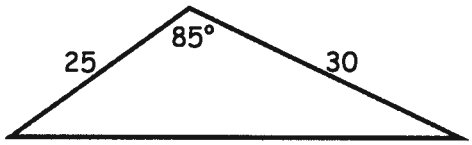
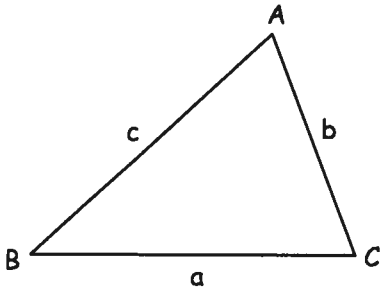
Cosine Law

- There are 2 cases of non-right triangles where the Sine law cannot be applied.
  1) All 3 sides are known but none of the angles.
  2) Two sides and the contained angle are known.



- In these cases another tool must be used, the Cosine Law.

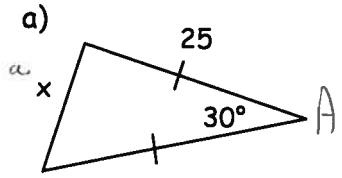


$$a^2 = b^2 + c^2 - 2bc\ \text{Cos}\,A$$

Must know one value and be missing the other.
Always across from each other in the diagram.

Ex/ Determine the unknown measure.

a)



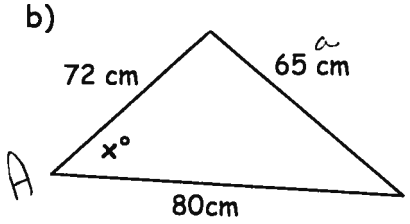
$x^2 = 25^2 + 25^2 - 2(25)(25)\cos 30$

$x^2 = 167.47$

$x = \sqrt{167.47}$

$= 12.94$

b)



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

$\cos X = \dfrac{[72^2 + 80^2 - 65^2]}{[2(72)(80)]}$ ← Put brackets around or d each part seperately

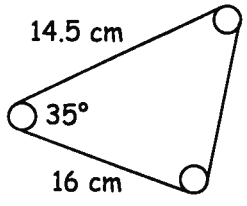
$\cos Y = \dfrac{7359}{11520}$

$\cos x = 0.639\ldots$

$X = \cos^{-1}(0.639\ldots)$ } Take the inverse

$= 50.3$

Ex/ A drive belt wraps around three pulleys as shown. Find the total length of the belt.



$Y^2 = 14.5^2 + 16^2 - 2(14.5)(16)\cos 35$

$= 86.1$

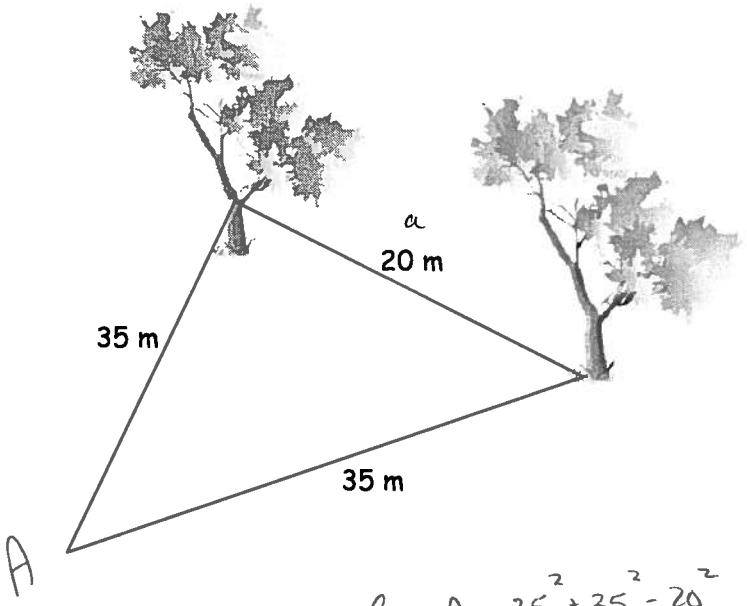
$Y = \sqrt{86.1}$

$= 9.28$

Belt $= 14.5 + 16 + 9.28$

$= 39.78\ m$

Ex/ Cheryl is trying to hit her golf ball between two trees. She estimated the distances shown. Within what angle must Cheryl make her shot, in order to pass between the trees?



$$\cos A = \frac{35^2 + 35^2 - 20^2}{2(35)(35)}$$

$$= \frac{2050}{2450}$$

$$\cos A = 0.837\ldots$$

$$A = \cos^{-1}(0.837\ldots)$$

$$= 33.2^\circ$$

Homework: Pg. 443 #'s: 3,4,5a,7,11,12