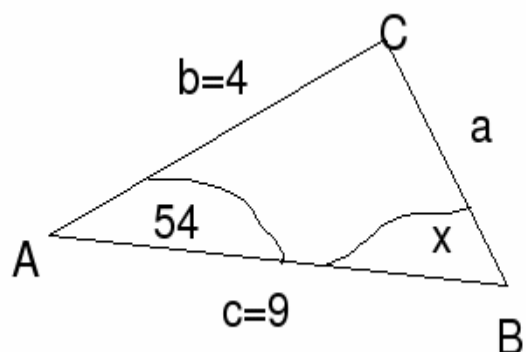
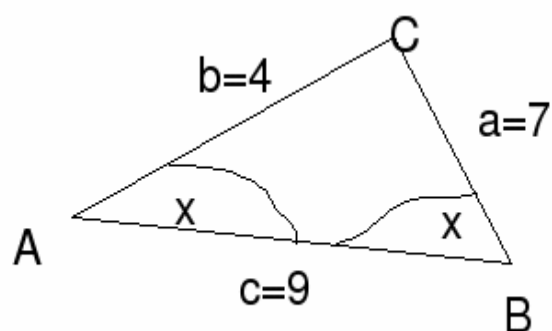


The Cosine Rule

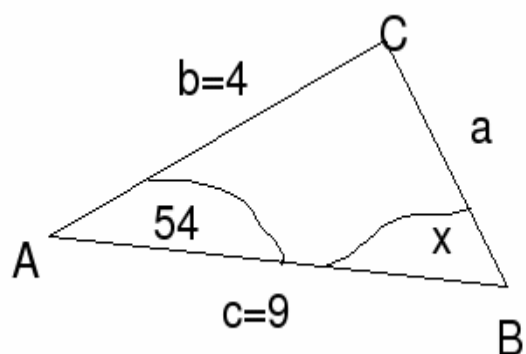
We can use the cosine rule to:



1. Find a side when it is opposite a known angle and that angle is between two known sides.



2. Find an angle when all three sides are known.



1. We start by labelling the sides a, b, c and the angles A, B, C with sides opposite their respective angles as shown.

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

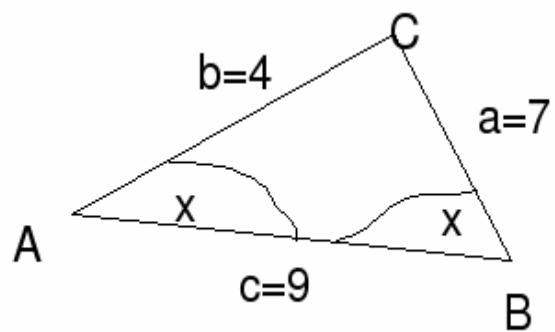
$$a^2 = 4^2 + 9^2 - 2 * 4 * 9 * \cos 54$$

$$a^2 = 16 + 81 - 72 * 0.5878 = 54.77$$

$$a = \sqrt{(54.77)} = 7.395$$

2. We start by labelling the sides a, b, c and the angles A, B, C with sides opposite their respective angles as shown.

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



$$7^2 = 4^2 + 9^2 - 2 * 4 * 9 * \cos A$$

$$49 = 16 + 81 - 72 \cos A$$

$$49 = 97 - 72 \cos A$$

$$\cos A = \frac{49 - 97}{-72} = 0.6667$$

$$A = \cos^{-1} 0.6667 = 48.19$$