

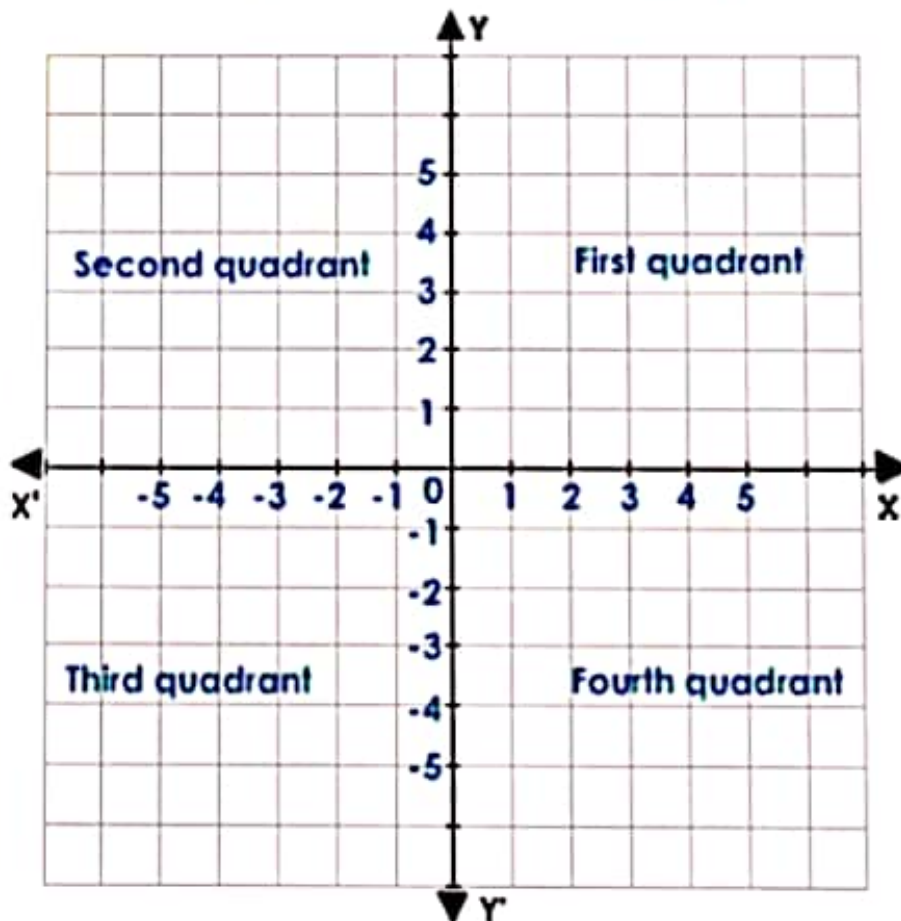
Coordinate Geometry

Coordinate geometry is that branch of mathematics which unifies algebra with geometry. We describe here many geometrical relationships with the help of algebra.

Coordinate Axes

If a pair of perpendicular lines XOX' and YOY' intersect at O , then these lines can be called coordinate axes. The axes divide the plane into four quadrants.

The plane containing the axes is called the Cartesian Plane.



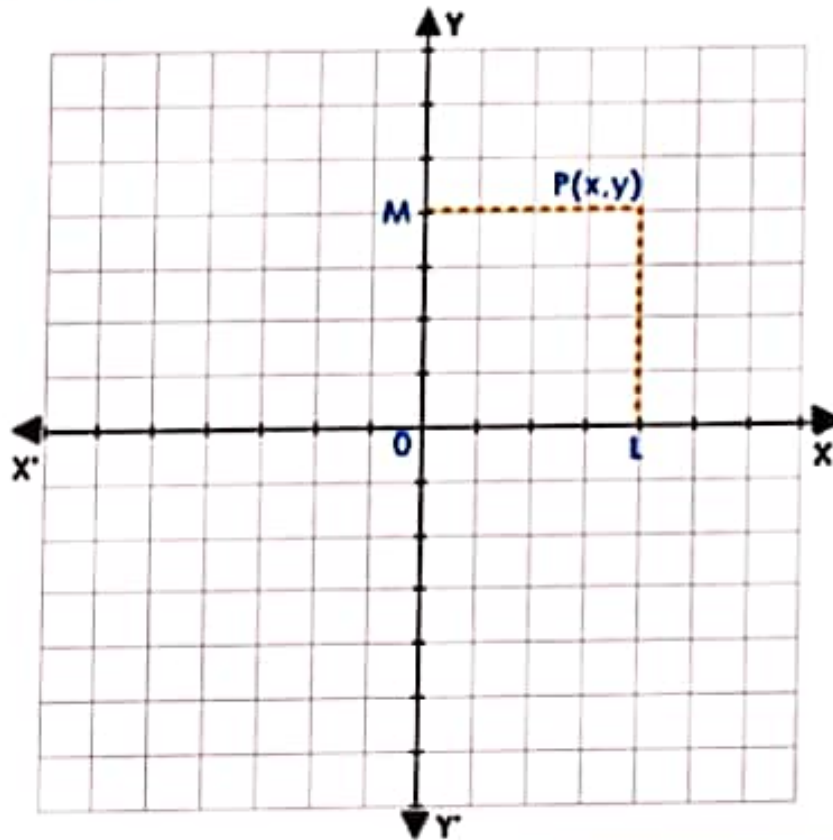
The lines XOX' and YOY' are usually drawn horizontally and vertically and are known as x -axis and y -axis respectively. The point of intersection of axes the point O is called 'the origin'. Values of x are measured from O along the x -axis and are called abscissae. The values of x are positive along OX and negative along OX' as shown in the figure.

