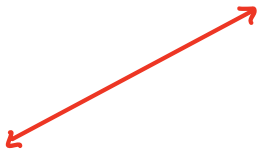
Linear equation.

* Line:

→ InPinite Points

→ one slope.



* Slope:

1) Two Points: $(x_1, y_1)(x_2, y_2)$

$$= \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Rise}}{\text{Run}}$$

Ex: Find slope of line Passes through (5,7)(3,4) ?

$$= \frac{4-7}{3-5} = \frac{-3}{-2} = \frac{3}{2}$$

Ex: Find slope of Line Passes through (2,3)(5,1) ?

$$= \frac{1-3}{5-2} = \frac{-2}{3}$$

Ex: Find slope of Line Passes through (3,4) And origin ?

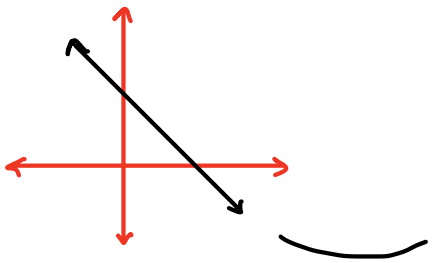
(0,0)

$$= \frac{0-4}{0-3} = \frac{-4}{-3} = \frac{4}{3}$$

4/3

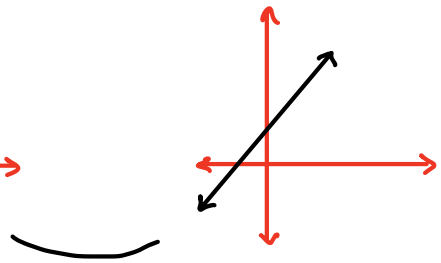
Note → Line Passes through origin and (x,y)

$$= \frac{y}{x}$$



Line Dec

-ve



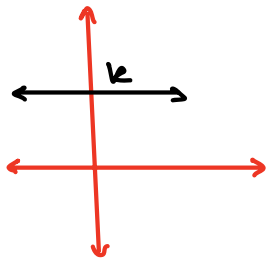
non. v.

non. H

Line: Inc

slope: +ve

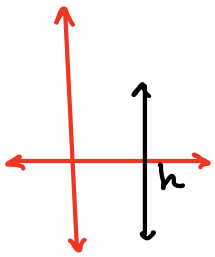
$y = mx + b$



H. L

slope = zero

$y = k$

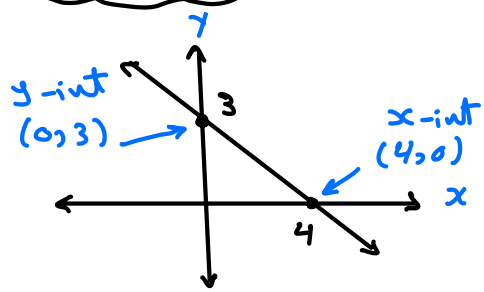


V. Line

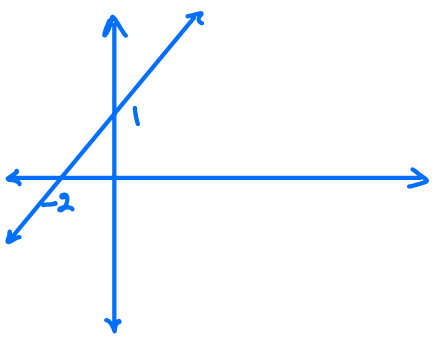
slope = undefined.

$x = h$

Find Slope:



$$\text{slope} = \frac{3-0}{0-4} = \frac{3}{-4} = \frac{-3}{4} = -\frac{3}{4}$$



$(0,1)\ (-2,0)$

$$= \frac{0-1}{-2-0} = \frac{-1}{-2} = \frac{1}{2}$$

Equation of line:

---

1) standard Form:

$$Ax + By = C$$

- slope $= -\frac{A}{B}$
- x-int $\rightarrow y = 0$
- y-int $\rightarrow x = 0$

Ex: $3x + 4y = 7$ Find:

1) slope: $\frac{-3}{4}$

2) x-int: $y = 0 \rightarrow 3x = 7 \rightarrow x = 7/3$

3) y-int: $x = 0 \rightarrow 4y = 7 \rightarrow y = \frac{7}{4}$

Ex: If $2x - 5y = 7$ Find:

slope: $\frac{-2}{-5} = \frac{2}{5}$

x-int: $2x = 7 \rightarrow x = \frac{7}{2}$

y-int: $-5y = 7 \rightarrow y = \frac{7}{5} = \frac{-7}{5}$

Ex: $4x = 7y - 11$ Find slope?

$4x - 7y = -11$

slope $= \frac{-4}{-7} = \frac{4}{7}$

Find x-intercept of line passes through $(5,7)(3,1)$?

