

Area of Triangle.

Section 5.6,5.8

12.1.15

Lesson 26

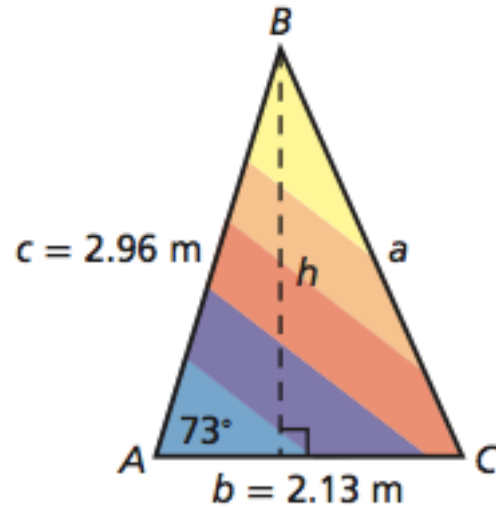
Warm-up

Given  $A = 50^\circ$

$B = 60^\circ$

$a=10$

Solve for the triangle.



The area of a triangle is  $\frac{1}{2}bh$ .

$$\text{In this case, } \sin A = \frac{h}{c}$$

$$h = (c)\sin A$$

If we plug this back into the area formula we would  
get

$$\text{Area} = \frac{1}{2}b(c)(\sin A)$$

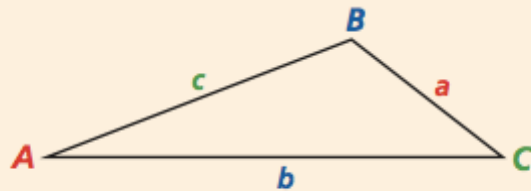
## Area of a Triangle

For  $\triangle ABC$ ,

$$\text{Area} = \frac{1}{2}bc \sin A$$

$$\text{Area} = \frac{1}{2}ac \sin B$$

$$\text{Area} = \frac{1}{2}ab \sin C$$



### Area of Triangles

Let  $\triangle ABC$  be any triangle with  $a$ ,  $b$ , and  $c$  representing the measures of the sides opposite the angles with measurements  $A$ ,  $B$ , and  $C$  respectively. Then the area  $K$  can be determined using one of the following formulas.

$$K = \frac{1}{2}a^2 \frac{\sin B \sin C}{\sin A}$$

$$K = \frac{1}{2}b^2 \frac{\sin A \sin C}{\sin B}$$

$$K = \frac{1}{2}c^2 \frac{\sin A \sin B}{\sin C}$$

### Hero's Formula

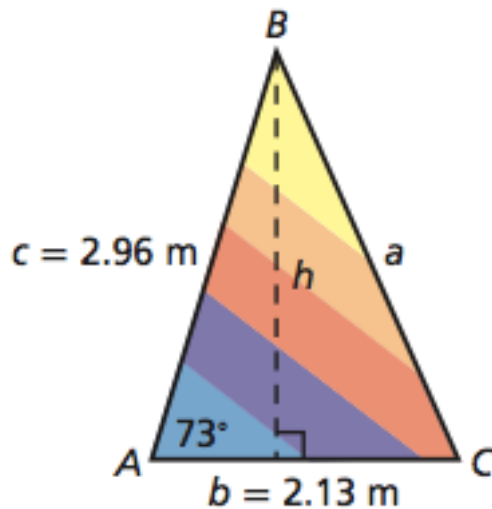
If the measures of the sides of a triangle are  $a$ ,  $b$ , and  $c$ , then the area,  $K$ , of the triangle is found as follows.

$$K = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = \frac{1}{2}(a+b+c)$$

When do we use which formula?

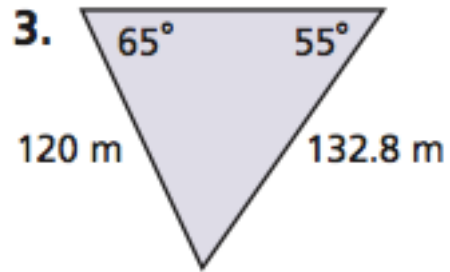
Discuss with your partner about the MINIMUM requirements for each!

I Try:  
Find the area of the sail.



Identify the givens.	$A=73^\circ$ $b=2.13\text{m}$ $c=2.96\text{m}$
Plug into the correct Area formula	$\text{Area} = \frac{1}{2}(b)(c)\sin A$
	$\text{Area} = \frac{1}{2}(2.13)(2.96)\sin 73^\circ$
Simplify	$\text{Area} = 3.015\text{m}^2$

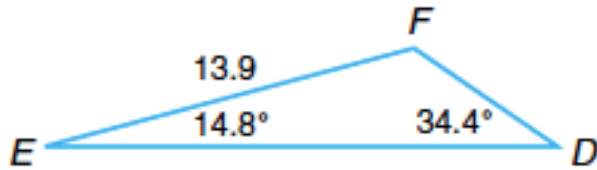
We Try:  
Find the area of the triangle.



Identify the givens.	
Plug into the Area formula	
Simplify	

We Try:

Solve for the area of the triangle.



Identify the Givens	
Plug into the correct area formula.	
Simplify	

You Try with your partners:

Left Write, Right Talk

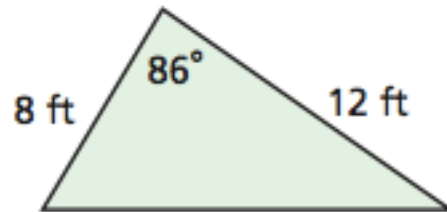
Given Triangle with sides.

$$a = 4, b = 6, c = 8$$

Find the area of the triangle

Identify the Givens	
Plug into the correct area formula.	
Simplify	

You try with your partners:  
Left Talk, Right Write



Identify the givens.	
Plug into the Area formula	
Simplify	



You try with your partners:

Left Talk, Right Write

$$A = 40^\circ, C = 70^\circ, a = 20$$

Identify the givens.	
Plug into the correct Area formula	
Simplify	

You try SOLO

Solve for the area with given:

$$A = 28^\circ, b = 14, c = 9$$

Identify the givens.	
Plug into the Area formula	
Simplify	

# The Ambiguous Case for Law of Sines

Case 1: $A < 90^\circ$			
$a < b$	$a < b \sin A$  no solution	$a = b \sin A$  one solution	$a > b \sin A$  two solutions
$a \geq b$	 one solution		
Case 2: $A \geq 90^\circ$			
$a \leq b$  no solution		$a > b$  one solution	

Exit Slip

1)

Solve for the triangle given:

$$a = 20, b = 30, c = 40$$

2)

Solve for the triangle given:

$$a = 5, B = 37^\circ, c = 30$$

3)

Solve for the triangle given:

$$A = 28^\circ, b = 14, c = 9$$