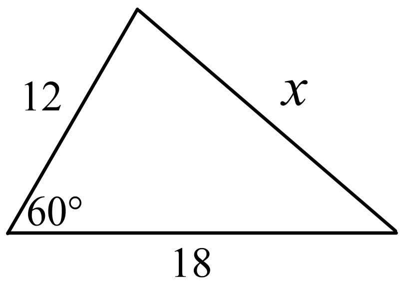
b) Law of Cosines

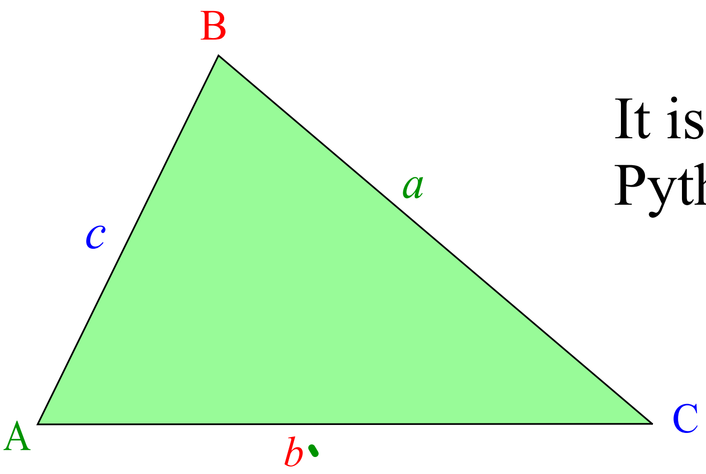
given:

i) Two sides and the included angle (SAS)



We can find the length of the side opposite the given angle.

Law of Cosines

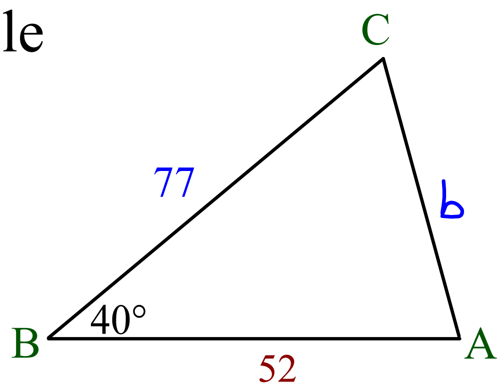


It is derived from the Pythagorean theorem.

To determine the length of a side

$$\begin{cases} c^2 = a^2 + b^2 - 2ab\cos C \\ \text{or} \\ a^2 = b^2 + c^2 - 2bc\cos A \\ \text{or} \\ b^2 = a^2 + c^2 - 2ac\cos B \end{cases}$$

Example



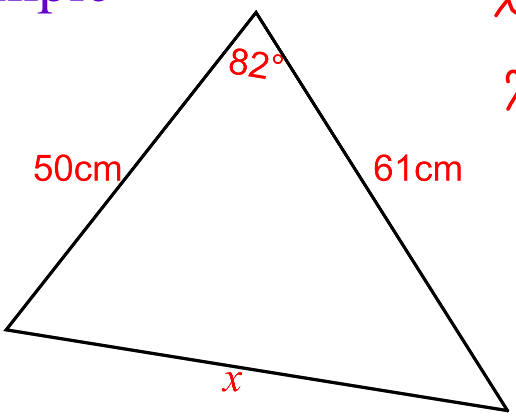
$$b^2 = a^2 + c^2 - 2ac \cdot \cos B$$

$$b^2 = 77^2 + 52^2 - 2(77)(52) \cdot \cos 40^\circ$$

$$b^2 = 2498.5161$$

$$b = \sqrt{2498.5161} = \underline{\underline{49.99}}$$

Example



$$x^2 = 50^2 + 61^2 - 2(50)(61)\cdot\cos 82^\circ$$

$$x^2 = 5372.044$$

$$x = \sqrt{5372.044}$$

$$x = \underline{73.29\ \text{cm}}$$

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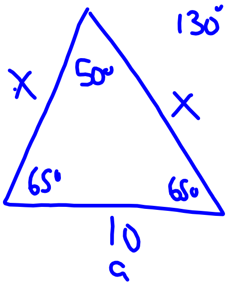
$180° - 50 = 130°$

$130° \div 2 = 65$



Question 10 a), b) & c)

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

$$10^2 = x^2 + x^2 - 2x^2 \cos 50°$$

$$100 = 2x^2 - 2x^2 \cos 50°$$

$$100 = 2x^2(1 - \cos 50°)$$

$$\frac{100}{2} = \frac{2x^2(0.35721)}{2}$$

$$\frac{50}{0.35721} = \frac{x^2 \cdot (0.35721)}{0.35721}$$

$$139.973 = x^2$$

$$11.8 = x$$

a) $x = 5.3$

b) $x = 6.1$

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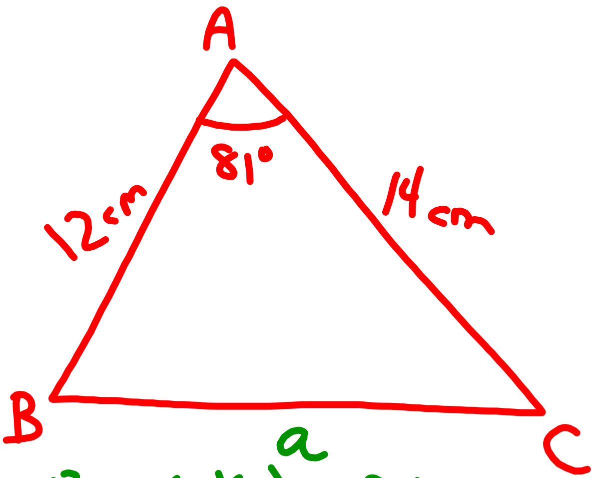

$$a^2 = 12^2 + 14^2 - 2(12)(14)\cos 81^\circ$$

$$a^2 = 287.438$$

$$a = \sqrt{287.438}$$

$$a = \underline{\underline{16.95 \text{ cm}}}$$