

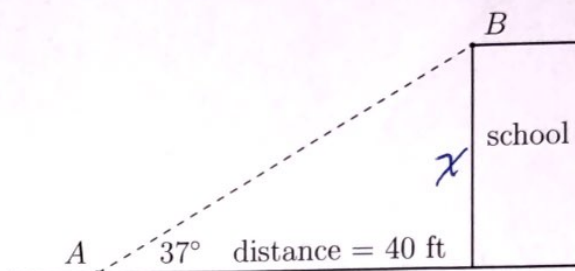
10.5 Trigonometric situations

HSG.SRT.C.8

1. Shown is a building with student A on the ground waving up to student B . Point A is 40 feet from the base of the building, and the angle of elevation from A to B is 37° . Find how high up student B is from the ground to the nearest foot. (not to scale)

$$\tan 37 = \frac{x}{40}$$

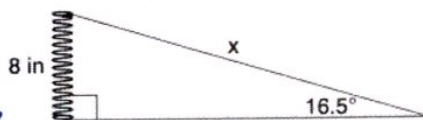
$$x = 40 \tan 37 \\ = 30.1421... \approx 30 \text{ ft.}$$



2. Yolanda is making a springboard to use for gymnastics. She has 8-inch-tall springs and wants to form a 16.5° angle with the base, as modeled in the diagram below.

$$\sin 16.5 = \frac{8}{x}$$

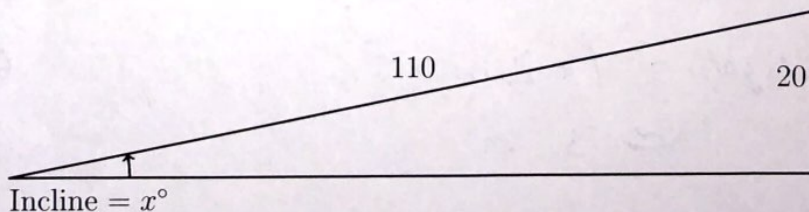
$$x = \frac{8}{\sin 16.5} = 28.16749...$$



$$\approx 28.2 \text{ in}$$

To the nearest tenth of an inch, what will be the length of the springboard, x ?

3. A child sleds from the top of a hill to a group of friends standing at the base of the hill. The hill is 20 feet tall, and the distance from the sledder to the group of friends is 110 feet. Find the angle of the incline x .

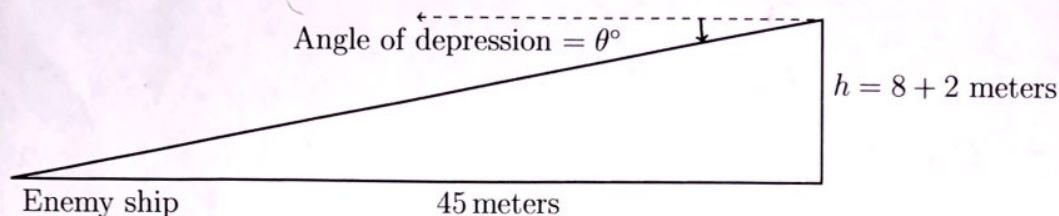


$$\sin x = \frac{20}{110}$$

$$x = \sin^{-1}\left(\frac{20}{110}\right) = 10.47568... \\ \approx 10.5^\circ$$

4. A pirate, who is two meters tall, is standing on a mast 8 meters tall. Looking down, the pirate sees an enemy ship 45 meters away.

Find the angle of depression to the nearest degree.



$$\tan \theta = \frac{10}{45}$$

$$\theta = \tan^{-1}\left(\frac{10}{45}\right) = 12.52810... \approx 13^\circ$$

5. A snowman is standing 6 meters away from the base of a set of monkey bars, looking up at a boy x meters off the ground. The snowman is 1 meter tall and the angle of elevation of his view to the boy is 18.5° .

