Coordinate Geometry

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Class 10^{th} Maths - Chapter 7

This is Problem-10 from Exercise 7.2

1. Find the area of the rhombus whose vertices are: (3,0),(4,5),(-1,4),(-2,-1)

$$(3,0),(4,5),(-1,4),(-2,-1) \tag{1}$$

Solution:

Given Data:

$$\mathbf{A} = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \tag{2}$$

$$\mathbf{B} = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \tag{3}$$

$$\mathbf{C} = \begin{pmatrix} -1 \\ 4 \end{pmatrix} \tag{4}$$

$$\mathbf{D} = \begin{pmatrix} -2 \\ -1 \end{pmatrix} \tag{5}$$

$$\tag{6}$$

$$\mathbf{BA} = \begin{pmatrix} -1 \\ -5 \end{pmatrix} \tag{7}$$

$$\mathbf{DA} = \begin{pmatrix} 5 \\ 1 \end{pmatrix} \tag{8}$$

$$\mathbf{CB} = \begin{pmatrix} 5 \\ 1 \end{pmatrix} \tag{9}$$

$$\mathbf{DB} = \begin{pmatrix} 6 \\ 6 \end{pmatrix} \tag{10}$$

$$\tag{11}$$

AREA OF A RHOMBUS;

$$\frac{1}{2}\left\|\mathbf{A}-\mathbf{B}\times\mathbf{A}-\mathbf{D}\right\|+\frac{1}{2}\left\|\mathbf{B}-\mathbf{C}\times\mathbf{B}-\mathbf{D}\right\| \tag{12}$$

$$\frac{1}{2}\begin{vmatrix}-1 & 5\\ -5 & 1\end{vmatrix}+\frac{1}{2}\begin{vmatrix}5 & 6\\ 1 & 6\end{vmatrix} \tag{13}$$

$$\frac{1}{2}\left\|-1+25\right\|+\frac{1}{2}\left\|30-6\right\| \tag{14}$$

$$\frac{1}{2}\left\|24\right\|+\frac{1}{2}\left\|24\right\| \tag{15}$$

$$12+12sq.units \tag{16}$$

$$24sq.units \tag{17}$$

$$\tag{18}$$

therefore the area of the given rhombus is 24 sq.units

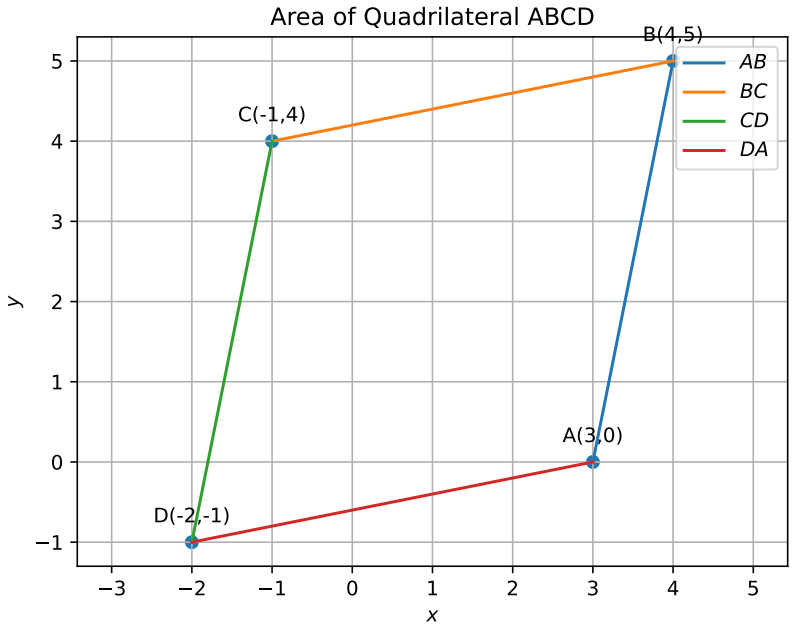

Figure 1: Quadrilateral ABCD