

## 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 :

1. Point  $(-3, 5)$  lies in the  
(A) first quadrant                      (B) second quadrant  
(C) third quadrant                      (D) fourth quadrant
2. Signs of the abscissa and ordinate of a point in the second quadrant are respectively  
(A)  $+, +$                       (B)  $-, -$                       (C)  $-, +$                       (D)  $+, -$
3. Point  $(0, -7)$  lies  
(A) on the  $x$ -axis                      (B) in the second quadrant  
(C) on the  $y$ -axis                      (D) in the fourth quadrant
4. 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
5. Abscissa of all the points on the  $x$ -axis is  
(A) 0                      (B) 1  
(C) 2                      (D) any number
6. 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

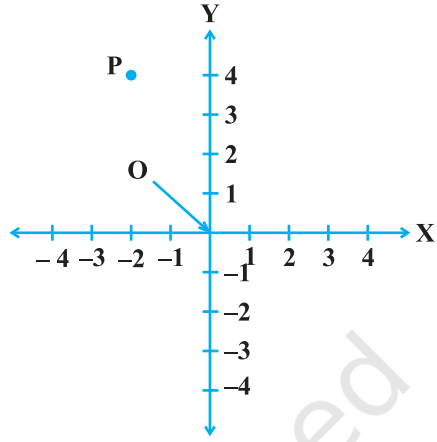


Fig. 3.1

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

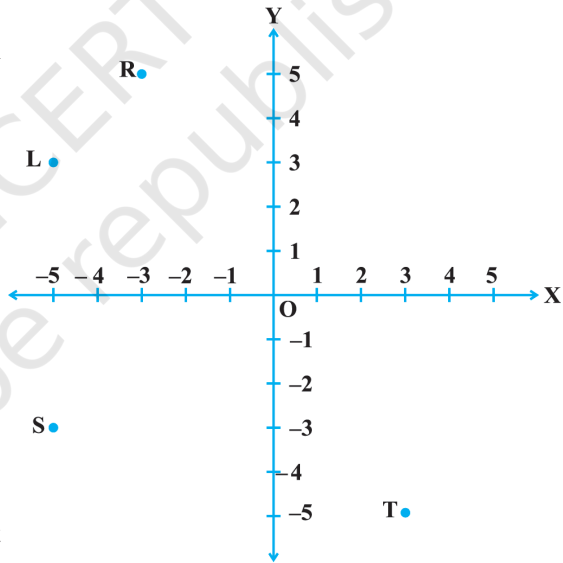


Fig. 3.2

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