$(5,7)(3,1)(x,0)$

$= \frac{1-7}{3-5} = \frac{0-1}{x-3}$

$\frac{-6}{-2} = \frac{-1}{x-3}$

$\frac{3}{1} = \frac{-1}{x-3}$

$3x - 9 = -1$

$3x = 8$

$x = \frac{8}{3}$

* slope - intercept form:

$$y = mx + b$$

- m → slope
- b → y-int

slope	y-int
Inc	stant_begin
Dec	base
rate	Fee
avrge	Likely
additional.	

→ Form equations:

---

* slope, y-int
* slope, Point
* Two Points.

Ex: → Find equation of line which has slope of (3) and y-intercept (-2)?

$$y = mx + b$$
$$y = 3x - 2$$

Ex: Find equation of line which Passes through (3, -2) and has slope of (5)?

(x, y)

$$y = mx + b$$
$$y = 5x + b$$
$$-2 = 5(3) + b$$
$$-17 = -2 - 15 = b$$

$y = 5x - 17$

Ex: Find equation of line Passes through (2, -1) And with slope of (-4) ?

$$y = mx + b$$
$$y = -4x + b$$
$$-1 = -4(2) + b$$
$$-1 = -8 + b$$
$$7 = b$$
$$y = -4x + 7$$

---

* Find equation of line Passes through (3, 4) (5, 10) ?

$$y = mx + b$$
$$m = \frac{10-4}{5-3} = \frac{6}{2} = 3$$
$$y = 3x + b$$

$$4 = 3(3) + b$$
$$4 - 9 = b$$
$$-5 = b$$

$$10 = 3(5) + b$$
$$10 - 15 = b$$
$$-5 = b$$

$$y = 3x - 5$$

Find equation of line Passes through (2, -7) (0, 1) ?

$$y = mx + b$$
$$m = \frac{1-(-7)}{0-2} = \frac{8}{-2} = -4$$
$$y = -4x + b$$
$$y = -4x + 1$$

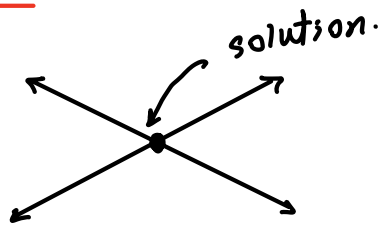
* Relation between lines.

---

* **Intersecting:**

→ one solution.

→ $slope_1 \neq slope_2$



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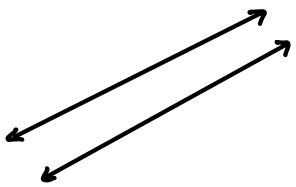
* **Parallel:**

→ No solution.

→ $slope_1 = slope_2$



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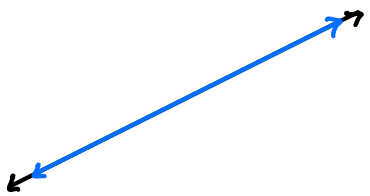
* **Coincident lines:**

→ Infinite solution.

→ $slope_1 = slope_2$

→ $y\text{-int}_1 = y\text{-int}_2$



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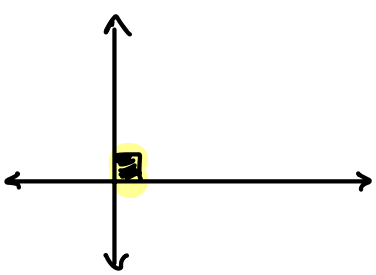
* **Perpendicular lines:**

→ $slope_1 \times slope_2 = -1$

$\frac{3}{2}$ ↙ ↘ $-\frac{2}{3}$



Ex: Find **equation** of line which passes through

→ $(3, -1)$ and **Parallel** to $3x + y = 7$? ←

$y = mx + b$ ← ↳ $slope_1 = slope_2 = \frac{-3}{1} = -3$

$y = -3x + b$ ←

$-1 = -3(3) + b \longrightarrow b = -1 + 9 = 8$

$y = -3x + 8$

* Find equation of line Passes through $(2, -5)$
And Parallel to line $2x - 4y = 7$

↳ slope $= \frac{-2}{-4} = \frac{1}{2}$

$y = mx + b$

$y = \frac{1}{2}x + b$

$-5 = \frac{1}{2}(2) + b$

$-5 = 1 + b$

$-6 = b$

$$y = \frac{1}{2}x - 6$$

---

* Find equation of line Passes through $(3, -2)$
And PerPendicular to line $2x - 6y = 7$?

↳ slope $= \frac{-2}{-6} = \frac{1}{3}$

PerP $= -3$

$y = mx + b$

$y = -3x + b$

$-2 = -3(3) + b$

$-2 + 9 = b$

$7 = b$

$$y = -3x + 7$$

Find equation of line Passes through
$(5, 7)$ and PerPendicular to line $4x - 3y = 9$

slope $= \frac{-4}{-3} = \frac{4}{3}$

PerP $= -\frac{3}{4}$

$y = mx + b$

$y = \frac{-3}{4}x + b$

$7 = \frac{-3}{4}(5) + b$

$7 = \frac{-15}{4} + b$

$\frac{43}{4} = \frac{28 + 15}{4} = \frac{7}{1} + \frac{15}{4} = b$

$y = \frac{-3}{4} + \frac{43}{4}$