

# 3.2.11

EE25BTECH11065 - Yoshita.J

## Question:

Draw an Right angle triangle  $\triangle ABC$  in which  $BC = 12$  cm,  $AB = 5$  cm, and  $\angle B = 90^\circ$ .

## Solution:

Variable	Value
$BC$	12 cm
$AB$	5 cm
$\angle B$	$90^\circ$

TABLE 0

$$AB^2 = 5^2 = 25, \quad (0.1)$$

$$BC^2 = 12^2 = 144. \quad (0.2)$$

The squared length of AC is just the vector AC dotted with itself. In matrix form, that means multiplying the row vector (transpose) of AC with the column vector AC.

$$AC^2 = (\mathbf{AC})^T (\mathbf{AC}) \quad (0.3)$$

$$= (12 \ 5) \begin{pmatrix} 12 \\ -5 \end{pmatrix} \quad (0.4)$$

$$= (12 \times 12) + (5 \times -5) \quad (0.5)$$

$$= 144 + 25 = 169 \quad (0.6)$$

Thus, the length of AC is:

$$AC = \sqrt{169} = 13 \text{ cm}. \quad (0.7)$$

Let's put the triangle on the coordinate plane. Since  $\angle B$  is a right angle, we put  $B$  at the origin.

$$\mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\mathbf{A} = \begin{pmatrix} 0 \\ 5 \end{pmatrix} \text{ because } AB = 5 \text{ cm on the } y\text{-axis}$$

$$\mathbf{C} = \begin{pmatrix} 12 \\ 0 \end{pmatrix} \text{ because } BC = 12 \text{ cm on the } x\text{-axis}$$

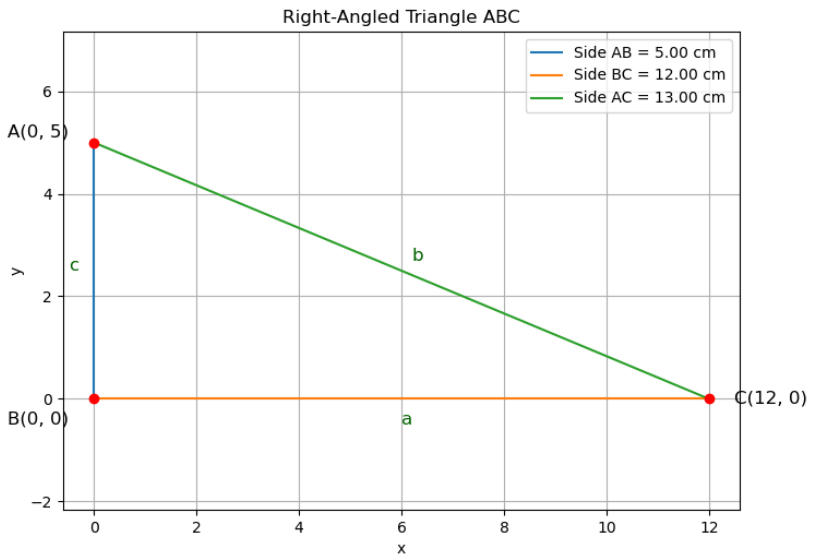


Fig. 0.1

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