

# CLASS NOTES

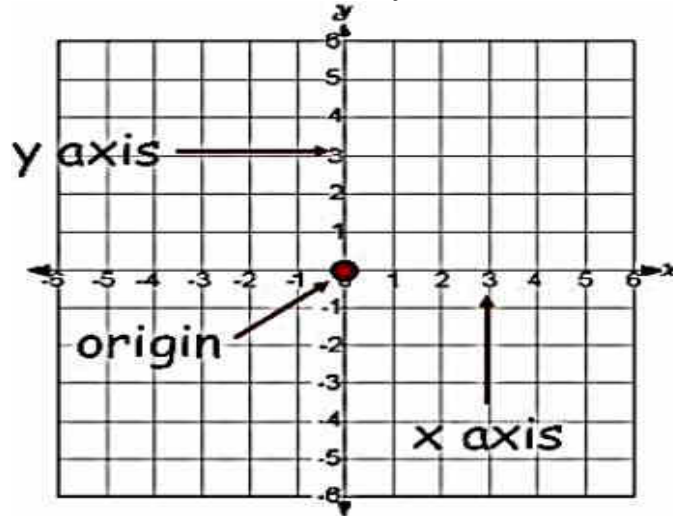
Class: IX

Topic: COORDINATE GEOMETRY

Subject: MATHEMATICS

## Cartesian System

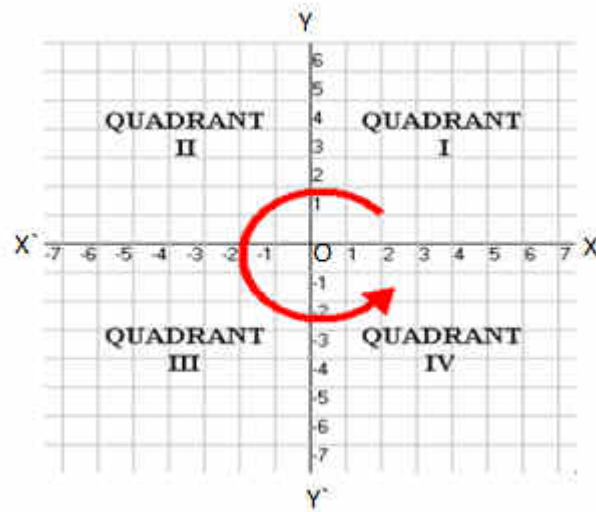
If we take two number lines, one horizontal and one vertical, and then combine them in such a way that they intersect each other at their zeroes, and then they form a **Cartesian Plane**.



- The horizontal line is known as **the x-axis** and the vertical line is known as the **y-axis**.
- The point where these two lines intersect each other is called the **origin**. It is represented as 'O'.
- OX and OY are the positive directions as the positive numbers lie in the right and upward direction.
- Similarly, the left and the downward directions are the negative directions as all the negative numbers lie there

## Quadrants of the Cartesian Plane

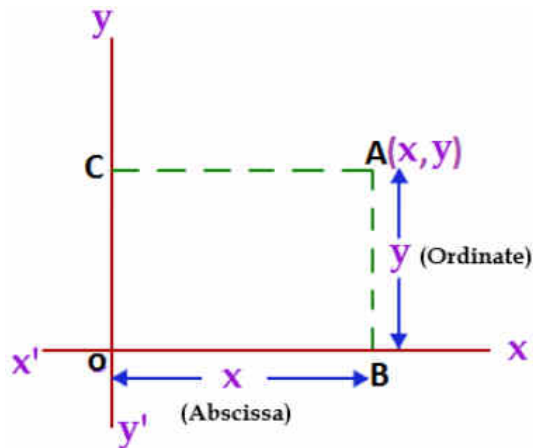
The Cartesian plane is dividing into four quadrants named as **Quadrant I, II, III, and IV** anticlockwise from OX.



## Coordinates of a Point

To write the coordinates of a point we need to follow these rules-

- The **x - coordinate** of a point is marked by drawing perpendicular from the y-axis measured a length of the x-axis. It is also called the **Abscissa**.
- The **y - coordinate** of a point is marked by drawing a perpendicular from the x-axis measured a length of the y-axis. It is also called the **Ordinate**.
- While writing the coordinates of a point in the coordinate plane, the x - coordinate comes first, and then the y - coordinate. We write the coordinates in brackets

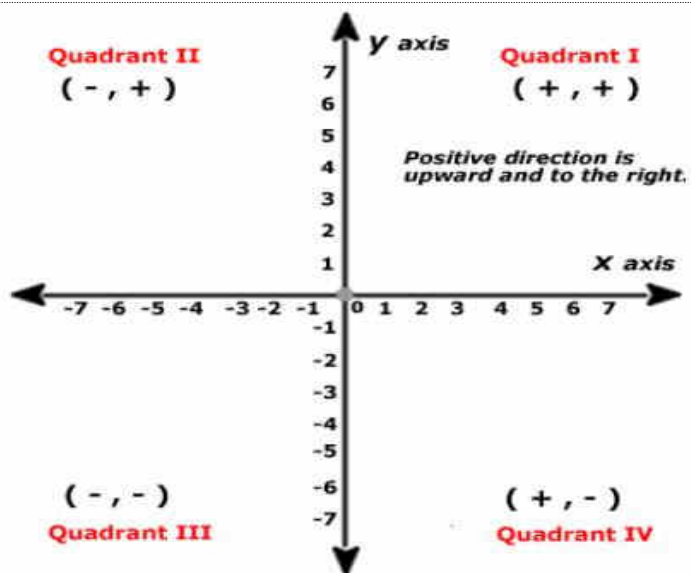


In the above figure,  $OB = CA = x$  coordinate (Abscissa), and  $CO = AB = y$  coordinate (Ordinate).

