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*'.

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

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,

$$\begin{aligned} x^2 - 2x - 15 &= 0 \\ x^2 - 5x + 3x - 15 &= 0 \\ x(x-5) + 3(x-5) &= 0 \\ (x-5)(x+3) &= 0 \end{aligned}$$

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.

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

$$\begin{aligned} BC &= \sqrt{(5+5)^2 + (5-5)^2} \\ &= \sqrt{(10)^2 + (0)^2} \\ &= \sqrt{100} \\ BC &= 10 \end{aligned}$$

$$\begin{aligned} AC &= \sqrt{(0+5)^2 + (0-5)^2} \\ &= \sqrt{(5)^2 + (-5)^2} \\ &= \sqrt{25+25} \end{aligned}$$

$AC = 5\sqrt{2}$

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 3*x* = 2*y*.

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