Co-Ordinate Geometry Ex 14.2 Q34

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 $Q(0,1)$, $P(5,-3)$ and $R(x,6)$.

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

$$PQ = \sqrt{(5-0)^2 + (-3-1)^2}$$
$$= \sqrt{(5)^2 + (-4)^2}$$
$$= \sqrt{25+16}$$
$$PQ = \sqrt{41}$$

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

$$QR = \sqrt{(0-x)^2 + (1-6)^2}$$
$$QR = \sqrt{(-x)^2 + (-5)^2}$$

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

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

Squaring on both sides of the equation we get,

$$41 = (-x)^2 + (-5)^2$$
$$41 = x^2 + 25$$
$$x^2 = 16$$
$$x = \pm 4$$

Hence the values of '*x*' are $\boxed{4 \text{ or } -4}$.

Now, the required individual distances,

$$QR = \sqrt{(0 \mp 4)^2 + (1-6)^2}$$
$$= \sqrt{(\mp 4)^2 + (-5)^2}$$
$$= \sqrt{16+25}$$
$$QR = \sqrt{41}$$

Hence the length of '*QR*' is $\boxed{\sqrt{41} \text{ units}}$.

For '*PR*' there are two cases. First when the value of '*x*' is 4,

$$PR = \sqrt{(5-4)^2 + (-3-6)^2}$$
$$= \sqrt{(1)^2 + (-9)^2}$$
$$= \sqrt{1+81}$$
$$PR = \sqrt{82}$$

Then when the value of '*x*' is -4,

$$PR = \sqrt{(5+4)^2 + (-3-6)^2}$$
$$= \sqrt{(9)^2 + (-9)^2}$$
$$= \sqrt{81+81}$$
$$PR = 9\sqrt{2}$$

Hence the length of '*PR*' can be $\boxed{\sqrt{82} \text{ or } 9\sqrt{2}}$ units

Co-Ordinate Geometry Ex 14.2 Q35

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 distance between two points $P(2,-3)$ and $Q(10,y)$ is given as 10 units. Substituting these values in the formula for distance between two points we have,

$10 = \sqrt{(2-10)^2 + (-3-y)^2}$

Now, squaring the above equation on both sides of the equals sign

$$100 = (-8)^2 + (-3-y)^2$$
$$100 = 64 + 9 + y^2 + 6y$$
$$27 = y^2 + 6y$$

Thus we arrive at a quadratic equation. Let us solve this now,

$$y^2 + 6y - 27 = 0$$
$$y^2 + 9y - 3y - 27 = 0$$
$$y(y+9) - 3(y+9) = 0$$
$$(y-3)(y+9) = 0$$

The roots of the above quadratic equation are thus 3 and −9.

Thus the value of 'y' could either be $\boxed{3 \text{ or } -9}$.

Co-Ordinate Geometry Ex 14.2 Q36

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 centre of a circle is at equal distance from all the points on its circumference.

Here it is given that the circle passes through the points $A(6,-6)$, $B(3,-7)$ and $C(3,3)$.

Let the centre of the circle be represented by the point $O(x, y)$.

So we have $AO = BO = CO$

$$AO = \sqrt{(6-x)^2 + (-6-y)^2}$$
$$BO = \sqrt{(3-x)^2 + (-7-y)^2}$$
$$CO = \sqrt{(3-x)^2 + (3-y)^2}$$

Equating the first pair of these equations we have,

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

Squaring on both sides of the equation we have,

$$(6-x)^2 + (-6-y)^2 = (3-x)^2 + (-7-y)^2$$
$$36 + x^2 - 12x + 36 + y^2 + 12y = 9 + x^2 - 6x + 49 + y^2 + 14y$$
$$6x + 2y = 14$$
$$3x + y = 7$$

Equating another pair of the equations we have,

$$AO = CO$$
$$\sqrt{(6-x)^2 + (-6-y)^2} = \sqrt{(3-x)^2 + (3-y)^2}$$

Squaring on both sides of the equation we have,

$$(6-x)^2 + (-6-y)^2 = (3-x)^2 + (3-y)^2$$
$$36 + x^2 - 12x + 36 + y^2 + 12y = 9 + x^2 - 6x + 9 + y^2 - 6y$$
$$6x - 18y = 54$$
$$x - 3y = 9$$

Now we have two equations for 'x' and 'y', which are

$$3x + y = 7$$
$$x - 3y = 9$$

From the second equation we have $y = -3x + 7$. Substituting this value of 'y' in the first equation we have,

$$x - 3(-3x + 7) = 9$$
$$x + 9x - 21 = 9$$
$$10x = 30$$
$$x = 3$$

Therefore the value of 'y' is,

$$y = -3x + 7$$
$$= -3(3) + 7$$
$$y = -2$$

Hence the co-ordinates of the centre of the circle are $\boxed{(3, -2)}$.

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