

The Law of Cosines

13.6

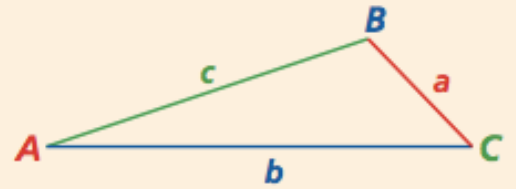
Law of Cosines

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

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

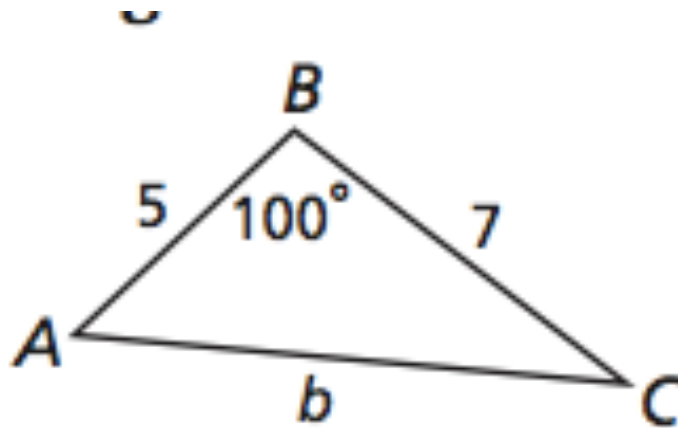
$$b^2 = a^2 + c^2 - 2ac \cos B.$$

$$c^2 = a^2 + b^2 - 2ab \cos C.$$



I do

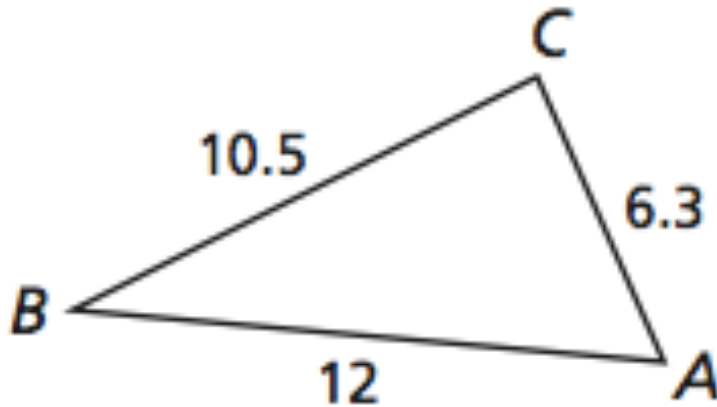
Use the given measurements to solve for the triangle.



Identify the givens	$B=100^\circ$ $a = 7, c = 5$
Solve for a missing part using Law of Cosine	$b^2 = a^2 + c^2 - 2(a)(c)\cos B$ $b^2 = 7^2 + 5^2 - 2(7)(5)\cos 100^\circ$ $b^2 = 86.2$ $b = 9.3$
Solve for the other angles.	$\frac{\sin A}{a} = \frac{\sin B}{b}$ $\frac{\sin A}{7} = \frac{\sin 100^\circ}{9.3}$ $A = 47.8^\circ$ $C = 180^\circ - 47.8^\circ - 100^\circ$ $C = 32.2^\circ$

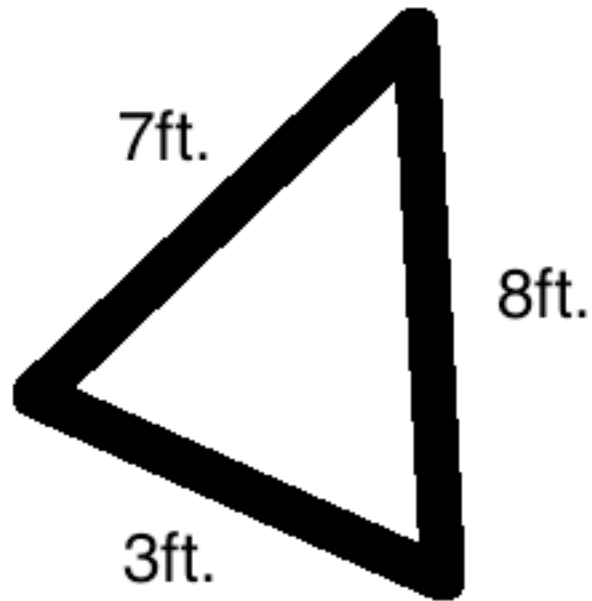
We Try:

Use the given measurements to solve for the triangle.



