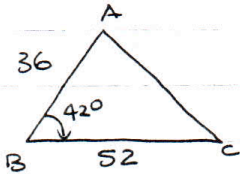


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Cosine Law

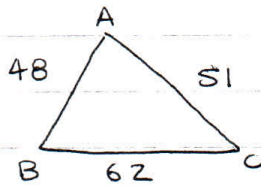
What happens when a triangle is not right angle and you do not have 2 angles and 1 side or 2 sides and an opposite angle?

i.e. you have 2 sides and a contained angle



OR

i.e. 3 sides, no angles



You use COSINE LAW

2 types → 1 for sides

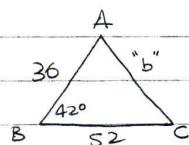
→ 1 for angles

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

$$\text{For Sides} \rightarrow a^2 = b^2 + c^2 - 2bc \cos A$$

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

Example 1:



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

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

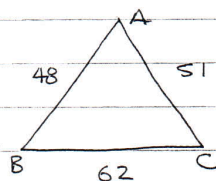
$$b = \sqrt{52^2 + 36^2 - 2(52)(36)(\cos 42)}$$

$$= \sqrt{2704 + 1296 - 3744 (\cos 42)}$$

$$= \sqrt{1217.665}$$

$$= 34.9$$

Example 2:



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

$$\cos A = \frac{51^2 + 48^2 - 62^2}{2(51)(48)}$$

$$\therefore \angle B$$

$$180 - 77 - 53 = 50^\circ$$

$$\cos^{-1} = \frac{1061}{4896}$$

$$= 77.48 \rightarrow 77^\circ$$

NOTE: due to rounding
you may be 1° off on
some of them.

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

$$\cos^{-1} = \frac{62^2 + 48^2 - 51^2}{2(62)(48)}$$

$$\cos^{-1} = 53^\circ$$