

Exercise 9.1

Q1 Find the distance between the following pairs of points.

(a) A (9,2), B (7,2)

Solution:

Distance formula = $d = \pm \sqrt{{x_2 - x_1}^2 + {y_2 - y_1}^2}$

$= \sqrt{{(7 - 9)}^2 + {(2 - 2)}^2}$

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

$= \sqrt{4 + 0} = \sqrt{4} = 2$

(b) A (2, -6), B (3, -6)

Solution:

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

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

(C) A (-8, 1), B (6, 1)

Solution:

$= \sqrt{{[6 - (-8)]}^2 + {[1 - 1]}^2}$

$= \sqrt{{(14)}^2 + {(0)}^2} = 14$

(d) A (-4, $\sqrt{2}$), B (-4, -3)

Solution:

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

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

(e) A (3, -11), B (3, -4)

Solution:

$|ABI| = \sqrt{{(3 - 3)}^2 + {[-4 - (-11)]}^2}$

$= \sqrt{{(0)}^2 + {(7)}^2} = 7$

(f) A (0, 0), B (0, -5)

Solution:

$|ABI| = \sqrt{{(0 - 0)}^2 + {(-5 - 0)}^2}$

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

$= \sqrt{0 + 25}$

$= \sqrt{25} = 5$

Q2. Let P be the point on x-axis with x-coordinate a and Q be the point on y-axis with y-coordinate b as given below. Find the distance between P and Q.

(i) a = 9, b = 7

Solution:

P is (9,0) and Q is (0,7)

$|PQ| = \sqrt{{(0 - 9)}^2 + {(7 - 0)}^2}$

$= \sqrt{81 + 49} = \sqrt{130}$

(ii) a = 2, b = 3

Solution:

P is (2,0) and Q is (0,3)

$|ABI| = \sqrt{{(0 - 2)}^2 + {(3 - 0)}^2}$

$= \sqrt{4 + 9} = \sqrt{13}$

(iii) a = -8, b = 6

Solution:

$|PQ| = \sqrt{{[0 - (-8)]}^2 + {(6 - 0)}^2} = \sqrt{{(8)}^2 + {(6)}^2}$

$= \sqrt{64 + 36} = \sqrt{100} = 10$

(iv) a = -2, b = -3

Solution:

$\therefore P$ is (-2,0) and Q is (0,3)

$|PQ| = \sqrt{{[0 - (-2)]}^2 + {(-3 - 0)}^2}$

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

$= \sqrt{13}$

(v) a = $\sqrt{2}$, b = 1

Solution:

$\therefore P$ is ($\sqrt{2}$,0) and Q is (0,1)

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

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

(vi) a = -9 and b = -4

Solution:

$\therefore P$ is (-9,0) and Q is (0,4)

$|PQ| = \sqrt{{(0 - (-9))}^2 + {[-4 - 0]}^2}$

$= \sqrt{{(9)}^2 + {(-4)}^2} = \sqrt{81 + 16}$

$= \sqrt{97}$

Exercise 9.2

Q1. Show whether the points with vertices (5, -2), (5, 4) and (-4, 1), are vertices of an equilateral triangle or an isosceles triangle?

Solution:

Let the points be A(5, -2), B(5, 4) and C(-4, 1).

$$\begin{aligned} |AB| &= \sqrt{(5-5)^2 + (4+2)^2} \\ &= \sqrt{(0)^2 + (6)^2} = \sqrt{0+36} = 6 \\ |BC| &= \sqrt{(5+4)^2 + (4-1)^2} \\ &= \sqrt{(9)^2 + (3)^2} \\ &= \sqrt{81+9} = \sqrt{90} = \sqrt{9 \times 10} = 3\sqrt{10} \\ |CA| &= \sqrt{(5+4)^2 + (-2-1)^2} \\ &= \sqrt{(9)^2 + (-3)^2} \\ &= \sqrt{81+9} = \sqrt{90} = \sqrt{9 \times 10} = 3\sqrt{10} \end{aligned}$$

$$\text{As } |BC| = |CA| = 3\sqrt{10}$$

Since two sides are equal therefore the triangle is formed is an isosceles triangle.

Q2. Show whether or not the points with vertices (-1, 1), (5, 4), (2, -2) and (-4, 1) form a square.

Solution:

Let the points be A(-1, 1), B(5, 4), C(2, 2) and D(-4, 1)

$$\begin{aligned} |AB| &= \sqrt{(5+1)^2 + (4-1)^2} \\ &= \sqrt{(36+9)} = \sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5} \\ |BC| &= \sqrt{(5-2)^2 + (4-2)^2} \\ &= \sqrt{(9+36)} = \sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5} \\ |CD| &= \sqrt{(2+4)^2 + (-2-1)^2} = \sqrt{(6)^2 + (-3)^2} \\ &= \sqrt{(36+9)} = \sqrt{45} = 3\sqrt{5} \\ |DA| &= \sqrt{(-1+4)^2 + (1-1)^2} = \sqrt{(3)^2 + 0^2} = 3 \\ |AB| &= |BC| = |CD| = 3\sqrt{5} \text{ but } |AD| = 3 \end{aligned}$$

Since all sides are not equal therefore the given points did not form a square.

