

## 11-2 Law of Sines

### Objectives:

1. I can solve a triangle using the law of sines.
2. I can identify 2 possible triangles and solve.

Non-Right Triangles

## Law of Sines

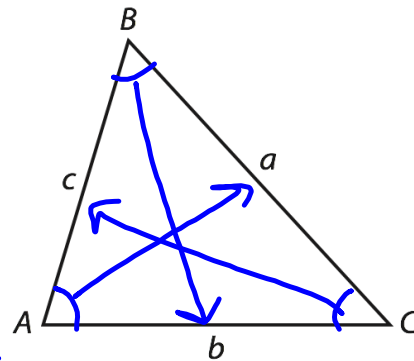
### Law of Sines

Given:  $\triangle ABC$

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

OR

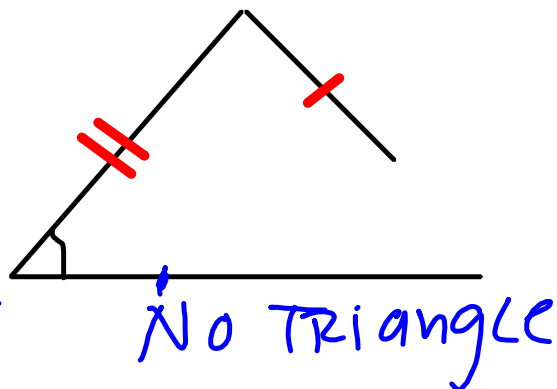
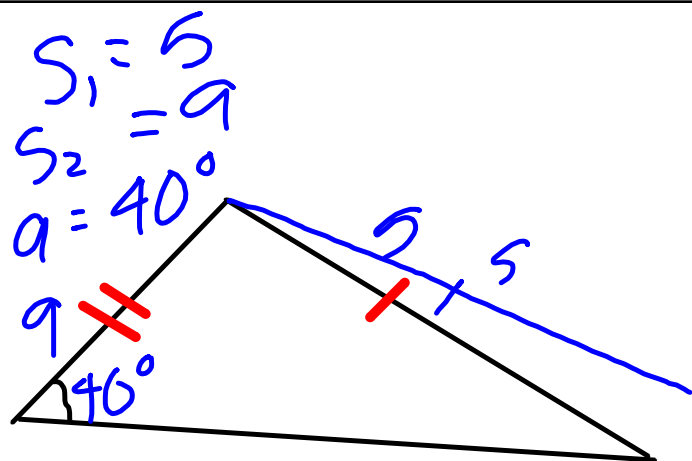
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$



<b>ASA or AAS</b>	Law of Sines
<b>SSA</b>	<u>Ambiguous Case</u>

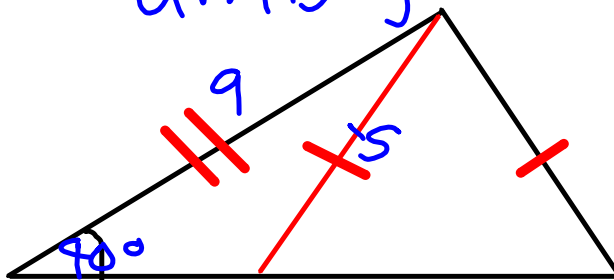
$A B C$  = angles

$a b c$  = side lengths



aSS  
 doesn't  
 work!

ambiguous



Step 1 Find the third angle measure.



Step 2 Find the unknown side lengths. Set up proportions using the Law of Sines and solve for the unknown.

180-33-35

$$\frac{r}{\sin R} = \frac{s}{\sin S}$$

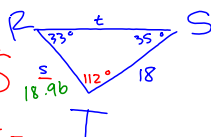
$$\frac{18}{\sin 33} = \frac{s}{\sin 35}$$

$$\frac{18 \cdot \sin 35}{\sin 33} = \frac{s \cdot \sin 33}{\sin 33}$$

$$18 \cdot \sin 35 / \sin 33$$

$$18.96 = s$$

$$t = 30.64 \leftarrow = t$$



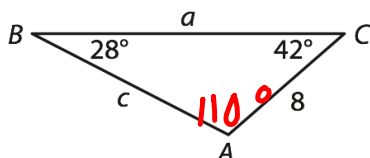
$$\frac{18}{\sin 33} = \frac{t}{\sin 112}$$

$$\frac{18 \cdot \sin 112}{\sin 33} = \frac{t \cdot \sin 33}{\sin 33}$$

**Your Turn**

Find all the unknown measures using the given triangle. Round to the nearest tenth.

