

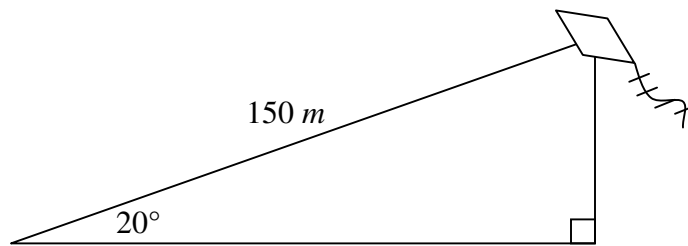
Trig Word Problems - Part I

Definitions:

Angle of Elevation – the angle at which you “look up” at something

Angle of Depression – the angle at which you “look down” at something

Example 1: Bryton is out in a field flying a kite. He has let out all 150 m of kite string. He estimates that the kite is at an angle of elevation of about 20° . How high above the ground is the kite?



$$\sin A = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 20^\circ = \frac{x}{150}$$

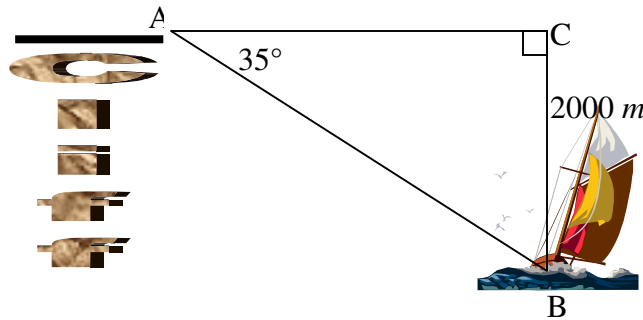
$$0.3420 = \frac{x}{150}$$

Solving for x by multiplying both sides by 150 gives.

$$x = 51.3$$

\therefore the kite is approximately 51.3 m above the ground.

Example 2: A sailboat is approaching a cliff. The angle of depression from the top of the cliff to the boat is 35° . The height of the cliff is known to be about 2000 m. How far is the sailboat away from the base of the cliff?



Solution:

$$\tan B = \frac{\text{opp}}{\text{adj}}$$

$$\tan 35^\circ = \frac{2000}{s} \quad \leftarrow s \text{ represents the distance between the sailboat and the cliff.}$$

$$0.7002 = \frac{2000}{s}$$

$$0.7002s = 2000$$

$$s = 2856.3$$

\therefore the sailboat is approximately 2856 m away from the cliff (or almost 3 km).

Example 3: Iron Man must fly to the top of a building that is 150m away and 350m tall. At what angle should he launch to successfully scale the building?

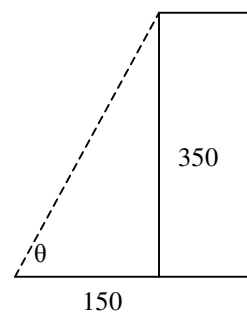
$$\tan \theta = \frac{350}{150}$$

$$\tan \theta = 2.3333333$$

$$\theta = \tan^{-1}(2.3333333)$$

$$\theta = 67^\circ$$

Iron Man should launch at an angle of 67° .



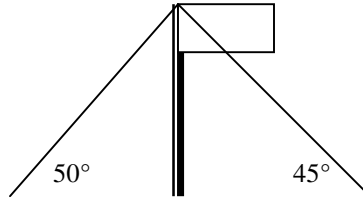
Example 4: A 20m flagpole will be tethered to the ground by two wires. The right wire will have an angle of elevation of 45° ; the left, 50° . Will a 50m spool of wire be enough?

Right Wire

$$\sin 45 = \frac{20}{h}$$

$$h = \frac{20}{\sin 45}$$

$$h = 28.3$$



Left Wire

$$\sin 50 = \frac{20}{h}$$

$$h = \frac{20}{\sin 50}$$

$$h = 26.1$$

Total: 54.4m > No, there will not be enough wire!

Practice: pg. 86 #3, 5, 6, 9, 10