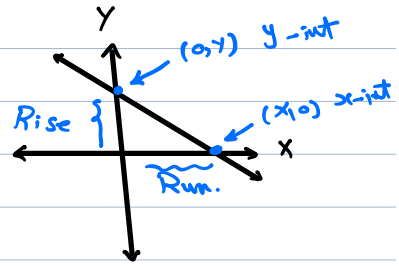
* standard form:

$ax + by = c$



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

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

1) Slope of Line: $\frac{-a}{b} = \frac{-3}{4}$
2) x-int: $\rightarrow y = 0$ $3x = 7 \rightarrow x = \frac{7}{3} \rightarrow (\frac{7}{3}, 0)$
3) y-int: $\rightarrow x = 0$ $4y = 7 \rightarrow y = \frac{7}{4} \rightarrow (0, \frac{7}{4})$

If $5x - 2y = 11$ Find:

1) slope = $\frac{-a}{b} = \frac{-5}{-2} = 5/2$
2) x-int = $y = 0 \rightarrow 5x = 11 \rightarrow x = 11/5$
3) y-int = $x = 0 \rightarrow -2y = 11 \rightarrow y = \frac{-11}{2}$

Ex: If $7y = 4x - 9$ Find:

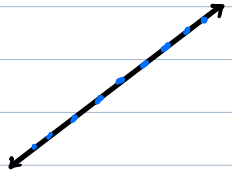
$-4x + 7y = -9$

1) slope = $\frac{-(-4)}{7} = \frac{4}{7}$
2) x-int = $y = 0 \rightarrow 4x = 9 \rightarrow x = 9/4$
3) y-int = $x = 0 \rightarrow 7y = -9 \rightarrow y = -9/7$

---

* Lines:

- one slope.
- Infinite Points.



→ slope of Line:

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

$$= \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$$

→ Ex: Find slope of line passes through $(5,7)(3,-2)$?

$$\text{slope} = \frac{-2-7}{3-5} = \frac{-9}{-2} = \frac{9}{2}$$

Ex: Find slope of line passes through $(3,4)$ and origin?

$(0,0)$

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

Note: Line passes through origin and (x,y)

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

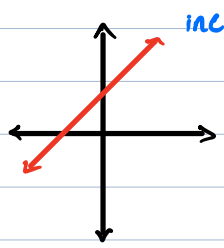
* Ex: Line passes through origin and $(3,m)$ $(m,12)$ Find m?

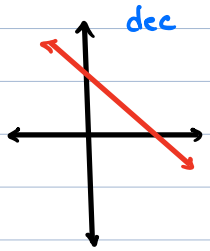
$$\text{slope} = \frac{m}{3} \times \frac{12}{m}$$

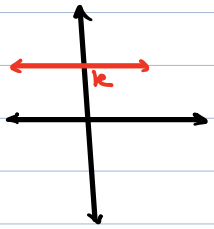
$$m^2 = 36$$

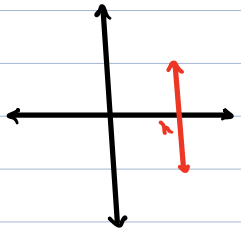
$$m = \pm 6$$

Note:









Slope (+ve) — non vertical — slope (-ve)

non horizontal

Horizontal line

$y = k$

Slope = Zero

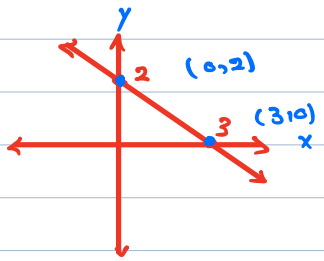
Vertical line

$x = h$

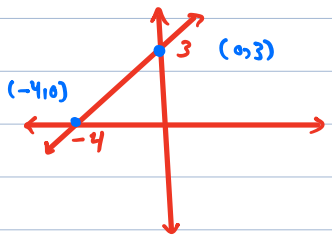
Slope = undefined.

