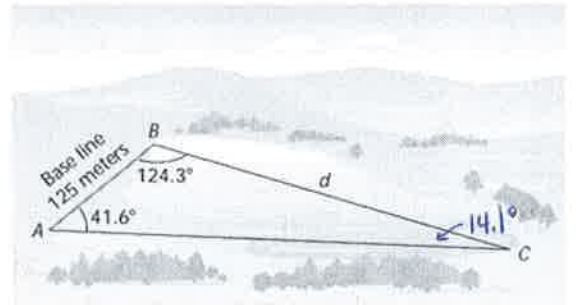Name : _____Key_____

Date : _____ Period : _____

1. To measure the length d of a lake, a baseline AB is established and measured to be 125 meters. Angles A and B are measured to be 41.6° and 124.3°, respectively. How long is the lake?

$$\frac{\sin 41.6}{d} = \frac{\sin 14.1}{125}$$

$$\frac{125 \sin 41.6}{\sin 14.1} = \frac{d \sin 14.1}{\sin 14.1}$$

$$d = 340.7 \text{ m}$$

The lake is 340.7 m long

2. Two lookout posts, A and B (10 miles apart), are established along a coast to watch for illegal ships coming within the 3-mile limit. If post A reports a ship S at angle $BAS = 37°30'$, and post B reports the same ship at angle $ABS = 20°0'$, how far is the ship from post A? How far is the ship from the shore (assuming the shore is along the line joining the two observation posts)?
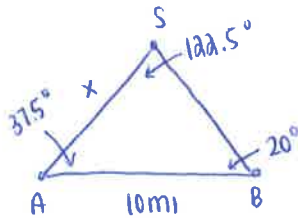
$$\frac{\sin 122.5}{10} = \frac{\sin 20}{x}$$

$$\frac{10 \sin 20}{\sin 122.5} = \frac{x \sin 122.5}{\sin 122.5}$$

$$x = 4.1$$

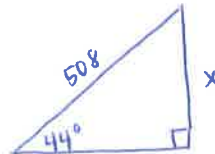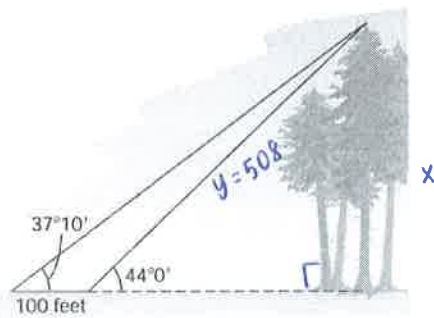The ship is 4.1 mi from post A
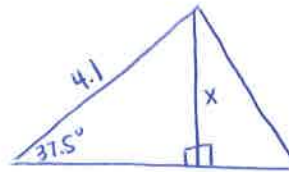
$$\frac{\sin 37.5}{1} = \frac{x}{4.1}$$

$$x = 4.1 \sin 37.5$$

$$x = 2.5 \text{ mi from shore}$$

3. The tallest trees in the world grow in Redwood National Park in California; they are taller than a football field is long. Find the height of one of those trees, given the information in the figure.

$$\frac{\sin 44}{1} = \frac{x}{508}$$

$$x = 508 \sin 44$$

$$x = 352.9$$

The tree is 352.9 feet tall

$$\frac{\sin 6.83}{100} = \frac{\sin 37.17}{y}$$

$$\frac{100 \sin 37.17}{\sin 6.83} = \frac{y \sin 6.83}{\sin 6.83}$$

$$y = 508$$

4. Three friends are camping in the woods, Bert, Ernie, and Cookie Monster. They each have their own tent and the tents are set up in a triangle. Bert and Ernie are 10 meters apart. The angle formed at Bert is 30°, and the angle formed at Cookie Monster is 105°. How far apart are Ernie and Cookie Monster?
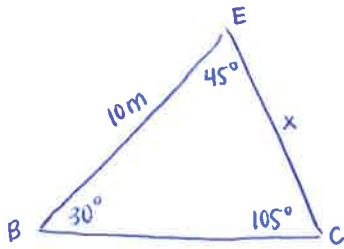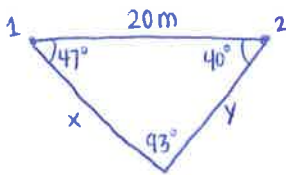

$$\frac{\sin 105}{10} = \frac{\sin 30}{x}$$

$$\frac{10 \sin 30 = x \sin 105}{\sin 105} \quad \frac{}{\sin 105}$$

$$x = 5.2$$

Ernie and CM are about 5.2 m apart

5. Two scuba divers are 20 m apart below the surface of the water. They both spot a shark that is below them. The angle of depression from diver 1 to the shark is 47° and the angle of depression from diver 2 to the shark is 40°. How far are each of the divers from the shark?

$$\frac{\sin 93}{20} = \frac{\sin 47}{y} = \frac{\sin 40}{x}$$

$$\frac{20 \sin 47 = y \sin 93}{\sin 93} \quad \frac{}{\sin 93}$$

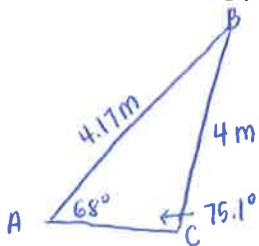$$y = 14.6 \, m$$

$$\frac{\sin 93}{20} = \frac{\sin 40}{x}$$

$$\frac{20 \sin 40 = x \sin 93}{\sin 93} \quad \frac{}{\sin 93}$$

$$x = 12.9$$

6. A 4 meter flag pole is not standing up straight. There is a wire that is 4.17 meters long attached to the top of the pole and anchored into the ground. The wire makes a 68° angle with the ground. What angle does the flag pole make with the wire?

$$\frac{\sin 68}{4} = \frac{\sin B}{b} = \frac{\sin C}{4.17}$$

$$\frac{4.17 \sin 68}{4} = \frac{4 \sin C}{4}$$

$$\sin C = .9666$$

$$m \angle C = \sin^{-1}(.9666)$$

$m \angle C = 75.1°$ or $m \angle C = 104.9°$

$m \angle B = 36.9°$ $m \angle B = 7.1°$

7. A real estate agent has just taken a trigonometry class at the local community college. She is considering purchasing a triangular piece of property and is waiting for the surveyor's report before closing the deal. If the surveyor submits a drawing as in the figure below, explain why the agent will reject the sale.

400 ft   370 ft

71°