Right Triangles and Trigonometry Word Problem Practice

1. At Mogul's Ski Resort, the beginner's slope is inclined at an angle of 12.3°, while the advanced slope is inclined at an angle of 26.4°. If Rudy skis 1,000 meters down the advanced slope while Valerie skis the same distance on the beginner's slope, how much longer was the horizontal distance that Valerie covered?

1) 81.3 m

3) 895.7 m

2) 231.6 m

4) 977.0 m

2. While sailing a boat offshore, Donna sees a lighthouse and calculates that the angle of elevation to the top of the lighthouse is 3°, as shown in the accompanying diagram. When she sails her boat 700 feet closer to the lighthouse, she finds that the angle of elevation is now 5°. How tall, to the *nearest tenth of a foot,* is the lighthouse?

5°   3°

700 ft

(Not drawn to scale)
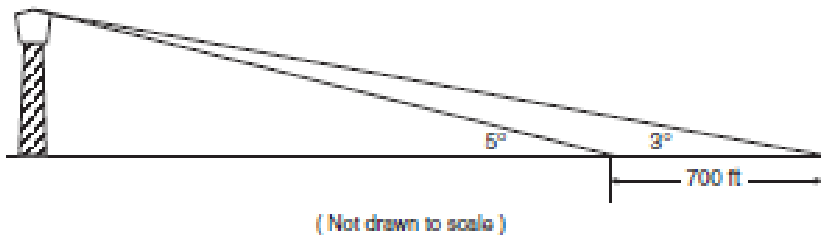
3. The map below shows the three tallest mountain peaks in New York State: Mount Marcy, Algonquin Peak, and Mount Haystack. Mount Haystack, the shortest peak, is 4960 feet tall. Surveyors have determined the horizontal distance between Mount Haystack and Mount Marcy is 6336 feet and the horizontal distance between Mount Marcy and Algonquin Peak is 20,493 feet.

The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

Algonquin Peak

Tallest Mountain Peaks of New York State

20,493 ft

Lake Colden

Flowed Lands

Mount Marcy

6336 ft

Mount Haystack
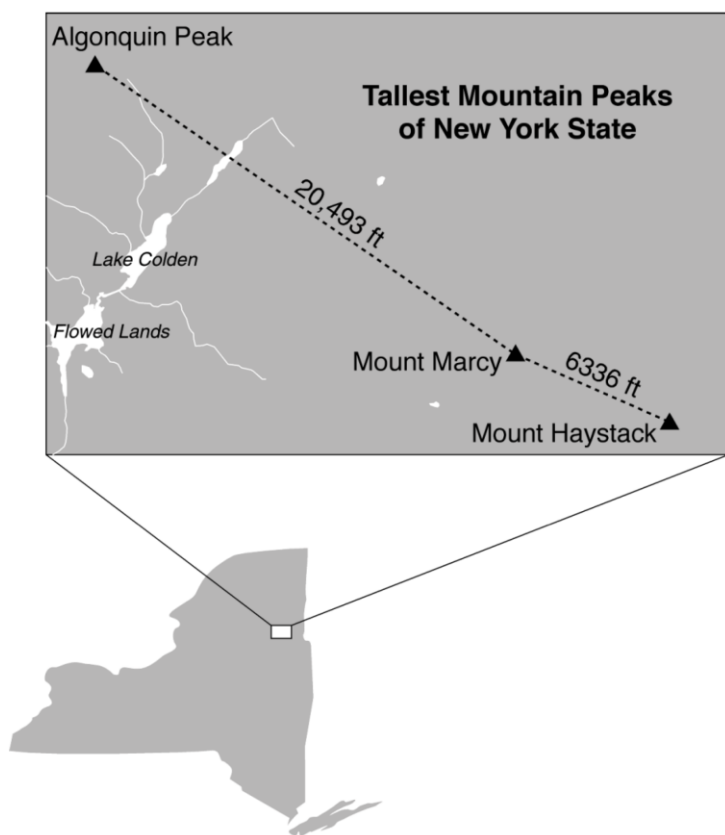
4. The map of a campground is shown below. Campsite C, first aid station F, and supply station S lie along a straight path. The path from the supply station to the tower, T, is perpendicular to the path from the supply station to the campsite. The length of path $\overline{FS}$ is 400 feet. The angle formed by path $\overline{TF}$ and path $\overline{FS}$ is 72°. The angle formed by path $\overline{TC}$ and path $\overline{CS}$ is 55°.

Determine and state, to the *nearest foot*, the distance from the campsite to the tower.

Campground Map
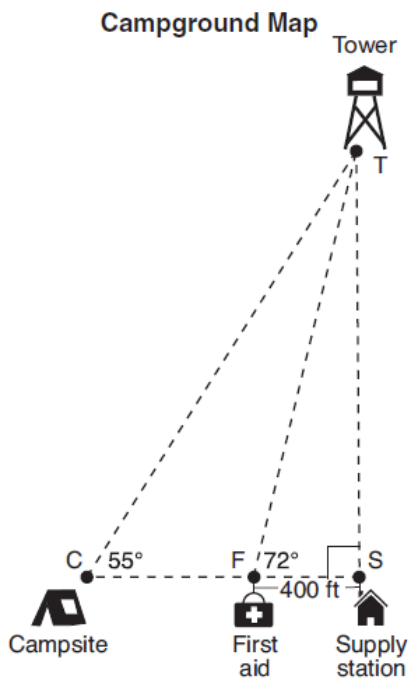
5. A sign 46 feet high is placed on top of an office building. From a point on the sidewalk level with the base of the building, the angle of elevation to the top of the sign and the angle of elevation to the bottom of the sign are 40° and 32°, respectively. Sketch a diagram to represent the building, the sign, and the two angles, and find the height of the building to the *nearest foot*.

