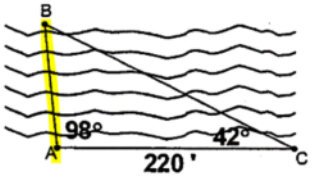
Wednesday, April 04, 2018
6:50 PM

Name: KEY Date: Period:

## *Precalculus - Section 6.1D – Law of Sines*
### *Word Problems*

*Solve each word problem; draw and label a diagram where necessary. Round final answers to the nearest tenth.*

1.) To find the distance between two points A and B on opposite sides of a river, we measure the distance from A to C to be 220 feet, $m\angle CAB = 98^\circ$, and $m\angle ACB = 42^\circ$. Find the distance between points A and B.




ASA

$B = 180^\circ - A - C$

$B = 180^\circ - 98^\circ - 42^\circ$

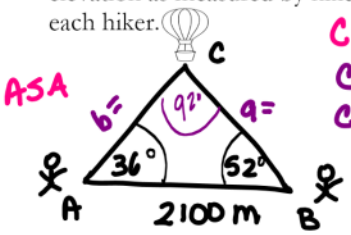
$B = 40^\circ$

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

$\frac{c}{\sin 42^\circ} = \frac{220'}{\sin 40^\circ}$

$c = \frac{220 \sin 42^\circ}{\sin 40^\circ} \approx$ **229.0 '**

2.) Two hikers, 2100 feet apart, sight a balloon which is between them and in their vertical plane. The angle of elevation as measured by hiker one is 36° and by hiker two is 52°. Find the distance to the balloon from each hiker.




ASA

$C = 180^\circ - A - B$

$C = 180^\circ - 36^\circ - 52^\circ$

$C = 92^\circ$

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

$\frac{a}{\sin 36^\circ} = \frac{2100}{\sin 92^\circ}$

$a = \frac{2100 \sin 36^\circ}{\sin 92^\circ}$

$a \approx 1235.1$ m

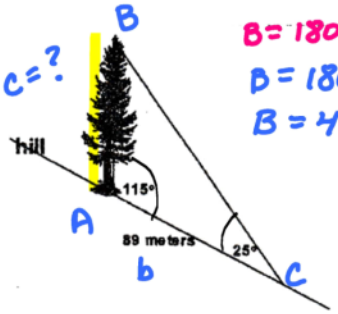
$\frac{b}{\sin B} = \frac{c}{\sin C}$

$\frac{b}{\sin 52^\circ} = \frac{2100}{\sin 92^\circ}$

$b = \frac{2100 \sin 52^\circ}{\sin 92^\circ}$

$b \approx 1655.8$ m

3.) The Forest Lumber Company has a special order for lumber to construct a pole that is 58 meters tall. One of their employees thinks she has found the tree to fill the order. It is on the company's hill where all of the trees grow at a 115° angle to the hill. From 89 meters downhill, she measures a 25° angle to the top of the tree. Should she cut down that tree for the special order?




$B = 180^\circ - A - C$

$B = 180^\circ - 115^\circ - 25^\circ$

$B = 40^\circ$

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

$\frac{c}{\sin 25^\circ} = \frac{89}{\sin 40^\circ}$

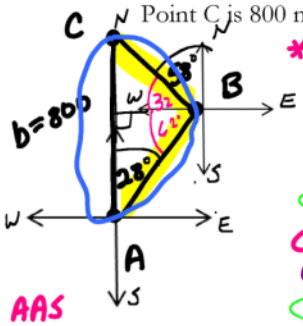
$c = \frac{89 \sin 25^\circ}{\sin 40^\circ}$

$c \approx 58.5$ m

Yes, she should cut down the tree because it is 58.5 meters tall, which is taller than the 58 m. needed.

4.) On a small lake, a child swam from point A to point B at a bearing of N 28° E. The child than swam to point C at a bearing of N 58° W. Point C is 800 meters due north of point A. How many total meters did the child swim?

