MATH 104/GRACEY NAME________________________

WORKSHEET/CHAPTER 7.1-7.3

CONGRUENCE AXIOMS

SIDE-ANGLE-SIDE (SAS)

If two sides and the included angle of one 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 three sides of one triangle are equal, respectively, to three sides of a second triangle, then the triangles are congruent.

A triangle that is not a right triangle is called an **oblique triangle**. The measures of the three sides and three angles of a triangle can be found if **at least one side and any other two measures are known**.

DATA REQUIRED FOR SOLVING OBLIQUE TRIANGLES

Case 1: One side and two angles are known (SAA or ASA).

Use Law of Sines

$$\frac{a}{\sin A}=\frac{b}{\sin B} \text{ or } \frac{a}{\sin A}=\frac{c}{\sin C} \text{ or } \frac{b}{\sin B}=\frac{c}{\sin C}$$

Case 2: Two sides and one angle **not included between the two sides** are known (SSA).

Use Law of Sines but realize it is the **ambiguous** case.

Case 3: Two sides and the angle **included between the two sides** are known (SAS).

Use Law of Cosines

$$a^2=b^2+c^2-2bc\cos A$$

$$b^2=a^2+c^2-2ac\cos B$$

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

Case 4: Three sides are known (SSS).

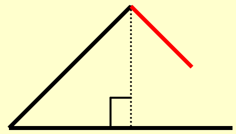
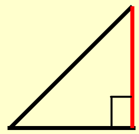
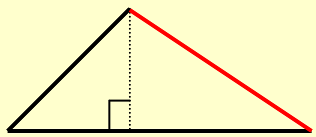
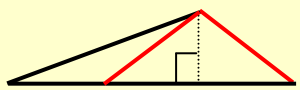
Use Law of Cosines (above)

1. Solve each triangle that exists.

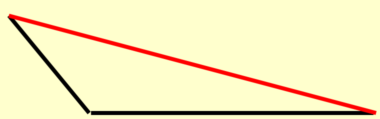
a. $a = 189\,yd,\ b = 214\,yd,\ \mathrm{c} = 325\,yd$

b. $A = 35.3^\circ,\ B = 52.8^\circ,\ AC = 675\,ft$

The Ambiguous Case of the Law of Sines if angle A is Acute

# of Triangles	Sketch	Applying Law of Sines leads to…
0		$\sin B > 1$, $a < h < b$
1		$\sin B = 1$, $a = h$ and $h < b$
1		$0 < \sin B < 1$, $a \geq b$
2		$0 < \sin B_2 < 1$, $h < a < b$

The Ambiguous Case of the Law of Sines if angle A is obtuse

# of Triangles	Sketch	Applying Law of Sines leads to…
0		$\sin B \geq 1$, $a \leq b$
1		$0 < \sin B < 1$, $a > b$

c. $B = 48.2^\circ,\ a = 890cm,\ b = 697cm$

d. $C = 68.5^\circ,\ \mathrm{c} = 258m,\ b = 386m$

Area Formulas

Heron's Area Formula (SSS)
If a triangle has sides of length *a, b,* and *c,* with semiperimeter $s = \frac{1}{2}(a+b+c)$, then the area of the triangle is $\lambda = \sqrt{s(s-a)(s-b)(s-c)}$.

(SAS)
In any triangle ABC, the area is given by
$\lambda = \frac{1}{2}ab\sin C,\ \lambda = \frac{1}{2}ac\sin B,\ \text{and}\ \lambda = \frac{1}{2}bc\sin A$

2. A painter needs to cover a triangular region 75m by 68m by 85m. A can of paint covers 75 square meters of area. How many cans will be needed?

3. A real estate agent wants to find the area of a triangular lot. A surveyor takes measurements and finds that two sides are 52.1m and 21.3m, and the angle between them is 42.2°. What is the area of the triangular lot?

4. A ship leaves a port at a speed of 16 mph at a heading of 32°. One hour later another ship leaves the port at a speed of 22 mph at a heading of 254°. Find the distance between the ships 4 hours after the first ship leaves the port.

5. A regular pentagon is inscribed in a circle with a radius of 25 inches. Find the length of one side of the pentagon.