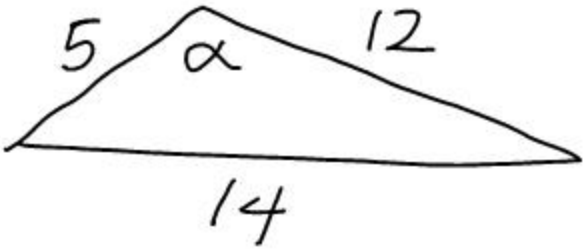
# SSS case of the Cosine Rule




Find $\alpha$.

$$c^2 = a^2 + b^2 - 2ab\cos\gamma \quad (SAS)$$

$$c^2 - a^2 - b^2 = -2ab\cos\gamma$$

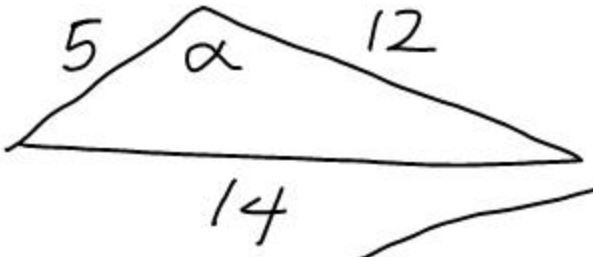
$$\left(\frac{-1}{-1}\right)\left(\frac{c^2 - a^2 - b^2}{-2ab}\right) = \cos\gamma$$

opposites

$$\cos\gamma = \frac{a^2 + b^2 - c^2}{2ab} \quad \text{SSS}$$

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

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




Find $\alpha$.

opposites

$$\cos\alpha = \frac{5^2 + 12^2 - 14^2}{2(5)(12)} = \underbrace{-0.225}_{\text{quad II}}$$

$$\alpha = 103.0^\circ$$

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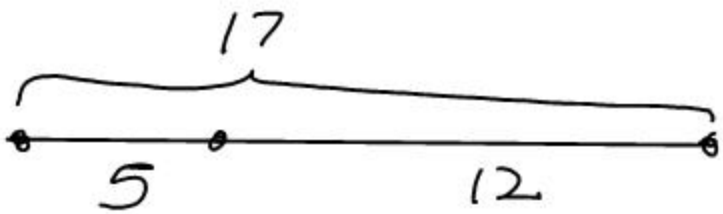
Ex. $a = 5,\ b = 12,\ c = 17$

Find $\beta$

No such triangle




The 2 shorter sides must add up to more than the longest side.