Pop for the Party

The table on the right shows the cost in dollars to purchase bottles of soda for a party.

independent variable = number of sodas, x

dependent variable = cost, $, y

Number of Sodas	Cost ($)
5	15
4	12
3	9
2	6
1	3
0	0

slope = $\frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{-3}{-1}$

Find the average rate of change for this relationship. Interpret this value.

average rate of change = $3 per soda

For each additional soda bought, the cost has increased by $3.

$m = 3$

State and interpret the y-intercept. y-intercept = ___0___

For _zero_ soda bottles, the cost is ___$0___.

b = 0

Number of Sodas	Cost ($)
5	15
4	12
3	9
2	6
1	3
0	0

x y

Write an equation that models this relationship:

$y = mx + b$

Number of Sodas	Cost ($)
5	15
4	12
3	9
2	6
1	3
0	0

$y = 3x + 0$

$y = 3x$

Use your model to determine the cost of 10 bottles of soda. \$30

$y = 3x$

$y = 3(10)$

$y = 30$

Use your model to predict how many bottles of soda were purchased if you spent $45. 15 bottles

$\frac{45}{3} = \frac{3x}{3}$

$15 = x$

1. Determine which of the following tables could represent a linear equation. For each that could be linear, find a linear equation that models the data.

a.

X	Y
5	3
10	28
20	58
25	93

$\frac{25}{5} \neq \frac{30}{10} \neq \frac{35}{5}$

slopes are not equal.

Not Linear

b.

X	Y
0	-5
5	20
10	45
15	70

Linear

$y = 5x - 5$

$m = \frac{25}{5} = 5$

$b = -5$

2. A mountain climber is scaling a 400-ft cliff. The climber starts at the bottom at $t = 0$ and climbs at a constant rate of 124 feet per hour.

a. Complete the table.

	Time t, (hours)	0	1	2	3	4
t						
y	Distance (ft)	0	124	248	372	496

b. Calculate and interpret the slope.

For each additional hour, the mountain climber scales 124 feet.

b. Calculate and interpret the y-intercept.

At the beginning of the climb, when *time* = 0, the mountain climber has scaled 0 feet.

c. Use the slope and y-intercept to write the linear model for the distance *y (in feet)* that the climber climbs in terms of time *(in hours)*.

$y = 124t$

d. After 3 ½ hours, has the climber reached the top of the cliff? Show work.

$t = 3.5$ find y $y = 124(3.5) = 434$ feet Yes

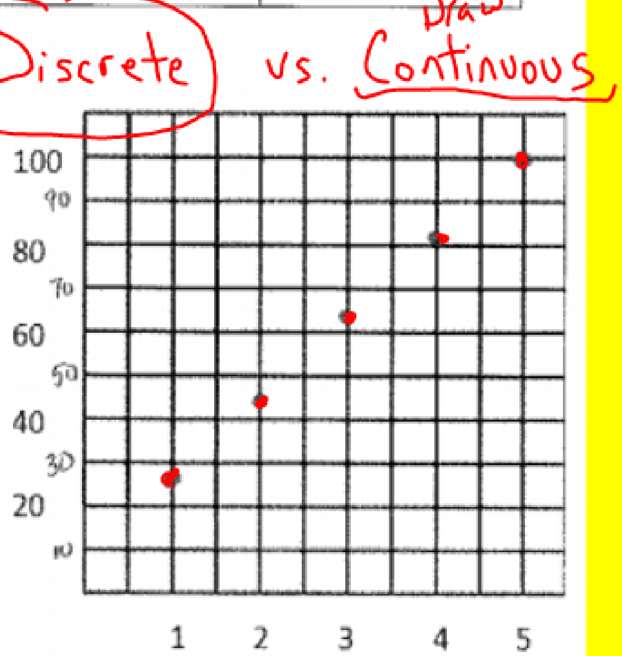
e. Use your linear model in part #1c to determine how long it takes for the climber to reach the top.

top = 400 ft = y find t

$\frac{400}{124} = \frac{124t}{124}$ $t = 3.23$ hours

3. Renting a canoe costs $10 plus $18 per day. The linear model for this situation relates the total costs of renting a canoe, *y*, with the number of days rented, *x*.

Days Rented(x)	1	2	3	4	5
Total Costs (y)	28	46	64	82	100



a. Complete the table and graph this data.

b. Calculate and interpret the slope. slope $18 per day

For each additional day, the cost to rent a canoe increases $18.

c. Determine and interpret the y-intercept.