TOTAL = 1056.6 meters




AAS

* FIND $\angle B$

$90^\circ - 58^\circ = 32^\circ$

$180^\circ - 90^\circ - 28^\circ = 62^\circ$

$\angle B = 62^\circ + 32^\circ$

$B = 94^\circ$

$C = 180^\circ - A - B$

$C = 180^\circ - 28^\circ - 94^\circ$

$c \approx 58^\circ$

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

$\frac{c}{\sin 58^\circ} = \frac{800}{\sin 94^\circ}$

$c = \frac{800 \sin 58^\circ}{\sin 94^\circ}$

$c \approx 680.1$ m

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

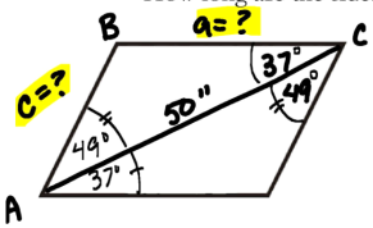
$\frac{a}{\sin 28^\circ} = \frac{800}{\sin 94^\circ}$

$a = \frac{800 \sin 28^\circ}{\sin 94^\circ}$

$a \approx 376.5$ m

+

5.) The diagonal of a parallelogram is 50 inches long and makes angles of 37° and 49° with its sides. How long are the sides of the parallelogram?




ASA

$B = 180° - A - C$

$B = 180° - 49° - 37°$

$B = 94°$

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

$\frac{a}{\sin 49°} = \frac{50}{\sin 94°}$

$a = \frac{50 \sin 49°}{\sin 94°}$

$a \approx 37.8$ inches

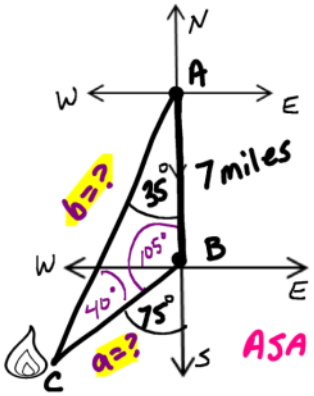
$\frac{c}{\sin C} = \frac{b}{\sin B}$

$\frac{c}{\sin 37°} = \frac{50}{\sin 94°}$

$c = \frac{50 \sin 37°}{\sin 94°}$

$c \approx 30.2$ inches

6.) Two fire lookout towers are located 7 miles apart. Tower A is directly north of Tower B. If a fire is spotted from Tower A at a bearing of S 35° W and from Tower B at a bearing of S 75° W, how far is the fire from each tower?




ASA

* FIND ∠B

$B = 180° - 75°$

$B = 105°$

$C = 180° - A - B$

$C = 180° - 35° - 105°$

$C \approx 40°$

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

$\frac{a}{\sin 35°} = \frac{7}{\sin 40°}$

$a = \frac{7 \sin 35°}{\sin 40°}$

$a \approx 6.2$ miles

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

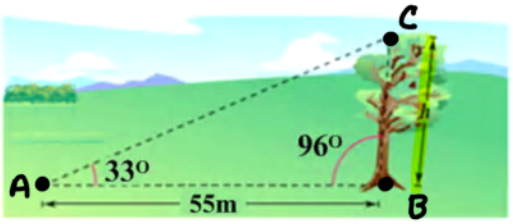
$\frac{b}{\sin 105°} = \frac{7}{\sin 40°}$

$b = \frac{7 \sin 105°}{\sin 40°}$

$b \approx 10.5$ miles

Distance from each Tower to fire.

7.) Because of prevailing winds, a tree grew so that it was leaning 6° from the vertical. At a point 55 meters from the tree, the angle of elevation to the top of the tree is 33°. Find the height of the tree.




ASA

$C = 180° - A - B$

$C = 180° - 33° - 96°$

$C = 51°$

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

$\frac{a}{\sin 33°} = \frac{55}{\sin 51°}$

$a = \frac{55 \sin 33°}{\sin 51°}$

$a \approx 38.5$ m