3.3.13

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Question

Draw a triangle ABC with $BC = 7\ cm$, $\angle B = 45$ and $\angle C = 60$.

Solution

Given

- $BC = 7\ cm$
- $\angle B = 45$
- $\angle C = 60$

Place point **B** at the origin and point **C** along the x-axis:

$$\mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \quad \mathbf{C} = \begin{pmatrix} 7 \\ 0 \end{pmatrix} \tag{1}$$

Solution

Use Law of Sines to find sides AB and AC

Using:

$$\frac{AB}{\sin C} = \frac{AC}{\sin B} = \frac{BC}{\sin A} \tag{2}$$

(3)

$$AB = \frac{7 \cdot \sin(60)}{\sin(75)} 6.28 \ \textit{units} \tag{4}$$

$$AC = \frac{7 \cdot \sin(45)}{\sin(75)} 5.12 \ \textit{units} \tag{5}$$

Solution

Coordinates of Point A

Using angle $\angle B = 45$ and side $AB \approx 6.28$:

$$A_x = AB\cos(45) \approx 6.28 \times 0.707 \approx 4.44 \tag{6}$$

$$A_y = AB\sin(45) \approx 6.28 \times 0.707 \approx 4.44 \tag{7}$$

So:

Point **A** $\approx (4.44, 4.44)$

Plot

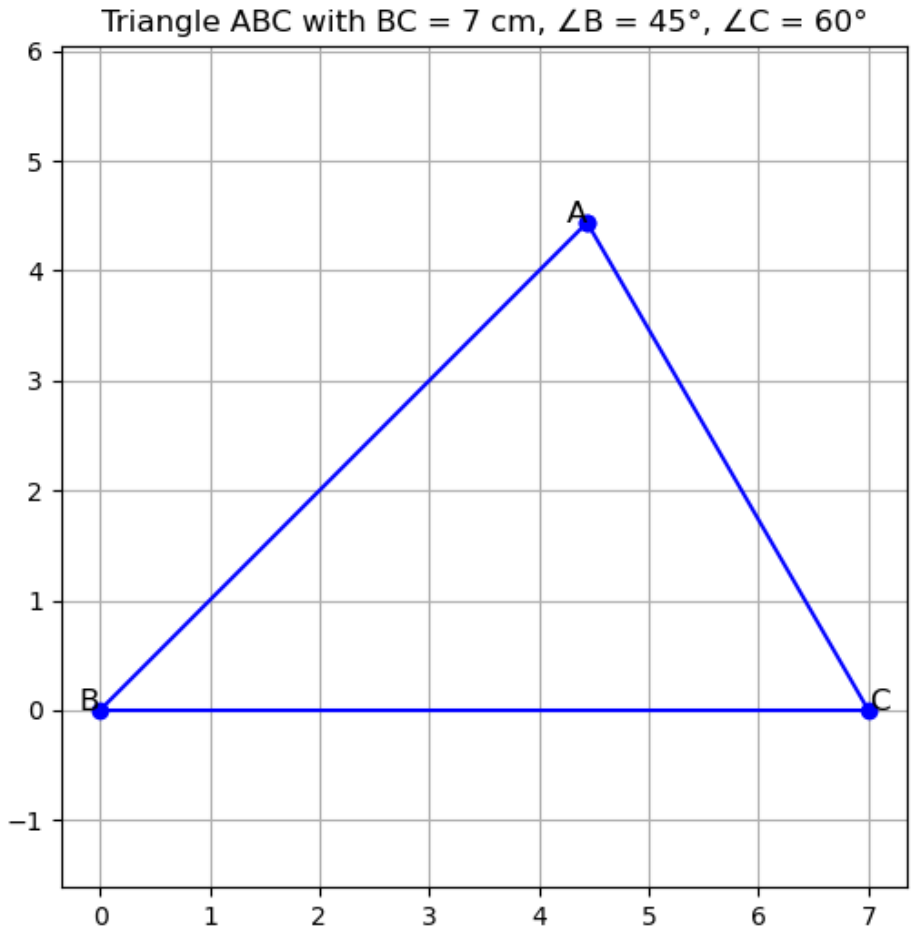

Figure: