NCERT Solutions for Class 10 Maths Chapter 7 Coordinate Geometry EXERCISE 7.1

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)

Solution:(i) We know that distance between the two points is given by:

$= [(x_1 - x_2)^2 + (y_1 - y_2)^2]^{1/2}$

Distance between (2, 3) and (4, 1) is:

$l = [(2 - 4)^2 + (3 - 1)^2]^{1/2}$

$= [4 + 4]^{1/2} = (8)^{1/2}$

$= 2\sqrt{2}$

(ii) Distance between (-5, 7) and (-1, 3) is:

$l = [(-5 + 1)^2 + (7 - 3)^2]^{1/2}$

$= [16 + 16]^{1/2} = (32)^{1/2}$

$= 4\sqrt{2}$

(iii) Distance between (a, b) and (-a, -b) is:

$l = [(a + a)^2 + (b + b)^2]^{1/2}$

$= [2a + 2b]^{1/2} = (4a^2 + 4b^2)^{1/2}$

$= 2\sqrt{a * a + b * b}$

2. Find the distance between the points (0, 0) and (36, 15). Can you now find the distancebetween the two towns A and B discussed in Section 7.2

Solution: Distance between (0, 0) and (36, 15) is:

$l = [(36 – 0)^2 + (15 – 0)^2]^{1/2}$

$= [1296 + 225]^{1/2} = (1521)^{1/2}$

$= 39$

Yes, we can find the distance between the given towns A and B. Let us take town A at origin point (0, 0)

Hence, town B will be at point (36, 15) with respect to town A

And, as calculated above, the distance between town A and B will be39 km

3. Determine if the points (1, 5), (2, 3) and (– 2, – 11) are collinear

Solution: Assume points (1, 5), (2, 3), and (- 2, - 11) representing the vertices A, B, and C of the given triangle respectively.

Let A (1, 5), B (2, 3) and C (-2, -11)

Now,

$AB = [(1 – 2)^2 + (5 – 3)^2]^{1/2}$

$= \sqrt{5}$

$BC = [(2 + 2)^2 + (3 + 11)^2]^{1/2}$

$= \sqrt{212}$

$CA = [(1+ 2)^2 + (5+ 11)^2]^{1/2}$

$= \sqrt{265}$

Since, AB + BC ≠ CA

Therefore, given points are not collinear

4. Check whether (5, – 2), (6, 4) and (7, – 2) are the vertices of an isosceles triangle

Solution:Let us assume that points (5, - 2), (6, 4), and (7, - 2) are representing the vertices A, B, and C of the given triangle respectively

AB = $[(5- 6)^2 + (-2- 4)^2]^{1/2}$

= $\sqrt{1 + 36}$

= $\sqrt{37}$

BC = $[(6- 7)^2 + (4+ 2)^2]^{1/2}$

= $\sqrt{1 + 36}$

= $\sqrt{37}$

CA = $[(5- 7)^2 + (-2+ 2)^2]^{1/2}$

= $\sqrt{4 + 0}$

= 2

Therefore, AB = BC

As two sides are equal in length, therefore, ABCis an isosceles triangle

5. In a classroom, 4 friends areseated at the points A, B, C and D as shown in Fig. 7.8 Champaand Chameli walk into the classand after observing for a fewminutes Champa asks Chameli,“Don’t you think ABCD is asquare?” Chameli disagrees.Using distance formula, findwhich of them is correct

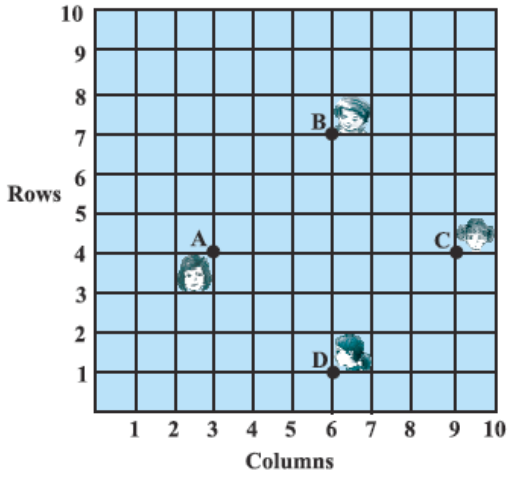

Fig. 7.8

Solution:It can be seen that A (3, 4), B (6, 7), C (9, 4), and D (6, 1) are the positions of 4 friends

