Co-Ordinate Geometry Ex 14.3 Q11

Answer :

The ratio in which the y-axis divides two points (x_1, y_1) and (x_2, y_2) is $-x_1 : x_2$

The co-ordinates of the point dividing two points (x_1, y_1) and (x_2, y_2) in the ratio $m:n$ is given as,

$$(x, y) = \left(\left(\frac{\lambda x_2 + x_1}{\lambda + 1}\right), \left(\frac{\lambda y_2 + y_1}{\lambda + 1}\right)\right)$$; where $\lambda = \frac{m}{n}$

Here the two given points are $A(-2,-3)$ and $B(3,7)$.

By the earlier mentioned statement we can say that the y-axis divides the two mentioned points in the ratio

$$-x_1 : x_2$$
$$-(-2) : 3$$
$$2 : 3$$

Thus the given points are divided by the y-axis in the ratio $\boxed{2:3}$.

The co-ordinates of this point (x, y) can be found by using the earlier mentioned formula.

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

$$(x, y) = \left(\left(\frac{\frac{6 - 2(3)}{3}}{\frac{2 + 3}{3}}\right), \left(\frac{\frac{14 - 3(3)}{3}}{\frac{2 + 3}{3}}\right)\right)$$

$$(x, y) = \left(\left(\frac{0}{5}\right), \left(\frac{5}{5}\right)\right)$$

$$(x, y) = (0, 1)$$

Thus the co-ordinates of the point which divides the given points in the required ratio are $\boxed{(0,1)}$.

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 it is said that the point $\left(-5, -\frac{21}{5}\right)$ divides the points $(-3,-1)$ and $(-8,-9)$. Substituting these values in the above formula we have,

$$\left(-5, -\frac{21}{5}\right) = \left(\left(\frac{m(-8) + n(-3)}{m + n}\right), \left(\frac{m(-9) + n(-1)}{m + n}\right)\right)$$

Equating the individual components we have,

$$-5 = \frac{m(-8) + n(-3)}{m + n}$$
$$-5m - 5n = -8m - 3n$$
$$3m = 2n$$
$$\frac{m}{n} = \frac{2}{3}$$

Therefore the ratio in which the line is divided is $\boxed{2:3}$.

Co-Ordinate Geometry Ex 14.3 Q12

Answer :

We have two points A (3, 4) and B (k, 7) such that its mid-point is $\mathrm{P}(x, y)$.

It is also given that point P lies on a line whose equation is

$$2x + 2y + 1 = 0$$

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,

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

Therefore mid-point P of side AB can be written as,

$$P(x, y) = \left(\frac{k + 3}{2}, \frac{7 + 4}{2}\right)$$

Now equate the individual terms to get,

$$x = \frac{k + 3}{2}$$
$$y = \frac{11}{2}$$

Since, P lies on the given line. So,

$$2x+2y+1=0$$

Put the values of co-ordinates of point P in the equation of line to get,

$$2\left(\frac{k+3}{2}\right)+2\left(\frac{11}{2}\right)+1=0$$

On further simplification we get,

$$k+15=0$$

So, $k=\boxed{-15}$

Co-Ordinate Geometry Ex 14.3 Q13

Answer :

Let the line $x-y-2=0$ divide the line segment joining the points A (3,−1) and B (8, 9) in the ratio $\lambda:1$ at any point $P(x,y)$

Now according to the section formula if point a point P divides a line segment joining $A(x_1,y_1)$ and $B(x_2,y_2)$ in the ratio m: n internally than,

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

So,

$$P(x,y)=\left(\frac{8\lambda+3}{\lambda+1},\frac{9\lambda-1}{\lambda+1}\right)$$

Since, P lies on the given line. So,

$$x-y-2=0$$

Put the values of co-ordinates of point P in the equation of line to get,

$$\left(\frac{8\lambda+3}{\lambda+1}\right)-\left(\frac{9\lambda-1}{\lambda+1}\right)-2=0$$

On further simplification we get,

$$-3\lambda+2=0$$

So, $\lambda=\boxed{\frac{2}{3}}$

So the line divides the line segment joining A and B in the ratio 2: 3 internally.

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