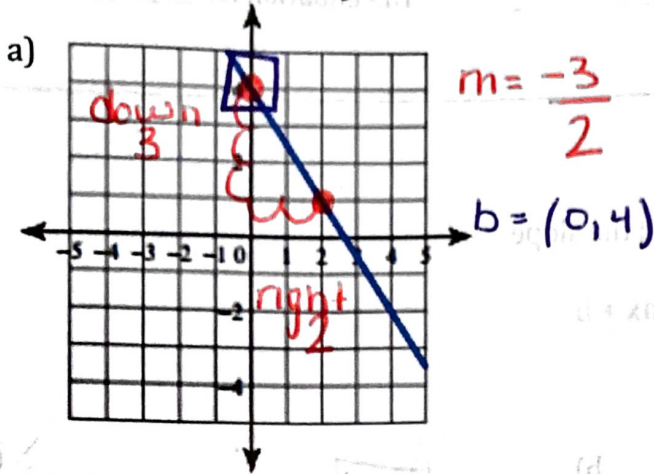# Writing Linear Equations

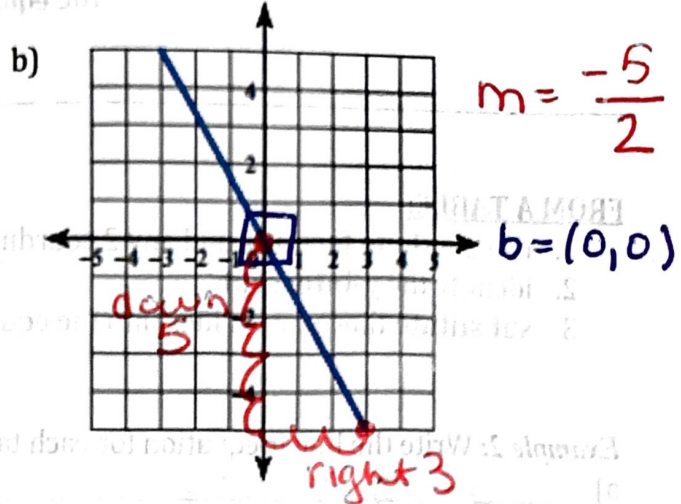**FROM A GRAPH:**
1. identify **2 points** → pretty points
2. use these 2 points to count the **slope**
3. identify the **y-intercept** → where crosses y-axis
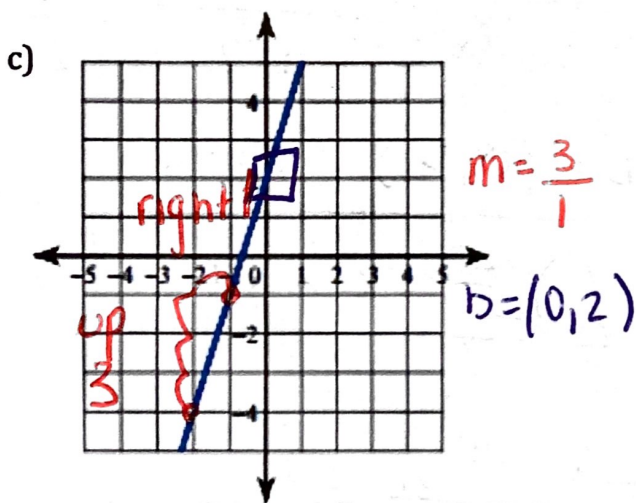4. **substitute** these two values into the equation $y = mx + b$

