# 1.2.18 Matgeo

AI25BTECH11012 - Garige Unnathi

# Question

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

# Coordinate System

We choose the coordinate axes such that:

- $+x$ axis $\rightarrow$ East
- $+y$ axis $\rightarrow$ North

# Solution

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

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

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

# Solution

The vector components are:

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

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

By comparing

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

We get

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

# Graphical Representation

Hence the coordinates of $\vec{D}$ are (7 , 3)