# 3 ▨ ▨ ▨   Coordinate Geometry

Lesson at a Glance

1. The location of an object in a plane is found by drawing two perpendicular lines. One of them is horizontal and other one is vertical.

2. The plane is called the cartesian plane and the lines are called the coordinate axes.

3. The horizontal and vertical lines are called x-axis and y-axis respectively.

4. The point of intersection of the x-axis and y-axis is called the origin.

5. The coordinate axes divide the cartesian plane into four parts which are called quadrants.

6. The four quadrants are known as 1st quadrant, 2nd quadrant, 3rd quadrant and 4th quadrant.

7. The distance of a point from y-axis is called its x-coordinate.

8. The distance of a point from x-axis is called y-coordinate.

9. The x-coordinate is also called abscissa and the y-coordinate is also called ordinate.

10. The cartesian plane is also called the coordinate plane or the xy-plane.

11. If x-coordinate of a point is α and y-coordinate is β, then (α, β) are called the coordinates of the point.

12. The coordinates of a point on the x-axis are of the form $(\alpha, 0)$ and that of the point on the y-axis are $(0, \beta)$.

13. The coordinates of the origin are $(0, 0)$.

14. If $(x_1, y_1) = (x_2, y_2)$, then $x_1 = x_2$ and $y_1 = y_2$ and if $(x_1, y_1) \neq (x_2, y_2)$, then $x_1 \neq x_2$ and $y_1 \neq y_2$.

15. The signs of x-coordinate and y-coordinate of a point in the quadrants are as follows:

Quadrant	Signs	
	x-coordinate	y-coordinate
I	+	+
II	−	+
III	−	−
IV	+	−

TEXTBOOK QUESTIONS SOLVED

Exercise 3.1 *(Pages – 53-54)*

1. *How will you describe the position of a table lamp on your study table to another person?*

25 cm

30 cm
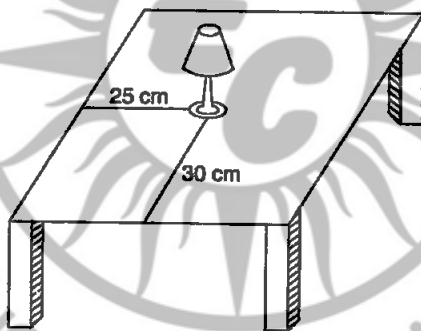
Sol. Consider the lamp as a point and table as a plane. Choose any two perpendicular edges of the table. Measure the distance of the lamp from the longer edge, suppose it is 25 cm. Again, measure the distance of the lamp from the shorter edge, and suppose it is 30 cm. We can write the position of the lamp as (30, 25) or (25, 30), depending on the order of axes we fix.

**Note:** Student may suppose different distances from edges.

2. ***Street Plan:*** *A city has two main roads which cross each other at the centre of the city. These two roads are along the North-South direction and East-West direction. All the other streets of the city run parallel to these roads and are 200 m apart. There are about 5 streets in each*

direction. Using 1 cm = 200 m, draw a model of the city on your notebook. Represent the roads/streets by single lines.

There are many cross-streets in your model. A particular cross-street is made by two streets, one running in the North-South direction and another in the East-West directions. Each cross-street is referred to in the following manner. If the second street running in the North-South direction and 5th in the East-West direction meet at some crossing, then we will call this cross-street (2, 5). Using this convention, find:

(i) how many cross-streets can be referred to as (4, 3)?

(ii) how many cross-streets can be referred to as (3, 7)?

Sol. The model of Street plan is shown in figure given below.
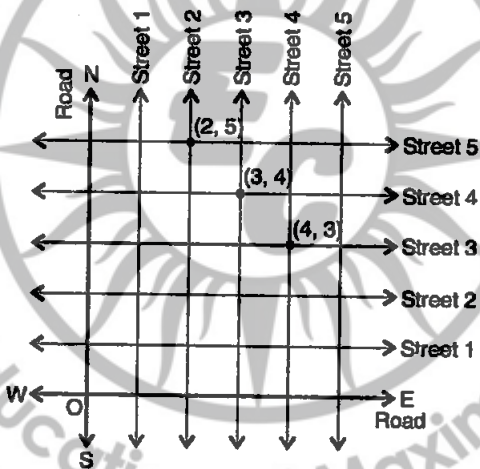
Let us take East-West as x-axis and North-South as y-axis of coordinates.

Both the cross-streets (4, 3) and (3, 4), are marked in the figure above. They are *uniquely* found because of the two reference lines we have used for locating them.

Exercise 3.2 *(Pages – 60-61)*

1. *Write the answer of each of the following questions:*

   (i) *What is the name of horizontal and the vertical lines drawn to determine the position of any point in the Cartesian plane?*

     (*ii*) *What is the name of each part of the plane formed by these two lines?*

   (*iii*) *Write the name of the point where these two lines intersect.*

Sol. (*i*) Horizontal line → *x*-axis, vertical line → *y*-axis.

    (*ii*) Quadrant.

    (*iii*) Origin.

2. *See figure given below and write the following:*

    (*i*) *The coordinates of B.*

    (*ii*) *The coordinates of C.*

   (*iii*) *The point identified by the coordinates* (– 3, – 5).

   (*iv*) *The point identified by the coordinates* (2, – 4).

