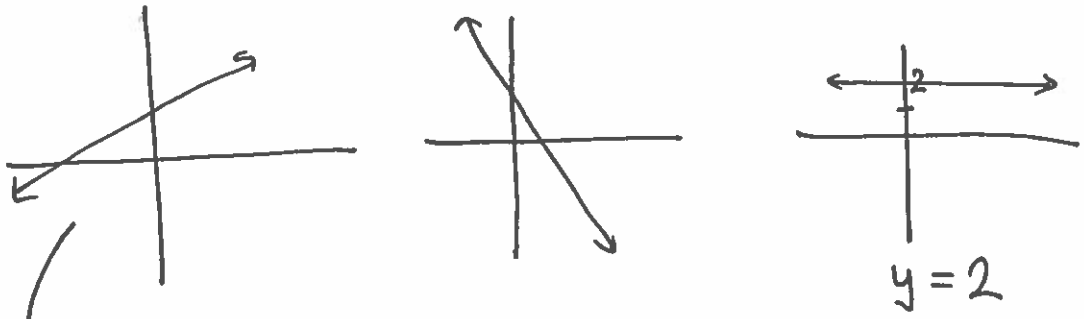
3.4 Slope-intercept Form



Lines & Equations

can have different equations

$3x - 4y = -12$

We prefer line equations:

$y = mx + b$

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

$\frac{3}{4}$ is the slope.

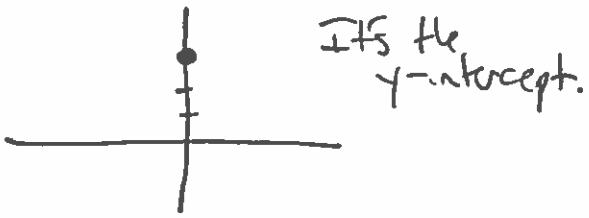
3 is the y-intercept

Plug in $x = 0$

$y = \frac{3}{4}(0) + 3$

$y = 3$

So $(0, 3)$ is on the line.



$x = 0 \longrightarrow (0, 3)$

4 forward

$x = 4 \longrightarrow (4, 6)$

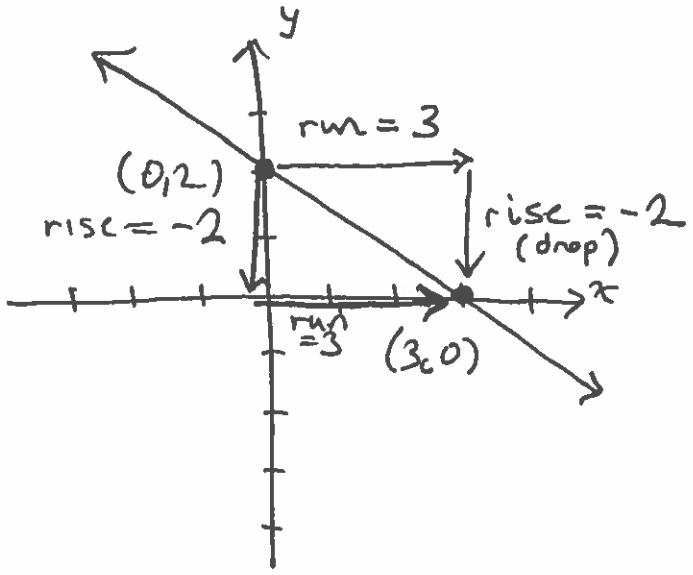
upward 3

rise = 3

run = 4

$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{3}{4}$

Ex



Find this line's slope and its y-intercept

2

or (0,2)

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{-2}{3}$$

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

Point 1: $(0,2)$ — x_1, y_1

Point 2: $(3,0)$ — x_2, y_2

Alternatively:

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{2-0}{0-3}$$

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

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

(m for slope)

Ex (1,3) and (−1,−5)

Find slope of the line connecting these.

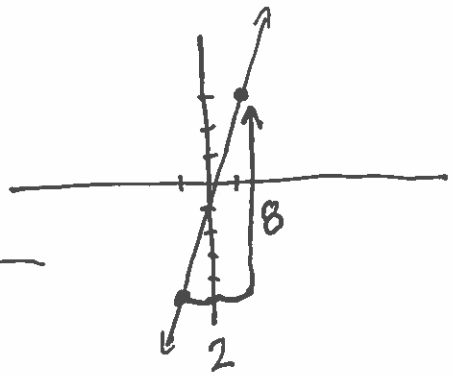
mem. formulas

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-5-3}{-1-1} = \frac{-8}{-2} = 4$$

