

COORDINATE GEOMETRY

(A) Main Concepts and Results

Cartesian system

Coordinate axes

Origin

Quadrants

Abscissa

Ordinate

Coordinates of a point

Ordered pair

Plotting of points in the cartesian plane:

- In the Cartesian plane, the horizontal line is called the x -axis and the vertical line is called the y -axis,
- The coordinate axes divide the plane into four parts called quadrants,
- The point of intersection of the axes is called the origin,
- Abscissa or the x -coordinate of a point is its distance from the y -axis and the ordinate or the y -coordinate is its distance from the x -axis,
- (x, y) are called the coordinates of the point whose abscissa is x and the ordinate is y ,
- Coordinates of a point on the x -axis are of the form $(x, 0)$ and that of the point on the y -axis is of the form $(0, y)$,

- The coordinates of the origin are $(0, 0)$,
- Signs of the coordinates of a point in the first quadrant are $(+, +)$, in the second quadrant $(-, +)$, in the third quadrant $(-, -)$ and in the fourth quadrant $(+, -)$.

(B) Multiple Choice Questions

Write the correct answer :

Sample Question 1: The points (other than origin) for which abscissa is equal to the ordinate will lie in

- | | |
|-------------------------|-------------------------|
| (A) I quadrant only | (B) I and II quadrants |
| (C) I and III quadrants | (D) II and IV quadrants |

Solution : Answer (C)

EXERCISE 3.1

Write the correct answer in each of the following :

- Point $(-3, 5)$ lies in the
(A) first quadrant (B) second quadrant
(C) third quadrant (D) fourth quadrant
- Signs of the abscissa and ordinate of a point in the second quadrant are respectively
(A) $+, +$ (B) $-, -$ (C) $-, +$ (D) $+, -$
- Point $(0, -7)$ lies
(A) on the x -axis (B) in the second quadrant
(C) on the y -axis (D) in the fourth quadrant
- Point $(-10, 0)$ lies
(A) on the negative direction of the x -axis
(B) on the negative direction of the y -axis
(C) in the third quadrant
(D) in the fourth quadrant
- Abscissa of all the points on the x -axis is
(A) 0 (B) 1
(C) 2 (D) any number
- Ordinate of all points on the x -axis is
(A) 0 (B) 1
(C) -1 (D) any number

7. The point at which the two coordinate axes meet is called the
(A) abscissa (B) ordinate (C) origin (D) quadrant
8. A point both of whose coordinates are negative will lie in
(A) I quadrant (B) II quadrant
(C) III quadrant (D) IV quadrant
9. Points $(1, -1)$, $(2, -2)$, $(4, -5)$, $(-3, -4)$
(A) lie in II quadrant (B) lie in III quadrant
(C) lie in IV quadrant (D) do not lie in the same quadrant
10. If y coordinate of a point is zero, then this point always lies
(A) in I quadrant (B) in II quadrant
(C) on x - axis (D) on y - axis
11. The points $(-5, 2)$ and $(2, -5)$ lie in the
(A) same quadrant (B) II and III quadrants, respectively
(C) II and IV quadrants, respectively (D) IV and II quadrants, respectively
12. If the perpendicular distance of a point P from the x -axis is 5 units and the foot of the perpendicular lies on the negative direction of x -axis, then the point P has
(A) x coordinate = -5 (B) y coordinate = 5 only
(C) y coordinate = -5 only (D) y coordinate = 5 or -5
13. On plotting the points O $(0, 0)$, A $(3, 0)$, B $(3, 4)$, C $(0, 4)$ and joining OA, AB, BC and CO which of the following figure is obtained?
(A) Square (B) Rectangle (C) Trapezium (D) Rhombus
14. If P $(-1, 1)$, Q $(3, -4)$, R $(1, -1)$, S $(-2, -3)$ and T $(-4, 4)$ are plotted on the graph paper, then the point(s) in the fourth quadrant are
(A) P and T (B) Q and R (C) Only S (D) P and R
15. If the coordinates of the two points are P $(-2, 3)$ and Q $(-3, 5)$, then (abscissa of P) – (abscissa of Q) is
(A) -5 (B) 1 (C) -1 (D) -2
16. If P $(5, 1)$, Q $(8, 0)$, R $(0, 4)$, S $(0, 5)$ and O $(0, 0)$ are plotted on the graph paper, then the point(s) on the x -axis are
(A) P and R (B) R and S (C) Only Q (D) Q and O
17. Abscissa of a point is positive in
(A) I and II quadrants (B) I and IV quadrants
(C) I quadrant only (D) II quadrant only

