

# Equation of a Line

By [BrushMyQuant](#)



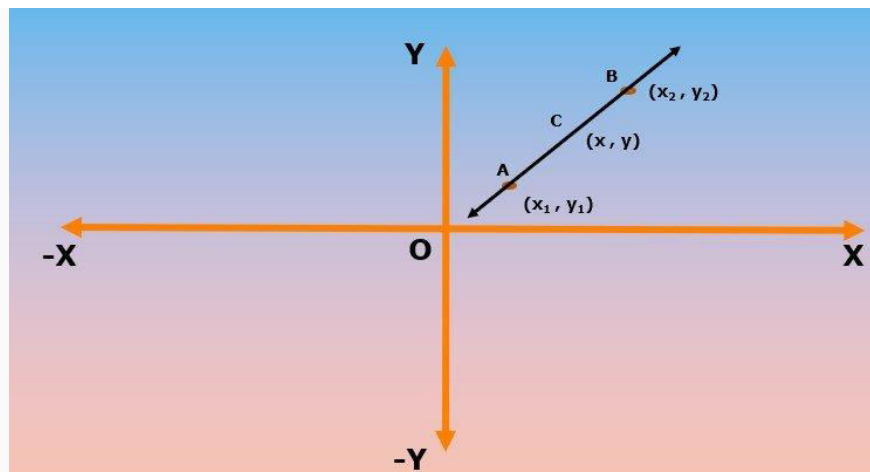
YouTube Video Link to this Post is [Here](#)

Following is covered in the video

- ▣ Equation of a Line: Two Point Form
- ▣ Equation of a Line: Point and Slope Form
- ▣ Equation of a Line: Intercept Form
- ▣ Generic Equation of a line (Point and Intercept Form)
- ▣ Equation of Horizontal and Vertical Lines

## Equation of a Line: Two Point Form

Let's say we have a line passing through two point  $A(x_1, y_1)$  and  $B(x_2, y_2)$ .  
Let's take a point  $C(x, y)$  on the line and between A and B as shown below.



Slope of the Part CA of the line = Slope of the part BA of the line = Slope of the line

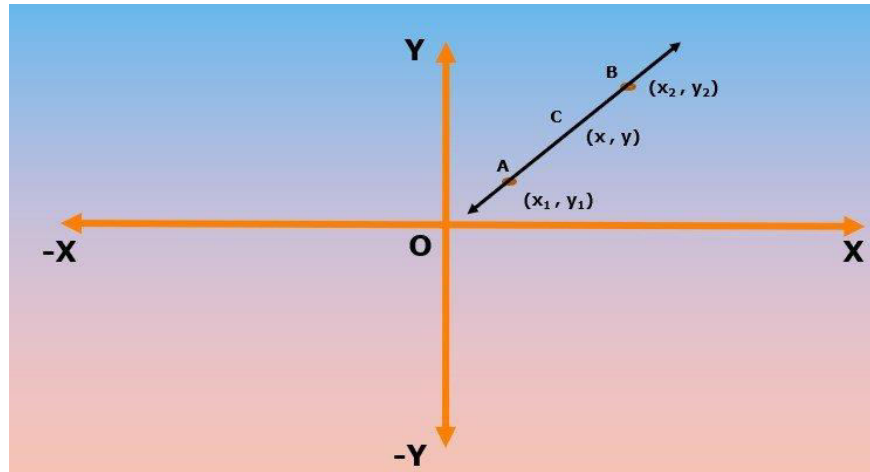
$$\Rightarrow \frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1} \quad [ \text{Watch this video if you want to know about the slope of the line} ]$$

$$\Rightarrow \text{Equation of a line in Two Point Form as } y - y_1 = \frac{y_2-y_1}{x_2-x_1} * (x - x_1)$$

where  $x$  and  $y$  are variables and value of  $(x_1, y_1)$  and  $(x_2, y_2)$  will be given to us in the problem.

## Equation of a Line: Point and Slope Form

Let's take the same line which was passing through point A and B and has a slope m



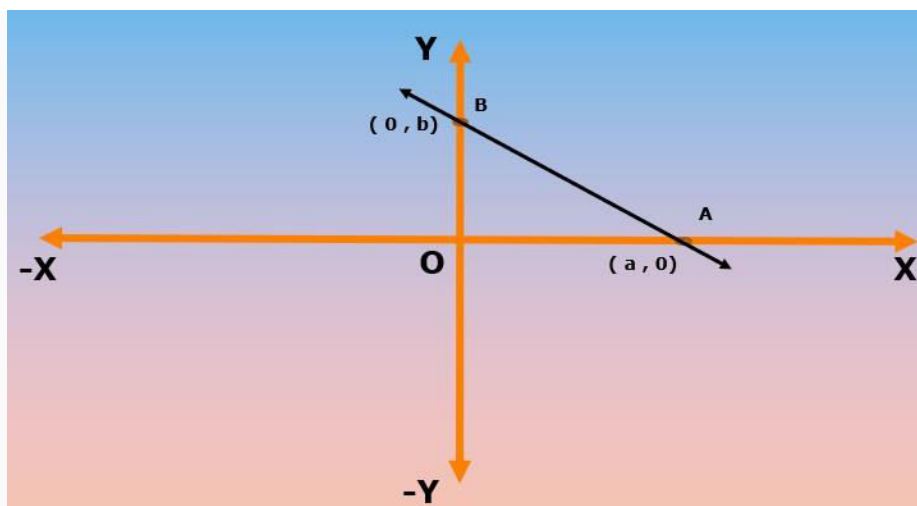
$$\text{Slope, } m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\text{Using, } y - y_1 = \frac{y_2 - y_1}{x_2 - x_1} * (x - x_1)$$

**Equation of a line in Point and Slope Form** as  $y - y_1 = m * (x - x_1)$

## Equation of a Line: Intercept Form

Let's say we have a line which intercepts X-Axis at point A(a,0) and Y-Axis at point B(0,b), as shown below.



