pg 434 #7

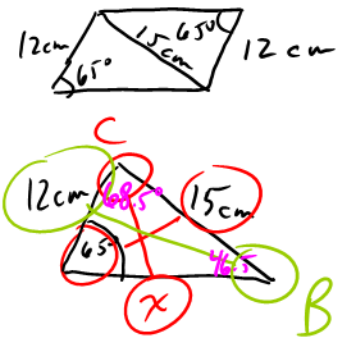
$$\frac{\sin B}{12} = \frac{\sin 65}{15}$$

$$\sin B = \left(\frac{\sin 65}{15}\right) \times 12$$

$$\sin B = 0.725046\ldots$$

$$\angle B = \sin^{-1}(0.725046\ldots)$$

$$\angle B = 46.5^\circ$$



ASTT $\angle C = 180 - 65 - 46.5 = 68.5^\circ$

$$\frac{x}{\sin 68.5} = \frac{15}{\sin 65}$$

$$x = \left(\frac{15}{\sin 65}\right) \times \sin 68.5$$

$$x = 15.4 \text{ cm}$$

Chapter 8 – Acute Triangle Trigonometry

8.3 – 8.4: The Cosine Law

The Cosine Law is another "formula" for solving Oblique Triangles. Remember, to "solve" a triangle you MUST be given 3 PIECES OF INFORMATION about the triangle (and I should note that one of those given pieces MUST BE A SIDE LENGTH).

The main question you will have to be able to answer is this:

When do you use

1) SOH CAH TOA

   When you have a Right Triangle

2) The SINE LAW

   When you have a acute triangle

   and you have a CORRESPONDING PAIR in the triangle (barbell)

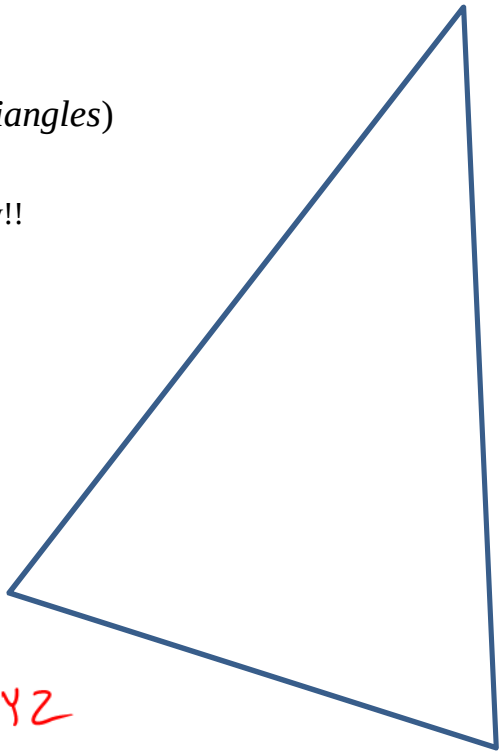
ASA, ASS, AAS

3) The COSINE LAW → when? when the other two don't work!

   or SAS, SSS

two sides and the included angle.

The Cosine Law *(for oblique triangles)*



There are **THREE SIDE FORMS** you should know!!

Given the non-right triangle, ΔABC, then:

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

or

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

or

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

$\triangle XYZ$

$$x^2 = y^2 + z^2 - 2yz\cos X$$

Also, there are **THREE ANGLE FORMS** you should know!!

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

or

$$\cos(B) = \frac{a^2 + c^2 - b^2}{2ac}$$

or

$$\cos(C) = \frac{a^2 + b^2 - c^2}{2ab}$$

The formula you use depends on which side or angle you are looking for!!!

Note: You will be given a formula sheet on tests.

$\triangle XYZ$

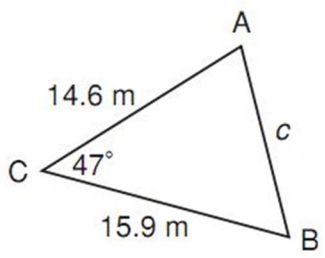
$$\cos X = \frac{y^2 + z^2 - x^2}{2yz}$$

Now, let's do some examples:

Example 1.5.1

For each of a), b) and c) determine whether you would use the Sine Law or the Cosine Law. Give a reason.

