

Equation of a Line

By [BrushMyQuant](#)



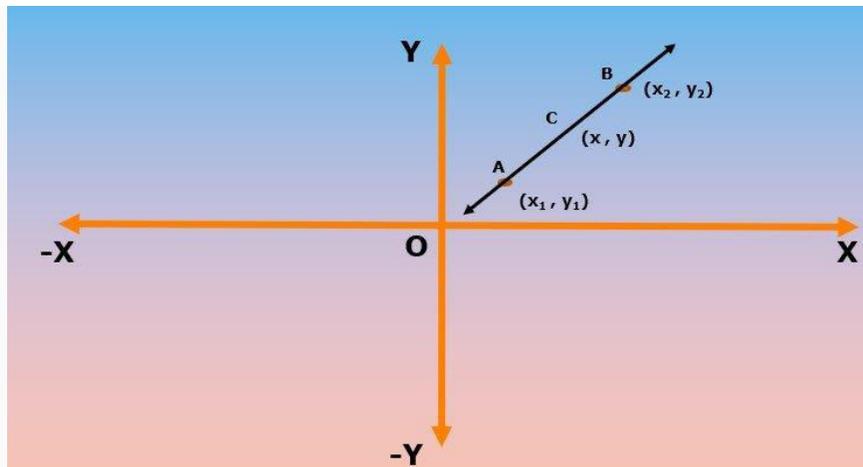
YouTube Video Link to this Post is [Here](#)

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

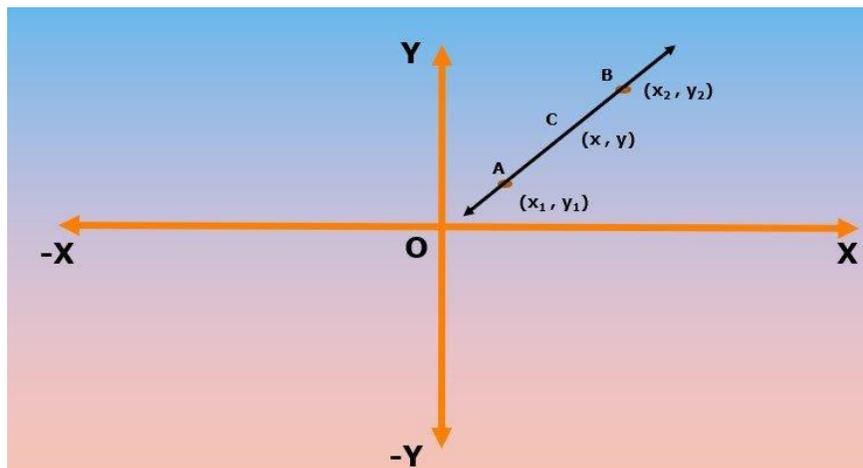
$$\Rightarrow \frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1} \quad [\text{Watch this video if you want to know about the slope of the line}]$$

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

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



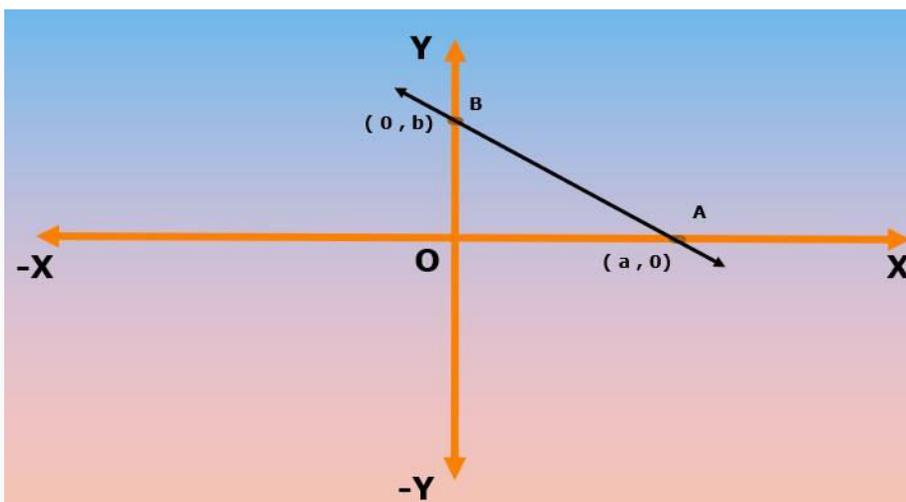
$$\text{Slope, } m = \frac{y_2 - y_1}{x_2 - x_1}$$

