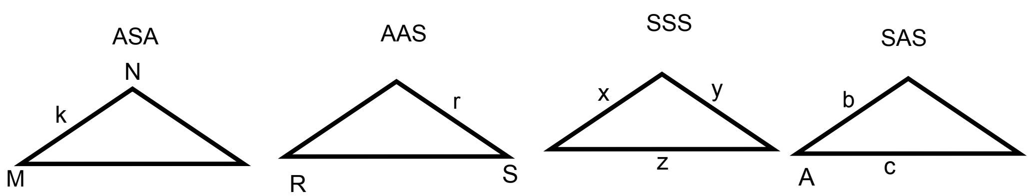
Trig 3.2 ~ The Law of Cosines

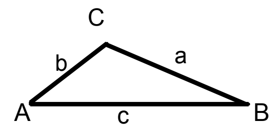
* Prove the law of cosines.
* Use the law of cosines to solve for parts of a triangle.
* Use the law of sines and the law of cosines to solve for parts of a triangle.
* Solve real life problems using these laws.
* Use two ways to find the area of a triangle.

Remembering Geometry Congruence Theorems:



Law of Cosines: In any triangle, ABC with sides a, b, c:

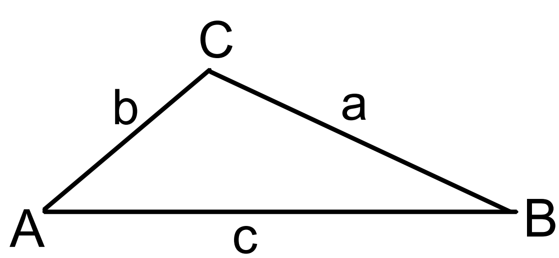
$c^2 = a^2 + b^2 - (2ab) \cos C$



It looks like the Pythagorean theorem!

PROOF: Given: Δ ABC with sides a, b, c

Prove: $a^2 = b^2 + c^2 - (2bc) \cos A$



Example 1 SAS:

Triangle ABC has c = 15 cm, b = 12 cm and ∠A measures 85º.
Solve for the remaining three parts of the triangle.

*Draw a picture.
*Label parts.
*Determine which law to use.
*Solve.

Example 2 SSS:

Given Δ RST with sides r =18", s =15", and t =10". Find the three angles.

Draw
Label
Equation
Solve

Example 3:

A plane flies 280 miles, turns 85º and flies another 350 miles. How far is it from the starting point?

Draw a picture.
Label it.
Determine which law to use.
Solve it.

The area of a triangle in two ways:

Area = 1/2 ab sin C
or
Area = $\sqrt{s(s-a)(s-b)(s-c)}$ where s = semiperimeter, $\frac{a+b+c}{2}$

The second is called Heron's formula.

Find the area of a triangle with sides 7cm, 12 cm, and 13 cm.

Use first formula:

Area = 1/2 ab sin C

Use Heron's formula