Co-Ordinate Geometry Ex 14.5 Q13

**Answer :**

GIVEN: If three points $(x_1, y_1), (x_2, y_2)$ and $(x_3, y_3)$ lie on the same line

TO PROVE: $\frac{(y_2 - y_3)}{x_2 x_3} + \frac{(y_3 - y_1)}{x_3 x_1} + \frac{(y_1 - y_2)}{x_1 x_2} = 0$

PROOF:

We know that three points $(x_1, y_1), (x_2, y_2)$ and $(x_3, y_3)$ are collinear if

$$x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$$

$$\Rightarrow x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) = 0$$

Dividing by $x_1 x_2 x_3$

$$\Rightarrow \frac{x_1(y_2 - y_3)}{x_1 x_2 x_3} + \frac{x_2(y_3 - y_1)}{x_1 x_2 x_3} + \frac{x_3(y_1 - y_2)}{x_1 x_2 x_3} = 0$$

$$\Rightarrow \boxed{\frac{(y_2 - y_3)}{x_2 x_3} + \frac{(y_3 - y_1)}{x_1 x_3} + \frac{(y_1 - y_2)}{x_1 x_2} = 0}$$

Hence proved.

Co-Ordinate Geometry Ex 14.5 Q14

**Answer :**

Since the point $(x, y)$ lie on the line joining the points (1, −3) and (−4, 2); the area of triangle formed by these points is 0.

That is,

$$\Delta = \frac{1}{2}\{x(-3-2) + 1(2-y) - 4(y+3)\} = 0$$

$$-5x + 2 - y - 4y - 12 = 0$$

$$-5x - 5y - 10 = 0$$

$$x + y + 2 = 0$$

Thus, the result is proved.

Co-Ordinate Geometry Ex 14.5 Q15

**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 $A(k,3)$, $B(6,-2)$ and $C(-3,4)$. It is also said that they are collinear and hence the area enclosed by them should be 0.

$$A = \frac{1}{2}\begin{vmatrix} k-6 & 3+2 \\ 6+3 & -2-4 \end{vmatrix}$$

$$A = \frac{1}{2}\begin{vmatrix} k-6 & 5 \\ 9 & -6 \end{vmatrix}$$

$$0 = \frac{1}{2}\left|(k-6)(-6)-(9)(5)\right|$$

$$0 = \frac{1}{2}\left|-6k+36-45\right|$$

$$0 = -6k+36-45$$

$$6k = -9$$

$$k = -\frac{3}{2}$$

Hence the value of '*k*' for which the given points are collinear is $\boxed{k = -\frac{3}{2}}$.

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