Similarly, the values of y are measured from O along the axis of y and are called ordinates. The values of y are positive along OY and negative along OY' as shown in the figure.

The abscissa and ordinate of a point taken together are called its coordinates.

For example, if the abscissa of a point is 3 and ordinate is 5, then the co-ordinates of the point are written as (3, 5).

To plot a point



Suppose P is any point in the plane. Draw $PL \perp XOX'$ and $PM \perp YOY'$.

Let $OL = x$ and $OM = y$, then the ordered pair (x, y) is said to define the point P .

Also x and y are called Cartesian coordinates of P .

Thus we find that to each point in the plane, we can associate an ordered pair (x, y) of real numbers.

Conversely, given an ordered pair of numbers, we can plot the point in the plane.

Q1 :

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.

Solution :

(i) The name of horizontal lines and vertical lines drawn to determine the position of any point in the Cartesian plane is x -axis and y -axis respectively.

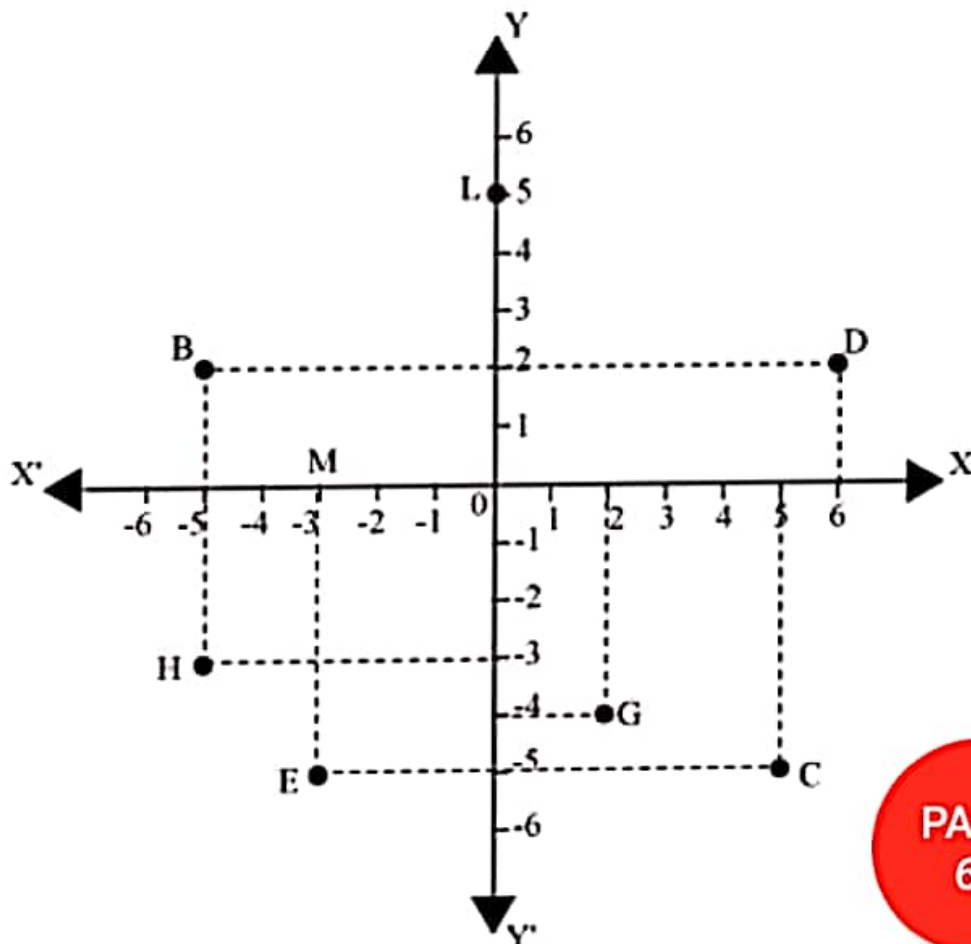
(ii) The name of each part of the plane formed by these two lines, x -axis and y -axis, is quadrant (one-fourth part).

(iii) The name of the point where these two lines intersect is the origin.

Q2 :

See the given figure, 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



Solution :

(i) The x -coordinate and the y -coordinate of point B are -5 and 2 respectively. Therefore, the coordinates of point B are $(-5, 2)$.

(ii) The x -coordinate and the y -coordinate of point C are 5 and -5 respectively. Therefore, the coordinates of point C are $(5, -5)$.

(iii) The point whose x -coordinate and y -coordinate are -3 and -5 respectively is point E.

(iv) The point whose x -coordinate and y -coordinate are 2 and -4 respectively is point G.

