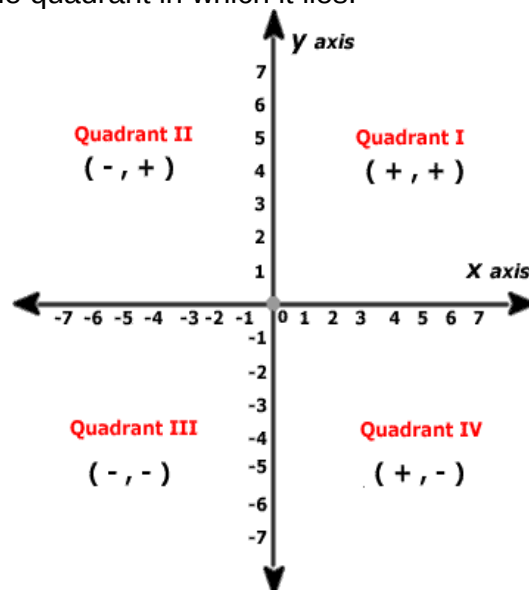


Co-ordinate Geometry

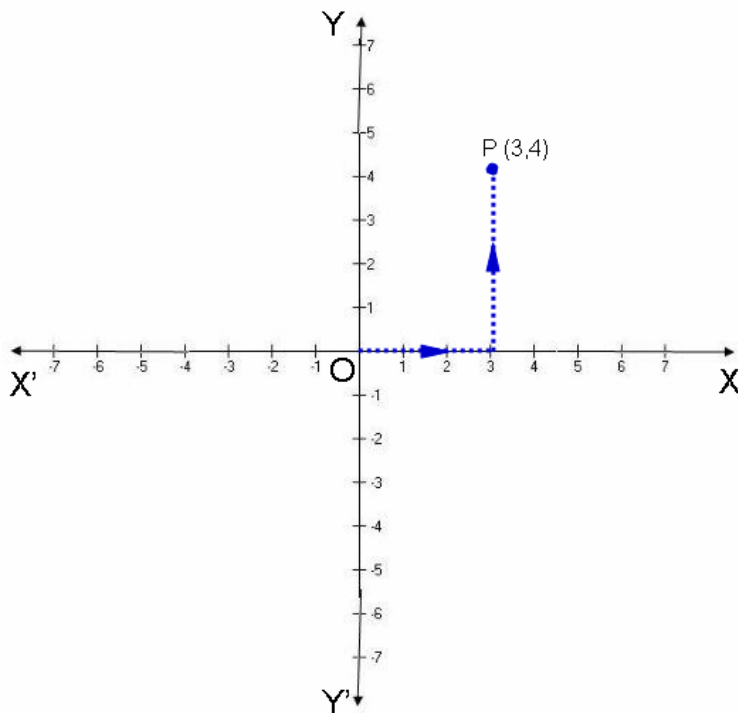
Co-ordinate Geometry is the branch of mathematics in which algebraic methods are used to solve geometrical problems.

Cartesian Plane

1. Two perpendicular number lines intersecting at point zero are called **coordinate axes**. The horizontal number line is the **x-axis** (denoted by $X'OX$) and the vertical one is the **y-axis** (denoted by $Y'OY$). The point of intersection of x-axis and y-axis is called **origin** and denoted by 'O'.
2. **Cartesian plane** is a plane obtained by putting the coordinate axes perpendicular to each other in the plane. It is also called coordinate plane or xy plane.
3. The **x-coordinate** of a point is its perpendicular distance from y-axis.
The **y-coordinate** of a point is its perpendicular distance from x-axis.
4. The point where the x axis and the y axis intersect is represented by coordinate points (0, 0) and is called the **origin**.
5. The **abscissa** of a point is the x-coordinate of the point. The **ordinate** of a point is the y-coordinate of the point.
6. If the abscissa of a point is x and the ordinate of the point is y, then (x, y) are called the **coordinates** of the point.
7. The axes divide the Cartesian plane into four parts called the **quadrants** (one fourth part), numbered I, II, III and IV anticlockwise from OX.
8. Sign of coordinates depicts the quadrant in which it lies.



9. The coordinates of a point on the x-axis are of the form $(x, 0)$ and that of the point on y-axis are $(0, y)$.
10. To plot a point $P(3, 4)$ in the Cartesian plane, start from origin and count 3 units on the positive x axis then move 4 units towards positive y axis. The point at which we will arrive will be the point $P(3, 4)$.