**(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.

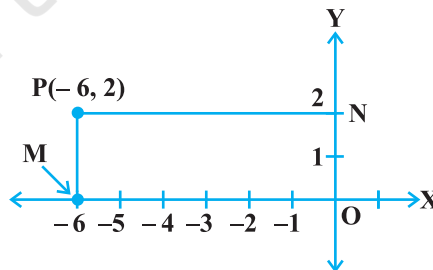
**EXERCISE 3.2**

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 :**

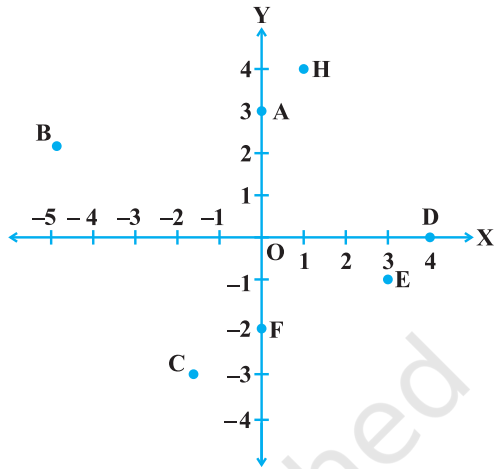


**Fig. 3.3**

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

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

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



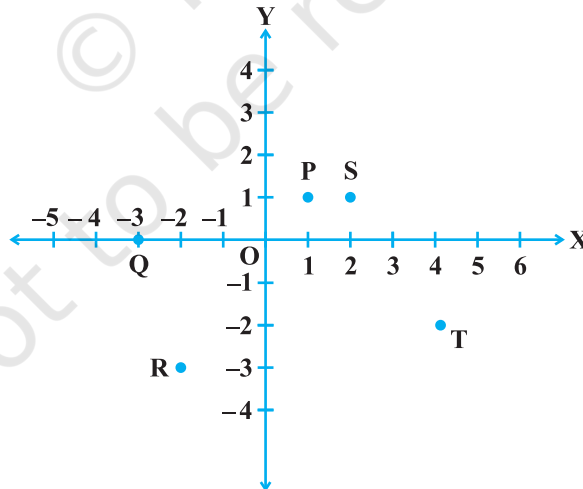
**Fig. 3.4**

**Solution :**

- (i)  $B = (-5, 2)$ ,  $C(-2, -3)$ ,  
 $E = (3, -1)$
- (ii) F
- (iii) 1
- (iv) 0

**EXERCISE 3.3**

1. 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

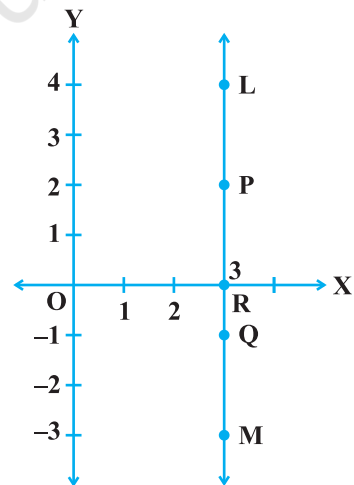


Fig. 3.6

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
- which lies on  $x$  and  $y$  axes both.
  - whose ordinate is  $-4$  and which lies on  $y$ -axis.
  - 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).

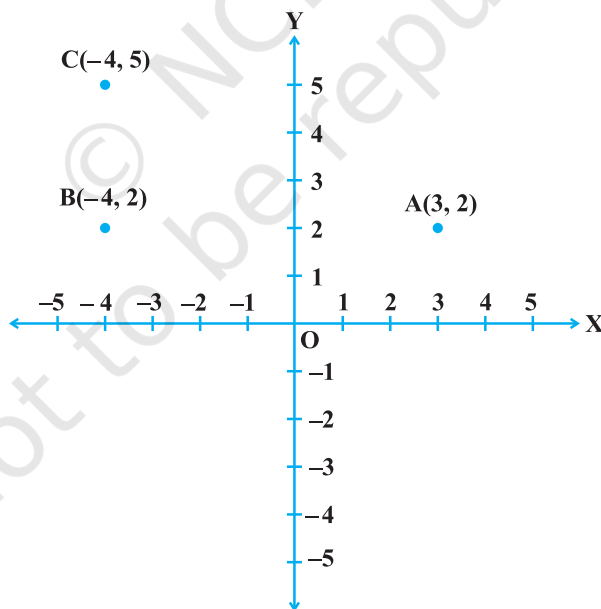


Fig. 3.7

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.

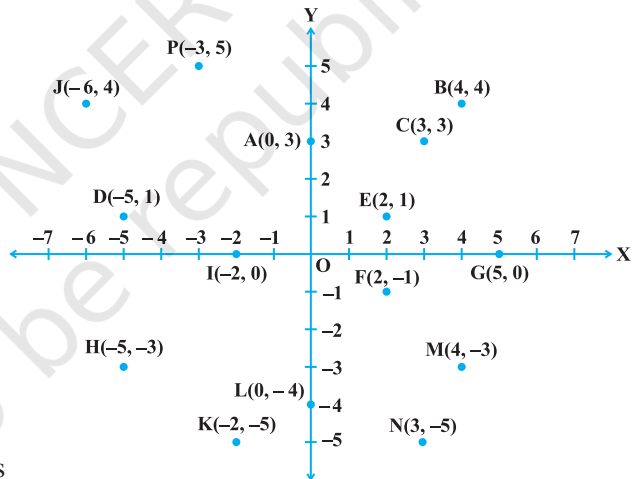


Fig. 3.8