18. The points whose abscissa and ordinate have different signs will lie in

- (A) I and II quadrants
- (B) II and III quadrants
- (C) I and III quadrants
- (D) II and IV quadrants

19. In Fig. 3.1, coordinates of P are

- (A) $(-4, 2)$
- (B) $(-2, 4)$
- (C) $(4, -2)$
- (D) $(2, -4)$

20. In Fig. 3.2, the point identified by the coordinates $(-5, 3)$ is

- (A) T
- (B) R
- (C) L
- (D) S

21. The point whose ordinate is 4 and which lies on y-axis is

- (A) $(4, 0)$
- (B) $(0, 4)$
- (C) $(1, 4)$
- (D) $(4, 2)$

22. Which of the points $P(0, 3)$, $Q(1, 0)$, $R(0, -1)$, $S(-5, 0)$, $T(1, 2)$ do not lie on the x-axis?

- (A) P and R only
- (B) Q and S only
- (C) P, R and T
- (D) Q, S and T

23. The point which lies on y-axis at a distance of 5 units in the negative direction of y-axis is

- (A) $(0, 5)$
- (B) $(5, 0)$
- (C) $(0, -5)$
- (D) $(-5, 0)$

24. The perpendicular distance of the point P $(3, 4)$ from the y-axis is

- (A) 3
- (B) 4
- (C) 5
- (D) 7

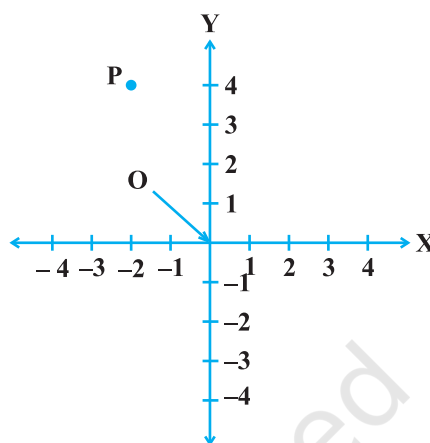


Fig. 3.1

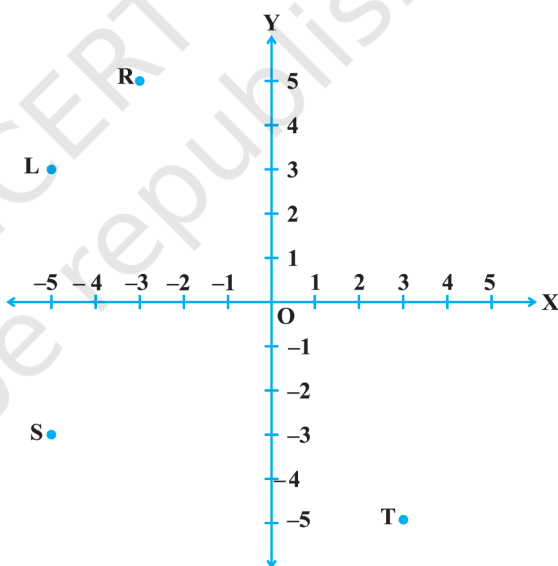


Fig. 3.2

(C) Short Answer Questions with Reasoning

Sample Question 1 : Write whether the following statements are **True** or **False**? Justify your answer.

- (i) Point $(0, -2)$ lies on y -axis.
- (ii) The perpendicular distance of the point $(4, 3)$ from the x -axis is 4.

Solution :

- (i) True, because a point on the y -axis is of the form $(0, y)$.
- (ii) False, because the perpendicular distance of a point from the x -axis is its ordinate. Hence it is 3, not 4.

EXERCISE 3.2

1. Write whether the following statements are True or False? Justify your answer.
 - (i) Point $(3, 0)$ lies in the first quadrant.
 - (ii) Points $(1, -1)$ and $(-1, 1)$ lie in the same quadrant.
 - (iii) The coordinates of a point whose ordinate is $-\frac{1}{2}$ and abscissa is 1 are $-\frac{1}{2}, 1$.
 - (iv) A point lies on y -axis at a distance of 2 units from the x -axis. Its coordinates are $(2, 0)$.
 - (v) $(-1, 7)$ is a point in the II quadrant.

(D) Short Answer Questions

Sample Question 1 : Plot the point $P(-6, 2)$ and from it draw PM and PN as perpendiculars to x -axis and y -axis, respectively. Write the coordinates of the points M and N .