The initial cost to rent a canoe, when days = 0, is $10.

d. Use the slope and y-intercept to write the linear model for total cost to rent a canoe, y, as a function of days, x.

y = $18x + 10$

e. Use your model to determine the cost to rent a canoe for 7 days. \$136

x

$y = 18(7) + 10$

$y = \$136$

f. Use your model to determine how many days you could rent a canoe if you had \$190 to spend. 10 days

y

$190 = 18x + 10$

$-10 \qquad -10$

$\frac{180}{18} = \frac{18x}{18}$

$x = 10$

E.Q.: How do we graph linear equations in two variables?

Standard: **MGSE9-12.A.CED.2**

Create linear equations in two or more variables to
represent relationships
between quantities; graph equations on coordinate axes
with labels and scales.
(The phrase "in two or more variables" refers to formulas
like the compound
interest formula, in which A = P(1 + r/n)nt has multiple
variables.)

Methods to Graphing a Linear Equation:

- Make a table of values and plot those points.

- Use the slope intercept method of graphing a line

- Find the x and y intercepts of a line.

Method 1:

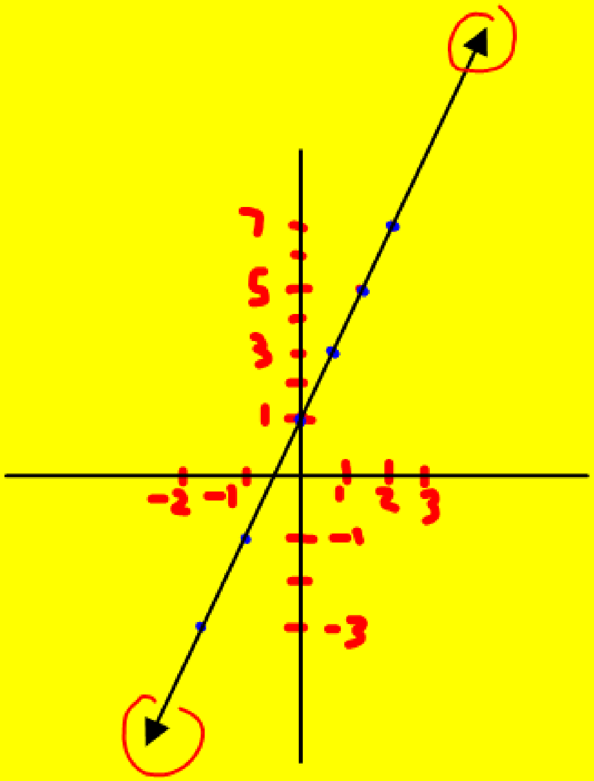
Make a table of values.

Plot the points in your table.

Draw your line.

