Law of Cosines

Section Objectives: use the Law of Cosines to solve acute, obtuse, and oblique triangles and how to use Heron's Formula to determine the area of a triangle in terms of the measures of the sides and angles.

For solving **SAS** and **SSS** problems with triangles that have sides and angles labeled in the **"**usual way**",** we use the

Law of Cosines:

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

Example 1: Given $a = 5$, $b = 8$, and $c = 7$, find all three angles of the triangle.

Example 2: Given $C = 111^0$, $a = 27$, and $b = 18$, find the remaining side and two angles of the triangle.

Example 3: The wing of a Delta Dart F-106 is a triangle, with two sides not touching the plane of 37.6 ft and 19.2 ft and angle between them of 68^0. Find the length of the side touching the plane.