Guide to:
The cosine rule

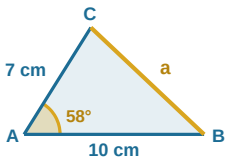
maths Links

Explanation:

Use the Cosine Rule when you do not have a complete opposite side-angle pair: either you know **2 sides and the included angle (SAS)** and want the third side using $\mathbf{a^2 = b^2 + c^2 - 2bc \cos A}$, or you know **all 3 sides (SSS)** and want an angle using $\mathbf{\cos A = \frac{b^2 + c^2 - a^2}{2bc}}$.

Make sure the side labeled **a** is always the side directly opposite the angle **A** in the formula. Remember to take the square root at the end when finding a side length.

Example 1: Find side a when b = 7 cm, c = 10 cm, and included angle A = 58° (3 s.f.).



Solution:

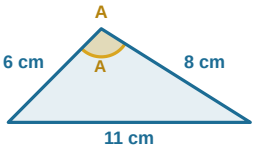
$a^2 = 7^2 + 10^2 - (2 \times 7 \times 10 \times \cos 58°)$

$a^2 = 149 - 140 \cos 58° = 74.8112...$

$a = \sqrt{74.8112...} = 8.6493...$ cm

Answer: a = 8.65 cm (3 s.f.)

Example 2: A triangle has sides 6 cm, 8 cm, and 11 cm. Find the largest angle (1 d.p.).



Solution:

Largest angle A is opposite longest side (**a = 11**):

$\cos A = \frac{6^2 + 8^2 - 11^2}{2 \times 6 \times 8} = -\frac{21}{96}$

$A = \cos^{-1}(-0.21875) = 102.635...°$

Answer: 102.6° (1 d.p.)

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