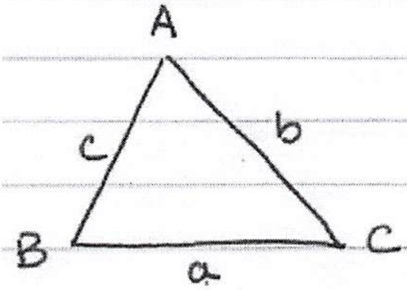
2.4 – THE COSINE LAW

Using standard notations, the cosine law is:

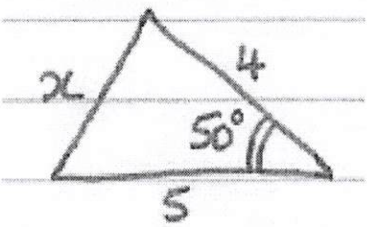


$$\boxed{a^2 = b^2 + c^2 - 2bc.\cos A}$$

opposite side of the angle

This formula works for any type of triangle.

Example 1: Determining a length

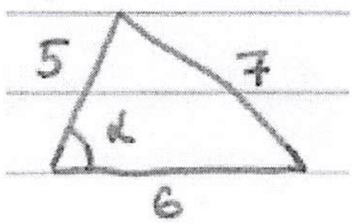


$x^2 = 4^2 + 5^2 - 2 \times 4 \times 5 \times \cos 50$

$x = \sqrt{41 - 40\cos 50}$

$x \simeq 3.9$

Example 2: Determining an angle



$7^2 = 5^2 + 6^2 - 2 \times 5 \times 6 \times \cos \alpha$

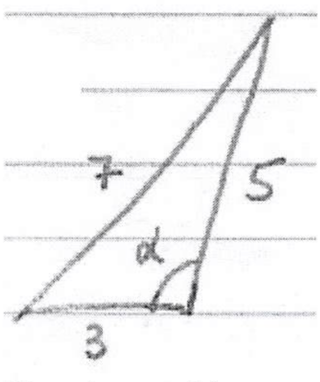
$49 = 61 - 60\cos\alpha$

$60\cos\alpha = 12$

$\cos\alpha = \frac{12}{60} \Rightarrow \alpha = \cos^{-1}\left(\frac{12}{60}\right)$

$\alpha \simeq 78°$

Example 3: Determining an angle



$7^2 = 3^2 + 5^2 - 2 \times 3 \times 5 \times \cos\alpha$

$49 = 34 - 30\cos\alpha$

$30\cos\alpha = -15$

$\cos\alpha = -\frac{1}{2}$

$\alpha = \cos^{-1}\left(-\frac{1}{2}\right) \qquad \alpha = 120°$

There is no ambiguous case with the cosine law.
If cos x is negative, the angle is obtuse, and the calculator will give the corresponding angle directly.

Hwk: p 119 # 1ac, 2ac, 4abde, 5, 7, 8, 10, 14, 15, 20, 23, 26.