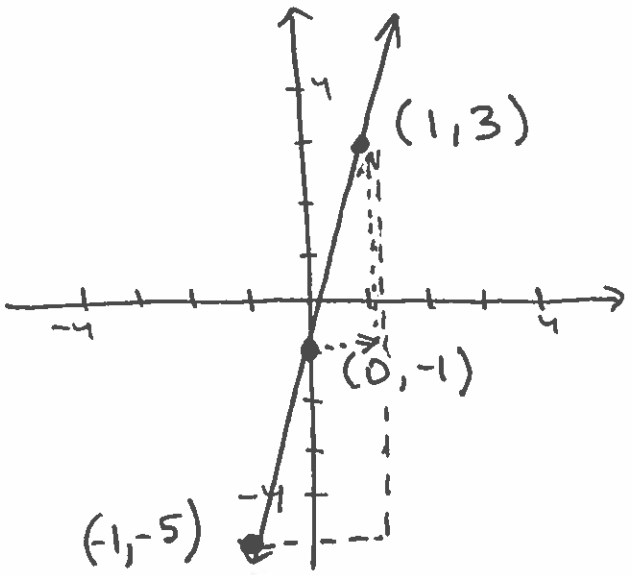
$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

$$= \frac{8}{2}$$

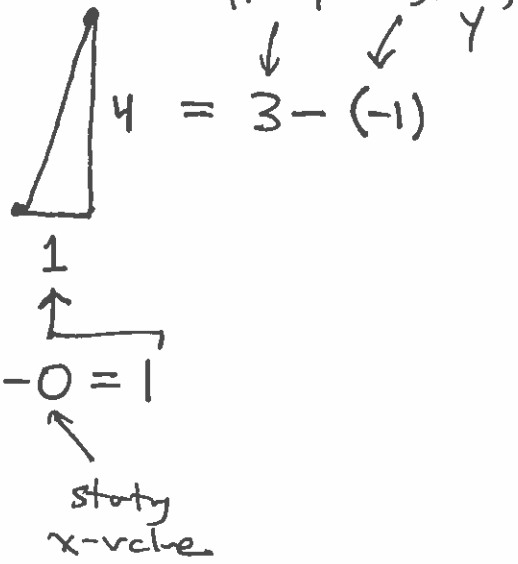
$$= 4$$



Ex



slope: how we measure steepness.



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{4}{1}$$

slope = (4)

$$\text{slope} = \frac{8}{2}$$

slope = (4)

Alternatively use large triangle:

(−1, −5) to (1, 3)

run = 2 ← 1 − (−1)

rise = 8 ← 3 − (−5)

So slope = 4,

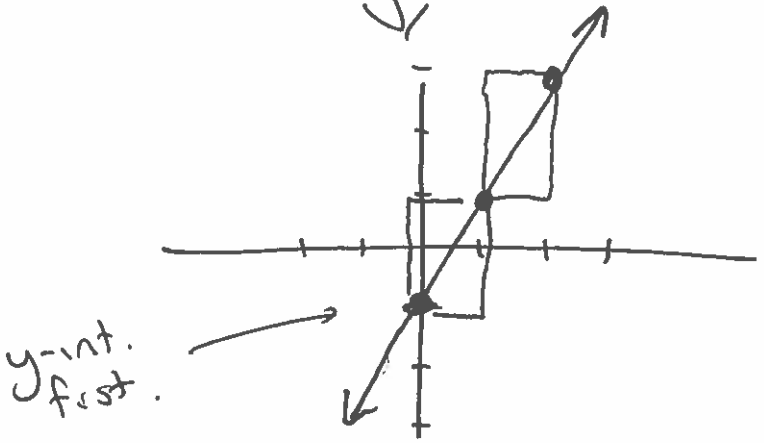
and y-intercept is at (0, −1)

!!!

Ex $y = 2x - 1$ $\Longrightarrow$ slope $= 2$

y-intercept $= -1$

Make a graph

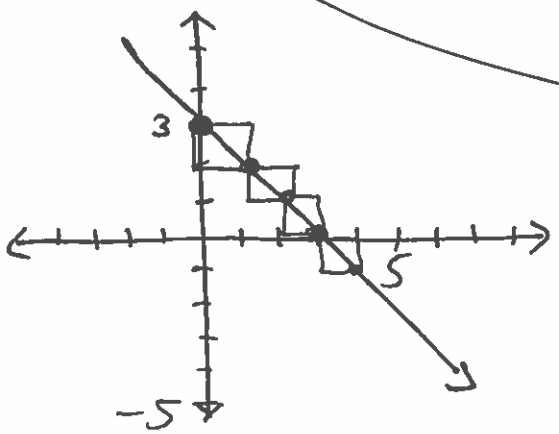


$m = 2 = \frac{2}{1}$ ← rise, ← run

Ex $y = -x + 3$ Sketch this.

y-intercept at 3

slope $= -1 = \frac{-1}{1}$ ← rise, ← run

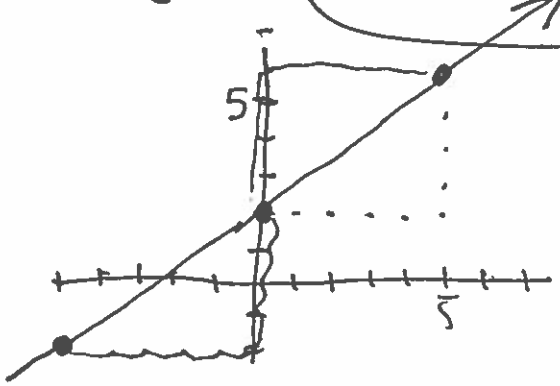


Ex $y = \frac{4}{5}x + 2$ sketch this

y-intercept is 2

slope $= \frac{4}{5}$ ← rise, ← run

slope $= \frac{-4}{-5}$ ← rise, ← run



Slope-intercept form of a line equation

$$y = m \cdot x + b$$

- m: slope — some number
- b: y-intercept — some number

← Useful

Make graphs easy to create & analyze