

Trigonometry Application Problems

Problem 1:

While walking to school you pass a barn with a silo. Looking up to the top of the silo you estimate the angle of elevation to the top of the silo to be about 14° . You continue walking and find that you were around 40 m from the silo. Calculate the height of the silo.

* angle of elevation = angle from horizontal up to whatever you are looking at

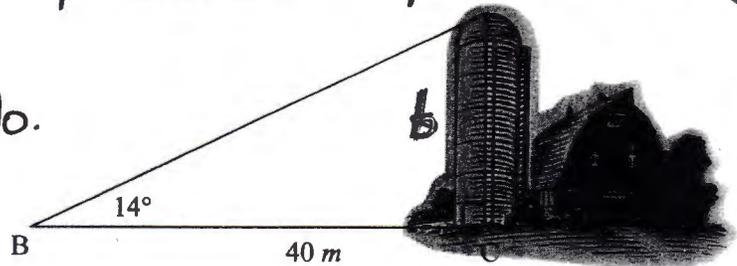


Let b be height of silo.

$$\tan 14^\circ = \frac{b}{40}$$

$$40 \cdot \tan 14^\circ = b$$

$$b = 10.0 \text{ m}$$



\therefore The height of the silo is 10 m.

Problem 2:

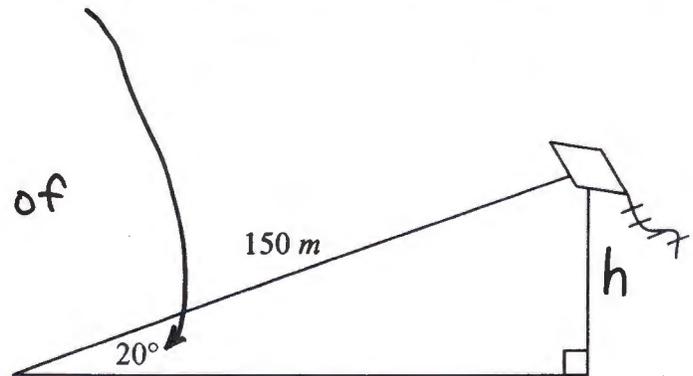
You're out in a field flying your kite. You have just let out all 150 m of your kite string. You estimate that the kite is at an angle of elevation from you of about 20° . Calculate the height of the kite above the ground.

Let h be the height of the kite.

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

$$150 \cdot \sin 20^\circ = h$$

$$h = 51.3 \text{ m}$$



\therefore The kite is 51.3 m above the ground.

$$\theta = \text{"theta"}$$

Example 3:

A sailboat that is 2 km due west of a lighthouse sends a signal to the lighthouse that it is in distress. The lighthouse quickly signals a rescue plane that is 7 km due south of the lighthouse. What heading from due north should the plane take in order to intercept the troubled sailboat? *direction (angle)*

Let θ be the angle from north.

$$\tan \theta = \frac{2}{7}$$

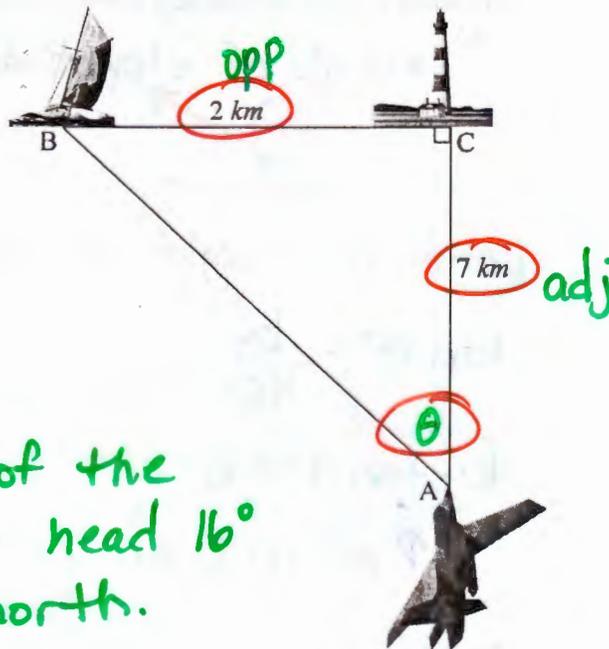
$$\theta = \tan^{-1} \left(\frac{2}{7} \right)$$

Calculator: $\boxed{\text{2nd}} \boxed{\text{tan}} (2 \div 7) =$

$$\theta = 15.9$$

$$\theta \approx 16^\circ$$

\therefore The pilot of the plane should head 16° west of north.



Example 4:

A sailboat is approaching a cliff. The angle of depression from the top of the cliff to the sailboat below 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?

Let d be the distance between the boat & the cliff

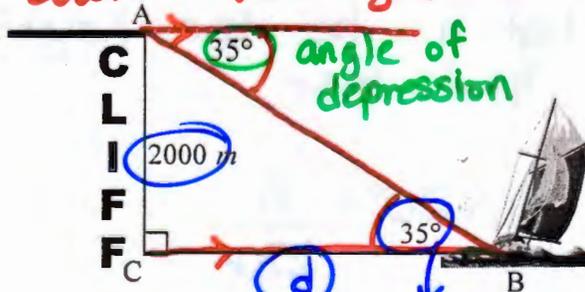
$$\tan 35^\circ = \frac{2000}{d}$$

$$d (\tan 35^\circ) = 2000$$

$$d = \frac{2000}{\tan 35^\circ}$$

$$d = 2856.3$$

angle from the horizontal line down to what you are looking at



$\angle ABC = 35^\circ$
(2 pattern)

\therefore The sailboat is 2856.3 m from the cliff.