PreCalculus   Name: Period: Date:

Warm Up 2/6

Lesson 6-4: The Law of Sines
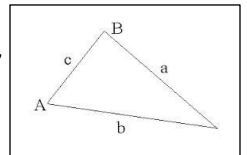
Objectives

Students will…
-    Be able to know what Law of Sines is.
-    Be able to apply the Law of Sines to solve for missing sides or angles.

Triangles
We've been studying the trigonometric ratios involving right triangles. Trigonometry can also be used for **non**-right triangles. First thing we need to do is to be consistent with our notations.
Consider the triangle $\triangle ABC$ shown on the right. The uppercase letters A, B, C represent the _____, or the _____ of the triangle, while the lower case letters a, b, c represent the sides.
For ease, the angles will always be labeled by uppercase letters, while the side _____ to each angle will always be labeled with the lowercase letter of the opposite angle.
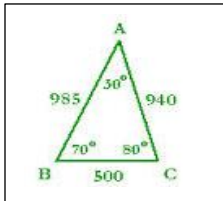So, from our picture, we see that a is the side opposite to A, while b is the side opposite to B and c is the side opposite to C.

Law of Sines

There exists and important law regarding triangles (not just right triangles) derived from its _____.
Law of Sines- For any triangle the lengths of its sides are proportional to the sines of the corresponding opposite angles. Namely, for $\triangle ABC$:
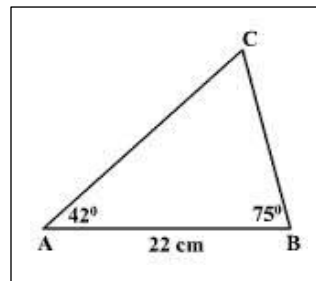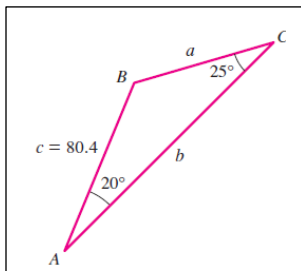
Ex.

For the $\triangle ABC$ to the left, we have…

Example

So we can apply the Law of Sines to solve for missing sides or angles.
(Important: Make sure your calculator is in the right mode!)
Find a and b.   Solve the triangle (i.e. find all missing sides and angles).

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Ambiguous Cases: Two solutions
The two previous examples had _____ known _____. There may be a case where we might only have _____ known _____, but with _____ known _____. In either case, Law of Sines can be applied to solve the triangle. However, one important thing to bear mind here is the fact there may be _____, or even ____correct answer when the Law of Sines is applied with **one known angle and two known sides**. Consider the following: *Solve triangle ΔABC if $\angle A = 43.1°$, $a = 186.2$, and $b = 248.6$*

Ambiguous Cases: One solution
Now consider: *Solve triangle ΔABC if $\angle A = 45°$, $a = 7\sqrt{2}$, and $b = 7$*

Ambiguous Cases: No solution
Now consider: *Solve triangle ΔABC if $\angle A = 42°$, $a = 70$, and $b = 122$*

General Guideline: Law of Sines

Law of Sines:

_____ and _____ known: Only ___possible outcome.
_____ and _____ known:

        Case I- _____ outcome (angle measure of triangles cannot exceed _____)

        Case II- _____possible outcomes

        Case III- ____ possible outcome (sine of an angle cannot be _____)
            ex. $\sin A = 1.239$ →   no possible solution.

Homework 2/6
TB pg. 506 #1, 3, 5, 11, 15, 17, 19, 21, 23, 25