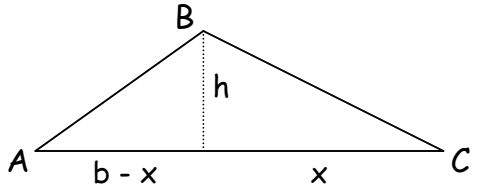
Pre-Calculus Notes 6.2 **Name:** _____

Law of Cosines

Remember the Law of Sines
We used it to *find a side* given _____or _____

We used it to *find an angle* given _____(Note: we had to always check for the number of triangle on this one!)

Could we ***find a side*** given **SAS**



$c^2 = h^2 + (b - x)^2$

algebra magic

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

MEMORIZE: THE LAW OF COSINES

For ANY triangle ABC, where a, b, and c are the lengths of the sides OPPOSITE the angles with measures A, B, and C (respectively)…

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

Generally, since not every triangle is labeled ABC:
The length of a missing side = _____

twice the product of_____

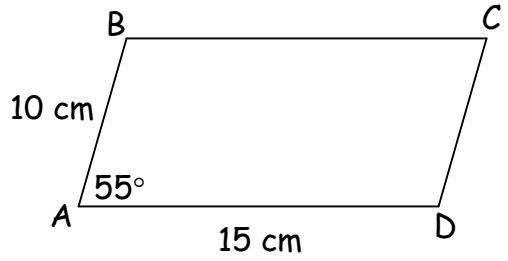
(Note: we must have **SAS** to use this formula)

Examples: Solve triangle ABC.

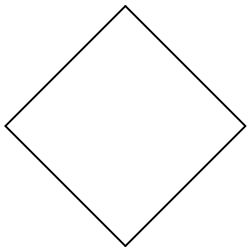
1. $\angle C = 100.5^\circ$, $a = 1.2$, and $b = 2.6$

2. $\angle A = 115^\circ$, $b = 10cm$, and $c = 15cm$

3. Given the following parallelogram, find the measures of the other angles and the two diagonals.



Bonus: What is the area of the parallelogram?

4. The pitcher's mound on a women's softball field is 43 feet from home plate and the distance between the bases is 60 feet. (The pitcher's mound is not halfway between home plate and second base.) How far is the pitcher's mound from first base? 	5. Two ships leave port at 1P.M. One travels with a bearing of $N\,50^\circ E$ at a speed of 10 miles per hour. The other ship travels with a bearing of $S\,42^\circ E$ at a speed of 15 miles per hour. At 3 P.M., how far apart will the ships be?

Notes 6.2 Part 2

Remember the Law of Sines
We used it to *find a side* given _____or _____

We used it to *find an angle* given _____(Note: we had to always check for the number of triangle on this one!)

Remember the Law of Cosines
We used it to *find a side* given _____

Could we ***find an angle*** given **SSS ?** **Yes, we could use the Law of Cosines**

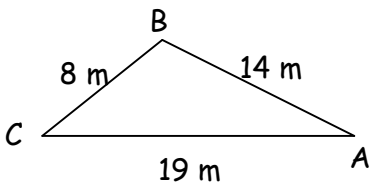
Solve for angle C $c^2 = a^2 + b^2 - 2ab\cos C$	$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$ so C = _____ $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$ so C = _____ $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$ so C = _____

Generally, since not every triangle is labeled ABC:
The measure of a missing angle = _____
-_____ , all divided by _____
(Note: we must have **SSS** to use this formula)

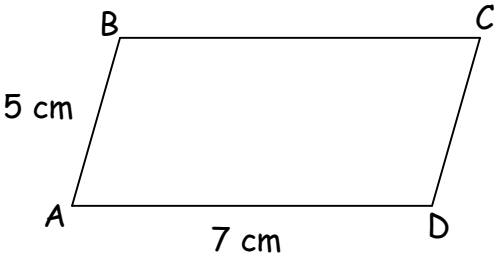
Examples:

1. Find angle A in triangle ABC. a = 20, b = 18, and c= 13.

2. Solve the following triangle ABC



3. Given the following parallelogram, find the measures of the angles and the other diagonal, given AC=10.



4. A ship travel 60 miles due east, then adjusts its course northward. After traveling 80 miles in that direction, the ship is 139 miles from its point of departure. Describe the bearing of the ship from point B to point C.

5. A 150-foot vertical tower is to be erected on the side of a hill that makes a $5°$ angle with the horizontal. Find the length of the two guy wires that will be needed to anchor the base 100 feet uphill and 100 feet downhill.