

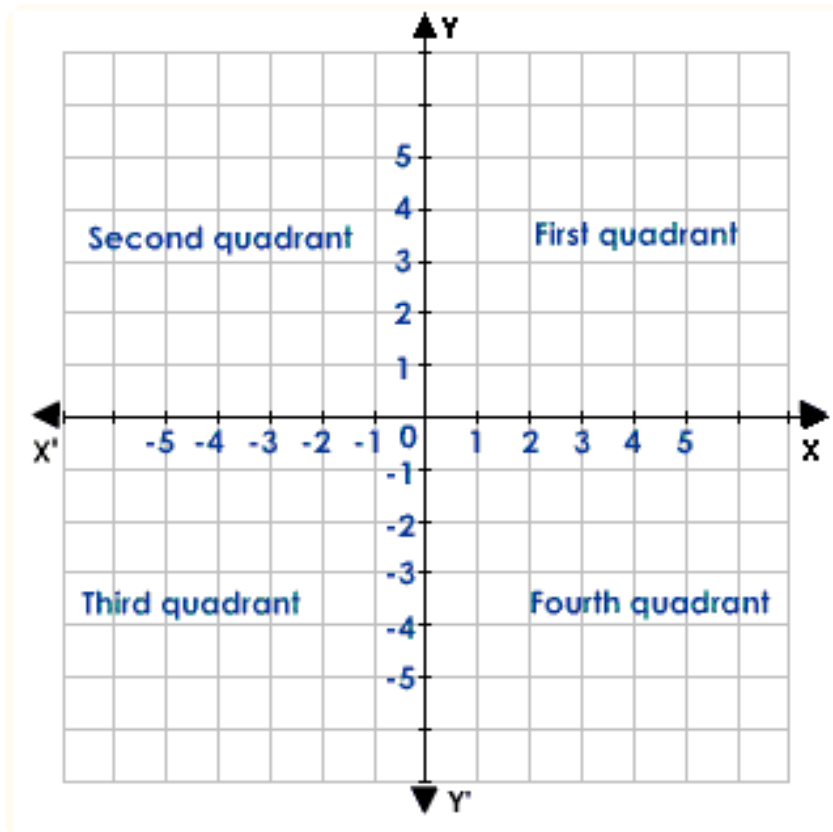
## Coordinate Geometry

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.



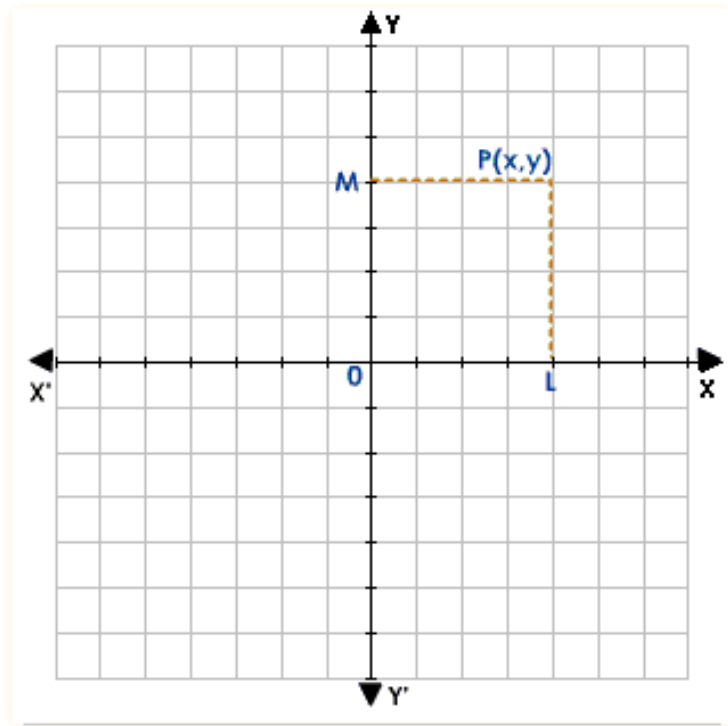
The lines  $XOX'$  and  $YOY'$  are usually drawn horizontally and vertically and are known as  $x$ -axis and  $y$ -axis respectively. The point of intersection of axes the point  $O$  is called 'the origin'. Values of  $x$  are measured from  $O$  along the  $x$ -axis and are called abscissae. The values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