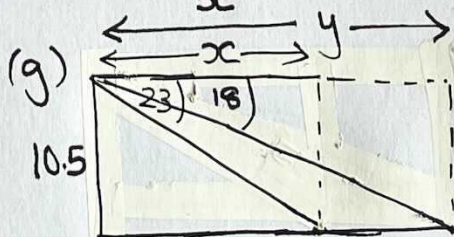
(f) A plane passes overhead at a height of 8000 m. A short time later, it is at an angle of elevation of  $71^\circ$ . How far away is the plane from its original position?



$$\tan 71 = \frac{8000}{x}$$

$$x = 2755 \text{ m}$$

(g) A prison officer watches prisoners from a guard tower which is 10.5 m tall. He looks due North and can see two prisoners. The angle of depression of each of the prisoners is  $18^\circ$  and  $23^\circ$ . How far apart along the ground are the two prisoners?



$$\tan 23 = \frac{10.5}{x}$$

$$\tan 18 = \frac{10.5}{y}$$

$$x = 24.74 \text{ m}$$

$$y = 32.32 \text{ m}$$

$$\text{Difference} = 7.58 \text{ m}$$