(v) The x -coordinate of point D is 6 . Therefore, the abscissa of point D is 6 .

(vi) The y -coordinate of point H is -3 . Therefore, the ordinate of point H is -3 .

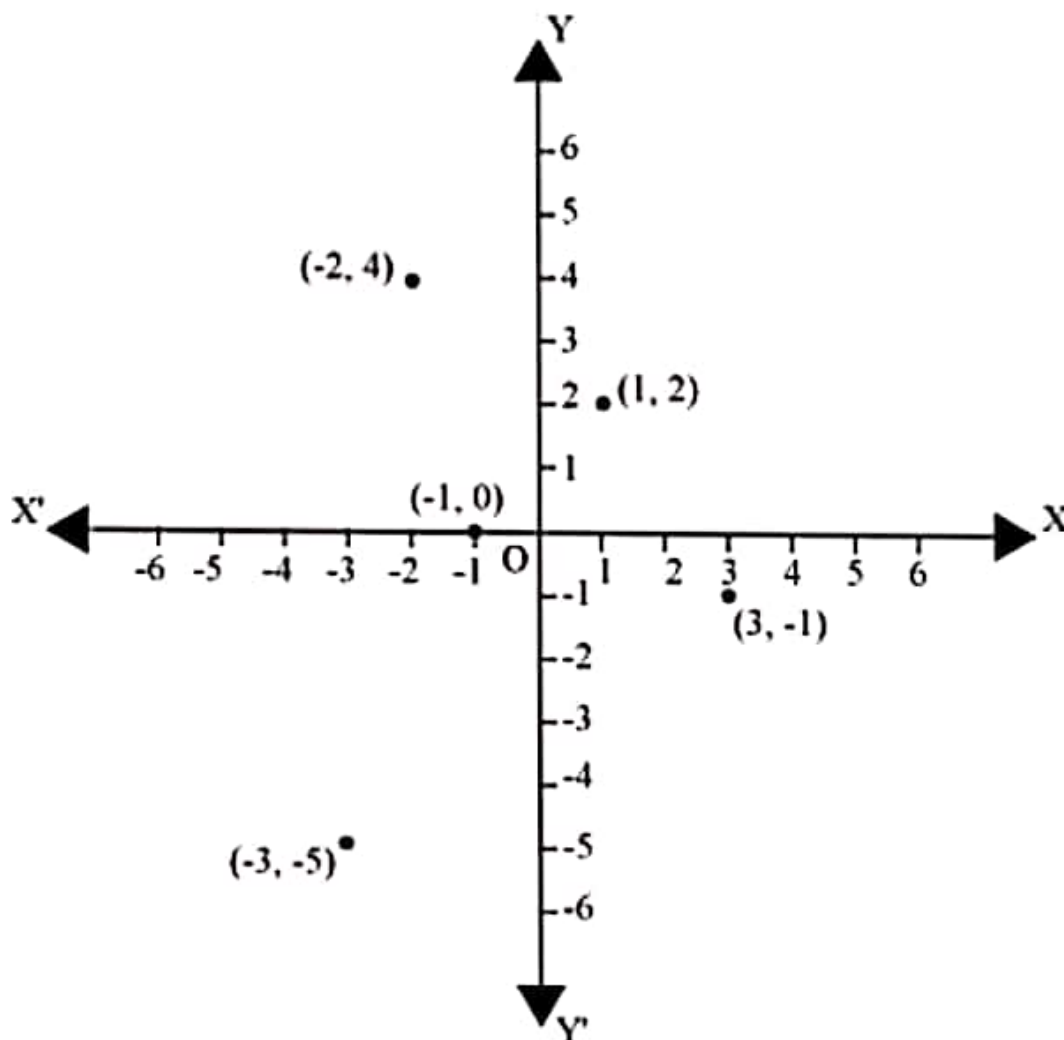
(vii) The x -coordinate and the y -coordinate of point L are 0 and 5 respectively. Therefore, the coordinates of point L are $(0, 5)$.

(viii) The x -coordinate and the y -coordinate of point M are -3 and 0 respectively. Therefore, the coordinates of point M is $(-3, 0)$.

Q1 :

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.

Solution :



The point $(-2, 4)$ lies in the IInd quadrant in the Cartesian plane because for point $(-2, 4)$, x -coordinate is negative and y -coordinate is positive.

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Again, the point $(3, -1)$ lies in the IVth quadrant in the Cartesian plane because for point $(3, -1)$, x -coordinate is positive and y -coordinate is negative.

The point $(-1, 0)$ lies on negative x -axis because for point $(-1, 0)$, the value of y -coordinate is zero and the value of x -coordinate is negative.

The point $(1, 2)$ lies in the Ist quadrant as for point $(1, 2)$, both x and y are positive.

The point $(-3, -5)$ lies in the IIIrd quadrant in the Cartesian plane because for point $(-3, -5)$, both x and y are negative.

Q2 :

Plot the point (x, y) given in the following table on the plane, choosing suitable units of distance on the axis.

x	-2	-1	0	1	3
y	8	7	-1.25	3	-1

Solution :

The given points can be plotted on the Cartesian plane as follows.