4.



$$180 - 28 - 42$$

$$\underline{\underline{a}}$$

$$\frac{8}{\sin 28} = \frac{a}{\sin 110}$$

$$\frac{8 \cdot \sin 110}{\sin 28} = a \cdot \frac{\sin 28}{\sin 28}$$

$$a = 16.01$$

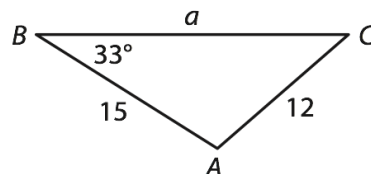
$$\underline{\underline{c}}$$

$$\frac{8}{\sin 28} = \frac{c}{\sin 42}$$

$$\frac{8 \cdot \sin 42}{\sin 28} = \frac{c \cdot \sin 28}{\sin 28}$$

$$11.40 = c$$

5.



ambiguous

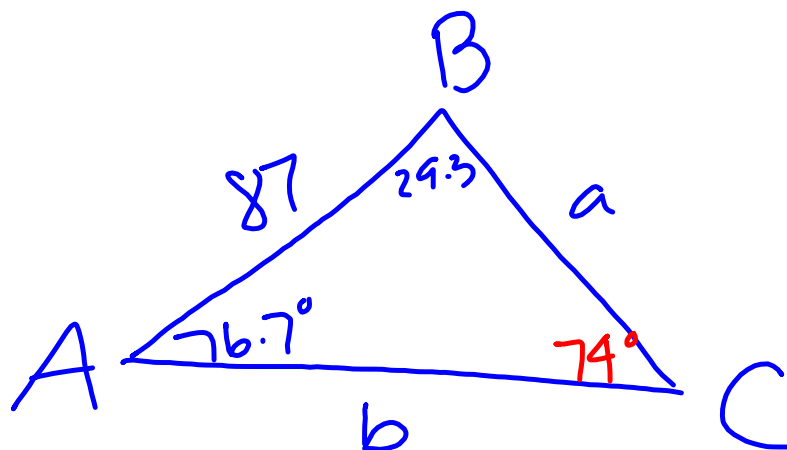
Solve the triangle given:

$$A = 76.7^\circ$$

$$B = 29.3^\circ$$

$$c = 87$$

Find all  
lengths &  
all angles



$$\frac{b}{\sin 29.3} = \frac{87}{\sin 74} = \frac{a}{\sin 76.7}$$

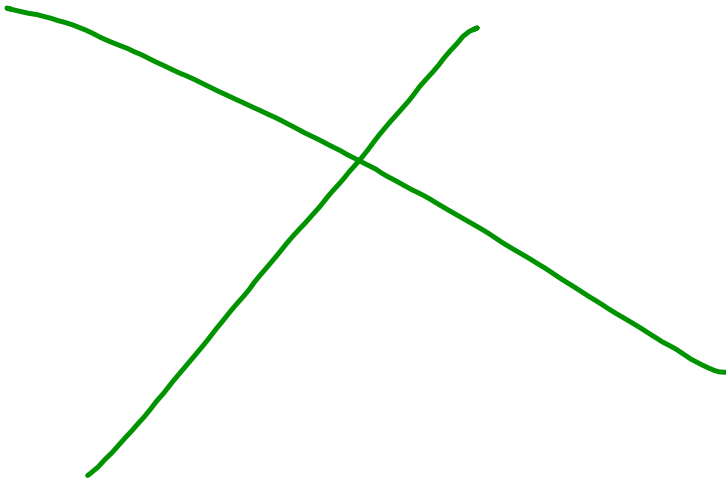
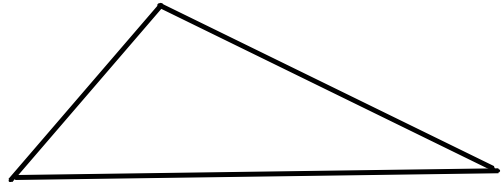
$$\frac{87 \cdot \sin 29.3}{\sin 74}$$

$$b = 44.29$$

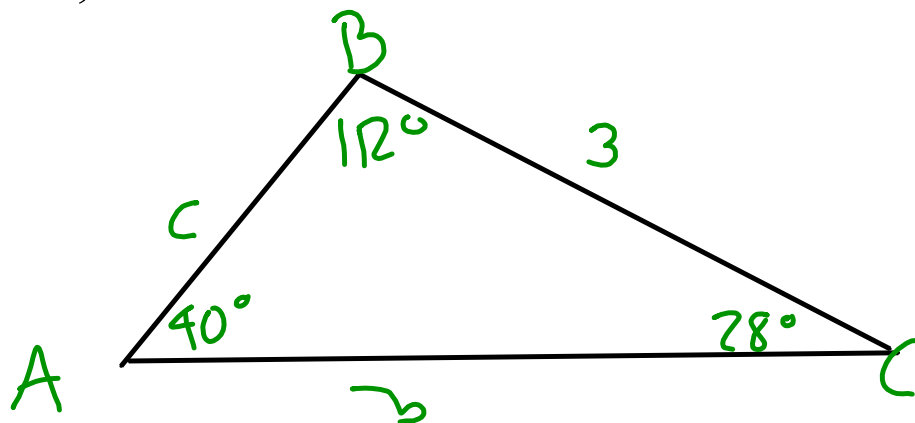
$$\frac{87 \cdot \sin 76.7}{\sin 74}$$

$$a = 88.08$$

Given  $a=20$ ,  $A=50^\circ$ ,  $B=42^\circ$   
find  $c=$



Given:  $a=3$ ,  $C=28^\circ$ ,  $A=40^\circ$   
 find  $c=$



~~$$\frac{c}{\sin 28} = \frac{3}{\sin 40} = \frac{b}{\sin 12}$$~~

~~$$c \cdot \frac{\sin 40}{\sin 40} = \frac{3 \cdot \sin 28}{\sin 40}$$~~

$$c = 2.19$$

~~$$\frac{3 \cdot \sin 12}{\sin 40} = b \cdot \frac{\sin 40}{\sin 40}$$~~

$$4.33 = b$$