$y = 2x + 1$

X	Y
-2	-3
-1	-1
0	1
1	3
2	5
3	7



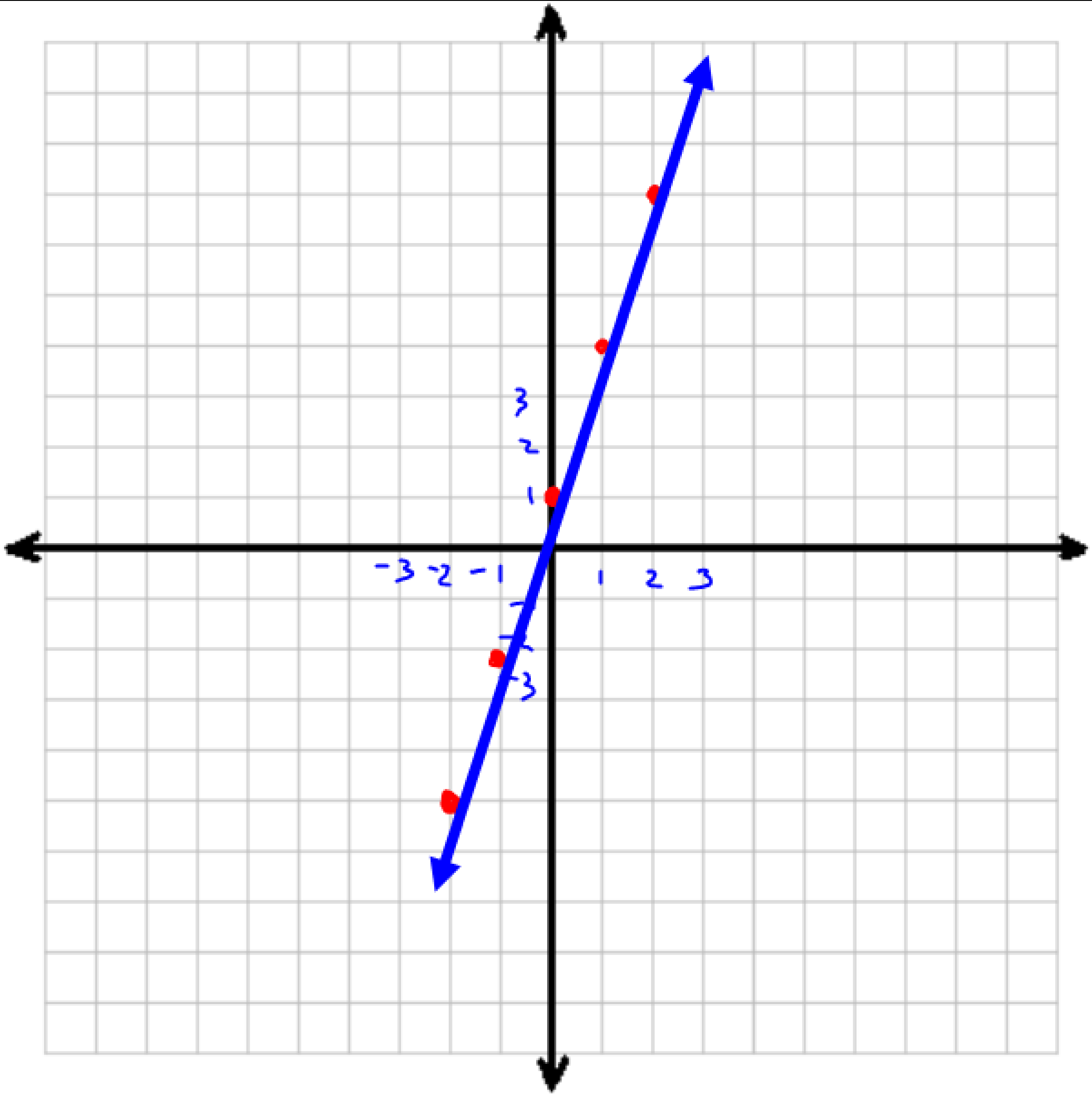
$y = 3x + 1$

slope   y-int

$3(-2) + 1$

x	y
-2	-5
-1	-2
0	1
1	4
2	7

+3



Solve for y first, then complete your table.

