Co-Ordinate Geometry Ex 14.2 Q15

Answer :

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

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

In an isosceles triangle two sides will be of equal length.

Here two vertices of the triangle is given as *A* (2, 0) and *B* (2, 5). Let the third side of the triangle be *C*(*x, y*)

It is given that the length of the equal sides is 3 units.

Let us now find the length of the side in which both the vertices are known.

$$AB = \sqrt{(2-2)^2 + (0-5)^2}$$
$$= \sqrt{(0)^2 + (-5)^2}$$
$$= \sqrt{0+25}$$
$$= \sqrt{25}$$
$$AB = 5$$

So, now we know that the side '*AB*' is not one of the equal sides of the isosceles triangle.

So, we have $AC = BC$

$$AC = \sqrt{(2-x)^2 + (0-y)^2}$$
$$BC = \sqrt{(2-x)^2 + (5-y)^2}$$

Equating these two equations we have,

$$\sqrt{(2-x)^2 + (0-y)^2} = \sqrt{(2-x)^2 + (5-y)^2}$$

Squaring on both sides of the equation we have,

$$(2-x)^2 + (0-y)^2 = (2-x)^2 + (5-y)^2$$

$$= \frac{16 \pm 4\sqrt{11}}{8}$$

$$x = 2 \pm \frac{\sqrt{11}}{2}$$

Hence the possible co-ordinates of the third vertex of the isosceles triangle are

$$\boxed{\left(2 + \frac{\sqrt{11}}{2}, \frac{5}{2}\right) \text{ or } \left(2 - \frac{\sqrt{11}}{2}, \frac{5}{2}\right)}.$$

Co-Ordinate Geometry Ex 14.2 Q16

Answer :

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

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

Here we are to find out a point on the *x*–axis which is equidistant from both the points *A* (5, 9) and *B* (–4, 6)

Let this point be denoted as *C*(*x, y*)

Since the point lies on the *x*-axis the value of its ordinate will be 0. Or in other words we have $y = 0$.

Now let us find out the distances from '*A*' and '*B*' to '*C*'

$$AC = \sqrt{(5-x)^2 + (9-y)^2}$$
$$= \sqrt{(5-x)^2 + (9-0)^2}$$
$$AC = \sqrt{(5-x)^2 + (9)^2}$$
$$BC = \sqrt{(-4-x)^2 + (6-y)^2}$$
$$= \sqrt{(4+x)^2 + (6-0)^2}$$
$$BC = \sqrt{(4+x)^2 + (6)^2}$$

We know that both these distances are the same. So equating both these we get,

$$AC = BC$$

$$\sqrt{(5-x)^2+(9)^2} = \sqrt{(4+x)^2+(6)^2}$$

Squaring on both sides we have,

$$(5-x)^2+(9)^2 = (4+x)^2+(6)^2$$

$$25+x^2-10x+81 = 16+x^2+8x+36$$

$$18x = 54$$

$$x = 3$$

Hence the point on the *x*-axis which lies at equal distances from the mentioned points is $\boxed{(3,0)}$.

Co-Ordinate Geometry Ex 14.2 Q17

Answer :

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

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

For three points to be collinear the sum of distances between two pairs of points should be equal to the third pair of points.

The given points are *A* (−2, 5), *B* (0, 1) and *C* (2, −3)

Let us find the distances between the possible pairs of points.

$$AB = \sqrt{(-2-0)^2+(5-1)^2}$$

$$= \sqrt{(-2)^2+(4)^2}$$

$$= \sqrt{4+16}$$

$$AB = 2\sqrt{5}$$

$$AC = \sqrt{(-2-2)^2+(5+3)^2}$$

$$= \sqrt{(-4)^2+(8)^2}$$

$$= \sqrt{16+64}$$

$$AC = 4\sqrt{5}$$

$$BC = \sqrt{(0-2)^2+(1+3)^2}$$

$$= \sqrt{(-2)^2+(4)^2}$$

$$= \sqrt{4+16}$$

$$BC = 2\sqrt{5}$$

We see that $AB + BC = AC$

Since sum of distances between two pairs of points equals the distance between the third pair of points the three points must be collinear.

Hence we have proved that the three given points are $\boxed{\text{collinear}}$.

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