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 than the quadrilateral is a parallelogram.

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

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

So the mid-point of the diagonal AC is,

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

Similarly mid-point of diagonal BD is,

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

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 $\mathrm{D}(x, y)$

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 $\mathrm{P}(x, y)$ of two points $\mathrm{A}(x_1, y_1)$ and $\mathrm{B}(x_2, y_2)$ we use section formula as,

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

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

So,

$$\text{Co-ordinate of mid-point of AC} = \text{Co-ordinate of mid-point of BD}$$

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 $\boxed{\mathrm{D}(1,2)}$

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 $A(x_1, y_1)$ 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,

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

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

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

$$x=-2$$

$$y=1$$

So the forth vertex is $\boxed{D(-2,1)}$

Co-Ordinate Geometry Ex 14.3 Q7

Answer :

The co-ordinates of a point which divided two points (x_1, y_1) and (x_2, y_2) 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 $\boxed{4:1}$.

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 $\boxed{6}$.

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