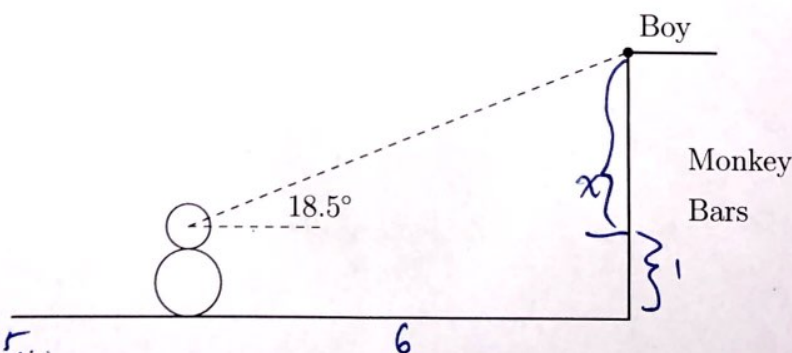
Find the height of the boy off the ground.

$$\tan 18.5 = \frac{x}{6}$$

$$x = 6 \tan 18.5 = 2.00757...$$

$$\text{height} = 1 + 2.00757... \approx 3 \text{ m.}$$

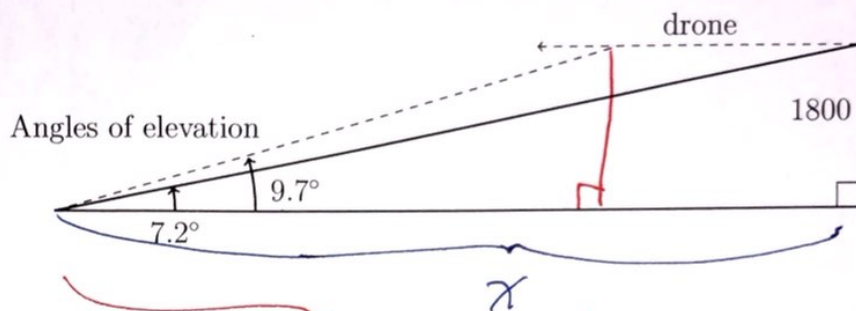
(not drawn to scale)



Name: Solomon

6. A drone flying at an altitude of 1,800 meters is observed twice. The first time the angle of elevation is 7.2° and exactly one minute later the angle of elevation is 9.7° .

Find the distance the drone flies over the minute and its speed in kilometers per hour.
(not drawn to scale)



$$\tan 7.2 = \frac{1800}{x}$$

$$x = \frac{1800}{\tan 7.2} = 14,248.46...$$

$$\tan 9.7 = \frac{1800}{y}$$

$$y = \frac{1800}{\tan 9.7} = 10,530.43...$$

$$d = 14,248.46 - 10,530.43... = 3,718.03... \text{ m} = 3.718... \text{ km}$$

$$\text{Speed} = 60 \times 3.718... = 223.08... \text{ km/hr}$$

7. The vertices of quadrilateral $MATH$ have coordinates $M(-4, 2)$, $A(-1, -3)$, $T(9, 3)$, and $H(6, 8)$.
Given

Prove that quadrilateral $MATH$ is a parallelogram.

$$m_{\overline{MA}} = \frac{-3-2}{-1-(-4)} = -\frac{5}{3}$$

$$\Rightarrow m_{\overline{MA}} = m_{\overline{TH}} \Rightarrow \overline{MA} \parallel \overline{TH}$$

$$m_{\overline{TH}} = \frac{8-3}{6-9} = -\frac{5}{3}$$

$$m_{\overline{AT}} = \frac{3-(-3)}{9-(-1)} = \frac{6}{10}$$

$$\Rightarrow m_{\overline{AT}} = m_{\overline{MH}} \Rightarrow \overline{AT} \parallel \overline{MH}$$

$$m_{\overline{MH}} = \frac{8-2}{6-(-4)} = \frac{6}{10}$$

therefore $MATH$ is a parallelogram

because opposite sides are parallel.