Co-Ordinate Geometry Ex 14.2 Q5

Answer :

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

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

Here it is given that one end of a line segment has co-ordinates (2,−3). The abscissa of the other end of the line segment is given to be 10. Let the ordinate of this point be 'y'.

So, the co-ordinates of the other end of the line segment is (10, y).

The distance between these two points is given to be 10 units.

Substituting these values in the formula for distance between two points we have,

$$d = \sqrt{(2-10)^2 + (-3-y)^2}$$

$$10 = \sqrt{(-8)^2 + (-3-y)^2}$$

Squaring on both sides of the equation we have,

$$100 = (-8)^2 + (-3-y)^2$$

$$100 = 64 + 9 + y^2 + 6y$$

$$27 = y^2 + 6y$$

We have a quadratic equation for 'y'. Solving for the roots of this equation we have,

$$y^2 + 6y - 27 = 0$$

$$y^2 + 9y - 3y - 27 = 0$$

$$y(y+9) - 3(y+9) = 0$$

$$(y+9)(y-3) = 0$$

The roots of the above equation are '−9' and '3'

Thus the ordinates of the other end of the line segment could be $\boxed{-9 \text{ or } 3}$.

Co-Ordinate Geometry Ex 14.2 Q6

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 rectangle, the opposite sides are equal in length. The diagonals of a rectangle are also equal in length.

Here the four points are $A(-4,-1)$, $B(-2,-4)$, $C(4,0)$ and $D(2,3)$.

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

$$AB = \sqrt{(-4+2)^2 + (-1+4)^2}$$

$$= \sqrt{(-2)^2 + (3)^2}$$

$$= \sqrt{4+9}$$

$$AB = \sqrt{13}$$

$$CD = \sqrt{(4-2)^2 + (0-3)^2}$$

$$= \sqrt{(2)^2 + (-3)^2}$$

$$= \sqrt{4+9}$$

$$CD = \sqrt{13}$$

We have one pair of opposite sides equal.

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

$$BC = \sqrt{(-2-4)^2 + (-4-0)^2}$$

$$= \sqrt{(-6)^2 + (-4)^2}$$

$$= \sqrt{36+16}$$

$BC = \sqrt{52}$

$$AD = \sqrt{(-4-2)^2 + (-1-3)^2}$$
$$= \sqrt{(-6)^2 + (-4)^2}$$
$$= \sqrt{36+16}$$
$$AD = \sqrt{52}$$

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

For a parallelogram to be a rectangle we need to check if the diagonals are also equal in length.

$$AC = \sqrt{(-4-4)^2 + (-1-0)^2}$$
$$= \sqrt{(-8)^2 + (-1)^2}$$
$$= \sqrt{64+1}$$
$$AC = \sqrt{65}$$
$$BD = \sqrt{(-2-2)^2 + (-4-3)^2}$$
$$= \sqrt{(-4)^2 + (-7)^2}$$
$$= \sqrt{16+49}$$
$$BD = \sqrt{65}$$

Now since the diagonals are also equal we can say that the parallelogram is definitely a rectangle.

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

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