

Properties of Parallelogram

1 10th 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

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

$$\mathbf{V} = (\mathbf{C} - \mathbf{D}) = \left(\begin{pmatrix} x \\ 6 \end{pmatrix} - \begin{pmatrix} 3 \\ 5 \end{pmatrix} \right) = \begin{pmatrix} x - 3 \\ 1 \end{pmatrix} \quad (2)$$

$$\begin{pmatrix} 3 \\ y-2 \end{pmatrix} = \begin{pmatrix} x-3 \\ 1 \end{pmatrix} \quad (3)$$

$$x = 6 \quad (4)$$

$$y = 3 \quad (5)$$

$$\mathbf{P} = (\mathbf{B} - \mathbf{A}) = \left(\begin{pmatrix} 4 \\ 3 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \end{pmatrix} \right) = \begin{pmatrix} 3 \\ 1 \end{pmatrix} \quad (6)$$

$$\mathbf{Q} = (\mathbf{C} - \mathbf{D}) = \left(\begin{pmatrix} 6 \\ 6 \end{pmatrix} + \begin{pmatrix} 3 \\ 5 \end{pmatrix} \right) = \begin{pmatrix} 3 \\ 1 \end{pmatrix} \quad (7)$$

$$\mathbf{R} = (\mathbf{C} - \mathbf{B}) = \left(\begin{pmatrix} 6 \\ 6 \end{pmatrix} + \begin{pmatrix} 4 \\ 3 \end{pmatrix} \right) = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad (8)$$

$$\mathbf{S} = (\mathbf{D} - \mathbf{A}) = \left(\begin{pmatrix} 3 \\ 5 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \end{pmatrix} \right) = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad (9)$$

We know that $\mathbf{P}=\mathbf{Q}$ and $\mathbf{R}=\mathbf{S}$, ABCD is a parallelogram.

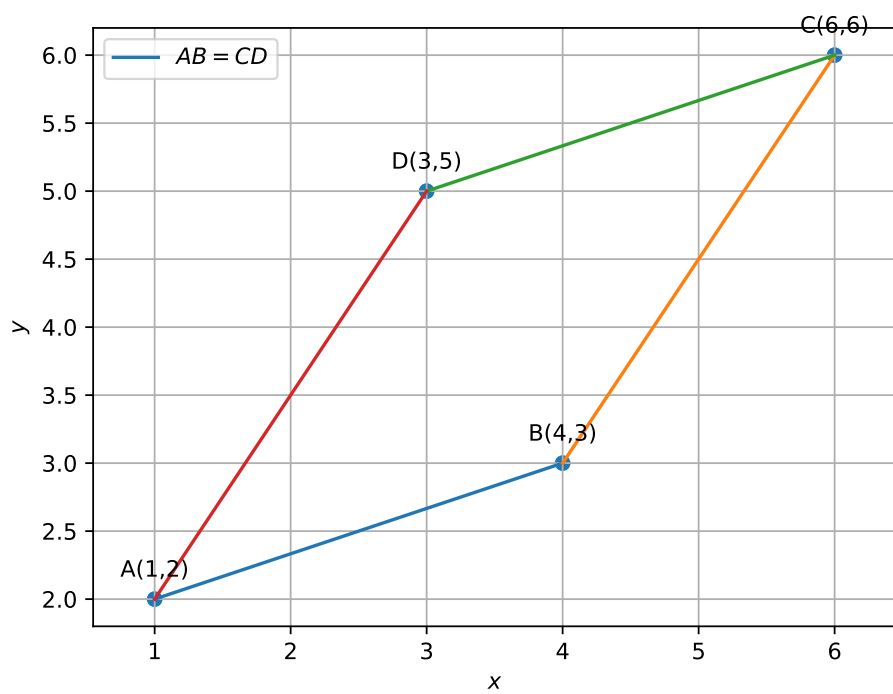


Figure 1