

## Co-Ordinate Geometry Ex 14.5 Q8

## Answer:

GIVEN: The area of triangle is 5.Two of its vertices are (2, 1) and (3, -2). The third vertex lies on y = x+3

TO FIND: The third vertex.

PROOF: Let the third vertex be (x, y)

We know area of triangle formed by three points  $(x_1,y_1),(x_2,y_2)$  and  $(x_3,y_3)$  is given by

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

Now

Taking three points(x, y), (2, 1) and (3, -2)

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

$$\Delta = \frac{1}{2} |3x+y-7|$$

$$5 = \frac{1}{2} |3x+y-7|$$

$$\pm 10 = 3x+y-7$$

$$10 = 3x+y-7 \text{ or } -10 = 3x+y-7$$

$$0 = 3x+y-17 \dots (1) \text{ or } 0 = 3x+y+3 \dots (2)$$

Also it is given the third vertex lies on y = x+3

Substituting the value in equation (1) and (2) we get

$$\pm 10 = 3x + y - 7$$

$$10 = 3x + y - 7$$

$$0 = 3x + y - 17$$

$$0 = 3x + (x + 3) - 17$$

$$x = \frac{7}{2}$$

Again substituting the value of x in equation 1we get

$$0 = 3x + y - 17$$
 .....(1)

$$0 = 3\left(\frac{7}{2}\right) + y - 17$$

$$y = \frac{13}{2}$$

Hence 
$$\left(\frac{7}{2}, \frac{13}{2}\right)$$

Similiarly

$$-10 = 3x + y - 7$$

$$0 = 3x + y + 3 \qquad \dots (2)$$

$$0 = 3x + (x+3)$$

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

Again substituting the value of x in equation 2 we get

$$0 = 3x + y + 3$$
 .....(2)

$$0 = 3\left(\frac{-3}{2}\right) + y + 3$$

$$y=\frac{3}{2}$$

Hence 
$$\left(\frac{-3}{2}, \frac{3}{2}\right)$$

Hence the coordinates of 
$$\left(\frac{7}{2},\frac{13}{2}\right)$$
 and  $\left(\frac{-3}{2},\frac{3}{2}\right)$ 

Co-Ordinate Geometry Ex 14.5 Q9

## Answer:

GIVEN: If  $a \neq b \neq c$ 

TO PROVE: that the points  $(a,a^2)$ ,  $(b,b^2)$ ,  $(c,c^2)$ , can never be collinear.

## PROOF

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

$$\frac{1}{2} \| x_1 (y_2 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2) \| = 0$$

Now taking three points  $(a, a^2)$ ,  $(b, b^2)$ ,  $(c, c^2)$ ,

Area = 
$$\frac{1}{2}|a(b^2 - c^2) + b(c^2 - a^2) + c(a^2 - b^2)|$$
  
=  $\frac{1}{2}|ab^2 - ac^2 + bc^2 - ba^2 + ca^2 - cb^2|$   
=  $\frac{1}{2}|(a^2c - a^2b) + (ab^2 - ac^2) + (bc^2 - b^2c)|$   
=  $\frac{1}{2}|(-a^2(b-c)) + (a(b^2 - c^2)) - (bc(b-c))|$   
=  $\frac{1}{2}|(b-c)(-a^2) + (a(b+c)) - bc|$   
=  $\frac{1}{2}|(b-c)(-a^2) + ab + ac - bc|$   
=  $\frac{1}{2}|(b-c)(-a)(a-b) + c(a-b)|$   
=  $\frac{1}{2}|(b-c)(a-b)(c-a)|$ 

Also it is given that

 $a \neq b \neq c$ 

Hence area of triangle made by these points is never zero. Hence given points are never collinear.

\*\*\*\*\*\*\* END \*\*\*\*\*\*