Co-Ordinate Geometry Ex 14.2 Q7

Answer :

The distance d between two points (x_1, y_1) and (x_2, y_2) is given by the formula

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

In a parallelogram the opposite sides are equal in length.

Here the four points are $A(1,-2)$, $B(3,6)$, $C(5,10)$ and $D(3,2)$.

Let us check the length of the opposite sides of the quadrilateral that is formed by these points.

$$AB = \sqrt{(1-3)^2 + (-2-6)^2}$$
$$= \sqrt{(-2)^2 + (-8)^2}$$
$$= \sqrt{4+64}$$
$$AB = \sqrt{68}$$
$$CD = \sqrt{(5-3)^2 + (10-2)^2}$$
$$= \sqrt{(2)^2 + (8)^2}$$
$$= \sqrt{4+64}$$
$$CD = \sqrt{68}$$

We have one pair of opposite sides equal.

Now, let us check the other pair of opposite sides.

$$BC = \sqrt{(3-5)^2 + (6-10)^2}$$
$$= \sqrt{(-2)^2 + (-4)^2}$$
$$= \sqrt{4+16}$$
$$BC = \sqrt{20}$$
$$AD = \sqrt{(1-3)^2 + (-2-2)^2}$$
$$= \sqrt{(-2)^2 + (-4)^2}$$
$$= \sqrt{4+16}$$
$$AD = \sqrt{20}$$

The other pair of opposite sides is also equal. So, the quadrilateral formed by these four points is definitely a parallelogram.

Hence we have proved that the quadrilateral formed by the given four points is a $\boxed{\text{parallelogram}}$.

Co-Ordinate Geometry Ex 14.2 Q8

Answer :

The distance d between two points (x_1, y_1) and (x_2, y_2) is given by the formula

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

In a square all the sides are equal in length. Also, the diagonals are equal in length in a square.

Here the four points are $A(1,7)$, $B(4,2)$, $C(-1,-1)$ and $D(-4,4)$.

First let us check if all the four sides are equal.

$$AB = \sqrt{(1-4)^2 + (7-2)^2}$$
$$= \sqrt{(-3)^2 + (5)^2}$$
$$= \sqrt{9+25}$$
$$AB = \sqrt{34}$$
$$BC = \sqrt{(4+1)^2 + (2+1)^2}$$
$$= \sqrt{(5)^2 + (3)^2}$$
$$= \sqrt{25+9}$$
$$BC = \sqrt{34}$$
$$CD = \sqrt{(-1+4)^2 + (-1-4)^2}$$
$$= \sqrt{(3)^2 + (-5)^2}$$
$$= \sqrt{9+25}$$
$$CD = \sqrt{34}$$
$$AD = \sqrt{(1+4)^2 + (7-4)^2}$$

$$= \sqrt{(5)^2 + (3)^2}$$
$$= \sqrt{25 + 9}$$
$$AD = \sqrt{34}$$

Since all the sides of the quadrilateral are the same it is a rhombus.

For the rhombus to be a square the diagonals also have to be equal to each other.

$$AC = \sqrt{(1+1)^2 + (7+1)^2}$$
$$= \sqrt{(2)^2 + (8)^2}$$
$$= \sqrt{4 + 64}$$
$$AC = \sqrt{68}$$
$$BD = \sqrt{(4+4)^2 + (2-4)^2}$$
$$= \sqrt{(8)^2 + (-2)^2}$$
$$= \sqrt{64 + 4}$$
$$BD = \sqrt{68}$$

Since the diagonals of the rhombus are also equal to each other the rhombus is a square.

Hence the quadrilateral formed by the given points is a square.

********** END **********