Co-Ordinate Geometry Ex 14.4 Q1

Answer :

We know that the co-ordinates of the centroid of a triangle whose vertices are $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ is-

$$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$$

(i) The co-ordinates of the centroid of a triangle whose vertices are (1, 4); (−1,−1); (3,−2) are-

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

$$=\boxed{\left(1, \frac{1}{3}\right)}$$

(ii) The co-ordinates of the centroid of a triangle whose vertices are (−2, 3); (2,−1); (4, 0) are-

$$=\left(\frac{2-2+4}{3}, \frac{3-1+0}{3}\right)$$

$$=\boxed{\left(\frac{4}{3}, \frac{2}{3}\right)}$$

Co-Ordinate Geometry Ex 14.4 Q2

Answer :

We have to find the co-ordinates of the third vertex of the given triangle. Let the co-ordinates of the third vertex be (x, y).

The co-ordinates of other two vertices are (1, 2) and (3, 5)

The co-ordinate of the centroid is (0, 0)

We know that the co-ordinates of the centroid of a triangle whose vertices are $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ is–

$$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$$

So,

$$(0,0)=\left(\frac{x+1+3}{3}, \frac{y+2+5}{3}\right)$$

Compare individual terms on both the sides-

$$\frac{x+1+3}{3}=0$$

So,

$$x=-4$$

Similarly,

$$\frac{y+2+5}{3}=0$$

So,

$$y=-7$$

So the co-ordinate of third vertex $\boxed{(-4,-7)}$

Co-Ordinate Geometry Ex 14.4 Q3

Answer :

Let $\Delta\mathrm{OAB}$ be any triangle such that O is the origin and the other co-ordinates are $\mathrm{A}(x_1, y_1)$; $\mathrm{B}(x_2, y_2)$. P and R are the mid-points of the sides OA and OB respectively.

We have to prove that line joining the mid-point of any two sides of a triangle is equal to half of the third side which means,

$$\mathrm{PR}=\frac{1}{2}(\mathrm{AB})$$

In general 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,

Co-ordinates of P is,

$$\mathrm{P}\left(\frac{x_1}{2}, \frac{y_1}{2}\right)$$

Similarly, co-ordinates of R is,

$$R\left(\frac{x_2}{2}, \frac{y_2}{2}\right)$$

In general, the distance between $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by,

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

Similarly,

$$\begin{aligned} PR &= \sqrt{\left(\frac{x_2}{2} - \frac{x_1}{2}\right)^2 + \left(\frac{y_2}{2} - \frac{y_1}{2}\right)^2} \\ &= \frac{1}{2}\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \frac{1}{2}(AB) \end{aligned}$$

Hence,

$$PR = \frac{1}{2}(AB)$$

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