Co-Ordinate Geometry Ex 14.3 Q8

Answer :

The distance *d* between two points (x_1, y_1) and (x_2, y_2) is given by the formula

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

The co-ordinates of the midpoint (x_m, y_m) between two points (x_1, y_1) and (x_2, y_2) is given by,

$$(x_m, y_m) = \left(\left(\frac{x_1 + x_2}{2}\right), \left(\frac{y_1 + y_2}{2}\right)\right)$$

Here, it is given that the three vertices of a triangle are $A(-1,3)$, $B(1,-1)$ and $C(5,1)$.

The median of a triangle is the line joining a vertex of a triangle to the mid-point of the side opposite this vertex.

Let '*D*' be the mid-point of the side '*BC*'.

Let us now find its co-ordinates.

$$(x_D, y_D) = \left(\left(\frac{1+5}{2}\right), \left(\frac{-1+1}{2}\right)\right)$$

$$(x_D, y_D) = (3,0)$$

Thus we have the co-ordinates of the point as $D(3,0)$.

Now, let us find the length of the median '*AD*'.

$$\begin{aligned} AD &= \sqrt{(-1-3)^2 + (3-0)^2} \\ &= \sqrt{(-4)^2 + (3)^2} \\ &= \sqrt{16+9} \end{aligned}$$

$$AD = 5$$

Thus the length of the median through the vertex '*A*' of the given triangle is $\boxed{5 \text{ units}}$.

Co-Ordinate Geometry Ex 14.3 Q9

Answer :

The co-ordinates of the midpoint (x_m, y_m) between two points (x_1, y_1) and (x_2, y_2) is given by,

$$(x_m, y_m) = \left(\left(\frac{x_1 + x_2}{2}\right), \left(\frac{y_1 + y_2}{2}\right)\right)$$

Let the three vertices of the triangle be $A(x_A, y_A)$, $B(x_B, y_B)$ and $C(x_C, y_C)$.

The three midpoints are given. Let these points be $M_{AB}(1,1)$, $M_{BC}(2,-3)$ and $M_{CA}(3,4)$.

Let us now equate these points using the earlier mentioned formula,

$$(1,1) = \left(\left(\frac{x_A + x_B}{2}\right), \left(\frac{y_A + y_B}{2}\right)\right)$$

Equating the individual components we get,

$$x_A + x_B = 2$$

$$y_A + y_B = 2$$

Using the midpoint of another side we have,

$$(2,-3) = \left(\left(\frac{x_B + x_C}{2}\right), \left(\frac{y_B + y_C}{2}\right)\right)$$

Equating the individual components we get,

$$x_B + x_C = 4$$

$$y_B + y_C = -6$$

Using the midpoint of the last side we have,

$$(3,4) = \left(\left(\frac{x_A + x_C}{2}\right), \left(\frac{y_A + y_C}{2}\right)\right)$$

Equating the individual components we get,

$$x_B + x_C = 4$$

$$y_B + y_C = -6$$

Using the midpoint of the last side we have,

$$(3,4) = \left(\left(\frac{x_A + x_C}{2}\right), \left(\frac{y_A + y_C}{2}\right)\right)$$

Equating the individual components we get,

$$x_A + x_C = 6$$

$$y_A + y_C = 8$$

Adding up all the three equations which have variable '*x*' alone we have,

$$x_A + x_B + x_B + x_C + x_A + x_C = 2 + 4 + 6$$

$$2(x_A + x_B + x_C) = 12$$

$$x_A + x_B + x_C = 6$$

Substituting $x_B + x_C = 4$ in the above equation we have,

$$x_A + x_B + x_C = 6$$

$$x_A + 4 = 6$$

$$x_A = 2$$

Therefore,

$$x_A + x_C = 6$$

$$x_C = 6 - 2$$

$$x_C = 4$$

And

$$x_A + x_B = 2$$

$$x_B = 2 - 2$$

$$x_B = 0$$

Adding up all the three equations which have variable '*y*' alone we have,

$$y_A + y_B + y_B + y_C + y_A + y_C = 2 - 6 + 8$$

$$2(y_A + y_B + y_C) = 4$$

$$y_A + y_B + y_C = 2$$

Substituting $y_B + y_C = -6$ in the above equation we have,

$$y_A + y_B + y_C = 2$$

$$y_A - 6 = 2$$

$$y_A = 8$$

Therefore,

$$y_A + y_C = 8$$

$$y_C = 8 - 8$$

$$y_C = 0$$

And

$$y_A + y_B = 2$$

$$y_B = 2 - 8$$

$$y_B = -6$$

Therefore the co-ordinates of the three vertices of the triangle are $\boxed{\begin{array}{l} A(2,8) \\ B(0,-6) \\ C(4,0) \end{array}}$.

Co-Ordinate Geometry Ex 14.3 Q10

Answer :

Let a ΔABC in which P and Q are the mid-points of sides AB and AC respectively. The coordinates are: A (1, 1); P (−2, 3) and Q (5, 2).

We have to find the co-ordinates of $B(x_1, y_1)$ and $C(x_2, y_2)$.

In general to find the mid-point $P(x, y)$ of two points $A(x_1, y_1)$ and $B(x_2, y_2)$ we use section formula as,

$$P(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Therefore mid-point P of side AB can be written as,

$$P(-2, 3) = \left(\frac{x_1 + 1}{2}, \frac{y_1 + 1}{2}\right)$$

Now equate the individual terms to get,

$$\boxed{\begin{aligned} x_1 &= -5 \\ y_1 &= 5 \end{aligned}}$$

So, co-ordinates of B is (−5, 5)

Similarly, mid-point Q of side AC can be written as,

$$Q(5, 2) = \left(\frac{x_2 + 1}{2}, \frac{y_2 + 1}{2}\right)$$

Now equate the individual terms to get,

$$\boxed{\begin{aligned} x_2 &= 9 \\ y_2 &= 3 \end{aligned}}$$

So, co-ordinates of C is (9, 3)

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