11. If $x \neq y$, then $(x, y) \neq (y, x)$ and if $(x, y) = (y, x)$, then $x = y$.

Graphing a Linear Equation

1. The Cartesian plane can be used to graph different kinds of situations from everyday life.
2. A line graph which is a whole unbroken line is called a linear graph.
3. Two quantities which vary directly can be plotted as a linear graph. Independent variable is generally taken on x axis the dependent variable is taken on y axis.
4. Steps to draw a graph:
 - I. Find out the relation between y and x.
 - II. Calculate different values of y corresponding to the values of x.
 - III. Tabulate the results.
 - IV. Plot the points.
 - V. Join the points to obtain the graph.

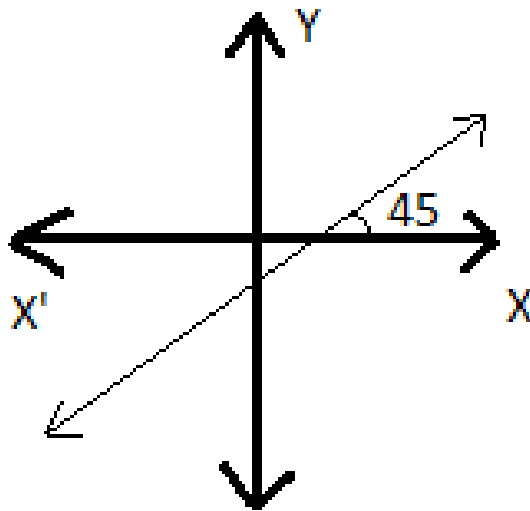
5. By looking at a linear graph, we can find out the 'y' coordinate (or 'x' coordinate) in relation to any point on the 'x' axis (or 'y' axis).
6. $x = 0$ is the equation of the y-axis and $y = 0$ is the equation of the x-axis.

Inclination and Slope

1. The angle which a straight line makes with the positive direction of the x-axis (measured in the anti-clockwise direction) is called inclination of the line.

The inclination of the line is usually denoted by θ (theta).

In the below figure, $\theta = 45^\circ$



2. If θ is the inclination of a line then slope of the line is $\tan \theta$ and is usually denoted by letter m .

Slope = $m = \tan \theta$.

For x-axis and every line parallel to x-axis, the inclination $\theta = 0^\circ$.

Hence, Slope (m) = $\tan \theta = \tan 0^\circ = 0$

For y-axis and every line parallel to y-axis, the inclination $\theta = 90^\circ$.

Hence, Slope (m) = $\tan \theta = \tan 90^\circ = \text{not defined}$

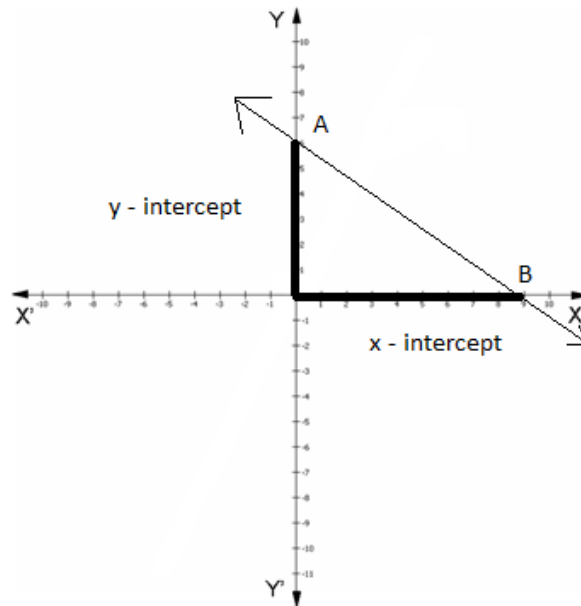
Y-Intercept

If a straight line meets y-axis at a point, the distance of this point from the origin is called y-intercept and is usually denoted by the letter c.

For x-axis, y-intercept = 0

For every, line parallel to y-axis, y-intercept = 0.

Y-intercept is positive if measure above the origin and negative if measured below the origin.



Steps to find Slope and the Y-Intercept of a given line ($ax + by + c = 0$):

1. Make y, the subject of the equation.

$$\Rightarrow y = \frac{-a}{b}x - \frac{c}{b}$$

2. The coefficient of x is the slope.

$$\Rightarrow \text{slope (m)} = \frac{-a}{b}$$

3. The constant term is the y-intercept of the given line.

$$\Rightarrow \text{y-intercept} = \frac{-c}{b}$$