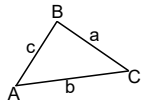
Non Right Angled Trig - Cosine Law

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

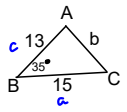
$b^2 = a^2 + c^2 - 2ac \cos B$

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



1st Case:

Finding a side when the other two sides, and the angle contained between them, are given.



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

$b^2 = 15^2 + 13^2 - 2(15)(13)\cos 35°$

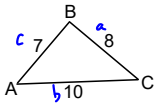
$b^2 = 74.53$

$b = 8.6$ units

2nd Case:

Finding an angle when the three sides are given.

Find the measure of angle C.



1st Method:

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

$7^2 = 8^2 + 10^2 - 2(8)(10)\cos C$

$49 = 164 - 160\cos C$

$\frac{-115}{-160} = \frac{-160\cos C}{-160}$

$\cos C = \left(\frac{115}{160}\right)$

$C = \cos^{-1}\left(\frac{115}{160}\right)$

$C = 44.05°$

2nd Method:

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

$\cos C = \frac{8^2 + 10^2 - 7^2}{2(8)(10)}$

$\cos C = \frac{115}{160}$

$C = \cos^{-1}\left(\frac{115}{160}\right)$

$= 44.05°$

Three Angle formulas are:

① $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

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

③ $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$

*Don't forget to evaluate $\cos^{-1}$ at the end!

This is for you Michael! :) how to isolate $\cos C$

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

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

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

$C = \cos^{-1}\left(\frac{a^2 + b^2 - c^2}{2ab}\right)$