**Algebra 2B----Law of Sines**

Today I am going to teach you how to find side lengths and angle measures when you **don’t** have a right triangle. There are two formulas, and today we will just look at one of them. It’s called the “Law of Sines”. Read on!!!

1. Draw a triangle below (but make sure it is NOT a right triangle). Make it big enough to label it and be able to refer back to it.
2. Label the Corners A, B and C (make sure to use capital letters).
3. Now put one finger on angle A. Good, now put another finger on the side that is opposite angle A (the side that doesn’t touch A at all!!!). Label this side “a” (use a lower case letter this time.)
4. Do the same thing to label side “b” and side “c”.

\*\*\* Notice that the capital letters stand for angles and the lower case letters stand for side lengths. \*\*\*

1. What do capital letters stand for?
2. What do lower case letters stand for?
3. Here is the formula for the Law of Sines: 
4. Hmmm, I put a capital X next to the first sine function…what does that mean capital X is?
5. I put a lower case x on under the SinX,. What does the lower case x represent?
6. So in general, the angle measures always go on the \_\_\_\_\_\_\_\_\_ of the fraction.
7. In general, the side lengths always go on the \_\_\_\_\_\_\_\_\_\_\_\_ of the fraction.
8. In your triangle way above, label angle A as 42 degrees and label angle B as 70 degrees. Then label side “a” as being 30 long. Use the formula to find side “b”. Do this below!!
9. Did you get 42.1? If so, move on. If not, get help right now!!!

\*\*\* Now try these few problems before moving on. Check your answers when you’re done. \*\*\*

**Find each measure using the given measures of ∆ABC. Round angle measures to the nearest degree and side measures to the nearest tenth of a degree.**

1. If c = 13, m∠A = 78, and m∠C = 38, find a.
2. If b = 22, c = 34, and m∠C = 62, find m∠B.
3. If a = 19, c = 12, and m∠A = 88, find m∠C.
4. If a = 27, m∠A = 70, and m∠B = 15, find b.

1. Make a new triangle below. Label the angles A,B, and C. Label the sides “a”, “b”, and “c”. In your triangle below, label angle A as 42 degrees. Then label side “a” as being 30 long and label side “c” as being 40 long. Use the formula to find angle C. Go!!!
2. Did you get 63.1? If so, move on. If not, take your right arm and throw it up in the air. I will come help you. Do it now!!

\*\*\* Now finish the rest of the problems on the next few pages. \*\*\*

**Use the given triangle and the information provided to solve for x and y.**

1.

2.

18

x

48°

42°

6

x

85°

y

18°

36

y

x

22°

103°

y

3.

**Draw a triangle to go with each problem and label it with the given information. Then solve for what you are asked. Round angle measures to the nearest degree and side measures to the nearest tenth.**

1. Two ice-cream stores A and B are 17 miles apart. Bill is located at point X at the same time. The three points form ∠XAB, which measures 52°, and ∠XBA, which measures 44°. How far is Bill from each ice-cream store?
2. One side of Greg’s triangular back yard is 22 feet. The angles on each side of this side measure 62° and 79°. Find the total length of fence needed to enclose the garden.
3. A frightened pet owner wants to determine the distances from points A and B to her cat that is stuck in a tree. ∠BAC measures 59°. If points A and B are 96 feet apart, find the distance from C to each point.