Standard Form

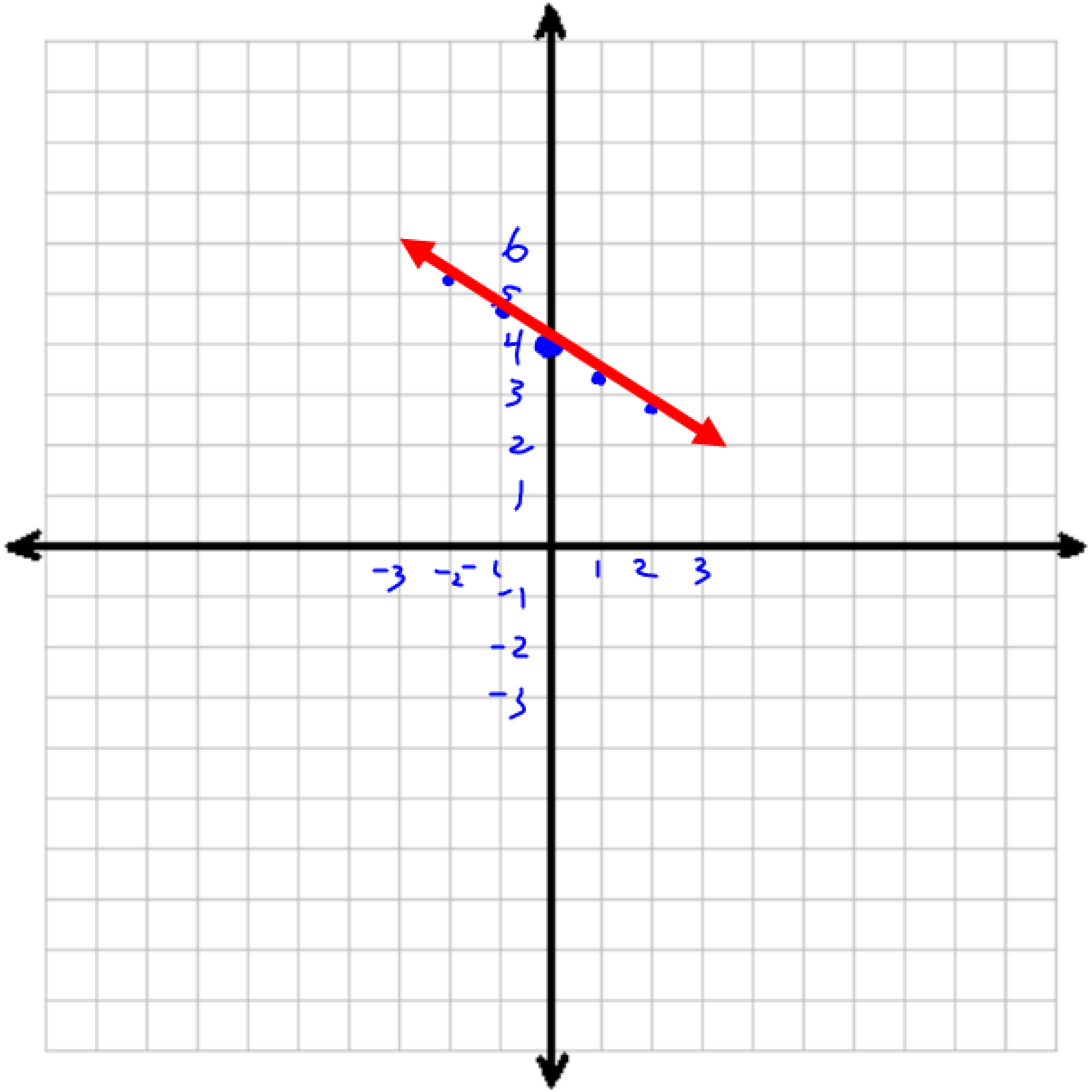
$$2x + 3y = 12$$

x	y	
-2	16/3 or	$5.\overline{3}$
-1	14/3 or	$4.\overline{6}$
0	4	
1	10/3 or	$3.\overline{3}$
2	8/3 or	$2.\overline{6}$

$2(2) + 3y = 12$

$4 - 4 + 3y = 12 - 4$

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



Method 2:

Use the slope intercept method.

Plot your y-intercept.

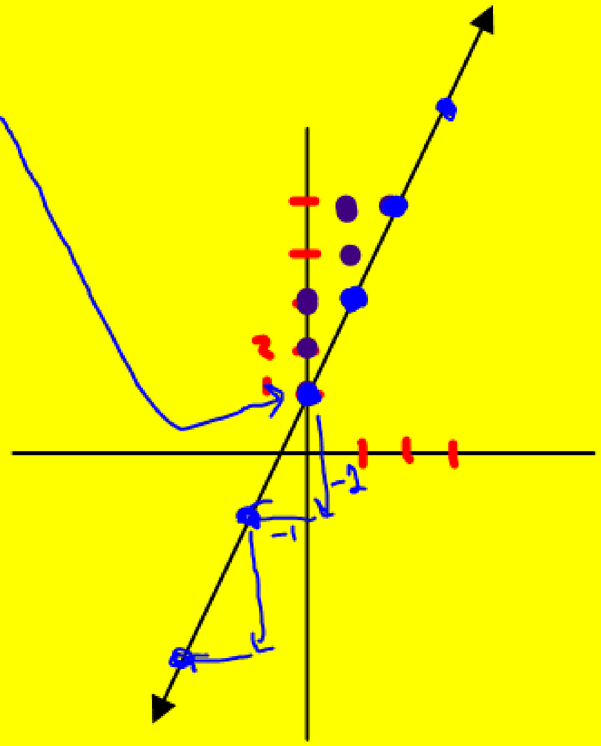
Use your slope to find other points.

Draw your line.

