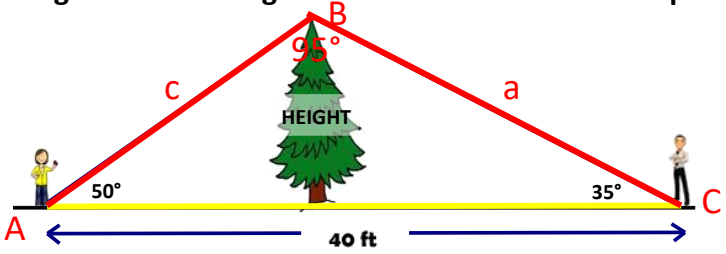
Geometry (G.SRT.10) Name: _____

Unit Two: Law of Sines & Cosines Applications (IC/HW32) Date: _____ Period: _____

1. Jack and Jill are tying decorative string from the top of the Christmas Tree to the ground. They will do this many times in many different colors creating a very unique celebration of color and pattern. What is the length of Jill's string based on the measurements provided? (round to the nearest foot)



$\frac{\sin 95}{40} = \frac{\sin 50}{a}$

$\frac{a\sin 95}{\sin 95} = \frac{40 \sin 50}{\sin 95}$

$a = \frac{40 \sin 50}{\sin 95}$

$a \approx 31$ ft

$\frac{\sin 95}{40} = \frac{\sin 35}{c}$

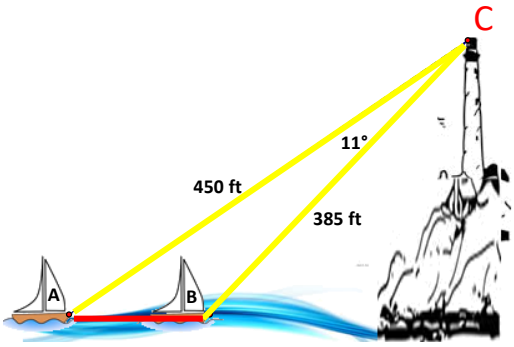
$\frac{c\sin 95}{\sin 95} = \frac{40 \sin 35}{\sin 95}$

$c = \frac{40 \sin 35}{\sin 95}$

$c \approx 23$ ft

String ≈ 31 + 23 = 54 ft

2. From the lighthouse two boats are spotted. The line of sight to the two boats is 450 ft to boat A and 385 ft to boat B. If the line of sight angle between the two boats is 11°, how far apart are the boats from each other? (round to the nearest foot)

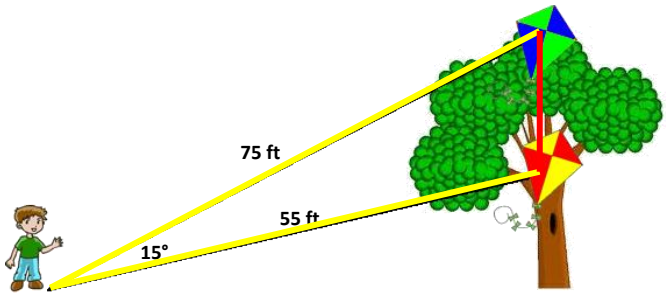


$c^2 = 450^2 + 385^2 - 2(450)(385)\cos 11$

$c \approx 103$

103 ft

3. A boy lets out 55 ft of string on his 1st kite but it gets stuck in the tree… instead of getting it out of the tree he picks up his 2nd kite and lets out 75 ft of string. It too gets stuck in the tree but higher up. If the line of sight angle to the two kites is 15°, how much higher is the one kite from the other? (nearest foot)

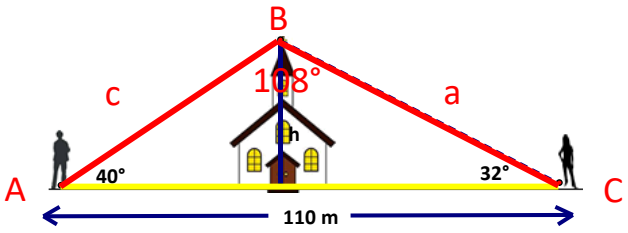


$h^2 = 75^2 + 55^2 - 2(75)(55)\cos 15$

$h \approx 26$

26 ft

4. Jack views the bird sitting on the steeple of the church at an angle of elevation of 40° and Jane views the same bird at an angle of elevation of 32°. If they are 110 m apart, how much shorter is the line of sight for Jack to see the bird than for Jane? (round to the nearest m)