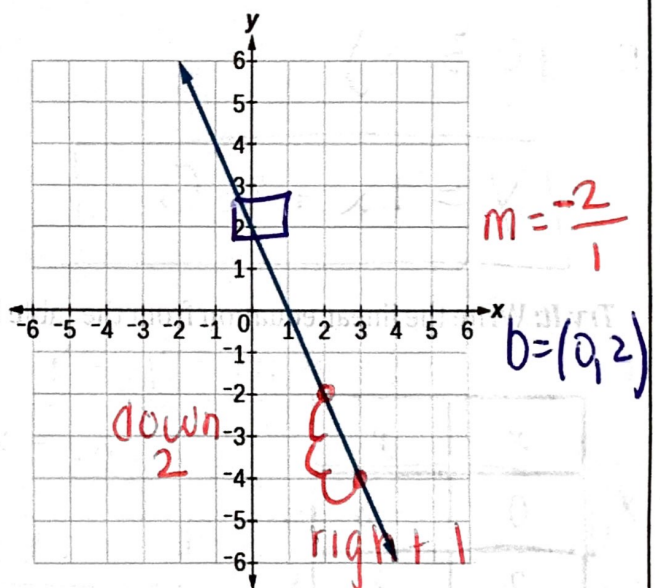**Example 1:** Write the equation of the lines below in slope-intercept form.

a)

down 3

right 2

$m = \dfrac{-3}{2}$

$b = (0, 4)$

$y = \dfrac{-3}{2}x + 4$

b)

down 5

right 3

$m = \dfrac{-5}{2}$

$b = (0, 0)$

$y = \dfrac{-5}{3}x$

c)

right 1

up 3

$m = \dfrac{3}{1}$

$b = (0, 2)$

$y = 3x + 2$

Try It: Write the linear equation of the following graph.
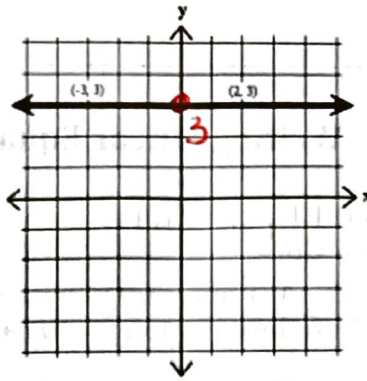
down 2

right 1

$m = \dfrac{-2}{1}$

$b = (0, 2)$

$y = -2x + 2$

Horizontal lines:
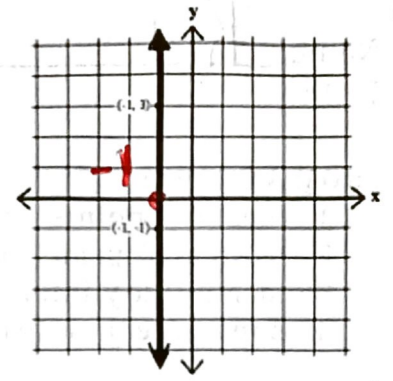- are parallel to the x-axis
- Will always be "y = ↑"

where it crosses axis

Vertical lines:
- are parallel to the y-axis
- Will always be "x = "↓

The equation is: $y = 3$

The equation is: $x = -1$

FROM A TABLE:
1. use the **slope formula** and any 2 coordinates to find the slope
2. identify the **y-intercept**
3. **substitute** these two values into the equation **y = mx + b**

Example 2: Write the linear equation for each table below.

a)

x	0	1	2	3	4
y	3.5	4.5	5.5	6.5	7.5

X_1 X_2

$$m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{5.5 - 4.5}{2 - 1} = \frac{1}{1}$$

$$b = (0, 3.5)$$

$$\boxed{y = 1x + 3.5}$$

b)

x	0	1	2	3	4
y	5	3	1	−1	−3

X_1 X_2

$$m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{-3 - 1}{4 - 2} = \frac{-4}{2} = \frac{-2}{1}$$

$$b = (0, 5)$$

$$\boxed{y = -2x + 5}$$

Try It: Write the linear equation from the table below.

x	y
0	−3
2	2
4	7
6	12

X_1 Y_1
X_2 Y_2

$$m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{2 - (-3)}{2 - 0} = \frac{5}{2}$$

$$b = (0, -3)$$

$$\boxed{y = \frac{5}{2}x - 3}$$