Hence,

AB = $[(3- 6)^2 + (4 - 7)^2]^{1/2}$

= $\sqrt{9+9} = \sqrt{18}$

= $3\sqrt{2}$

BC = $[(6 - 9)^2 + (7- 4)^2]^{1/2}$

= $\sqrt{9+9} = \sqrt{18}$

= $3\sqrt{2}$

CB = $[(9- 6)^2 + (4- 1)^2]^{1/2}$

= $\sqrt{9+9} = \sqrt{18}$

= $3\sqrt{2}$

AD = $[(3 - 6)^2 + (4 - 1)^2]^{1/2}$

= $\sqrt{9+9} = \sqrt{18}$

= $3\sqrt{2}$

Diagonal AC = $[(3 - 9)^2 + (4 - 4)^2]^{1/2}$

= $\sqrt{36+0}$

= 6

Diagonal BD = $[(6-6)^2 + (7-1)^2]^{1/2}$

= $\sqrt{36+0}$

= 6

It can be seen that all sides of quadrilateral ABCD are of the same length and diagonals are of the same length

Therefore, ABCD is a square and hence, Champa was correct

6. Name the type of quadrilateralformed, if any, by the followingpoints, and give reasons foryour 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)

Solution:(i) Let the points (- 1, - 2), (1, 0), (- 1, 2), and (- 3, 0) be representing the vertices A, B, C, and D of the givenquadrilateral respectively

AB = $[(-1-1)^2 + (-2-0)^2]^{1/2}$

= $\sqrt{4+4}$ = $\sqrt{8}$

= $2\sqrt{2}$

BC = $[(1+1)^2 + (0-2)^2]^{1/2}$

= $\sqrt{4+4}$ = $\sqrt{8}$

= $2\sqrt{2}$

CD = $[(-1+3)^2 + (2-0)^2]^{1/2}$

= $\sqrt{4+4}$ = $\sqrt{8}$

= $2\sqrt{2}$

AD = $[(-1+ 3)^2 + (-2- 0)^2]^{1/2}$

= $\sqrt{4+4}$ = $\sqrt{8}$

= $2\sqrt{2}$

Diagonal AC = $[(-1 + 1)^2 + (-2 - 2)^2]^{1/2}$

= $\sqrt{0+16}$

= 4

Diagonal BD = $[(1 + 3)^2 + (0- 0)^2]^{1/2}$

= $\sqrt{16+0}$

= 4

It is clear that all sides of this quadrilateral are of the same length and the diagonals are of the samelength. Therefore, the given points are the vertices of a square

(ii)Let the points (- 3, 5), (3, 1), (0, 3), and (- 1, - 4) be representing the vertices A, B, C, and D of the given quadrilateral respectively

AB = $[(-3- 3)^2 + (5- 1)^2]^{1/2}$

= $\sqrt{36+16}$ = $\sqrt{52}$

= $2\sqrt{13}$

BC = $[(3- 0)^2 + (1- 3)^2]^{1/2}$

= $\sqrt{9+4}$

= $\sqrt{13}$

CD = $[(0 + 1)^2 + (3+ 4)^2]^{1/2}$

= $\sqrt{1+49}$ = $\sqrt{50}$

= $5\sqrt{2}$

AD = $[(-3+1)^2 + (5+4)^2]^{1/2}$

= $\sqrt{4+81}$

= $\sqrt{85}$

We can observe that all sides of this quadrilateral are of different lengths.

