Co-Ordinate Geometry Ex 14.2 Q28

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*(7,6) and *B*(−3,4).

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*'

$$\begin{aligned} AC &= \sqrt{(7-x)^2 + (6-y)^2} \\ &= \sqrt{(7-x)^2 + (6-0)^2} \\ AC &= \sqrt{(7-x)^2 + (6)^2} \\ BC &= \sqrt{(-3-x)^2 + (4-y)^2} \\ &= \sqrt{(-3-x)^2 + (4-0)^2} \\ BC &= \sqrt{(-3-x)^2 + (4)^2} \end{aligned}$$

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

$$AC = BC$$

$$\sqrt{(7-x)^2 + (6)^2} = \sqrt{(-3-x)^2 + (4)^2}$$

Squaring on both sides we have,

$$\begin{aligned} (7-x)^2 + (6)^2 &= (-3-x)^2 + (4)^2 \\ 49 + x^2 - 14x + 36 &= 9 + x^2 + 6x + 16 \\ 20x &= 60 \\ x &= 3 \end{aligned}$$

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 Q29

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 a square all the sides are equal to each other. And also the diagonals are also equal to each other.

Here the four points are *A*(5,6), *B*(1,5), *C*(2,1) and *D*(6,2).

First let us check if all the four sides are equal.

$$\begin{aligned} AB &= \sqrt{(5-1)^2 + (6-5)^2} \\ &= \sqrt{(4)^2 + (1)^2} \\ &= \sqrt{16+1} \\ AB &= \sqrt{17} \\ BC &= \sqrt{(1-2)^2 + (5-1)^2} \\ &= \sqrt{(-1)^2 + (4)^2} \\ &= \sqrt{1+16} \\ BC &= \sqrt{17} \\ CD &= \sqrt{(2-6)^2 + (1-2)^2} \\ &= \sqrt{(-4)^2 + (-1)^2} \\ &= \sqrt{16+1} \\ CD &= \sqrt{17} \end{aligned}$$

$$AD = \sqrt{(5-6)^2 + (6-2)^2}$$
$$= \sqrt{(-1)^2 + (4)^2}$$
$$= \sqrt{1+16}$$
$$AD = \sqrt{17}$$

Here, we see that all the sides are equal, so it has to be a rhombus.

Now let us find out the lengths of the diagonals of this rhombus.

$$AC = \sqrt{(5-2)^2 + (6-1)^2}$$
$$= \sqrt{(3)^2 + (5)^2}$$
$$= \sqrt{9+25}$$
$$AC = \sqrt{34}$$
$$BD = \sqrt{(1-6)^2 + (5-2)^2}$$
$$= \sqrt{(-5)^2 + (3)^2}$$
$$= \sqrt{25+9}$$
$$BD = \sqrt{34}$$

Now since the diagonals of the rhombus are also equal to each other this rhombus has to be a square.

Hence we have proved that the quadrilateral formed by the given four points is a $\boxed{\text{square}}$.

Co-Ordinate Geometry Ex 14.2 Q30

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*(−2,5) and *B*(2,−3)

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*'

$$AC = \sqrt{(-2-x)^2 + (5-y)^2}$$
$$= \sqrt{(-2-x)^2 + (5-0)^2}$$
$$AC = \sqrt{(-2-x)^2 + (5)^2}$$
$$BC = \sqrt{(2-x)^2 + (-3-y)^2}$$
$$= \sqrt{(2-x)^2 + (-3-0)^2}$$
$$BC = \sqrt{(2-x)^2 + (-3)^2}$$

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

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

Squaring on both sides we have,

$$(-2-x)^2 + (5)^2 = (2-x)^2 + (-3)^2$$
$$4 + x^2 + 4x + 25 = 4 + x^2 - 4x + 9$$
$$8x = -16$$
$$x = -2$$

Hence the point on the *x*-axis which lies at equal distances from the mentioned points is $\boxed{(-2,0)}$.

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