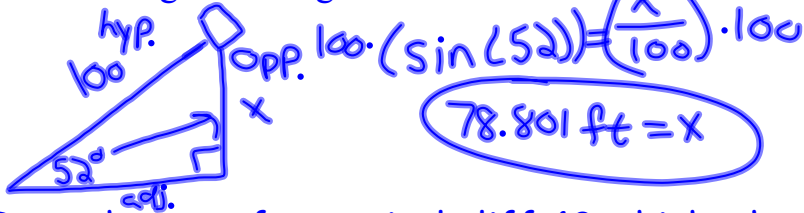


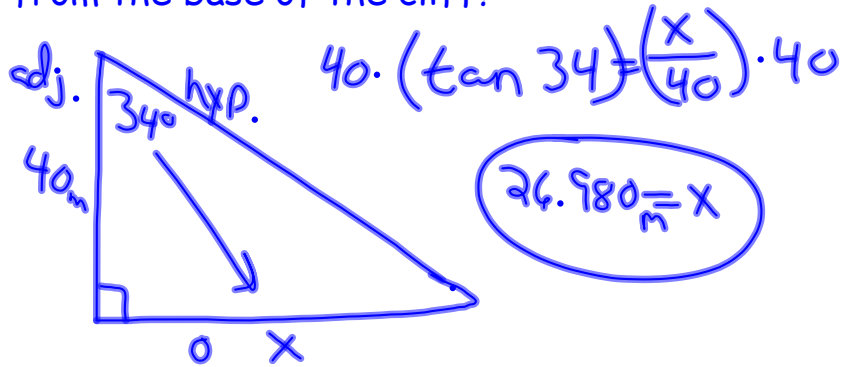
Bell Work \*\*Hint - draw a picture\*\*

SOH CAH TOA

- 1) A man flies a kite with a 100 foot string. The angle of elevation of the string is  $52^\circ$ . How high off the ground is the kite?



- 2) From the top of a vertical cliff 40m high, the angle of depression of an object that is level with the base of the cliff is  $34^\circ$ . How far is the object from the base of the cliff?



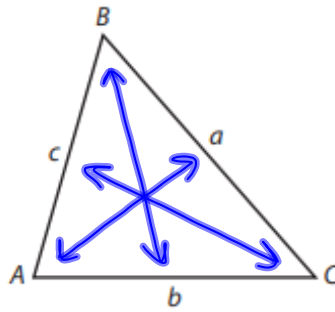
## 14.1 Law of Sines

Essential Question: How can we find missing side lengths or angle measures using trigonometry when it's not a right triangle?

### Law of Sines

Given:  $\triangle ABC$

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



The **Law of Sines** allows you to find the unknown measures for a given triangle, as long as you know either:

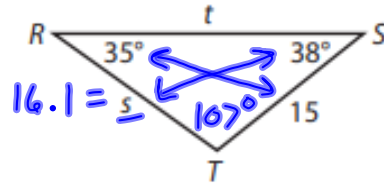
1. Two angle measures and any side length
2. Two side lengths and the measure of an angle that is not between them

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

$$\frac{\sin 38}{s} \rightarrow \frac{\sin 35}{15}$$

$$s \cdot \frac{\sin 35}{\cancel{\sin 35}} = \left( \frac{15 \cdot \sin 38}{\sin 35} \right)$$

$$s = 16.1$$



$$35 + 38 = 73$$

$$180 - 73 = 107$$

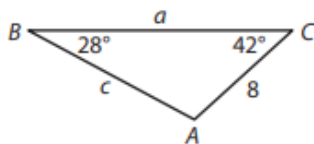
$$\frac{\sin 107}{t} \rightarrow \frac{\sin 35}{15}$$

$$t \cdot \frac{\sin 35}{\cancel{\sin 35}} = \left( \frac{15 \cdot \sin 107}{\sin 35} \right)$$

$$t = 25.0$$

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

4.

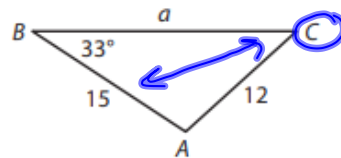


$$\frac{\sin 42}{c} \rightarrow \frac{\sin 28}{8}$$

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

$$c = 11.4$$

5.



$$\frac{\sin C}{15} \rightarrow \frac{\sin 33}{12}$$

$$\frac{12 \cdot \sin C}{12} = \frac{15 \cdot \sin 33}{12}$$

$$\sin C = \frac{15 \sin 33}{12}$$

$$C = \sin^{-1} \left( \frac{15 \sin 33}{12} \right)$$

$$C = 43^\circ$$

## 14.2 Law of Cosines

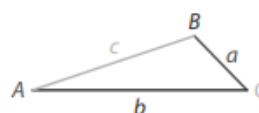
### Law of Cosines

For  $\triangle ABC$ , the Law of Cosines states that

$$a^2 = b^2 + c^2 - 2bccosA$$

$$b^2 = a^2 + c^2 - 2accosB$$

$$c^2 = a^2 + b^2 - 2abcosC$$



**\*\*Only do when can't use SOH CAH TOA or Law of Sines\*\***

Solve  $\triangle ABC$ . Round intermediate results to 3 decimal places and final answers to 1 decimal place.

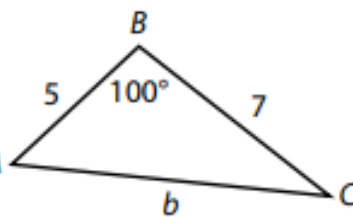
Solve for  $b$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$b^2 = (7)^2 + (5)^2 - 2(7)(5)\cos(100^\circ)$$

$$\sqrt{b^2} = \sqrt{86.155}$$

$$b = 9.3$$



Solve  $\triangle ABC$ . Round intermediate results to 3 decimal places and final answers to 1 decimal place.

3.  $b = 23, c = 18, m\angle A = 173^\circ$

Solve for  $a$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$(35)^2 = [(42)^2 + (50.3)^2] - [2(42)(50.3)] \cos A$$

$$1225 = 4294.09 - 4225.2 \cos A$$

$$\frac{-3069.09}{-4225.2} = \frac{-4225.2 \cos A}{-4225.2}$$

$$0.726 = \cos A$$

$$\cos^{-1}(0.726) = A$$

$$43^\circ = A$$

4.  $a = 35, b = 42, c = 50.3$

Solve for  $A$

## Homework

pg. 750 #9-11 find all

pg. 761 #7 find P

#10 find a