$\text{slope} = \frac{2}{1} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$

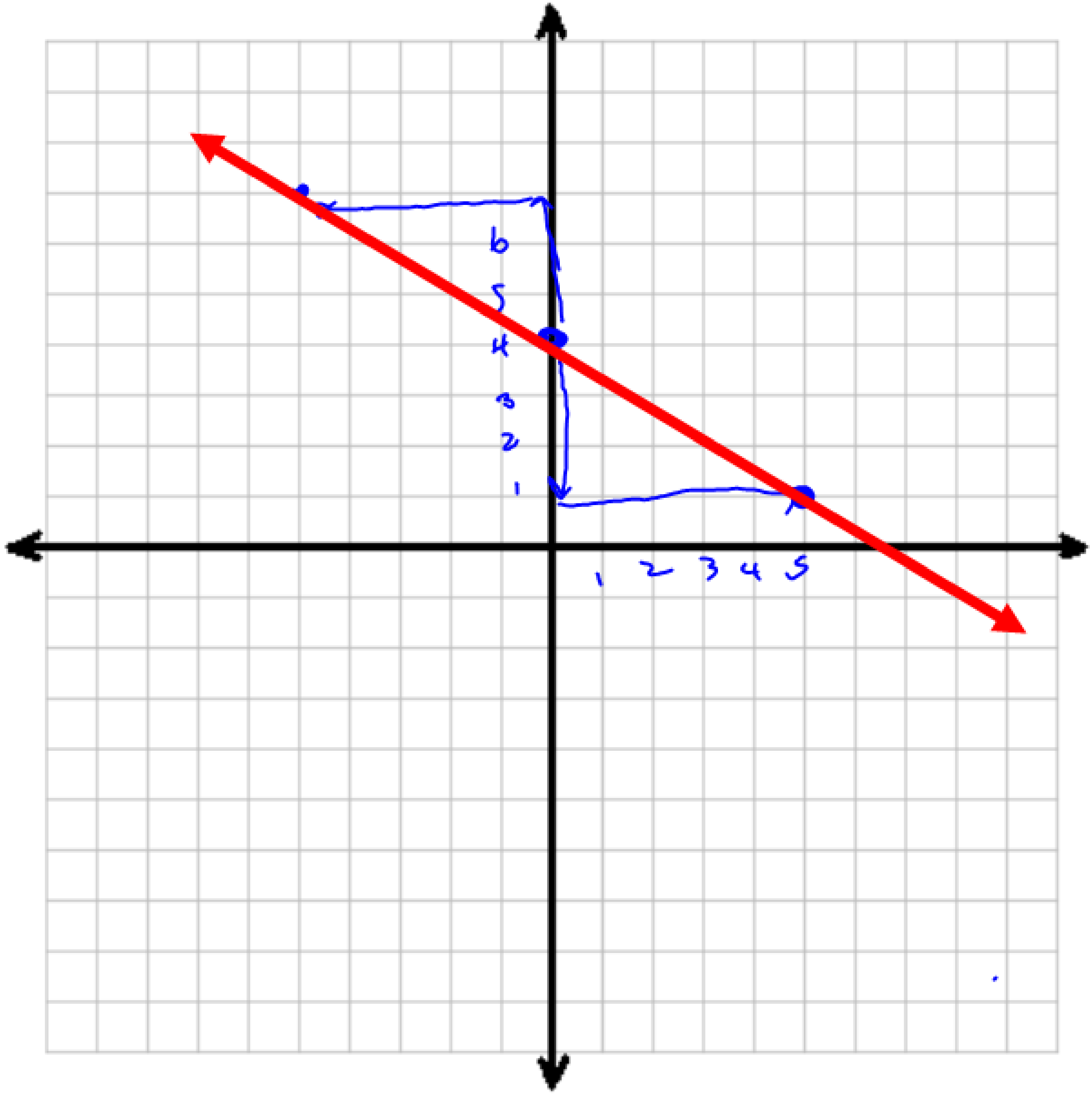
$y = 2x + 1$

X	Y
-2	-3
-1	-1
0	1
1	3
2	5
3	7



$$y = \frac{-3}{5}x + 4$$

$$\frac{-3}{5} = \frac{\text{rise}}{\text{run}}$$



