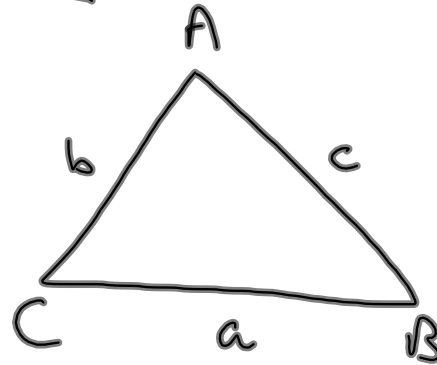


3.3 The Cosine Law

For acute $\triangle ABC$

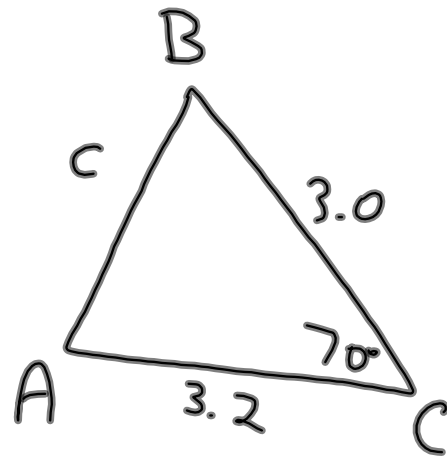


The cosine law says:

$$c^2 = \underline{a^2} + \underline{b^2} - \underline{2ab \cos C}$$

Also: $b^2 = a^2 + c^2 - 2ac \cos B$
 $a^2 = b^2 + c^2 - 2bc \cos A$

Ex: solve for side c



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = (3.0)^2 + (3.2)^2 - (2(3.0)(3.2) \cos 70^\circ)$$

$$c^2 = 9 + 10.24 - 6.57$$

$$c^2 = 12.67$$

$$c = \sqrt{12.67}$$

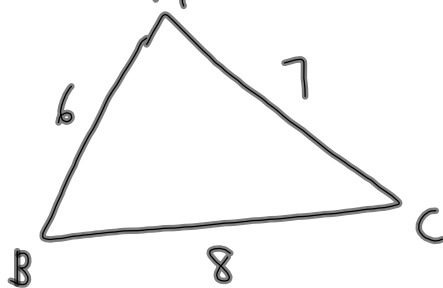
$$c = 3.6$$

Another case where sine Law does not work, but cosine law will is when we are given all 3 sides and no angles. To calculate one of the angles we rearrange the cosine law and write it as

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

Also: $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$, $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$

Ex: Determine the measure of $\angle A$ in the triangle below:



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

$$\cos A = \frac{7^2 + 6^2 - 8^2}{2(7)(6)}$$

$$\cos A = 0.25$$

$$A = \cos^{-1}(0.25)$$

$$A = 76^\circ$$

$$\cos A = \frac{49 + 36 - 64}{84}$$

$$\cos A = \frac{21}{84}$$

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