Section 7.1 Oblique Triangles and the Law of Sines

Congruence Axioms (Information that is needed to describe a unique triangle.)

If we know these 3 parts of a triangle in this order,

then we know for sure exactly what the other parts must be.

Side-Angle-Side (SAS)	If two sides and the included angle of one of the triangle are equal, respectively, to two sides and the included angle of a second triangle, then the triangles are congruent.
Angle-Side-Angle (ASA)	If two angles and the included side of one triangle are equal, respectively, to two angles and the included side of a second triangle, then the triangles are congruent.
Side-Side-Side (SSS)	If the three sides of one triangle are equal, respectively, to three sides of a second triangle, then the triangles are congruent.

NOTE: AAA could describe infinitely many triangles.

Also, SSA or ASS does not guarantee a unique triangle, as we will see in Section 7.2 when we discuss this ambiguous case.

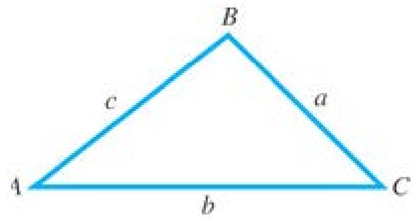
A triangle that is not a right triangle is called an **oblique triangle.** We can "solve" an oblique triangle, that is, we can determine the measure of all its angles and the lengths of all of its sides, if **at least the length of ONE SIDE is known along with ANY two other measures.**

There are four possible cases:

Data Required for Solving Oblique Triangles		**Requires use of…**
CASE 1:	One side and two angles are known (SAA or ASA)	The Law of Sines (Section 7.1)
CASE 2:	Two sides and one angle not included between the two sides are known (SSA.) This case may lead to more than one triangle.	The Law of Sines (Section 7.2) *Considers the "ambiguous case" that leads to two possible triangles*
CASE 3:	Two sides and the angle included between the two sides are known (SAS).	The Law of Cosines (Section 7.3)
CASE 4:	Three sides are known (SSS)	

The Law of Sines

In any triangle, ABC, with sides a,b,c, the lengths of the sides are proportional to the sines of the measures of the angles opposite them.



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad \textbf{OR} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

CASE 1: SAA

Solve triangle ABC if $A = 28.8°$, $C = 102.6°$ and $c = 25.3$ in.

CASE 1: ASA

Solve triangle ABC if $B = 38° \ 40'$, $a = 19.7$ cm, and $C = 91°40'$.