Coordinate Geometry Exercise 1

Question 1 Find the distance between the following pairs of points
(i) (2, 3), (4, 1)
(ii) (– 5, 7), (– 1, 3)
(iii) ((*a*, *b*), (– *a*, – *b*)

Question 2 Find the distance between the points (0, 0) and (36, 15). Can you now find the distance between the two towns A and B?

Question 3 Determine if the points (1, 5), (2, 3) and (– 2, – 11) are collinear.
Question 4 Check whether (5, – 2), (6, 4) and (7, – 2) are the vertices of an isosceles triangle

Question 5 In a classroom, 4 friends are seated at the points A, B, C and D as shown below. Champaand Chameli walks into the class and after observing for a few minutes Champa asks Chameli,
"Don't you think ABCD is a square?" Chameli disagrees. Using distance formula, find Which of them is correct?

Question 6 Name the type of quadrilateral formed, if any, by the following points, and give reasons for your answer:

(i) (– 1, – 2), (1, 0), (– 1, 2), (– 3, 0)
(ii) (–3, 5), (3, 1), (0, 3), (–1, – 4)

iii) (4,5) ,(7,6), (4,3) (1,2)

Question 7 Find the point on the *x*-axis which is equidistant from (2, –5) and (–2, 9).

Question 8 Find the values of *y* for which the distance between the points P(2, – 3) and Q(10, *y*) is 10 units

Question 9 If Q(0, 1) is equidistant from P(5, –3) and R(*x*, 6), find the values of *x*. Also find the distances QR and PR.

Question 10 Find a relation between *x* and *y* such that the point (*x*, *y*) is equidistant from the point (3, 6) and (– 3, 4).

Solution 1

Distance between the points AB is given by

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

i) $D = \sqrt{(4-2)^2 + (1-3)^2} = 2\sqrt{2}$

ii) $D = \sqrt{(-1+5)^2 + (3-7)^2} = 4\sqrt{2}$

iii) $D = \sqrt{(-a-a)^2 + (-b-b)^2} = 2\sqrt{a^2 + b^2}$

Solution 2

Let P(0,0) and Q(36,15) be the given points.

Distance between the points PQ is given by

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

$$D = \sqrt{(36-0)^2 + (15-0)^2} = 39$$

The position of town A and B can be represented as points P and Q respectively, so distance between towns will be 39 km

Solution3

Let's us denote point by P(1,5) , Q(2,3) and R(-2,-11)

If the points are not collinear, then we should be able to form the triangle

Let's us find the length of PQ, QR and PR by distance formula

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

$$PQ = \sqrt{(2-1)^2 + (3-5)^2} = \sqrt{5}$$

$$QR = \sqrt{(-2-2)^2 + (-11-3)^2} = \sqrt{212}$$

$$PR = \sqrt{(-2-1)^2 + (-11-5)^2} = \sqrt{265}$$

Clearly none of these is true

PQ+QR=PR

PR+PQ=QR

PQ=QR+PR

Hence they are not collinear

Solution 4

Let us denote point by P(5,-2) , Q(6,4) and R(7,-2)

Let us find the length of PQ, QR and PR by distance formula

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

$$PQ = \sqrt{(6-5)^2 + (4+2)^2} = \sqrt{37}$$

$$QR = \sqrt{(7-6)^2 + (-2-4)^2} = \sqrt{37}$$

$$PR = \sqrt{(7-5)^2 + (-2+2)^2} = 2$$

Now PQ =QR, so it is an isosceles triangle

Solution 5

As per the figure given, The coordinates of the points A,B,C and D are (3,4), (6,7) ,(9,4) and (6,1)

Let us find the length of AB, BC ,CD and AD by distance formula

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

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

$$BC = \sqrt{(9-6)^2 + (4-7)^2} = 3\sqrt{2}$$

$$CD = \sqrt{(6-9)^2 + (1-4)^2} = 3\sqrt{2}$$

$$DA = \sqrt{(3-6)^2 + (4-1)^2} = 3\sqrt{2}$$

So all the sides are equal. But we cannot still say that it is square as rhombus has all the sides equal also.

