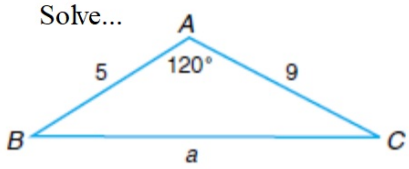
Trig 5.8

Solve triangles using the law of cosines
Find the area of triangles

Solve...



law of sines (needs a pair)

semicircle

semiperimeter
$c = \frac{1}{2}$ perim

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

Hero's formula (Heron's formula)

whiteboards

Quiz Thurs. 5.7-5.8

When pairs are not known...

Law of Cosines

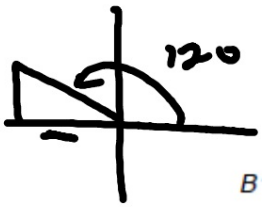
Let $\triangle ABC$ be any triangle with a, b, and c representing the measures of sides opposite angles with measurements A, B, and C, respectively. Then, the following are true.

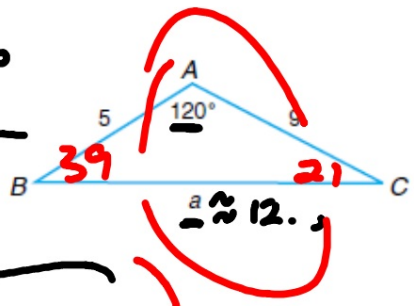
$$a^2 = b^2 + c^2 - 2bc \cos A$$
$$b^2 = a^2 + c^2 - 2ac \cos B$$
$$c^2 = a^2 + b^2 - 2ab \cos C$$

Jeremiah was a bullfrog (?)

2 Solve each triangle.

a. $A = 120°, b = 9, c = 5$





$a^2 = 5^2 + 9^2 - (2 \cdot 5 \cdot 9 \cdot \cos 120)$

$a^2 = 25 + 81 + (+45)$

$a^2 = 151$

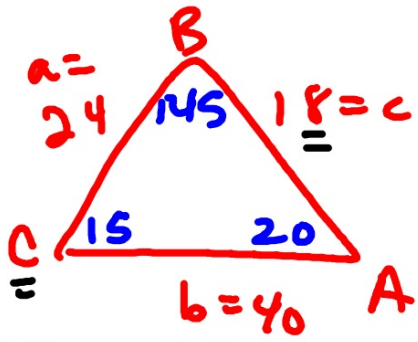
$a = 12.3$.

$$\frac{12.3}{\sin 120} = \frac{5}{\sin C}$$

$$\frac{12.3 \sin C}{12.3} = \frac{5 \sin 120}{12.3}$$

$\sin C = 0.3520$

b. $a = 24, b = 40, c = 18$



$18^2 = 24^2 + 40^2 - 2 \cdot 24 \cdot 40 \cdot \cos C$

$324 = 576 + 1600 - 1920 \cdot \cos C$

$-571 \quad -576 \quad -1600$

-1600

$-1852 = -1920 \cos C$

$0.9646 = \cos C$

$C = 15$

$\frac{18}{\sin 15} = \frac{24}{\sin A}$

$\frac{18 \sin A}{18} = \frac{24 \sin 15}{18}$

$\sin A = 0.3451$

$A = 20$

Solve each triangle. Round to the nearest tenth.

5. $a = 32, b = 38, c = 46$

6. $a = 25, b = 30, C = 160°$

Heron's formula
semicircle...
semiperimeter...

Hero's

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. $$K = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = \frac{1}{2}(a+b+c)$$ *s is called the semiperimeter.*

K =

3 Find the area of $\triangle ABC$ if $a = 4$, $b = 7$, and $c = 9$.

$s = 10$

$$K = \sqrt{10(10-4)(10-7)(10-9)}$$

$$= \sqrt{10 \cdot 6 \cdot 3 \cdot 1}$$

$$\approx 13.4$$

Find the area of each triangle. Round to the nearest tenth.

8. $a = 2, b = 7, c = 8$

9. $a = 25, b = 13, c = 17$