

Question

Draw a triangle ABC with $BC = 7\text{ cm}$, $\angle B = 45^\circ$ and $\angle C = 60^\circ$.

Solution

Given

- $BC = 7\text{ cm}$
- $\angle B = 45^\circ$
- $\angle C = 60^\circ$

Approach

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

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

Use Law of Sines to find sides AB and AC

Using:

$$\frac{AB}{\sin C} = \frac{AC}{\sin B} = \frac{BC}{\sin A} \quad (2)$$

(3)

$$AB = \frac{7 \cdot \sin(60^\circ)}{\sin(75^\circ)} 6.28\text{ units} \quad (4)$$

$$AC = \frac{7 \cdot \sin(45^\circ)}{\sin(75^\circ)} 5.12\text{ units} \quad (5)$$

Coordinates of Point A

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

$$A_x = AB \cos(45^\circ) \approx 6.28 \times 0.707 \approx 4.44 \quad (6)$$

$$A_y = AB \sin(45^\circ) \approx 6.28 \times 0.707 \approx 4.44 \quad (7)$$

So:

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

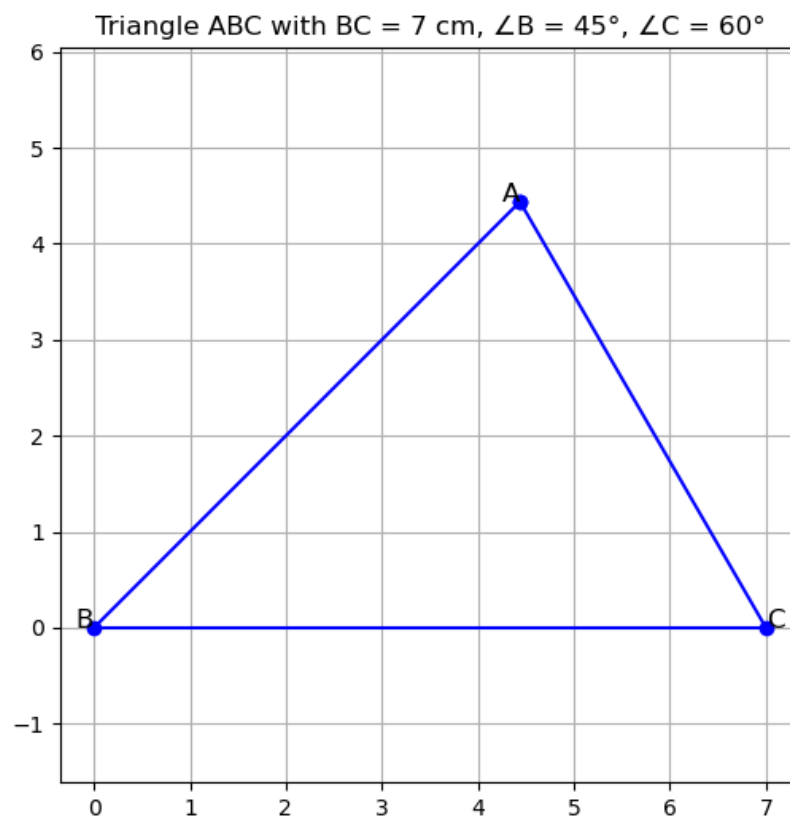


Figure 1