Solution :

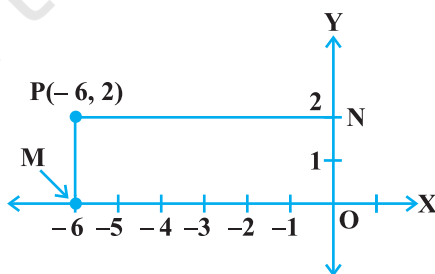


Fig. 3.3

From the graph, we see that $M(-6, 0)$ and $N(0, 2)$.

Sample Question 2 : From the Fig. 3.4, write the following:

- Coordinates of B, C and E
- The point identified by the coordinates $(0, -2)$
- The abscissa of the point H
- The ordinate of the point D

Solution :

- $B = (-5, 2)$, $C(-2, -3)$,
 $E = (3, -1)$
- F
- 1
- 0

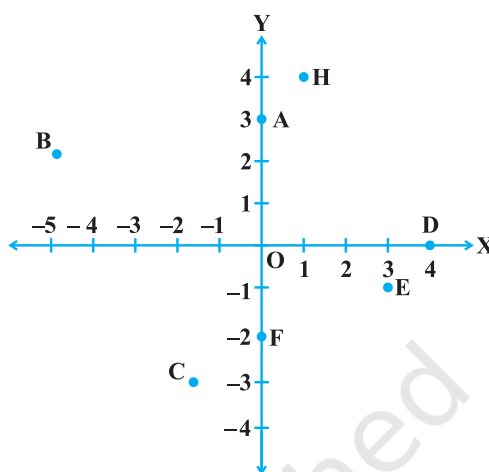


Fig. 3.4

EXERCISE 3.3

- Write the coordinates of each of the points P, Q, R, S, T and O from the Fig. 3.5.

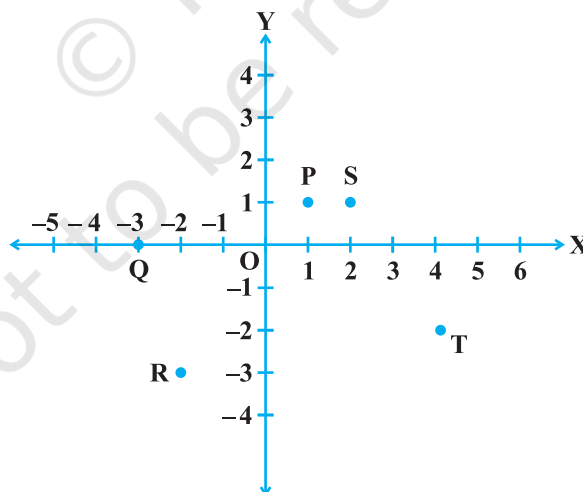


Fig. 3.5

2. Plot the following points and write the name of the figure obtained by joining them in order:

P(-3, 2), Q(-7, -3), R(6, -3), S(2, 2)

3. Plot the points (x, y) given by the following table:

x	2	4	-3	-2	3	0
y	4	2	0	5	-3	0

4. Plot the following points and check whether they are collinear or not :

(i) (1, 3), (-1, -1), (-2, -3)

(ii) (1, 1), (2, -3), (-1, -2)

(iii) (0, 0), (2, 2), (5, 5)

5. Without plotting the points indicate the quadrant in which they will lie, if

(i) ordinate is 5 and abscissa is -3

(ii) abscissa is -5 and ordinate is -3

(iii) abscissa is -5 and ordinate is 3

(iv) ordinate is 5 and abscissa is 3

6. In Fig. 3.6, LM is a line parallel to the y-axis at a distance of 3 units.

(i) What are the coordinates of the points P, R and Q?

(ii) What is the difference between the abscissa of the points L and M?

7. In which quadrant or on which axis each of the following points lie?

(-3, 5), (4, -1), (2, 0), (2, 2), (-3, -6)

8. Which of the following points lie on y-axis?

A (1, 1), B (1, 0), C (0, 1), D (0, 0), E (0, -1), F (-1, 0), G (0, 5), H (-7, 0), I (3, 3).