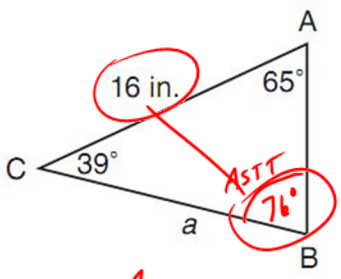
a)



→ SAS

Cosine Law

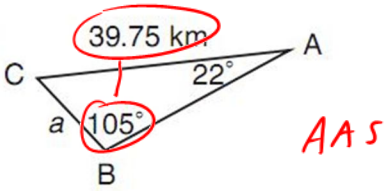
b)



ASA

Sine Law

c)



AAS

Sine Law

Example 1.5.2

Determine the indicated side (set up the "law" using the correct triangle labels!):

a = m
b = p
c = n

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

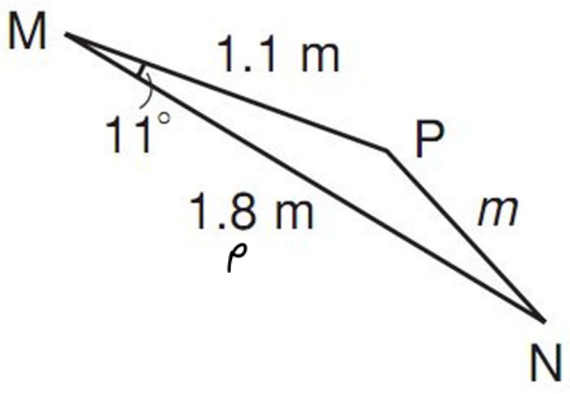
$m^2 = p^2 + n^2 - 2pn\cos M$

$m^2 = (1.8)^2 + (1.1)^2 - 2(1.8)(1.1)\cos 11$

↳ in calc.

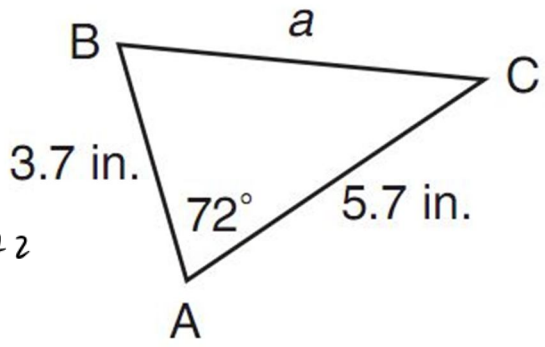
$m^2 = 0.562756\ldots$

$m = 0.75$



Example 1.5.3

Determine the indicated side:



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

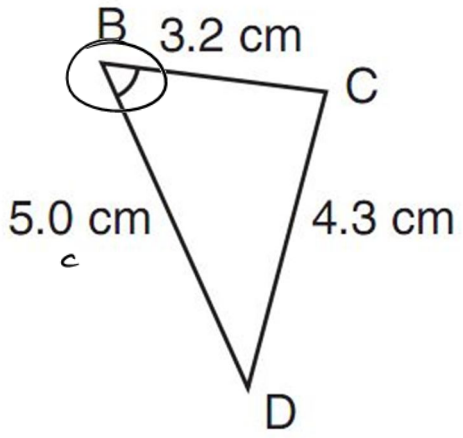
$a^2 = (5.7)^2 + (3.7)^2 - 2(5.7)(3.7)\cos 72$

$a^2 = 33.14566$

$a = 5.8$ in

Example 1.5.4

Determine the indicated angle:



$\cos B = \dfrac{c^2 + d^2 - b^2}{2cd}$

$\cos B = \dfrac{(5)^2 + (3.2)^2 - (4.3)^2}{2(5)(3.2)}$ — in calc / — in calc.

$\cos B = \dfrac{16.75}{32}$

$\angle B = \cos^{-1}\left(\dfrac{16.75}{32}\right)$

$\angle B = 58°$

Class/Homework: Page 443 #2, 3a, 4b, 5bc, 7, 9