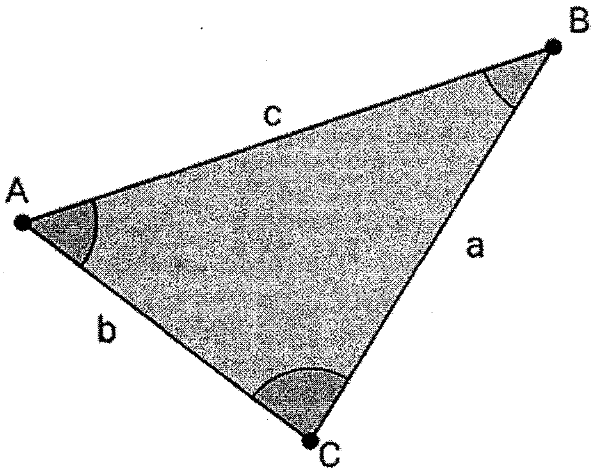
Name: Key Date: 3/1/18

CC GEOMETRY TROICI

LESSON #13: LAW OF SINES (DAY 2)



Law of sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

1. Find the perimeter of ΔDEF, to the nearest tenth of a unit.

$31.5897 + 42.1253 + 16 = \boxed{89.7}$

$\frac{16}{\sin 19} = \frac{x}{\sin 40}$

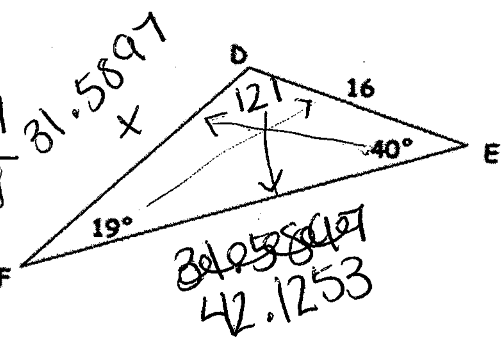
$\frac{x \cancel{\sin 19}}{\cancel{\sin 19}} = \frac{16 \sin 40}{\sin 19}$

$x = 31.5897$

$\frac{16}{\sin 19} = \frac{y}{\sin 121}$

$\frac{y \cancel{\sin 19}}{\cancel{\sin 19}} = \frac{16 \sin 121}{\sin 19}$

$y = 42.1253$



2. The accompanying diagram shows the plans for a cellphone tower that is to be built near a busy highway. Find the height of the tower, to the nearest foot.

$\frac{100}{\sin 33} = \frac{y}{\sin 32}$

$\frac{y \cancel{\sin 33}}{\cancel{\sin 33}} = \frac{100 \sin 32}{\sin 33}$

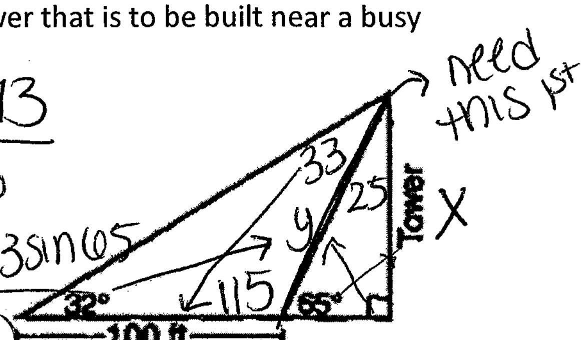
$y = 97.2973$

$\frac{x}{\sin 65} = \frac{97.2973}{\sin 90}$

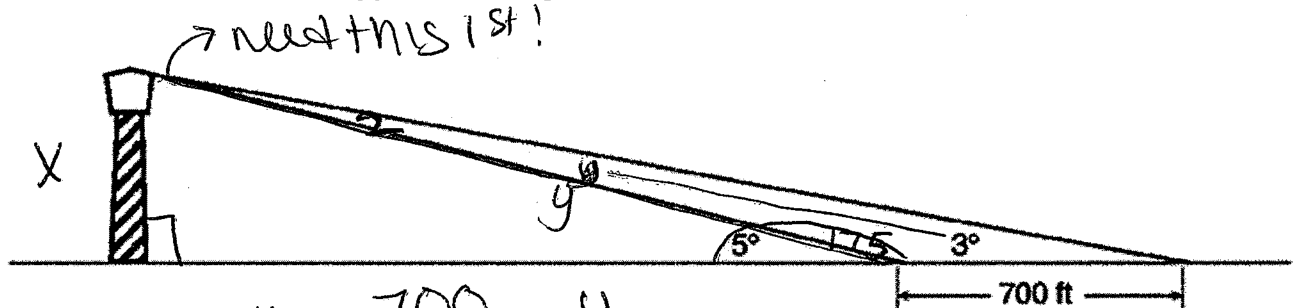
$\frac{x \cancel{\sin 90}}{\cancel{\sin 90}} = \frac{97.2973 \sin 65}{\sin 90}$

$x = 88.1813$

$\boxed{x = 88\text{ ft}}$



3. While sailing a boat offshore, Donna see a lighthouse and calculates that the angle of elevation to the top of the lighthouse is 3°, as shown in the accompanying diagram before. 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 foot*, is the lighthouse?