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

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

$$\frac{y-0}{x-a} = \frac{b-0}{0-a}$$

$$\Rightarrow ay = -bx + ab$$

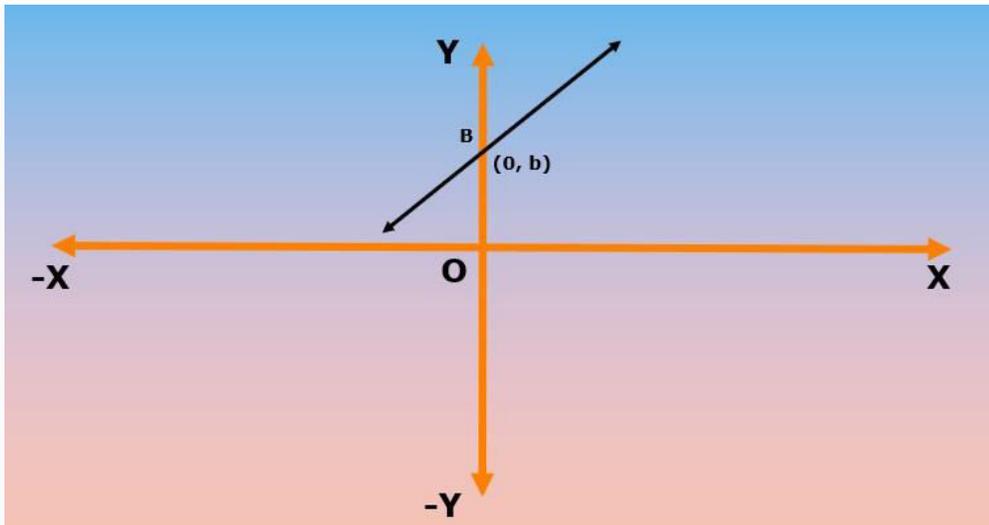
$$\Rightarrow bx + ay = ab$$

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

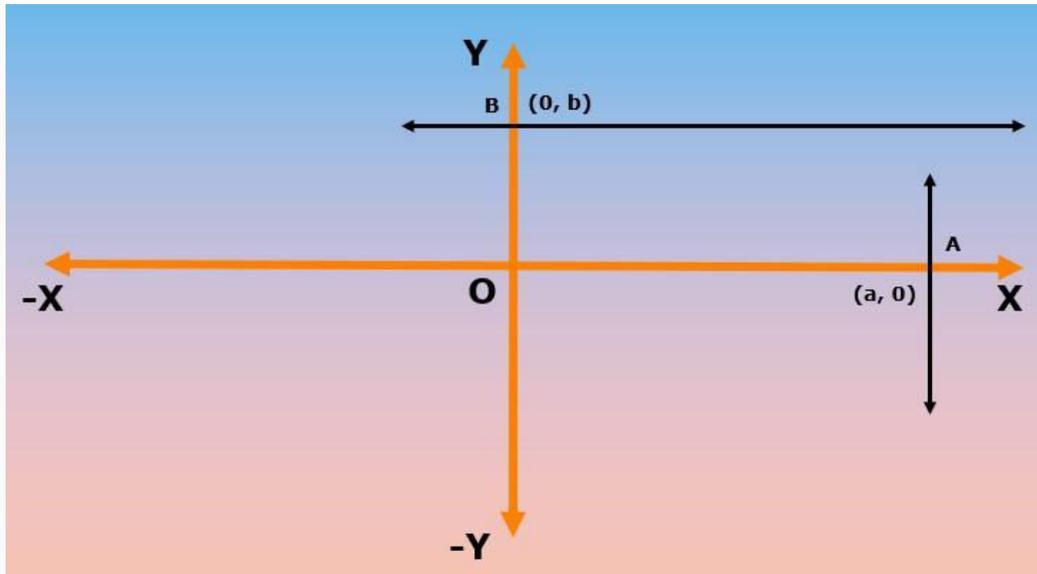
$$y - b = m * (x - 0)$$

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.