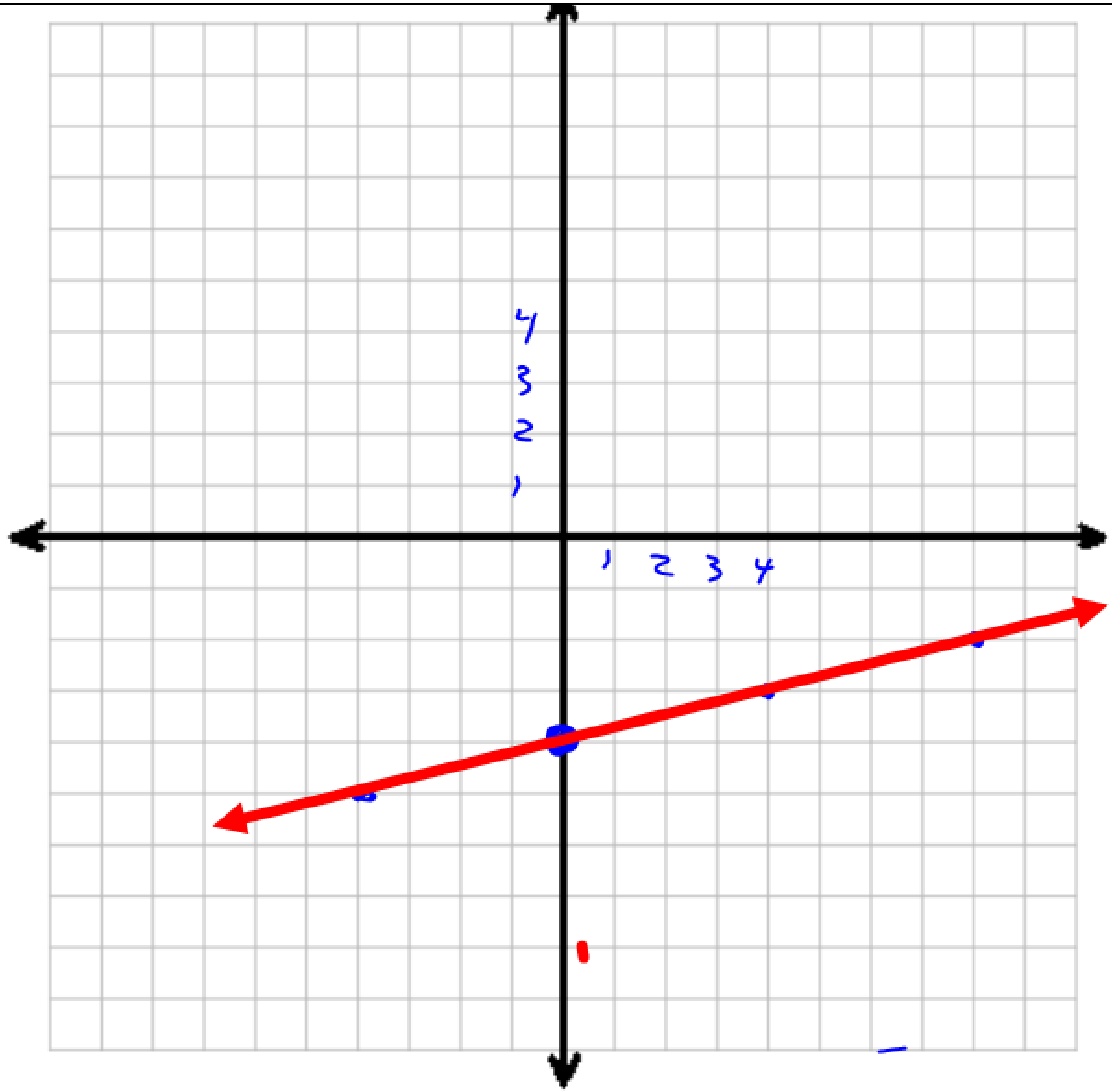
solve for y.

$$x - 4y = 16$$

$-x \qquad -x$

$$\frac{-4y}{-4} = \frac{-1x}{-4} + \frac{16}{-4}$$

$$y = \frac{1}{4}x - 4$$



Method 3:

x-int (y = 0)

Find the x and y intercepts.

Plot the x and y intercepts.

Draw your line.