Find slope of line:

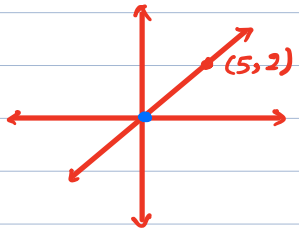
$= \frac{2-0}{0-3} = \frac{2}{-3}$



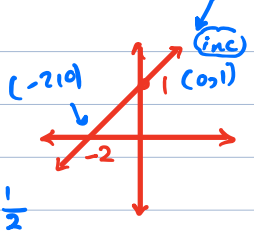
$= \frac{3-0}{0-(-4)} = \frac{3}{4}$



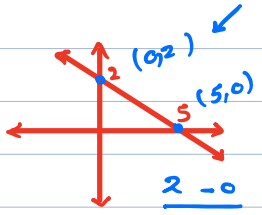
$= \frac{y}{x} = \frac{2}{5}$



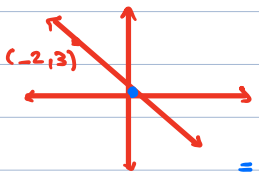
Ex: Find slope:



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



$\frac{2-0}{0-5} = \frac{-2}{5}$



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

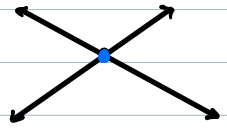
* Slope - intercept Form:

$$y = mx + b$$

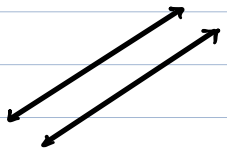
Slope	y-int.
Inc	initial
Dec	start
rate	begin
average	base
change	Fee
additional.	likely
	before

Relation between lines:

1) Intersecting Lines:
   - → one solution.
   - → $Slope_1 \neq Slope_2$



2) Parallel Lines:
   - → No Solution
   - → $Slope_1 = Slope_2$

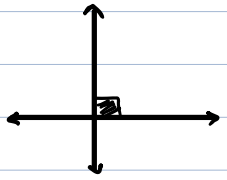


3) Coincident lines:
   - → Infinite solutions.
   - → $Slope_1 = Slope_2$

4) Perpendicular lines.

$Slope_1 \times Slope_2 = -1$

$\frac{3}{2}$ ↙ $\frac{-2}{3}$ ↙



* Equation: → slope, y-int
→ slope, Point
→ Two Points.

* Find equation of line with slope of (-3) and y-int (4)?

$y = mx + b$

$y = -3x + 4$

---

* Find equation of line passes through (5, 3) and slope of (-2)?

(x, y) → subs. → y-int b.

$y = mx + b$

$y = -2x + b$

$3 = -2(5) + b$

$3 = -10 + b$ ←

$13 = b$

---

* Find equation of line passes through (3, -2) And slope of (7)?

$y = 7x + b$

$-2 = 7(3) + b$

$-2 - 21 = b$

$-23 = b$

$y = 7x - 23$

Find equation of line passes through (5, 7) (0, 9)

$y = mx + b$

$m = \frac{9-7}{0-5} = \frac{2}{-5}$

$y = \frac{-2}{5}x + b$

$7 = \frac{-2}{5}(5) + b$

$7 + 2 = b$

$9 = b$

$y = -\frac{2}{5}x + 9$

Find equation of line passes through (0,3)(2,7)

$y = mx + b$

$m = \frac{7-3}{2-0} = \frac{4}{2} = 2$

$y = 2x + b$

$7 = 2(2) + b$

$7 - 4 = b$

$3 = b$

Find equation of line passes through (5,3) ←

And Perpendicular to $x + 3y = 7$?

slope, × slope$_2$ = −1

slope = $\frac{-1}{3}$ ←

Perp = (3) ←

$y = mx + b$

$y = 3x + b$

$3 = 3(5) + b$

$3 - 15 = b$

$-12 = b$

$y = 3x - 12$

Find equation of line passes through (7, −2)

And Parallel to $2x - y = 7$

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

$y = 2x + b$

$-2 = 7(2) + b$

$-2 = 14 + b$

$-16 = b$

$y = 2x - 16$