

1.5.7

EE25BTECH11019 - Darji Vivek M.

Question:

If $\left(\frac{a}{3}, 4\right)$ is the midpoint of the line segment joining the points $(-6, 5)$ and $(-2, 3)$, then the value of a is (10, 2021)

Solution:

Variable	Description
A	First endpoint $(-6, 5)$
B	Second endpoint $(-2, 3)$
M	Midpoint of A and B
a	Unknown variable to be determined

TABLE 0: Variables Used

$$\mathbf{A} = \begin{pmatrix} -6 \\ 5 \end{pmatrix}, \quad \mathbf{B} = \begin{pmatrix} -2 \\ 3 \end{pmatrix} \quad (1)$$

The midpoint formula is

$$\mathbf{M} = \frac{\mathbf{A} + \mathbf{B}}{2} \quad (2)$$

Substituting values,

$$\mathbf{M} = \frac{1}{2} \left(\begin{pmatrix} -6 \\ 5 \end{pmatrix} + \begin{pmatrix} -2 \\ 3 \end{pmatrix} \right) = \frac{1}{2} \begin{pmatrix} -8 \\ 8 \end{pmatrix} = \begin{pmatrix} -4 \\ 4 \end{pmatrix} \quad (3)$$

But given midpoint is

$$\mathbf{M} = \begin{pmatrix} \frac{a}{3} \\ 4 \end{pmatrix} \quad (4)$$

Equating first components,

$$\frac{a}{3} = -4 \implies a = -12 \quad (5)$$

Hence, the value of a is -12

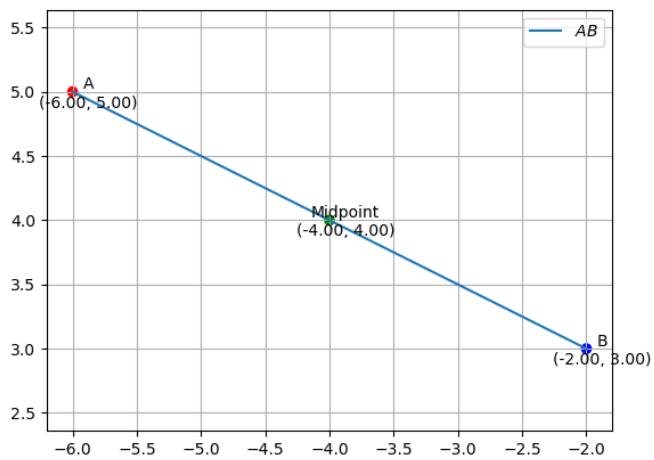


Fig. 0.1: plot