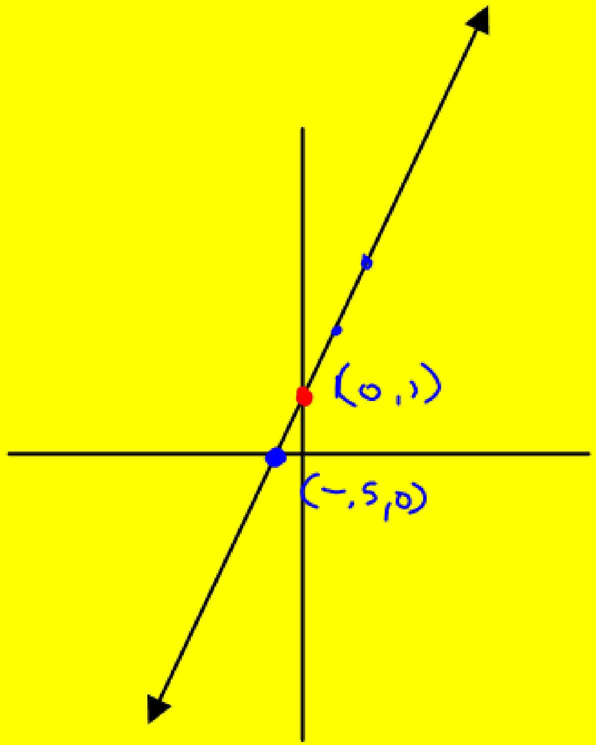
$y = 2x + 1$

X	Y
-2	-3
-1	-1
0	1
1	3
2	5
3	7

$0 = 2x + 1$

$-1 = 2x$

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



$y = 2x + 8$

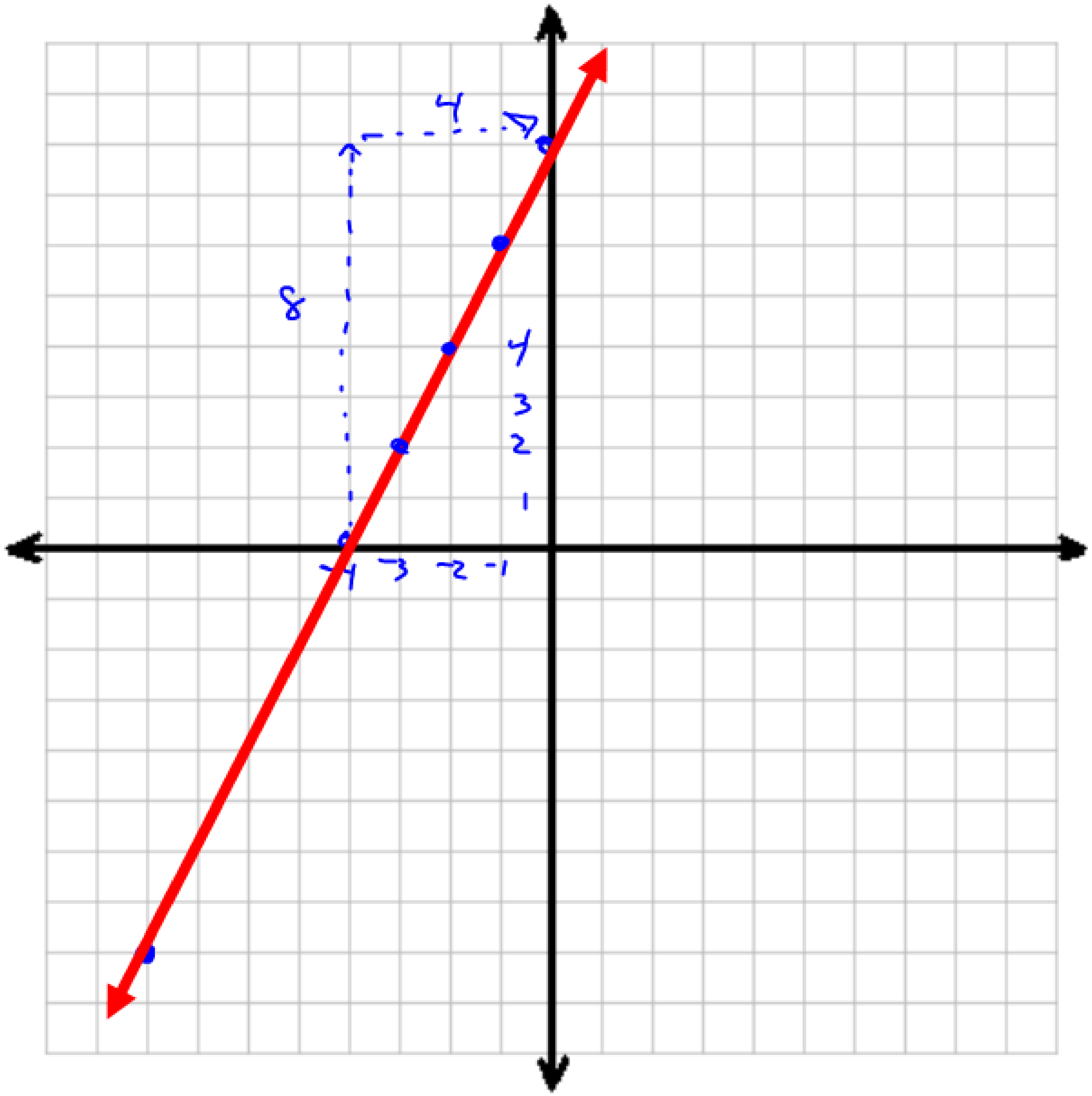
y-int: 8

x-int

$0 = 2x + 8$

$-8 = 2x$

$-4 = x\text{-int}$



5x - 6(0)

