



Co-Ordinate Geometry Ex 14.5 Q19

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,

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

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

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

The three given points are $A(8, 1)$, $B(3, -4)$ and $C(2, k)$. It is also said that they are collinear and hence the area enclosed by them should be 0.

$$A = \frac{1}{2} \begin{vmatrix} 8 - 3 & 1 + 4 \\ 3 - 2 & -4 - k \end{vmatrix}$$

$$A = \frac{1}{2} \begin{vmatrix} 5 & 5 \\ 1 & -4 - k \end{vmatrix}$$

$$0 = \frac{1}{2} \{ (5)(-4 - k) - (1)(5) \}$$

$$0 = \frac{1}{2} \{ -20 - 5k - 5 \}$$

$$0 = -20 - 5k - 5$$

$$5k = -25$$

$$k = -5$$

Hence the value of 'k' for which the given points are collinear is $k = -5$.

Co-Ordinate Geometry Ex 14.5 Q20

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,

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

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

The three given points are $A(a, 2a)$, $B(-2, 6)$ and $C(3, 1)$. It is also said that the area enclosed by them is 10 square units. Substituting these values in the above mentioned formula we have,

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

$$10 = \frac{1}{2} \begin{vmatrix} a + 2 & 2a - 6 \\ -5 & 5 \end{vmatrix}$$

$$10 = \frac{1}{2} \{ (a + 2)(5) - (-5)(2a - 6) \}$$

$$10 = \frac{1}{2} \{ 5a + 10 + 10a - 30 \}$$

$$20 = |15a - 20|$$

$$4 = |3a - 4|$$

Co-Ordinate Geometry Ex 14.5 Q21

We have $|3a - 4| = 4$. Hence either

$$3a - 4 = 4$$

$$3a = 8$$

$$a = \frac{8}{3}$$

Or

$$-(3a - 4) = 4$$

$$4 - 3a = 4$$

$$a = 0$$

Hence the values of 'a' which satisfies the given conditions are

$$\begin{array}{|l} a = 0 \\ a = \frac{8}{3} \end{array}$$

***** END *****