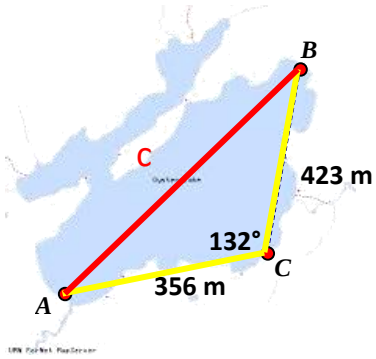


$$\frac{\sin 108}{110} = \frac{\sin 40}{a}$$
$$\frac{a\sin 108}{\sin 108} = \frac{110\sin 40}{\sin 110}$$
a ≈ 74 m

$$\frac{\sin 108}{110} = \frac{\sin 32}{c}$$
$$\frac{c\sin 95}{\sin 95} = \frac{40\sin 35}{\sin 95}$$
c ≈ 61 m

Difference: 74 – 61 = 13 m

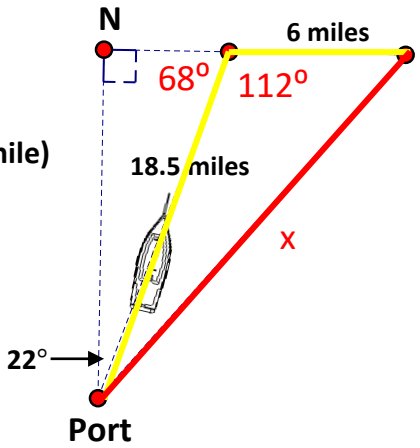
5. A surveyor wishes to find the distance between two points A and B on opposite sides of a lake. While standing at point C, she finds that AC = 356 m, BC = 423 m and that the angle ACB is 132°. Find the distance from A to B? (round to the nearest meter)



$c^2 = 423^2 + 356^2 - 2(423)(356)\cos 132$
c ≈ 712

712 m

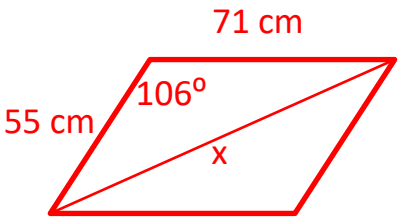
6. A ship leaves port at an angle of 22° and travels 18.5 miles. The ship then turns due east for another 6 miles. How far is the ship from port? (nearest mile)



$x^2 = 18.5^2 + 6^2 - 2(18.5)(6)\cos 112$
$x^2 = 461.4127$

x ≈ 21 mi

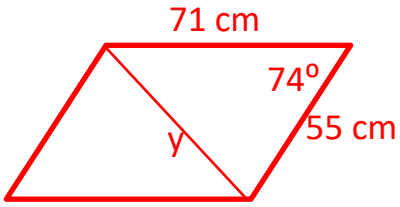
7. The sides of a parallelogram are 55 cm and 71 cm. Find the length of each diagonal if the larger angle of the parallelogram is 106°.



$x^2 = 55^2 + 71^2 - 2(55)(71)\cos 106$

$x^2 = 10218.72775$

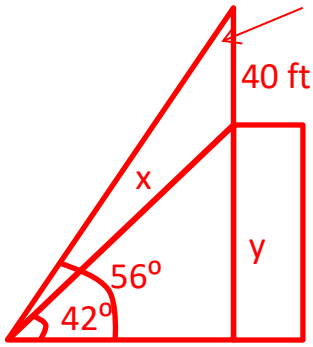
$x \approx 101$ cm



$y^2 = 55^2 + 71^2 - 2(55)(71)\cos 74$

$x \approx 77$ cm

8. A 40-foot television antenna stands on top of a building. From a point on the ground, the angles of elevation to the top and bottom of the antenna measure 56° and 42° respectively. How tall is the building?



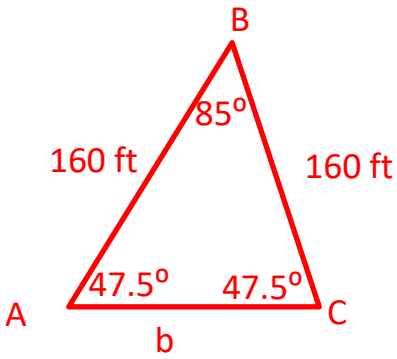
$\frac{\sin 34}{x} = \frac{\sin 14}{40}$

$x \approx 92.4584$ ft

$\sin 42 = \frac{y}{92.4581}$

$y \approx 62$ ft

9. A house is built on a triangular plot of land. Two sides of the plot are 160 feet long and they meet at an angle of 85°. If a fence is to be built around the property, how much fencing material is needed?



$\frac{\sin 47.5}{160} = \frac{\sin 85}{b}$

$b \approx 216$ ft

$160 + 160 + 216 = 536$ ft