6. Freda, who is training to use a radar system, detects an airplane flying at a constant speed and heading in a straight line to pass directly over her location. She sees the airplane at an angle of elevation of 15° and notes that it is maintaining a constant altitude of 6250 feet. One minute later, she sees the airplane at an angle of elevation of 52°.
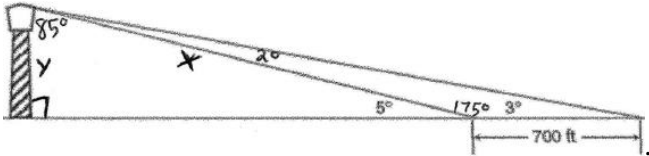
    How far has the airplane traveled, to the *nearest foot*?

    Determine and state the speed of the airplane, to the *nearest mile per hour*.

ANSWER KEY

1. (1)

$$\cos 12.3 = \frac{\text{adjacent}}{1000}$$

$$\text{adjacent} \approx 977 \text{ feet}$$

$$\cos 26.4 = \frac{\text{adjacent}}{1000}$$

$$\text{adjacent} \approx 895.7 \text{ feet}$$

$$977 - 895.7 = 81.3$$

2. 91.5

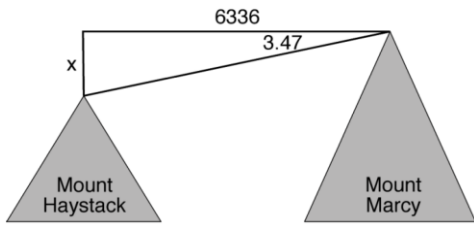$$\frac{x}{\sin 3} = \frac{700}{\sin 2}$$

$$x = \frac{700 \sin 3}{\sin 2}.$$

$$x \approx 1049.7$$

$$\sin 5 \approx \frac{y}{1049.7}$$
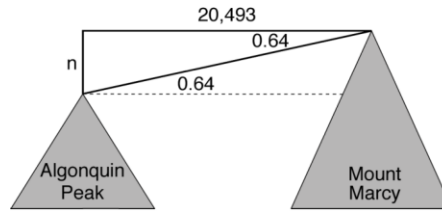
$$y \approx 91.5$$

3. 5,115

$$\tan 3.47 = \frac{M}{6336}$$

$$M \approx 384$$

$$4960 + 384 = 5344$$

$$\tan 0.64 = \frac{A}{20,493}$$

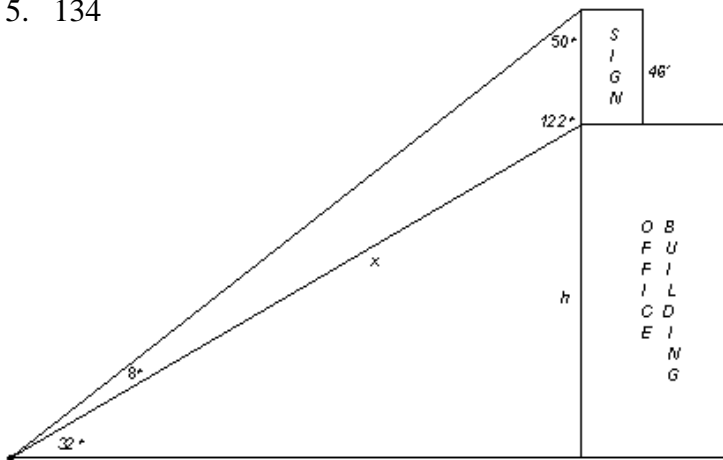$$A \approx 229$$

$$5344 - 229 = 5115$$

4. 1,503

$$\tan 72 = \frac{x}{400}$$

$$x = 400 \tan 72$$

$$\sin 55 = \frac{400 \tan 72}{y}$$

$$y = \frac{400 \tan 72}{\sin 55} \approx 1503$$

5. 134

$$\frac{x}{\sin 50} = \frac{46}{\sin 8}$$

$$x = \frac{46 \sin 50}{\sin 8}$$

$$x \approx 253.2$$

$$\sin 32 \approx \frac{h}{253.2}$$

$$h \approx 134$$

6. 18,442 and 210 mph

$$\tan 15 = \frac{6250}{x} \qquad \tan 52 = \frac{6250}{y} \qquad 23325.3 - 4883 = 18442$$

$$x \approx 23325.3 \qquad\qquad y \approx 4883$$

$$\frac{18442 \text{ ft}}{1 \text{ min}} \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left(\frac{60 \text{ min}}{1 \text{ h}} \right) \approx 210$$