

# ASSIGNMENT-1

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Download all python codes from

<https://github.com/BOJJAVOYINAANUSHA/Assignment.1/blob/main/ASSIGNMENT1/assignment1.py>

and latex-tikz codes from

<https://github.com/BOJJAVOYINAANUSHA/Assignment.1/blob/main/ASSIGNMENT1/main.tex>

By applying row reduction

$$\begin{pmatrix} 1 & 1 & 18 \\ 1 & -1 & 8 \end{pmatrix} \quad (2.0.11)$$

$$\xrightarrow{R_2 \rightarrow R_2 - R_1} \begin{pmatrix} 1 & 1 & 18 \\ 0 & -2 & -10 \end{pmatrix} \quad (2.0.12)$$

$$\xrightarrow{R_1 \rightarrow 2R_1 + R_2} \begin{pmatrix} 2 & 0 & 26 \\ 0 & -2 & -10 \end{pmatrix} \quad (2.0.13)$$

$$\xrightarrow{\begin{matrix} R_1 \rightarrow \frac{R_1}{2} \\ R_2 \rightarrow -\frac{R_2}{2} \end{matrix}} \begin{pmatrix} 1 & 0 & 13 \\ 0 & 1 & 5 \end{pmatrix} \quad (2.0.14)$$

Therefore,

$$\begin{pmatrix} b \\ c \end{pmatrix} = \begin{pmatrix} 13 \\ 5 \end{pmatrix} \quad (2.0.15)$$

Now, Vertices of given  $\triangle ABC$  can be written as,

$$\mathbf{A} = \begin{pmatrix} 0 \\ c \end{pmatrix} = \begin{pmatrix} 0 \\ 5 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix} = \begin{pmatrix} 12 \\ 0 \end{pmatrix} \quad (2.0.16)$$

## 1 QUESTION NO-2.6

$\triangle ABC$  is right angled at  $B$ . If  $a = 12$  and  $b + c = 18$ . Find  $b, c$  and draw the triangle.

## 2 SOLUTION

Let,

$$\mathbf{A} = \begin{pmatrix} 0 \\ c \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} a \\ 0 \end{pmatrix} \quad (2.0.1)$$

Given,

$$a = 12, b + c = 18 \quad (2.0.2)$$

From  $\triangle ABC$ , we use the Baudhayana sutra,

$$b^2 = c^2 + a^2 \quad (2.0.3)$$

$$\Rightarrow a^2 = b^2 - c^2 \quad (2.0.4)$$

$$\Rightarrow (12)^2 = (b + c)(b - c) \quad (\because a = 12) \quad (2.0.5)$$

$$\Rightarrow 144 = (18)(b - c) \quad (\because b + c = 18) \quad (2.0.6)$$

$$\Rightarrow b - c = 8 \quad (2.0.7)$$

Now we have,

$$b + c = 18 \quad (2.0.8)$$

$$b - c = 8 \quad (2.0.9)$$

which can be expressed as the matrix equation

$$\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} b \\ c \end{pmatrix} = \begin{pmatrix} 18 \\ 8 \end{pmatrix} \quad (2.0.10)$$

Now,  $\triangle ABC$  can be plotted using vertices  $AB$ ,  $BC$  and  $CA$ .

Plot the right angle  $\triangle ABC$ :

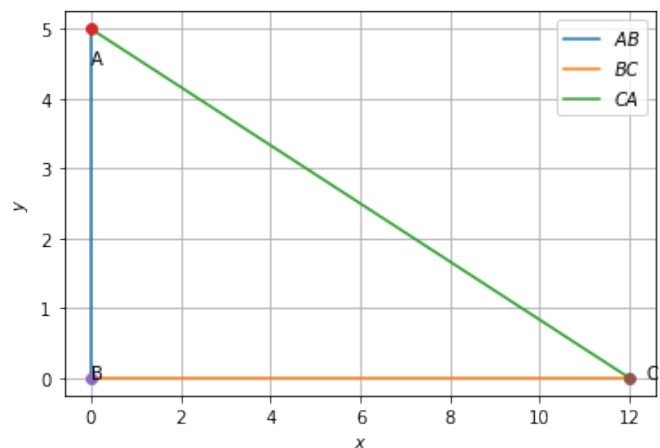


Fig. 2.1: Right Angle  $\triangle ABC$