



Co-Ordinate Geometry Ex 14.3 Q4

Answer :

Let A (3,-2); B (4, 0); C (6,-3) and D (5,-5) be the vertices of a quadrilateral. We have to prove that the quadrilateral ABCD is a parallelogram.

We should proceed with the fact that if the diagonals of a quadrilateral bisect each other then the quadrilateral is a parallelogram.

Now to find the mid-point $P(x, y)$ of two points $A(x_1, y_1)$ and $B(x_2, y_2)$ we use section formula as,

$$P(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

So the mid-point of the diagonal AC is,

$$\begin{aligned} Q(x, y) &= \left(\frac{3+6}{2}, \frac{-2-3}{2} \right) \\ &= \left(\frac{9}{2}, -\frac{5}{2} \right) \end{aligned}$$

Similarly mid-point of diagonal BD is,

$$\begin{aligned} R(x, y) &= \left(\frac{4+5}{2}, \frac{-5+0}{2} \right) \\ &= \left(\frac{9}{2}, -\frac{5}{2} \right) \end{aligned}$$

Therefore the mid-points of the diagonals are coinciding and thus diagonal bisects each other.

Hence ABCD is a parallelogram.

Co-Ordinate Geometry Ex 14.3 Q5

Answer :

Let ABCD be a parallelogram in which the co-ordinates of the vertices are A (-2,-1); B (1, 0) and C (4, 3). We have to find the co-ordinates of the forth vertex.

Let the forth vertex be $D(x, y)$

Since ABCD is a parallelogram, the diagonals bisect each other. Therefore the mid-point of the diagonals of the parallelogram will coincide.

Now to find the mid-point $P(x, y)$ of two points $A(x_1, y_1)$ and $B(x_2, y_2)$ we use section formula as,

$$P(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

The mid-point of the diagonals of the parallelogram will coincide.

So,

Co-ordinate of mid-point of AC = Co-ordinate of mid-point of BD

Therefore,

$$\left(\frac{x+1}{2}, \frac{y}{2} \right) = \left(\frac{4-2}{2}, \frac{3-1}{2} \right)$$

$$\left(\frac{x+1}{2}, \frac{y}{2} \right) = (1, 1)$$

Now equate the individual terms to get the unknown value. So,

$$x = 1$$

$$y = 2$$

So the forth vertex is $D(1, 2)$

Co-Ordinate Geometry Ex 14.3 Q6

Answer :

Let ABCD be a parallelogram in which the co-ordinates of the vertices are A (3, -4); B (-1, -3) and C (-6, 2). We have to find the co-ordinates of the forth vertex.

Let the forth vertex be D(x, y)

Since ABCD is a parallelogram, the diagonals bisect each other. Therefore the mid-point of the diagonals of the parallelogram will coincide.

Now to find the mid-point P(x, y) of two points A(x₁, y₁) and B(x₂, y₂) we use section formula as,

$$P(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

The mid-point of the diagonals of the parallelogram will coincide.

So,

Co-ordinate of mid-point of AC = Co-ordinate of mid-point of BD

Therefore,

$$\left(\frac{x-1}{2}, \frac{y-3}{2} \right) = \left(\frac{3-6}{2}, \frac{2-4}{2} \right)$$

$$\left(\frac{x-1}{2}, \frac{y-3}{2} \right) = \left(-\frac{3}{2}, -1 \right)$$

Now equate the individual terms to get the unknown value. So,

$$x = -2$$

$$y = 1$$

So the forth vertex is **D(-2, 1)**

Co-Ordinate Geometry Ex 14.3 Q7

Answer :

The co-ordinates of a point which divided two points (x₁, y₁) and (x₂, y₂) internally in the ratio m : n is given by the formula,

$$(x, y) = \left(\left(\frac{mx_2 + nx_1}{m+n} \right), \left(\frac{my_2 + ny_1}{m+n} \right) \right)$$

Here we are given that the point P(2, y) divides the line joining the points A(-2, 2) and B(3, 7) in some ratio.

Let us substitute these values in the earlier mentioned formula.

$$(2, y) = \left(\left(\frac{m(3) + n(-2)}{m+n} \right), \left(\frac{m(7) + n(2)}{m+n} \right) \right)$$

Equating the individual components we have

$$2 = \frac{m(3) + n(-2)}{m+n}$$

$$2m + 2n = 3m - 2n$$

$$m = 4n$$

$$\frac{m}{n} = \frac{4}{1}$$

We see that the ratio in which the given point divides the line segment is **4:1**.

Let us now use this ratio to find out the value of 'y'.

$$(2, y) = \left(\left(\frac{m(3) + n(-2)}{m+n} \right), \left(\frac{m(7) + n(2)}{m+n} \right) \right)$$

$$(2, y) = \left(\left(\frac{4(3) + 1(-2)}{4+1} \right), \left(\frac{4(7) + 1(2)}{4+1} \right) \right)$$

Equating the individual components we have

$$y = \frac{4(7) + 1(2)}{4+1}$$

$$y = 6$$

Thus the value of 'y' is **6**.

***** END *****