



### 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 **-9 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 rectangle.

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