Now we know that a square has both the diagonal equal also, So lets us calculate the diagonal's

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

$$BD = \sqrt{(6-6)^2 + (1-7)^2} = 6$$

Hence AC=BD

So it is a square.

So champa is correct

Solution 6

In this type of problem, we need to find of length of each segment, then check with the properties of different type of quadrilateral

i.e. for points A,B,C and D

Line segments are AB, BC,AC,CD,AD and BD

We need to find the length of each of these

i) (– 1, – 2), (1, 0), (– 1, 2), (– 3, 0)

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

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

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

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

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

$$AC = \sqrt{(-1+1)^2 + (2+2)^2} = 4$$

$$BD = \sqrt{(-3-1)^2 + (0-0)^2} = 4$$

Here the side AB, BC,CD and AD are equal and diagonal AC and BD are equal. So this is a square

ii) (–3, 5), (3, 1), (0, 3), (–1, – 4)

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

$$AB = \sqrt{(3+3)^2 + (1-5)^2} = 2\sqrt{13}$$

$$BC = \sqrt{(0-3)^2 + (3-1)^2} = \sqrt{13}$$

$$CD = \sqrt{(-1-0)^2 + (-4-3)^2} = \sqrt{50}$$

$$DA = \sqrt{(-1+3)^2 + (-4-5)^2} = \sqrt{85}$$

$$AC = \sqrt{(0+3)^2 + (3-5)^2} = \sqrt{13}$$

$$BD = \sqrt{(-1-3)^2 + (-4-1)^2} = \sqrt{41}$$

Now here AC+BC=AB

So that means ABC are collinear points.

So it is not a quadrilateral infact

iii) (4,5) ,(7,6), (4,3) (1,2)

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

$$AB = \sqrt{7-4)^2 + (6-5)^2} = \sqrt{10}$$

$$BC = \sqrt{(4-7)^2 + (3-6)^2} = \sqrt{18}$$

$$CD = \sqrt{(1-4)^2 + (2-3)^2} = \sqrt{10}$$

$$DA = \sqrt{(4-1)^2 + (5-2)^2} = \sqrt{18}$$

$$AC = \sqrt{(4-4)^2 + (3-5)^2} = 2$$

$$BD = \sqrt{(1-7)^2 + (2-6)^2} = \sqrt{52}$$

Now AB=CD and BC=DA

Now it could be rectangle or parallelogram

But diagonal AC is not equal diagonal BD

So It is a parallelogram

Solution 7

Since the point lies on X axis, the point should be of the form (a,0)

Now (a,0) is equidistant from both the given points

$$\sqrt{(x-2)^2+(0+5)^2} = \sqrt{(x+2)^2+(0-9)^2}$$

Squaring both the sides

$(x-2)^2 + (0+5)^2 = (x+2)^2 + (0-9)^2$

Solving it we get

x=-7

Solution 8

According to the question

PQ=10

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

Or

$$10 = \sqrt{y^2+6y+73}$$

Squaring both the sides

$y^2 + 6y - 27 = 0$

(y+9)(y-3)=0

So y=-9 or 3

Solution 9

Now

QP=QR

$$\sqrt{(5-0)^2+(-3-1)^2} = \sqrt{(x-0)^2+(6-1)^2}$$

Squaring both the sides

$25+16=x^2+25$

x= -4 or 4

So point R is either (4,6) or (-4,6)

Distance QR and PR when R (4,6)

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

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

Distance QR and PR when R (-4,6)

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

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

Solution 10

Let the point P(x,y) is equidistant from the point Q(3,6) and R(-3,4)

PQ=PR

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

Squaring both the sides

$x^2 -6x+9 +y^2-12y +36=x^2 +6x+9 +y^2 -8y+16$

-12x-4y+20=0

Or

3x+y-5=0 (dividing by -4)