Properties of Parallelegram

1 10^{th} Maths - Chapter 7

This is Problem-6 from Exercise 7.2

1. If $\mathbf{A}(1,2), \mathbf{B}(4,x), \mathbf{C}(y,6)$and $\mathbf{D}(3,5)$ are the vertices of a parallelogram taken in order,find x and y.

Solution: The input parameters for this problem are available in

Symbol	Value	Description
A	$\begin{pmatrix}1\\2\end{pmatrix}$	First point
B	$\begin{pmatrix}4\\y\end{pmatrix}$	Second point
C	$\begin{pmatrix}x\\6\end{pmatrix}$	Third point
D	$\begin{pmatrix}3\\5\end{pmatrix}$	Fourth point

Table 1

$$\mathbf{U} = (\mathbf{B} - \mathbf{A}) = \left(\begin{pmatrix}4\\y\end{pmatrix} - \begin{pmatrix}1\\2\end{pmatrix}\right) = \begin{pmatrix}3\\y-2\end{pmatrix} \tag{1}$$

(2)

$$\mathbf{V} = (\mathbf{C} - \mathbf{D}) = \left(\begin{pmatrix} x \\ 6 \end{pmatrix} - \begin{pmatrix} 3 \\ 5 \end{pmatrix}\right) = \begin{pmatrix} x-3 \\ 1 \end{pmatrix} \tag{3}$$

$$\tag{4}$$

$$\begin{pmatrix} 3 \\ y-2 \end{pmatrix} = \begin{pmatrix} x-3 \\ 1 \end{pmatrix} \tag{5}$$

$$\tag{6}$$

$$x = 6 \tag{7}$$

$$y = 3 \tag{8}$$

$$\mathbf{P} = (\mathbf{B} - \mathbf{A}) = \left(\begin{pmatrix} 4 \\ 3 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \end{pmatrix}\right) = \begin{pmatrix} 3 \\ 1 \end{pmatrix} \tag{9}$$

$$\mathbf{Q} = (\mathbf{C} - \mathbf{D}) = \left(\begin{pmatrix} 6 \\ 6 \end{pmatrix} + \begin{pmatrix} 3 \\ 5 \end{pmatrix}\right) = \begin{pmatrix} 3 \\ 1 \end{pmatrix} \tag{10}$$

$$\mathbf{R} = (\mathbf{C} - \mathbf{B}) = \left(\begin{pmatrix} 6 \\ 6 \end{pmatrix} + \begin{pmatrix} 4 \\ 3 \end{pmatrix}\right) = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \tag{11}$$

$$\mathbf{S} = (\mathbf{D} - \mathbf{A}) = \left(\begin{pmatrix} 3 \\ 5 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \end{pmatrix}\right) = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \tag{12}$$

We know that P=Q and R=S , ABCD is a parallelogram.

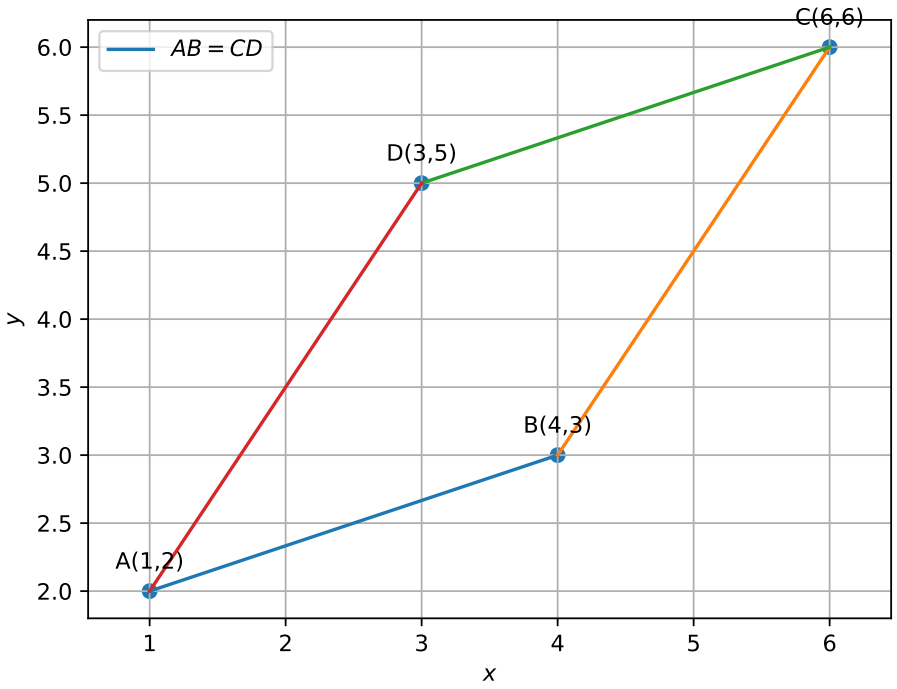

Figure 1