Co-Ordinate Geometry Ex 14.2 Q31

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 three given points are *P*(6,−1), *Q*(1,3) and *R*(*x*,8).

Now let us find the distance between '*P*' and '*Q*'.

$$PQ = \sqrt{(6-1)^2 + (-1-3)^2}$$
$$= \sqrt{(5)^2 + (-4)^2}$$
$$= \sqrt{25+16}$$
$$PQ = \sqrt{41}$$

Now, let us find the distance between '*Q*' and '*R*'.

$$QR = \sqrt{(1-x)^2 + (3-8)^2}$$
$$QR = \sqrt{(1-x)^2 + (-5)^2}$$

It is given that both these distances are equal. So, let us equate both the above equations,

$$PQ = QR$$
$$\sqrt{41} = \sqrt{(1-x)^2 + (-5)^2}$$

Squaring on both sides of the equation we get,

$$41 = (1-x)^2 + (-5)^2$$
$$41 = 1 + x^2 - 2x + 25$$
$$15 = x^2 - 2x$$

Now we have a quadratic equation. Solving for the roots of the equation we have,

$$x^2 - 2x - 15 = 0$$
$$x^2 - 5x + 3x - 15 = 0$$
$$x(x-5) + 3(x-5) = 0$$
$$(x-5)(x+3) = 0$$

Thus the roots of the above equation are 5 and −3.

Hence the values of '*x*' are $\boxed{5 \text{ or } -3}$.

Co-Ordinate Geometry Ex 14.2 Q32

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 there are two sides which are equal in length.

By Pythagoras Theorem in a right-angled triangle the square of the longest side will be equal to the sum of squares of the other two sides.

Here the three points are *A*(0,0), *B*(5,5) and *C*(−5,5).

Let us check the length of the three sides of the triangle.

$$AB = \sqrt{(0-5)^2 + (0-5)^2}$$
$$= \sqrt{(-5)^2 + (-5)^2}$$
$$= \sqrt{25+25}$$
$$AB = 5\sqrt{2}$$
$$BC = \sqrt{(5+5)^2 + (5-5)^2}$$
$$= \sqrt{(10)^2 + (0)^2}$$
$$= \sqrt{100}$$
$$BC = 10$$
$$AC = \sqrt{(0+5)^2 + (0-5)^2}$$
$$= \sqrt{(5)^2 + (-5)^2}$$
$$= \sqrt{25+25}$$

$AC = 5\sqrt{2}$

Here, we see that two sides of the triangle are equal. So the triangle formed should be an isosceles triangle.

Further it is seen that $BC^2 = AB^2 + AC^2$

If in a triangle the square of the longest side is equal to the sum of squares of the other two sides then the triangle has to be a right-angled triangle.

Hence proved that the triangle formed by the three given points is an $\boxed{\text{right-angled isosceles triangle}}$

Co-Ordinate Geometry Ex 14.2 Q33

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 three given points are $P(x, y)$, $A(5,1)$ and $B(-1,5)$.

Now let us find the distance between 'P' and 'A'.

$$PA = \sqrt{(x-5)^2 + (y-1)^2}$$

Now, let us find the distance between 'P' and 'B'.

$$PB = \sqrt{(x+1)^2 + (y-5)^2}$$

It is given that both these distances are equal. So, let us equate both the above equations,

$$PA = PB$$

$$\sqrt{(x-5)^2 + (y-1)^2} = \sqrt{(x+1)^2 + (y-5)^2}$$

Squaring on both sides of the equation we get,

$$(x-5)^2 + (y-1)^2 = (x+1)^2 + (y-5)^2$$

$$\Rightarrow x^2 + 25 - 10x + y^2 + 1 - 2y = x^2 + 1 + 2x + y^2 + 25 - 10y$$

$$\Rightarrow -12x = -8y$$

$$\Rightarrow 3x = 2y$$

Hence we have proved that $3x = 2y$.

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