1.2.18 Matgeo

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Question

If the points **A**(6,1),**B**(8,2),**C**(9,4) and **D**(p,3) are the vertices of a parallelogram,taken in order. find the value of p .

Solution

The given the points $\mathbf{A}\begin{bmatrix}6\\1\end{bmatrix}, \mathbf{B}\begin{bmatrix}8\\2\end{bmatrix}, \mathbf{C}\begin{bmatrix}9\\4\end{bmatrix}$ and $\mathbf{D}\begin{bmatrix}p\\3\end{bmatrix}$

If ABCD be a parallelogram with AB $||$ CD ,

$$\mathbf{B} - \mathbf{A} = \mathbf{C} - \mathbf{D}$$

Solution

The vector components are:

$$\mathbf{B} - \mathbf{A} = \begin{bmatrix} 8 \\ 2 \end{bmatrix} - \begin{bmatrix} 6 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix} \tag{1}$$

$$\mathbf{C} - \mathbf{D} = \begin{bmatrix} 9 \\ 4 \end{bmatrix} - \begin{bmatrix} p \\ 3 \end{bmatrix} = \begin{bmatrix} 9 - p \\ 1 \end{bmatrix} \tag{2}$$

By comparing

$$9 - p = 2 \tag{3}$$

We get

$$p = 7 \tag{4}$$

Graphical Representation

Hence the coordinates of **D** are (7 , 3)