3.2.11

EE25BTECH11065 - Yoshita.J

Question:
Draw an Right angle triangle $\triangle ABC$ in which $\boldsymbol{BC}$ = 12 cm, $\boldsymbol{AB}$ = 5 cm, and $\angle B = 90°$.
Solution:

Variable	Value
$\boldsymbol{BC}$	12 cm
$\boldsymbol{AB}$	5 cm
$\angle$**B**	90°

TABLE 0

$$AB^2 = 5^2 = 25,$$
$$BC^2 = 12^2 = 144.$$

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.

$$\begin{aligned} AC^2 &= (\mathbf{AC})^T(\mathbf{AC}) \\ &= \begin{pmatrix} 12 - 5 \end{pmatrix}\begin{pmatrix} 12 \\ -5 \end{pmatrix} \\ &= (12 \times 12) + (-5 \times -5) \\ &= 144 + 25 = 169 \end{aligned}$$

Thus, the length of AC is:

$$AC = \sqrt{169} = 13 \text{ cm}.$$

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

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

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

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

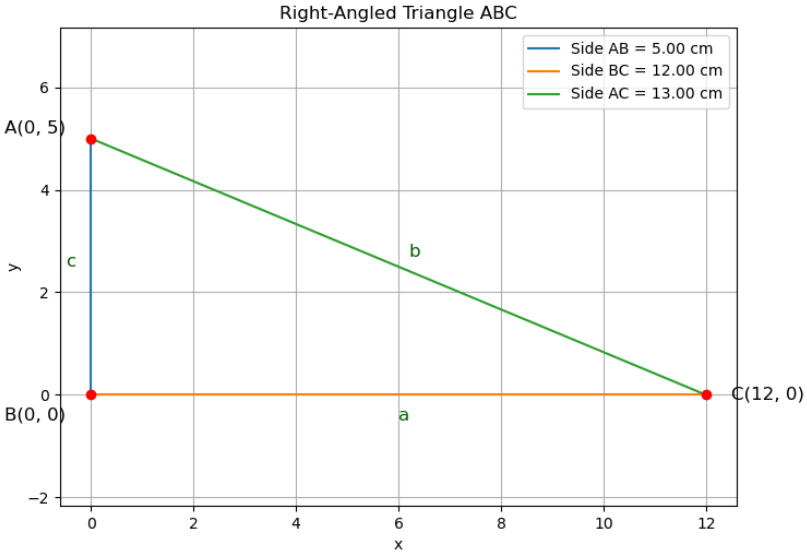

Fig. 0.1

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