Therefore, it can be said that it is only ageneral quadrilateral, and not specific such as square, rectangle, etc

(iii)Let the points (4, 5), (7, 6), (4, 3), and (1, 2) be representing the vertices A, B, C, and D of the given quadrilateral respectively

AB = $[(4-7)^2 + (5-6)^2]^{1/2}$

= $\sqrt{9+1}$

= $\sqrt{10}$

BC = $[(7-4)^2 + (6-3)^2]^{1/2}$

= $\sqrt{9+9}$

= $\sqrt{18}$

CD = $[(4-1)^2 + (3-2)^2]^{1/2}$

= $\sqrt{9+1}$

= $\sqrt{10}$

AD = $[(4-1)^2 + (5-2)^2]^{1/2}$

= $\sqrt{9+9}$

= $\sqrt{18}$

Diagonal AC = $[(4-4)^2 + (5-3)^2]^{1/2}$

$= \sqrt{0 + 4}$

= 2

Diagonal CD = $[(7 - 1)^2 + (6 - 2)^2]^{1/2}$

$= \sqrt{36 + 16}$

$= \sqrt{52}$

$= 13\sqrt{2}$

We can observe that opposite sides of this quadrilateral are of the same length.

However, the diagonals are ofdifferent lengths. Therefore, the given points are the vertices of a parallelogram

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

Solution: We have to find a point on *x*-axis.

Hence, its *y*-coordinate will be 0

Let the point on *x*-axis be (x, 0)

Distance between (x, 0) and (2, -5) = $[(x- 2)^2 + (0+ 5)^2]^{1/2}$

= $[(x- 2)^2 + (5)^2]^{1/2}$

Distance between (x, 0) and (-2, 9) = $[(x + 2)^2 + (0 + 9)^2]^{1/2}$

= $[(x + 2)^2 + (9)^2]^{1/2}$

By the given condition, these distances are equal in measure

$[(x - 2)^2 + (5)^2]^{1/2} = [(x + 2)^2 + (9)^2]^{1/2}$

$(x – 2)^2 + 25 = (x + 2)^2 + 81$

$x^2 + 4 – 4x + 25 = x^2 + 4 + 4x + 81$

8x = 25 – 81

8x = -56

x = - 7

Therefore, the point is (- 7, 0)

8. Find the values of y for which the distance between the points P(2, – 3) and Q (10, y) is10 units

Solution: It is given that the distance between (2, - 3) and (10, *y*) is 10

Therefore,

$[(2 - 10)^2 + (-3- y)^2]^{1/2} = 10$

$[(-8)^2 + (3+ y)^2]^{1/2} = 10$

$64 + (y + 3)^2 = 100$

$(y + 3)^2 = 36$

$y + 3 = \pm 6$

y + 3 = 6 or y + 3 = -6

Therefore, y = 3 or -9

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

Solution:PQ = QR

$[(5 - 0)^2 + (-3- 1)^2]^{1/2} = [(0 - x)^2 + (1- 6)^2]^{1/2}$

$\sqrt{25 + 16} = \sqrt{x * x + 25}$

$41 = x^2 + 25$

$x^2 = 16$

$x = \pm 4$

Hence, point R is (4, 6) or (- 4, 6).

When point R is (4, 6)

PR = $[(5 - 4)^2 + (-3 - 6)^2]^{1/2}$

= $\sqrt{1 + 81}$

= $\sqrt{82}$

QR = $[(0 - 4)^2 + (1 - 6)^2]^{1/2}$

= $\sqrt{16 + 25}$

= $\sqrt{41}$

When point R is (- 4, 6),

PR = $[(5 + 4)^2 + (-3 - 6)^2]^{1/2}$

= $\sqrt{81 + 81}$

= $9\sqrt{2}$

QR = $[(0+ 4)^2 + (1 - 6)^2]^{1/2}$

= $\sqrt{16 + 25}$

= $\sqrt{41}$

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:Point (*x*, *y*) is equidistant from (3, 6) and (- 3, 4)

Therefore,

$[(x- 3)^2 + (y - 6)^2]^{1/2} = [(x + 3)^2 + (y- 4)^2]^{1/2}$

$(x – 3)^2 + (y – 6)^2 = (x + 3)^2 + (y – 4)^2$

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

$36 - 16 = 6x + 6x + 12y - 8y$

$20 = 12x + 4y$

$3x + y = 5$

$3x + y - 5 = 0$