

Quiz: Sine Law and Cosine Law

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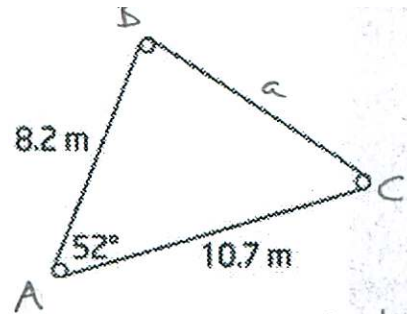
TIP: Write the formula, then substitute, to reduce potential for errors.

Marks

1. A fence is constructed around three posts, as shown.

Find the total length of the fence, to the nearest tenth of a metre.

(Ignore the curved sections at the vertices). Show the formula.



K 4

be careful... order of operations

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

$$\checkmark a^2 = (10.7)^2 + (8.2)^2 - 2(10.7)(8.2) \cdot \cos 52^\circ$$

$$\checkmark a^2 = 114.49 + 67.24 - 108.036$$

$$\checkmark a^2 = 73.694$$

$$\checkmark a = 8.6$$

length of fence = $a + b + c$
 $= 8.6 + 10.7 + 8.2$
 $= 27.5 \text{ m}$

\therefore the approx. length of the fence is 27.5 metres.

2. Find the measure of side b , to the nearest tenth of a metre.

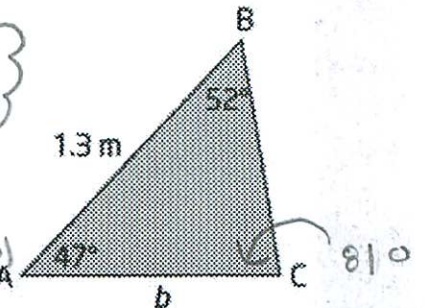
Please show the formula.

K 3

be sure to show this work

$$\angle C = 180^\circ - 52^\circ - 47^\circ$$

$$= 81^\circ$$



$$\frac{\sin C}{c} = \frac{\sin B}{b}$$

$$\checkmark \frac{\sin 81^\circ}{1.3} = \frac{\sin 52^\circ}{b}$$

$$b \cdot \sin 81^\circ = (1.3)(\sin 52^\circ)$$

$$b = \frac{(1.3)(\sin 52^\circ)}{\sin 81^\circ}$$

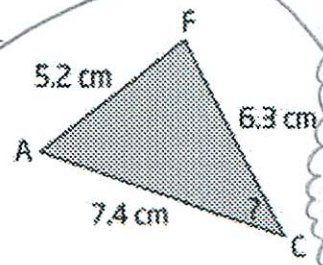
$$b = 1.0$$

3. Find the measure of $\angle C$ to the nearest degree.

K 3

$$\cos C = \frac{a^2 + f^2 - c^2}{2af}$$

$$\checkmark \cos C = \frac{(6.3)^2 + (7.4)^2 - (5.2)^2}{2(6.3)(7.4)}$$



be careful about what values you sub in

$$\cos C = \frac{67.41}{93.24}$$

$$\checkmark \angle C = 44^\circ$$

$$\checkmark \angle C = \cos^{-1} \left(\frac{67.41}{93.24} \right)$$

Marks

3. In large national parks, fire towers are used to spot forest fires. Park employees are in two fire towers that are 3.4 km apart, horizontally. A fire is spotted. From the first tower, the fire is spotted at an angle of 53° to the horizontal. From the second tower, the fire is spotted at an angle of 65° to the horizontal. Which tower is closer to the fire? Justify your answer using mathematics (explain why your answer is correct).

A5

tower 2 distance

$$\frac{\sin 53^\circ}{a} = \frac{\sin 62^\circ}{3.4} \quad \checkmark$$

$$a = \frac{(\sin 53^\circ)(3.4)}{\sin 62^\circ}$$

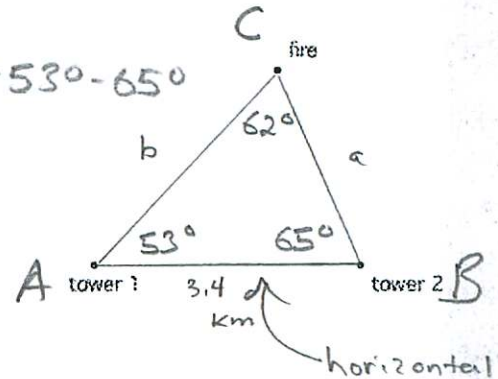
$$a \approx 3.1 \quad \checkmark$$

tower 1 distance

$$\frac{\sin 65^\circ}{b} = \frac{\sin 62^\circ}{3.4} \quad \checkmark$$

$$b = \frac{(\sin 65^\circ)(3.4)}{\sin 62^\circ}$$

$$b \approx 3.5 \quad \checkmark$$



need to explain why a tower is closest for full marks

\therefore , tower 2 is closer to the fire, since it is about 3.1 km away — as opposed to tower 1, which is about 3.5 km away from the fire. $\frac{1}{2}$