Co-Ordinate Geometry Ex 14.5 Q16

Answer :

The formula for the area '*A*' encompassed by three points (x_1, y_1), (x_2, y_2) and (x_3, y_3) is given by the formula,

$$A = \frac{1}{2}\begin{vmatrix} x_1 - x_2 & y_1 - y_2 \\ x_2 - x_3 & y_2 - y_3 \end{vmatrix}$$

$$A = \frac{1}{2}\left\{(x_1 - x_2)(y_2 - y_3) - (x_2 - x_3)(y_1 - y_2)\right\}$$

If three points are collinear the area encompassed by them is equal to 0.

The three given points are *A*(7,-2), *B*(5,1) and *C*(3,2*k*). It is also said that they are collinear and hence the area enclosed by them should be 0.

$$A = \frac{1}{2}\begin{vmatrix} 7-5 & -2-1 \\ 5-3 & 1-2k \end{vmatrix}$$

$$A = \frac{1}{2}\begin{vmatrix} 2 & -3 \\ 2 & 1-2k \end{vmatrix}$$

$$0 = \frac{1}{2}\left|(2)(1-2k) - (2)(-3)\right|$$

$$0 = \frac{1}{2}\left|2 - 4k + 6\right|$$

$$0 = 2 - 4k + 6$$

$$4k = 8$$

$$k = 2$$

Hence the value of '*k*' for which the given points are collinear is $\boxed{k = 2}$.

Co-Ordinate Geometry Ex 14.5 Q17

Answer :

The formula for the area '*A*' encompassed by three points (x_1, y_1), (x_2, y_2) and (x_3, y_3) is given by the formula,

$$A = \frac{1}{2}\begin{vmatrix} x_1 - x_2 & y_1 - y_2 \\ x_2 - x_3 & y_2 - y_3 \end{vmatrix}$$

$$A = \frac{1}{2}\left\{(x_1 - x_2)(y_2 - y_3) - (x_2 - x_3)(y_1 - y_2)\right\}$$

If three points are collinear the area encompassed by them is equal to 0.

It is said that the point *P*(*m*,3) lies on the line segment joining the points $A\left(-\frac{2}{5}, 6\right)$ and *B*(2,8).

Hence we understand that these three points are collinear. So the area enclosed by them should be 0.

$$A = \frac{1}{2}\begin{vmatrix} m + \frac{2}{5} & 3-6 \\ -\frac{2}{5} - 2 & 6-8 \end{vmatrix}$$

$$A = \frac{1}{2}\begin{vmatrix} m + \frac{2}{5} & -3 \\ -\frac{12}{5} & -2 \end{vmatrix}$$

$$0 = \frac{1}{2}\left|\left(m + \frac{2}{5}\right)(-2) - \left(-\frac{12}{5}\right)(-3)\right|$$

$$0 = \frac{1}{2}\left|-2m - \frac{4}{5} - \frac{36}{5}\right|$$

$$0 = -2m - \frac{40}{5}$$

$$2m = -8$$

$$m = -4$$

Hence the value of '*m*' for which the given condition is satisfied is $\boxed{m = -4}$.

Co-Ordinate Geometry Ex 14.5 Q18

Answer :

The formula for the area '*A*' encompassed by three points (x_1, y_1), (x_2, y_2) and (x_3, y_3) is given by the formula,

$$A = \frac{1}{2}\begin{vmatrix} x_1 - x_2 & y_1 - y_2 \\ x_2 - x_3 & y_2 - y_3 \end{vmatrix}$$

$$A = \frac{1}{2}\left\{(x_1 - x_2)(y_2 - y_3) - (x_2 - x_3)(y_1 - y_2)\right\}$$

If three points are collinear the area encompassed by them is equal to 0.

It is said that the point *R*(*x*, *y*) lies on the line segment joining the points *P*(*a*, *b*) and *Q*(*b*, *a*). Hence we understand that these three points are collinear. So the area enclosed by them should be 0.

$$A = \frac{1}{2}\begin{vmatrix} x - a & y - b \\ a - b & b - a \end{vmatrix}$$

$$0 = \frac{1}{2}\left|(x-a)(b-a)-(a-b)(y-b)\right|$$

$$0 = \frac{1}{2}\left|bx - ax - ab + a^2 - ay + ab + by - b^2\right|$$

$$0 = bx - ax + a^2 - ay + by - b^2$$

$$ax + ay - bx - by = a^2 - b^2$$

$$a(x+y) - b(x+y) = a^2 - b^2$$

$$(x+y)(a-b) = (a+b)(a-b)$$

$$x + y = a + b$$

Hence under the given conditions we have proved that $\boxed{x + y = a + b}$.

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