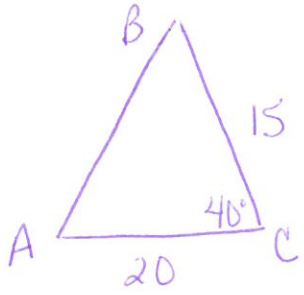
Section 6-2 Law of Cosines

1. In ΔABC, C=40°, b = 20cm, a = 15cm. Find c.



* Always draw a picture!!

can't use pythagorean theorem → NOT RIGHT Δ

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

$c^2 = 15^2 + 20^2 - 2(15)(20)(\cos 40°)$

$c^2 = 165.3733$

$c \approx 12.86$ cm

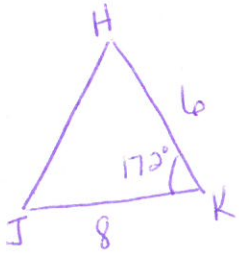
* remember * smallest side is across from the smallest ∠. Largest side across from largest ∠.

** Remember: angle 'A' goes across from side 'a', and so on.

The Law of Cosines

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

2. In ΔHJK, h = 8m, j = 6m, and K = 172 . Find k.



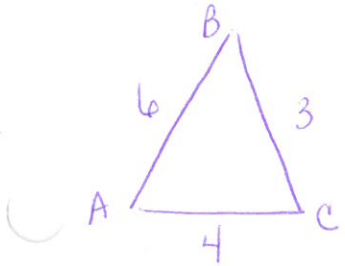
$K^2 = h^2 + j^2 - 2(h)(j)(\cos K)$

$K^2 = 8^2 + 6^2 - 2(8)(6)(\cos 172)$

$K^2 = 195.0657$

$K \approx 13.97$ m

3. In ΔABC, a = 3cm, b = 4cm, c = 6cm. Find C.



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

$6^2 = 3^2 + 4^2 - 2(3)(4)(\cos C)$

'variable'

* think of these as 2 different parts -- can't combine them because 1 has a "var."

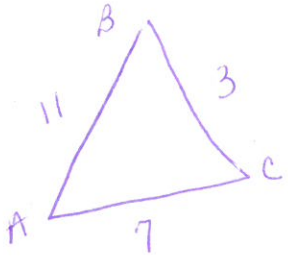
$36 = 25 - 24\cos C$

$11 = -24\cos C$

Why don't we use arccos here? → $-\frac{11}{24} = \cos C$

$C = 117.3 \approx 117°$

4. In ΔABC, a = 3m, b = 7m, and c = 11m. Find C.



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

$11^2 = 3^2 + 7^2 - 2(3)(7)\cos C$

$63 = -42\cos C$

$\frac{63}{-42} = \cos C$

error $\emptyset$

* $\cos C$ cannot be greater than 1.

* How could you tell from the start this was going to be $\emptyset$?

Ans: 2 smaller sides of the Δ must add up to be greater than the 3rd (largest) side.

$3 + 7 \not> 11$

so, no triangle possible

$\emptyset$