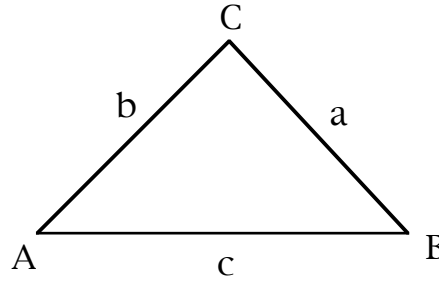The Law of Cosines is used to solve triangles in which two sides and the included angle (the angle between the two sides) are known or in which three sides are known (SAS or SSS)

The Law of Cosines - If A, B and C are the measures of the angles of a triangle and a, b and c are the lengths of the sides opposite these angles, then
$a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$
$b^2 = a^2 + c^2 - 2ac\cos B$ or $\cos B = \dfrac{a^2 + c^2 - b^2}{2ac}$
$c^2 = a^2 + b^2 - 2ab\cos C$ or $\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$

Note: It is wise to find the largest angle which is across the largest side FIRST !

Example 1 Solve triangle (SSS) $a = 8, b = 19$, and $c = 14$.

Example 2 Solve triangle (SAS) $\qquad A = 115°$, $c = 10$ and $b = 15$.

Example 3 The pitchers mound on a women's softball field is 43 feet from home plate and the distance between the bases is 60 feet. How far is the pitchers mound from first base?

Heron's Formula - If a, b and c are the lengths of the sides of a triangle, then the area of the triangle is $\quad \text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \dfrac{1}{2}(a+b+c)$.

Example 4 Find the area of a triangle having sides of lengths a = 43 meters, b = 53 meters, and c = 72 meters.