9. Plot the points (x, y) given by the following table.
Use scale 1 cm = 0.25 units

x	1.25	0.25	1.5	-1.75
y	-0.5	1	1.5	-0.25

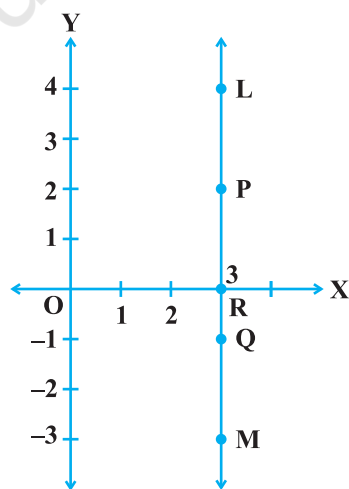


Fig. 3.6

10. A point lies on the x -axis at a distance of 7 units from the y -axis. What are its coordinates? What will be the coordinates if it lies on y -axis at a distance of -7 units from x -axis?
11. Find the coordinates of the point
- (i) which lies on x and y axes both.
 - (ii) whose ordinate is -4 and which lies on y -axis.
 - (iii) whose abscissa is 5 and which lies on x -axis.
12. Taking 0.5 cm as 1 unit, plot the following points on the graph paper :
A (1, 3), B (-3 , -1), C (1, -4), D (-2 , 3), E (0, -8), F (1, 0)

(E) Long Answer Questions

Sample Question 1 : Three vertices of a rectangle are (3, 2), (-4 , 2) and (-4 , 5). Plot these points and find the coordinates of the fourth vertex.

Solution : Plot the three vertices of the rectangle as A(3, 2), B(-4 , 2), C(-4 , 5) (see Fig. 3.7).

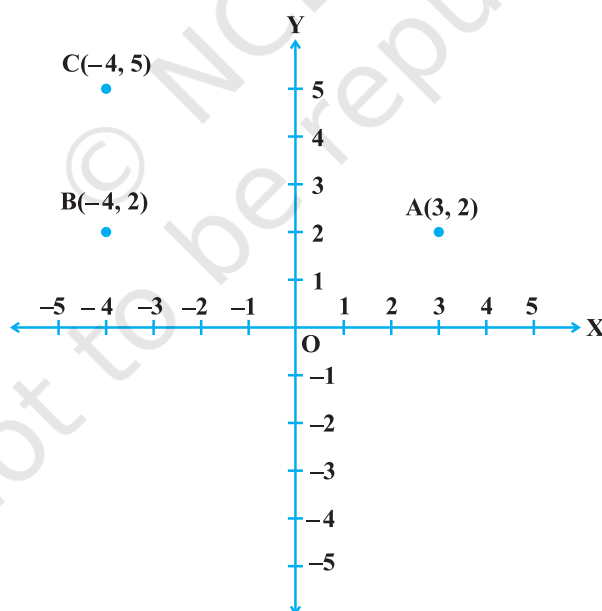


Fig. 3.7

We have to find the coordinates of the fourth vertex D so that ABCD is a rectangle. Since the opposite sides of a rectangle are equal, so the abscissa of D should be equal to abscissa of A, i.e., 3 and the ordinate of D should be equal to the ordinate of C, i.e., 5.

So, the coordinates of D are (3, 5).

EXERCISE 3.4

- Points A (5, 3), B (−2, 3) and D (5, −4) are three vertices of a square ABCD. Plot these points on a graph paper and hence find the coordinates of the vertex C.
- Write the coordinates of the vertices of a rectangle whose length and breadth are 5 and 3 units respectively, one vertex at the origin, the longer side lies on the x-axis and one of the vertices lies in the third quadrant.
- Plot the points P (1, 0), Q (4, 0) and S (1, 3). Find the coordinates of the point R such that PQRS is a square.

- From the Fig. 3.8, answer the following :

- Write the points whose abscissa is 0.
- Write the points whose ordinate is 0.
- Write the points whose abscissa is −5.

- Plot the points A (1, −1) and B (4, 5)

- Draw a line segment joining these points. Write the coordinates of a point on this line segment between the points A and B.

- Extend this line segment and write the coordinates of a point on this line which lies outside the line segment AB.

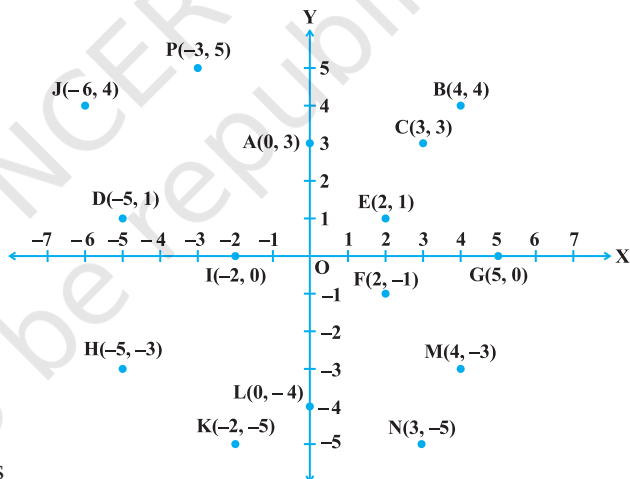


Fig. 3.8