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 $(10, 2021)$

Variables Used

Symbol	Meaning
A	Point $(-6, 5)$
B	Point $(-2, 3)$
M	Midpoint
a	Unknown to find

Midpoint Formula

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

$$\mathbf{M} = \frac{\mathbf{A} + \mathbf{B}}{2} \tag{2}$$

Substitution

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

$$= \frac{1}{2}\begin{pmatrix}-8\\8\end{pmatrix} \tag{4}$$

$$= \begin{pmatrix}-4\\4\end{pmatrix} \tag{5}$$

Given Midpoint

$$\mathbf{M} = \begin{pmatrix} \frac{a}{3} \\ 4 \end{pmatrix} \tag{6}$$

Equating components:

$$\frac{a}{3} = -4 \implies a = -12 \tag{7}$$

Final Answer

$$\boxed{a = -12}$$

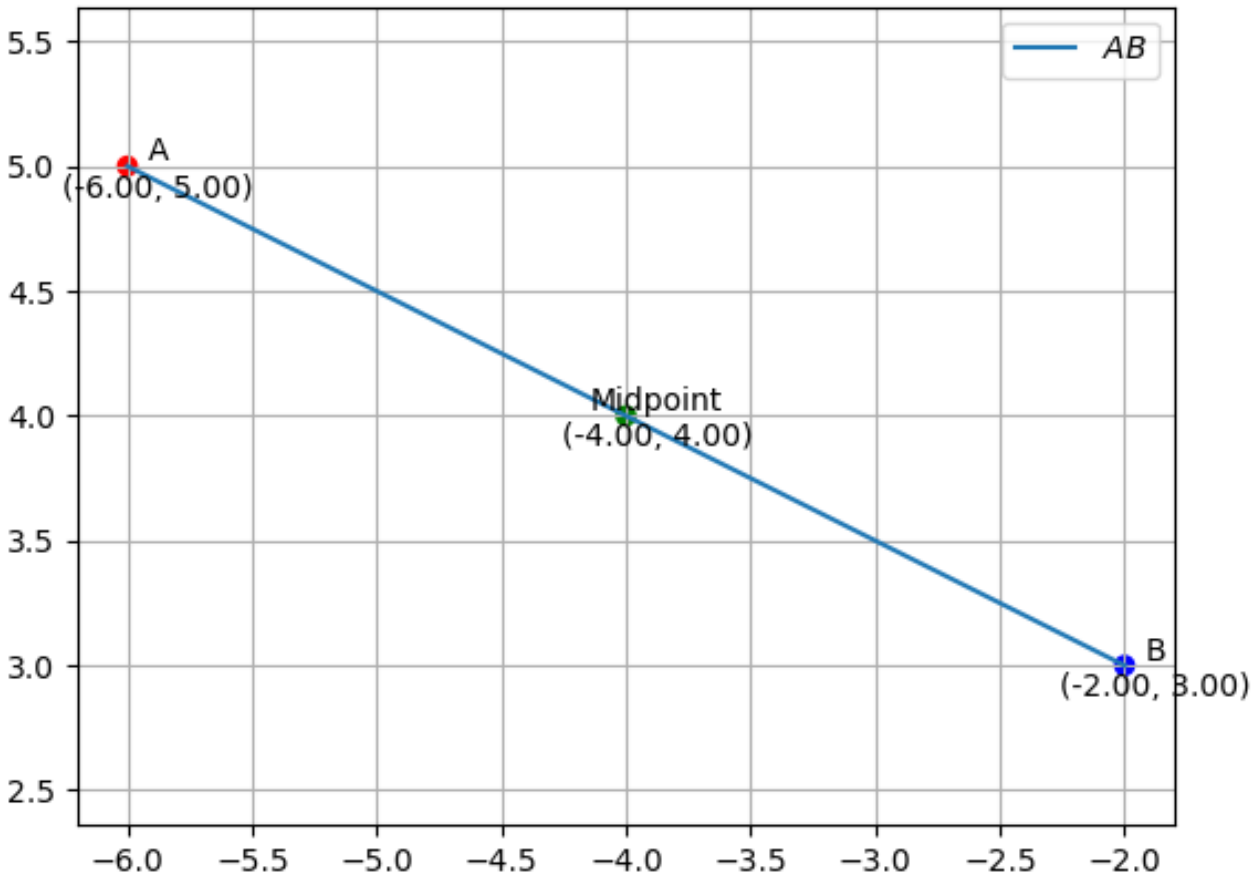
AB
A
(-6.00, 5.00)
Midpoint
(-4.00, 4.00)
B
(-2.00, 3.00)
5.5
5.0
4.5
4.0
3.5
3.0
2.5
−6.0
−5.5
−5.0
−4.5
−4.0
−3.5
−3.0
−2.5
−2.0

Figure: plot