

### 6.1-6.2 Notes – Solving Triangles

To solve a triangle means find the length of its sides and the measurement of its angles. A triangle has 6 parts (3 angles and 3 sides). In order to solve a triangle, you will be given the length or measure of some of its parts. Your job is to find the missing lengths of sides or missing angle measures.

**(6.1) Law of Sines:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$     *or*     $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

**(6.2) Law of Cosines:**

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

- If the triangle is a right triangle, use right triangle trig (SOHCAHTOA) (Chpt.4)
- Use the Law of Sines for oblique triangles, given AAS, ASA, and SSA. (6.1)  
Remember that SSA is the ambiguous case, where the answer could be no triangle, 1 triangle, or 2 triangles. (6.1)
- Use the Law of Cosines for oblique triangles, given SAS or SSS. (6.2)
  - SAS: 1) Find the missing side.  
2) Find the smallest angle (if not given).  
3) Find the other angle using geometry.
  - SSS: 1) Find the largest angle  
2) Use the Law of Sines to find any of the other 2 angles.  
3) Find the third angle using geometry.

#### AREA OF TRIANGLES USING TRIGONOMETRY:

- If at least one angle is known:  $\text{Area} = \frac{1}{2} (\text{side})(\text{side})(\sin \text{ of included angle})$ . (6.1)  
If you are given SAS, then just plug in the numbers. If you are given AAS, or SSA, use LS to “force” SAS. (6.1)

- If you are given SSS, then use Heron’s Formula: (6.2)

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

where  $s$  is the semi-perimeter, and  $a, b, c$ , are the sides of the triangle.