    (*v*) *The abscissa of the point D.*

   (*vi*) *The ordinate of the point H.*

  (*vii*) *The coordinates of the point L.*

 (*viii*) *The coordinates of the point M.*
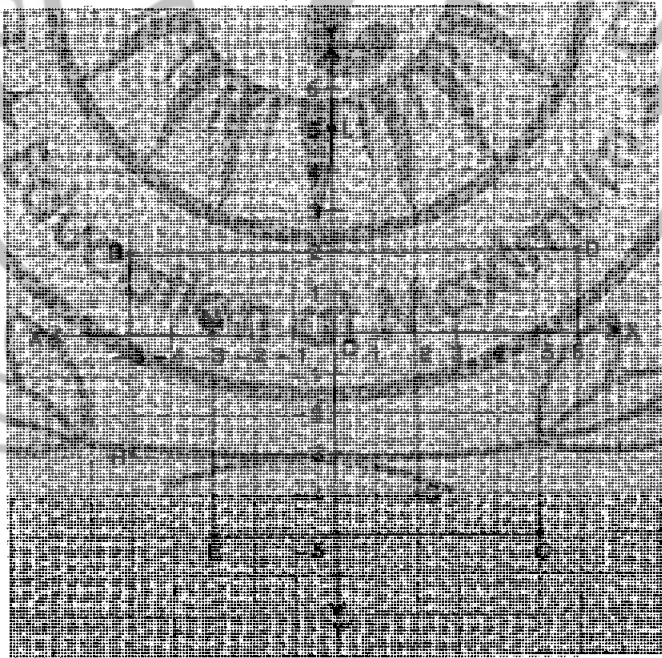
Sol. (i) Distance of point B from x-axis = 2 units (+ve side)

(y-coordinate)

Distance of point B from y-axis = 5 units (−ve side)

(x-coordinate)

∴   Coordinates of the point B are (− 5, 2).

(ii) Distance of point C from y-axis = 5 units (+ve side)

(x-coordinate)

Distance of point C from x-axis = 5 units (−ve side)

(y-coordinate)

∴   Coordinates of the point C are (5, − 5).

(iii) Coordinates of the point are (− 3, − 5)

Distance of the point from y-axis = 3 units (−ve side)

Distance of the point from x-axis = 5 units (−ve side)

We notice the point is E.

(iv) Coordinates of the point are (2, −4).

Distance of the point from y-axis = 2 units (+ve side)

Distance of the point from x-axis = 4 units (−ve side)

We notice the point is G.

(v) The abscissa of the point D = x-coordinate of the point D.

= Its distance from y-axis with direction = +6.

(vi) Ordinate of the point H = y-coordinate of the point H.

= Its distance from x-axis with direction = −3.

(vii) Distance of the point L from x-axis

= 5 units (+ve side)   (y-coordinate)

Distance of the point L from y-axis = 0 unit (+ve side)

(x-coordinate)

∴   Coordinates of the point L are (0, 5).

(viii) Distance of the point M from x-axis

= 0 unit (+ve side)   (y-coordinate)

Distance of the point M from y-axis

= 3 units (−ve side)   (x-coordinate)

∴   Coordinates of the point M are (−3, 0).

Exercise 3.3 *(Page – 65)*

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.,* (–, +) ⇒ The point lies in 2nd quadrant.

(3, – 1), *i.e.,* (+, –) ⇒ The point lies in 4th quadrant.

(– 1, 0), *i.e.,* (–, 0) ⇒ The point lies on the – ve x-axis.

(1, 2), *i.e.,* (+, +) ⇒ The point lies in 1st quadrant.

(– 3, – 5), *i.e.,* (–, –) ⇒ The point lies in 3rd quadrant.
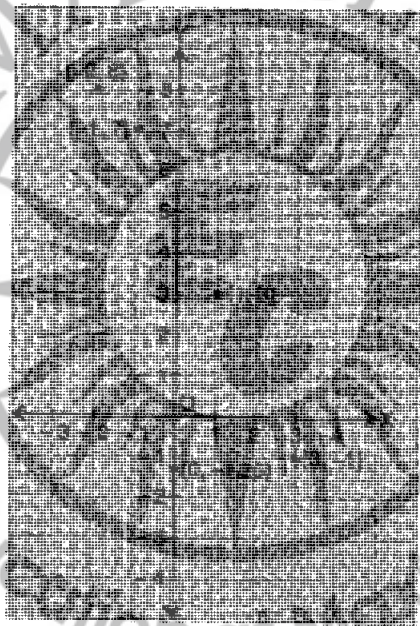
The points are shown in the cartesian plane given below:
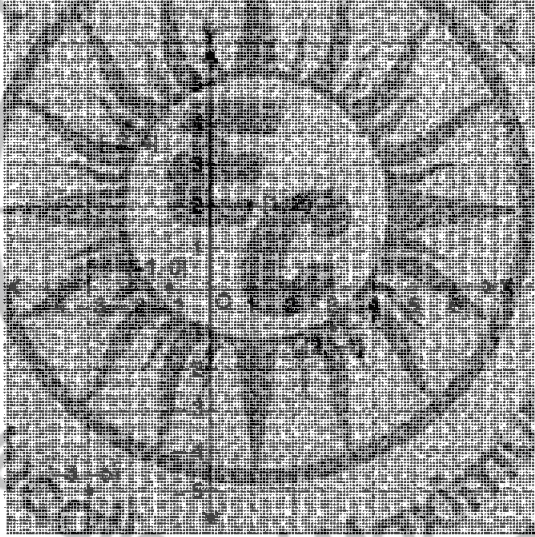
2. *Plot the points (x, y) given in the following table on the* *plane, choosing suitable units of distance on the axes.*

x	– 2	– 1	0	1	3
y	8	7	– 1.25	3	– 1

Sol.

x	y	(x, y)
-2	8	$(-2, 8)$
-1	7	$(-1, 7)$
0	-1.25	$(0, -1.25)$
1	3	$(1, 3)$
3	-1	$(3, -1)$