Q3. Show whether or not the points coordinate (1, 3), (4, 2) and (-2, 6) are vertices of a right triangle.

Solution:

Let the given points be A(1, 3), B(4, 2) and C(-2, 6).

$$\begin{aligned} |AB| &= \sqrt{(4-1)^2 + (2-3)^2} \\ &= \sqrt{(3)^2 + (-1)^2} = \sqrt{9+1} = 10 \\ |BC| &= \sqrt{(4+2)^2 + (2-6)^2} \\ &= \sqrt{(6)^2 + (-4)^2} \\ &= \sqrt{(36+16)} = \sqrt{52} \end{aligned}$$

Review Exercise 9

- Q1. Choose the correct answer.**
- (i) Distance between points (0, 0) and (1,1) is
- (a) 0 (b) 1
- (c) 2 (d) $\sqrt{2}$
- (ii) Distance between the points (1,0) and (0,1) is
- (a) 0 (b) 1
- (c) $\sqrt{2}$ (d) 2
- (iii) Midpoint of the points (2, 2) and (0, 0) is
- (a) (1,1) (b) (1,0)
- (c) (0,1) (d) (-1,-1)
- (iv) Mid-point of the points (2, >2) and (-2, 2) is
- (a) (2,2) (b) (-2,-2)
- (c) (0,0) (d) (1,1)
- (v) A triangle having all sides equal is called
- (a) Isosceles (b) Scalene
- (c) Equilateral (d) None of these

- (vi) A triangle having all sides different is called
- (a) Isosceles (b) Scalene
- (c) Equilateral (d) None of these

Answers:

(i) d	(ii) c	(iii) a	(iv) c	(v) c	(vi) b
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Q2. Answer the following, which is true and which is false.

- (i) A line has two end points.
- (ii) A line segment has one end point.
- (iii) A triangle is formed by three collinear points.
- (iv) Each side of a triangle has two collinear vertices.
- (v) The end points of each side of a rectangle are collinear.
- (vi) All the points that lie on the x-axis are collinear.
- (vii) Origin is the only point collinear with the points of both the axes separately.

Answers:

(i) F	(ii) F	(iii) F	(iv) T	(v) T	(vi) T
(vii) T					

Q3. Find the distance between the following pairs of points.

Solution:

(i) A (6,3), B (3,-3)

$$\begin{aligned} |AB| &= \sqrt{(3-6)^2 + (-3-3)^2} \\ &= \sqrt{(-3)^2 + (-6)^2} \\ &= \sqrt{9+36} = \sqrt{45} \end{aligned}$$

(ii) A (7, 5), B (1,-1)

$$\begin{aligned} |AB| &= \sqrt{(7-1)^2 + (5-1)^2} \\ &= \sqrt{(6)^2 + (6)^2} \\ &= \sqrt{36+36} = \sqrt{72} = 6\sqrt{2} \end{aligned}$$

(iii) A (0, 0), B (-4, -3)

$$\begin{aligned} |AB| &= \sqrt{(0+4)^2 + (0+3)^2} \\ &= \sqrt{(4)^2 + (3)^2} \\ &= \sqrt{16+9} = \sqrt{25} = 5 \end{aligned}$$

Q4. Find the mid-point between following pairs of points

(i) (6, 6), (4, -2)

Solution:

Mid-point M is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right)$

$$\left(\frac{6+4}{2}, \frac{6-2}{2} \right)$$

or $\left(\frac{10}{2}, \frac{4}{2} \right)$

or (5, 2).

(ii) (-5, -7), (-7, -5)

Mid-point M is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right)$

$$\left(\frac{-5-7}{2}, \frac{-7-5}{2} \right)$$

or $\left(\frac{-12}{2}, \frac{-12}{2} \right)$

or (-6, -6).

(iii) (8, 0), (0, -12)

Midpoint M is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right)$

$$\left(\frac{8+0}{2}, \frac{0-12}{2} \right)$$

or $\left(\frac{8}{2}, \frac{-12}{2} \right)$

or (-4,-6).

Q5. Define the following:

(i) **Coordinate geometry:**

Coordinate geometry is the study of geometrical shapes the Cartesian plane (or coordinate plane)

(ii) **Collinear:**

Two or more than two points which lie on the same straight line are called collinear points with respect to that line.

(iii) **Non-Collinear:**

The points which do not on the same straight line are called Non-collinear.

(iv) **Equilateral triangle:**

If the length of all three sides of a triangle is same, then the triangle is called an equilateral triangle.

(v) **Scalene Triangle:**

A triangle is called scalene triangle if measure of all the three sides are different.

(vi) **Isosceles Triangle:**

An isosceles triangle is a triangle which has two of its sides with equal length while the third side has different length.

(vii) **Right Triangle:**

A triangle in which one of the angles has measure equal to 90° is called right triangle.

(viii) **Square:**

A square is a closed figure formed by four non-collinear points such that lengths of all sides are equal and measure of each angle is 90°