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 $\boxed{k = -5}$.

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*,2*a*), *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

$$\begin{aligned}3a-4&=4\\3a&=8\\a&=\frac{8}{3}\end{aligned}$$

Or

$$\begin{aligned}-(3a-4)&=4\\4-3a&=4\\a&=0\end{aligned}$$

Hence the values of '*a*' which satisfies the given conditions are $\boxed{\begin{matrix}a=0\\a=\frac{8}{3}\end{matrix}}$.

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