We write the coordinate as  $(x, y)$ .

**Remark:** As the origin O has zero distance from the x-axis and the y-axis so its abscissa and ordinate are zero. Hence the **coordinate of the origin** is  $(0, 0)$ .

## The relationship between the signs of the coordinates of a point and the quadrant of a point in which it lies.

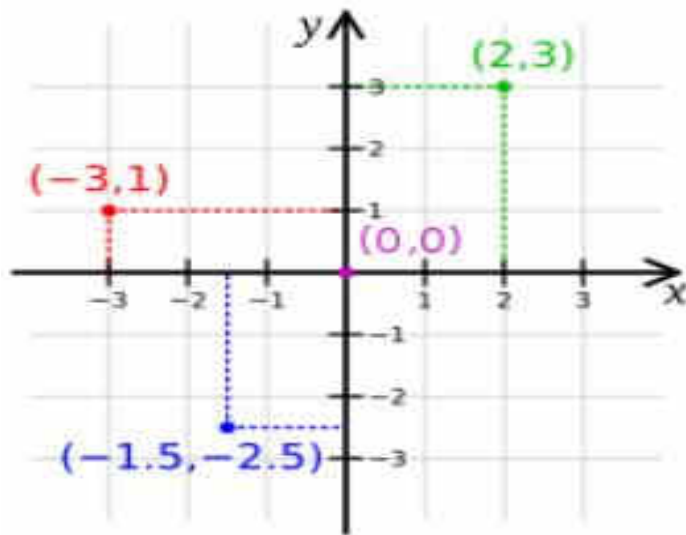


| Quadrant | Coordinate | Sign in the quadrant   |
|----------|------------|--|
| I        | (+, +)     | 1st quadrant is enclosed by the positive x-axis and the positive y-axis. |
| II       | (-, +)     | 2nd quadrant is enclosed by the negative x-axis and the positive y-axis. |
| III      | (-, -)     | 3rd quadrant is enclosed by the negative x-axis and the negative y-axis. |
| IV       | (+, -)     | 4th quadrant is enclosed by the positive x-axis and the negative y-axis. |

### Plotting a Point in the Plane if its Coordinates are Given

Steps to plot the point (2, 3) on the Cartesian plane -

- First of all, we need to draw the Cartesian plane by drawing the coordinate axes with 1 unit = 1 cm.
- To mark the x coordinates, starting from 0 moves towards the positive x-axis and count to 2.
- To mark the y coordinate, starting from 2 moves upwards in the positive direction and count to 3.
- Now this point is the coordinate (2, 3)



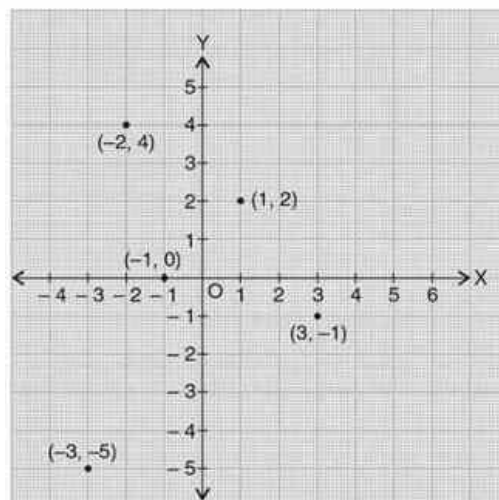
Likewise, we can plot all the other points, like  $(-3, 1)$  and  $(-1.5, -2.5)$

### Exercise 3.3

1. In which quadrant or on which axis do each of the points  $(-2, 4)$ ,  $(3, -1)$ ,  $(-1, 0)$ ,  $(1, 2)$  and  $(-3, -5)$  lie? Verify your answer by locating them on the Cartesian plane.

- Sol.**  $(-2, 4)$ , i.e.,  $(-, +)$   $\Rightarrow$  The point lies in 2nd quadrant.  
 $(3, -1)$ , i.e.,  $(+, -)$   $\Rightarrow$  The point lies in 4th quadrant.  
 $(-1, 0)$ , i.e.,  $(-, 0)$   $\Rightarrow$  The point lies on the  $-ve$   $x$ -axis.  
 $(1, 2)$ , i.e.,  $(+, +)$   $\Rightarrow$  The point lies in 1st quadrant.  
 $(-3, -5)$ , i.e.,  $(-, -)$   $\Rightarrow$  The point lies in 3rd quadrant.

The points are shown in the cartesian plane given below:



#### Extra questions for practice.

**Q.1** Plot the following points and check whether they are collinear or not:

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

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

**Q.2** 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.

**Q.3** 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  $(2, 2)$

**Q.4** Locate the points  $(5, 0), (0, 5), (2, 5), (5, 2), (-3, 5), (-3, -5), (5, -3)$  and  $(6, 1)$  in the Cartesian plane.