Using,  $\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1}$  1 we get

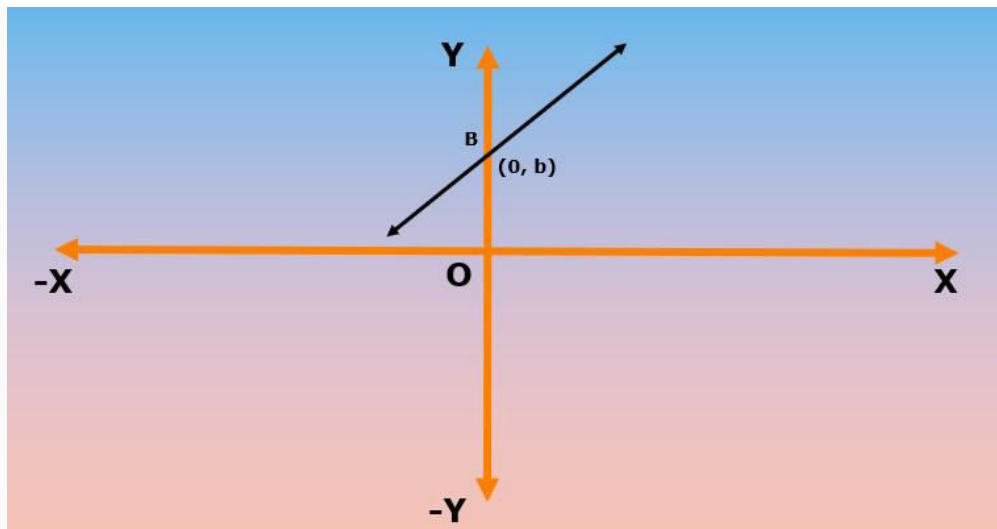
$$\begin{aligned}\frac{y-0}{x-a} &= \frac{b-0}{0-a} \\ \Rightarrow ay &= -bx + ab \\ \Rightarrow bx + ay &= ab\end{aligned}$$

Dividing both the sides by ab we get

**Equation of a line in Intercept Form** as  $\frac{x}{a} + \frac{y}{b} = 1$

## **Generic Equation of a line (Point and Intercept Form)**

Let's say we have a line which intercepts Y-Axis at point B(0,b) and has a slope m, as shown below.



Using,  $y - y_1 = m * (x - x_1)$  and substituting the value of Point B we get

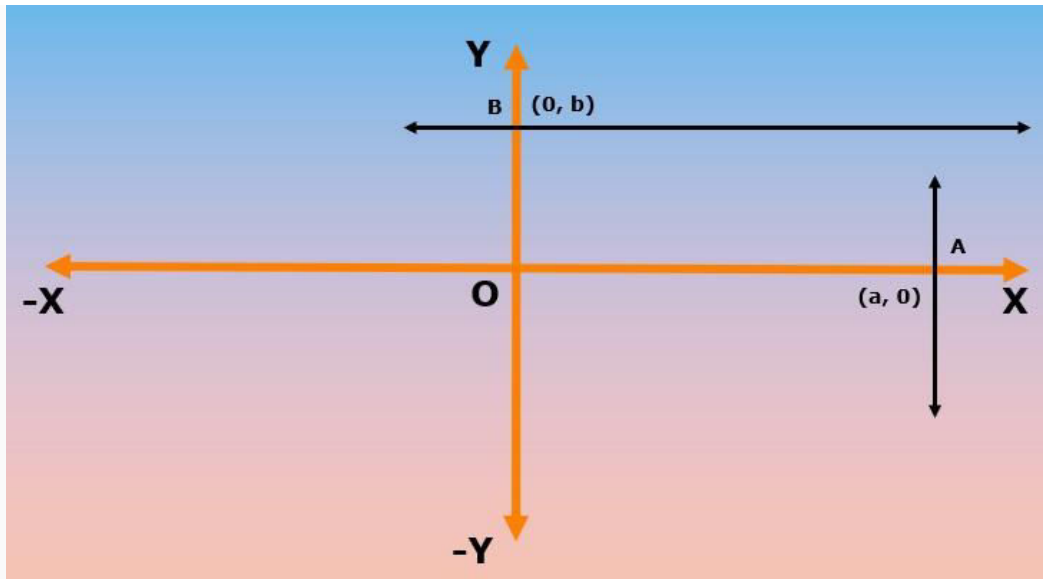
$$y - b = m * (x - 0)$$

**Generic Equation of a line (Point and Intercept Form)** as  $y = mx + b$

where m is the slope of the line and B is the y intercept.

## Equation of horizontal and vertical lines

Let's say we have a line parallel to X-Axis and intersecting Y-Axis at point  $B(0, b)$  and a line which is parallel to Y-Axis and intercepting the X-Axis at point  $A(a, 0)$  as shown below



### **Equation of Horizontal Line**

Now, all the points on this line will be at the same distance  $b$  from X-Axis and will have the  $y$ -coordinate as  $b$

=> Equation of Horizontal line will be  $y = b$  [constant]

### **Equation of Vertical Line**

Now, all the points on this line will be at the same distance  $a$  from Y-Axis and will have the  $x$ -coordinate as  $a$

=> Equation of Vertical line will be  $x = a$  [constant]

Hope it helps!

Thank you.