TG 4 Determine the possible dimensions for triangle ABC given $AB = 5.4$ cm, $\angle BAC = 32^\circ$ and $BC = 3$ cm.

Let $\angle ACB = \theta$:

$$\frac{\sin\theta}{5.4} = \frac{\sin 32^\circ}{3}$$

$$\sin\theta = \frac{5.4\sin 32^\circ}{3}$$

$$= 0.953854675\ldots$$

$$\theta = 72^\circ 32', 107^\circ 28' \qquad \text{(nearest min)}$$

If acute-angled triangle ABC, using $\theta = 72^\circ 32'$, let $\angle ABC = \alpha$:

$$\alpha = 180^\circ - (32^\circ + 72^\circ 32')$$

$$= 75^\circ 28'$$

Let $AC = x$:

$$x^2 = 3^2 + 5.4^2 - 2(3)(5.4)\cos 75^\circ 28'$$

$$= 30.02944009\ldots$$

$$x = 5.479912416\ldots$$

$$= 5.48 \text{ (2 dec pl)}$$

$\therefore AC = 5.48$ cm, $\angle ACB = 72^\circ 32'$, $\angle ABC = 75^\circ 28'$

If obtuse-angled triangle ABC, using $\theta = 107^\circ 28'$ with similar calculations,

$\therefore AC = 3.679$ cm, $\angle ACB = 107^\circ 28'$, $\angle ABC = 40^\circ 32'$

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by NESA.

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