$5x - 6y = 30$

5x + 0 = 30

x-int

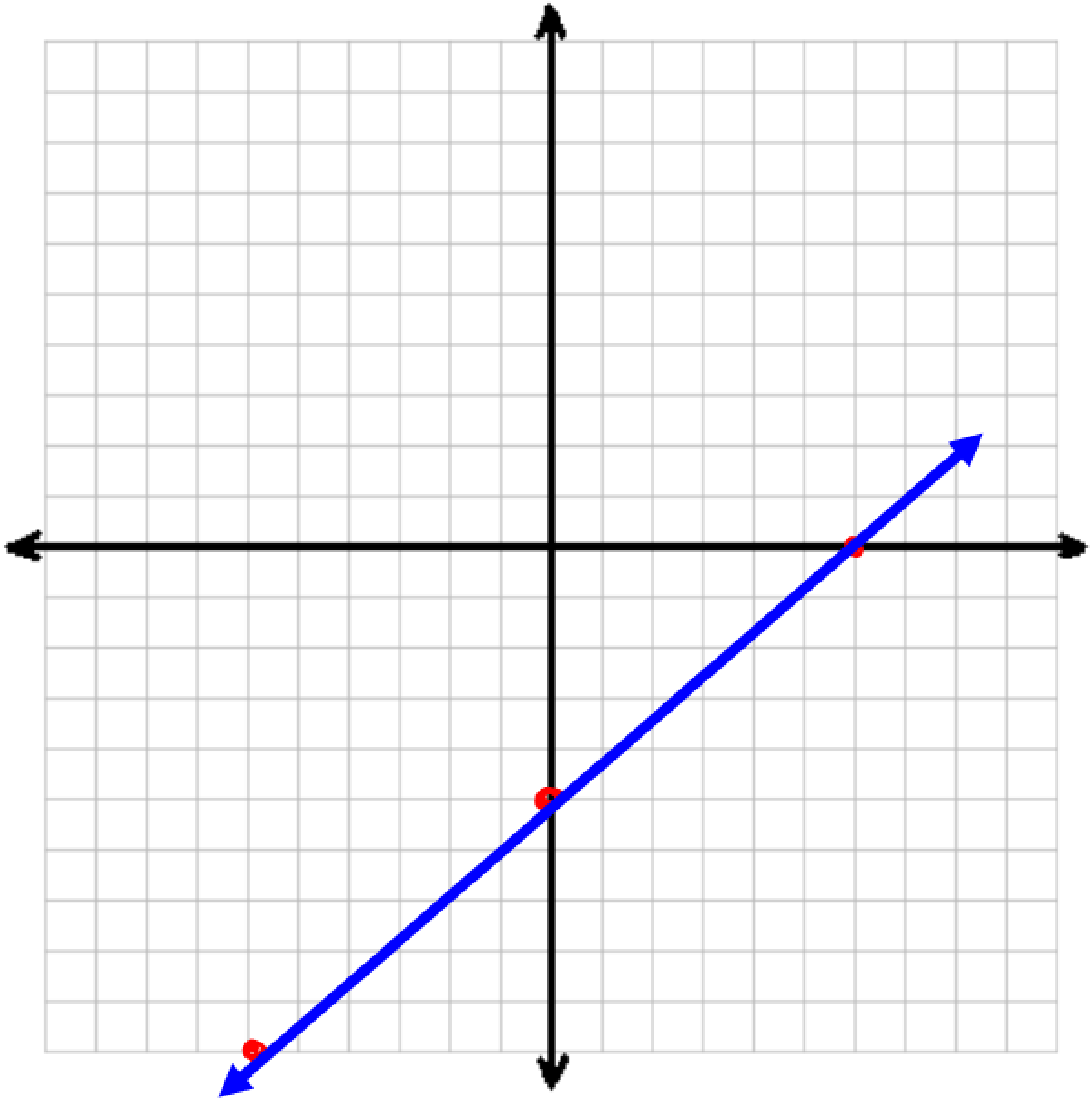
5x = 30

x = 6

y-int

-6y = 30

y = -5



Homework #5:

Graphing Two Variable Equations