~~$\frac{2}{\sin 700} = \frac{y}{\sin}$~~

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

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

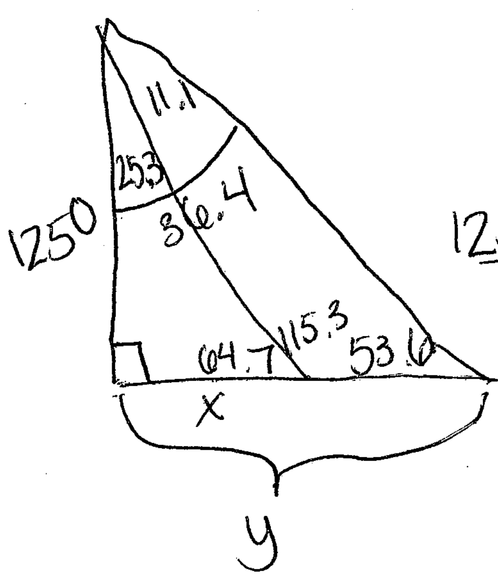
$$y = 1049.7334$$

$$\frac{1049.7334}{\sin 90} = \frac{x}{\sin 5}$$

$$\frac{1049.7334 \sin 5}{\sin 90} = \frac{x \sin 90}{\sin 90}$$

$$\boxed{x = 91.5}$$

~~4.~~ As Mr. Fox strolls down 34th street, he glances up at the Empire State Building, and estimates the angle of elevation of his view to be 53.6°. After walking closer to the building, he makes another estimation of 64.7°. Knowing that the Empire State Building is 1250 feet tall, how far, *to the nearest foot*, was he from the building at each of the two locations where he took his estimates?



$$\frac{x}{\sin 25.3} = \frac{1250}{\sin 64.7}$$

$$\frac{1250 \sin 25.3}{\sin 64.7} = \frac{x \sin 64.7}{\sin 64.7}$$

$$\boxed{x = 590.8722}$$

$$\boxed{x = 591 ft}$$

$$\frac{y}{\sin 36.4} = \frac{1250}{\sin 53.6}$$

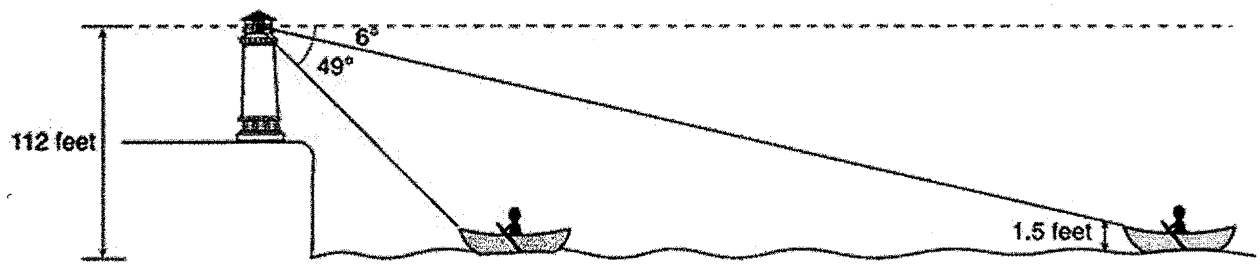
$$\frac{y \sin 53.6}{\sin 53.6} = \frac{1250 \sin 36.4}{\sin 53.6}$$

$$y = 921.5794$$

$$\boxed{y = 922 ft}$$

5. As shown below, a canoe is approaching a lighthouse on the coastline of a lake.

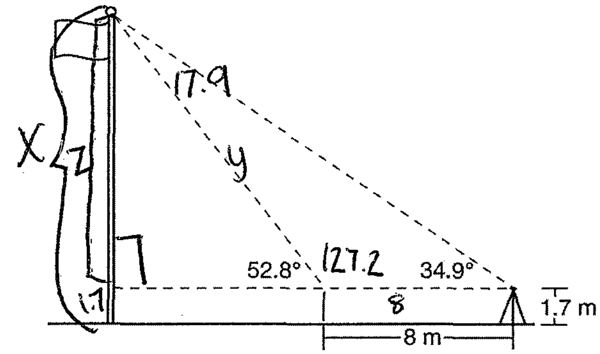
The front of the canoe is 1.5 feet above the water and an observer in the lighthouse is 112 feet above the water.



(Not drawn to scale)

At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

6. Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°. At each measurement, the survey instrument is 1.7 meters above the ground.



Determine and state, to the *nearest tenth of a meter*, the height of the flagpole.

$$\frac{8}{\sin 17.9} = \frac{y}{\sin 34.9}$$

$$\frac{y\cancel{\sin 17.9}}{\cancel{\sin 17.9}} = \frac{8\sin 34.9}{\sin 17.9}$$

$$y = 14.8920$$

$$\frac{14.8920}{\sin 90} = \frac{z}{\sin 52.8}$$

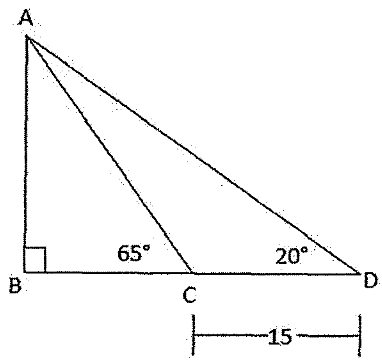
$$\frac{z\cancel{\sin 90}}{\cancel{\sin 90}} = \frac{14.8920\sin 52.8}{\sin 90}$$

$$z = 11.8619$$

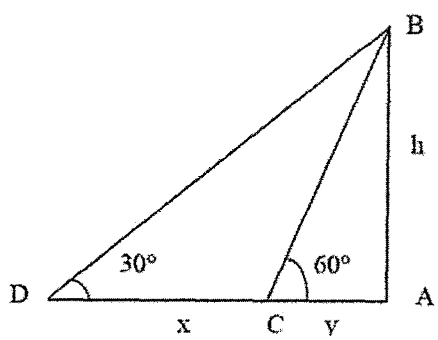
$$\begin{array}{r} 11.8619 \\ +1.7 \\ \hline 13.5619 \end{array}$$

$$\boxed{13.6\text{m}}$$

7. Find AB.



8. <A is a right angle, x = 20. Find h.



9. Find x.