

## Today's Learning Goal(s):

By the end of the class, I will be able to:

- Correctly write the cosine LAW to find an unknown **angle**.
- Use the cosine law to solve a non-right triangle.

Practice:  $A = \cos^{-1} \left( \frac{5.8^2 + 6.2^2 - 7.3^2}{2(5.8)(6.2)} \right) \rightarrow \left( \frac{18.79}{71.92} \right)$

until you get  $\doteq 74.855^\circ$  on your calculator!



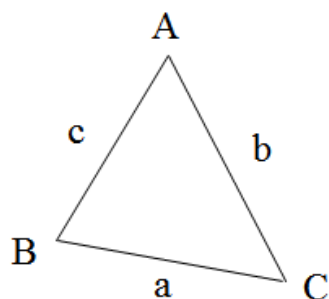
MBF 3CI

1.4 The Cosine Law (Day 2)

Date: Sept-13/17

The Cosine Law can be used with any triangle, even if it is not a right triangle.

Given any triangle,



$$\textcircled{1} \quad a^2 = b^2 + c^2 - 2bc \cos A \quad (\text{SAS})$$

$$\textcircled{2} \quad \cos A = \frac{b^2 + c^2 - a^2}{2bc} \quad (\text{SSS})$$

When the triangle we are solving involves 2 known sides and the contained angle (a.k.a. SAS), then we use the formula given in  $\textcircled{1}$ , because the sine law will not work.

Remember to take the square root of the answer to find  $a$ .

When the triangle we are solving involves 3 known sides, but no known angles (a.k.a. SSS), then we use the formula given in  $\textcircled{2}$ .

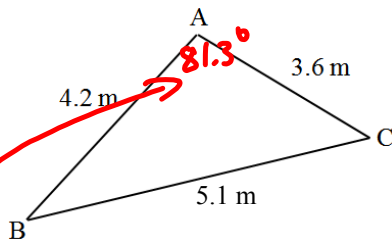
Remember to take the inverse cos, (or  $\cos^{-1}$ ) to find the measure of angle A.

Note: In this case, always find the largest angle first, in case it is an obtuse angle. The largest angle will be located opposite the longest side. [Think about it!]

Ex. 2 Solve the triangle. (Round side lengths and angles to the nearest tenth)

Diagram is not drawn to scale.

*(Tenth means 1 decimal place).*



$\angle A$	$\angle C$	$\angle B$
Since we have SSS, use ②	Now use the sine law (it's easier)	Now use the triangle sum
$\cos A = \frac{3.6^2 + 4.2^2 - 5.1^2}{2(3.6)(4.2)}$	$\frac{\sin C}{4.2} = \frac{\sin 81.3^\circ}{5.1}$	$\angle B \doteq 180^\circ - 81.3^\circ - 54.5^\circ$
$A = \cos^{-1}\left(\frac{3.6^2 + 4.2^2 - 5.1^2}{2 \times 3.6 \times 4.2}\right)$	$5.1 \sin C \doteq 4.2 \sin 81.3^\circ$	$\doteq 44.2^\circ$
$\doteq \cos^{-1}\left(\frac{4.59}{30.24}\right)$	$\sin C \doteq \frac{4.2 \sin 81.3^\circ}{5.1}$	
$\doteq 81.26$	$C \doteq \sin^{-1}\left(\frac{4.2 \sin 81.3^\circ}{5.1}\right)$	
$\doteq 81.3^\circ$	$\doteq 54.49$	
	$\doteq 54.5^\circ$	

**Review the learning goals on the next page.**

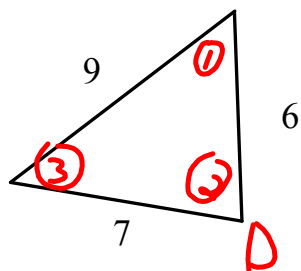
**Review the learning goals. Were we successful today?**

By the end of the class, I will be able to:

- Correctly write the cosine LAW to find an unknown angle.
- Use the cosine law to solve a non-right triangle.

**Today's entertainment: p. 39 #2, 7**

Quick Practice Question:



Label the angle you should find first as "D".

Write the formula for cosD.

$$\cos D = \frac{6^2 + 7^2 - 9^2}{2(6)(7)}$$