Identify the Givens	$a = 10.5, b = 6.3, c = 12$
Solve for a missing part using the Law of Cosine	
Solve for the other angles.	

You Try with your partner:
Find the angles



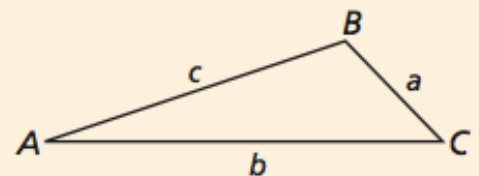
Mr. Yen has decided to use another method of finding
the area of his sails!



Heron's Formula

For $\triangle ABC$, where s is half of the perimeter of the triangle, or $\frac{1}{2}(a + b + c)$,

$$\text{Area} = \sqrt{s(s - a)(s - b)(s - c)}$$



Find half of the perimeter of the triangle.

$$s = \left(\frac{1}{2}\right) (11 + 8 + 7)$$

$$s = \frac{1}{2} (26)$$

$$s = 13$$

Plug into Heron's formula

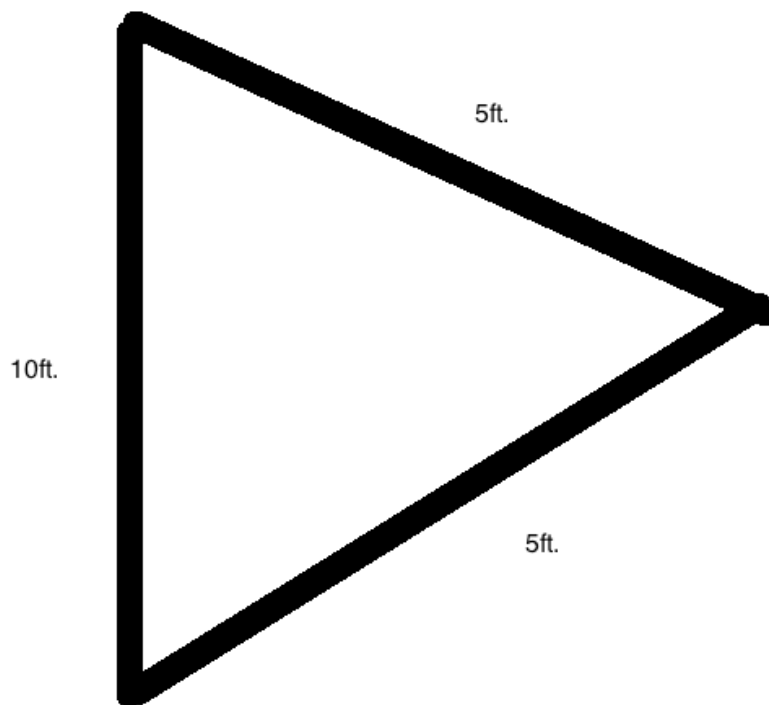
$$\text{Area} = \sqrt{s(s - a)(s - b)(s - c)}$$

$$A = \sqrt{13(13 - 11)(13 - 8)(13 - 7)}$$

Simplify

$$A=27.9ft^2$$

We Try:



Find the area of the triangle.

Find half of the perimeter of the triangle.	$S = \left(\frac{1}{2}\right) (11 + 8 + 7)$ $s = \frac{1}{2} (26)$ $s = 13$
Plug into Heron's formula $Area = \sqrt{s(s-a)(s-b)(s-c)}$	$A = \sqrt{13(13-11)(13-8)(13-7)}$
Simplify	$A = 27.9 ft^2$

You Try all alone:

Find the area of the triangle.

