Algebra 1   Unit 2 Linear Functions   Notes

Day 3– Writing Equations of Lines

What pieces of information do you need to write the equation of a line?

$\underline{\quad slope \quad}$ & $\underline{y\text{-}intercept}$ $y = \boxed{m}x + \boxed{b}$

a. $m = \dfrac{-4}{+1} = -4$ b $= -1$

Equation: $y = -4x - 1$
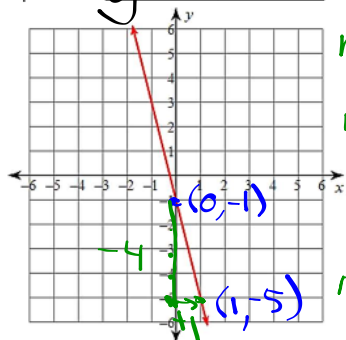
$m = \dfrac{rise}{run}$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$(0, -1)$

-4

$(1, -5)$

$m = \dfrac{-5 + 1)}{1 - 0} = \dfrac{-4}{1}$

b. $m = \dfrac{1}{2}$ b $= +1$
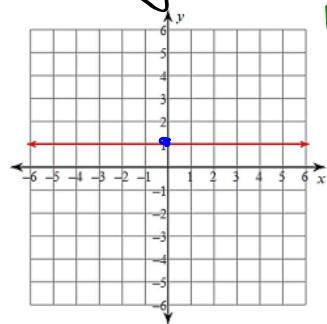
Equation: $y = \dfrac{1}{2}x + 1$

$+4$

$+2$

-1

-2
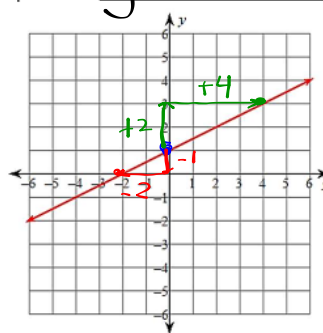
$m = \dfrac{+2}{+4}$

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

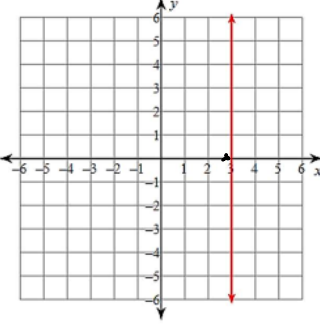$m = \dfrac{-1}{-2} = \dfrac{1}{2}$

c. $m = 0$ b $= +1$

Equation: $y = 1$ HOY

d. $m = und$ b $= none$

Equation: $x = 3$ VUX
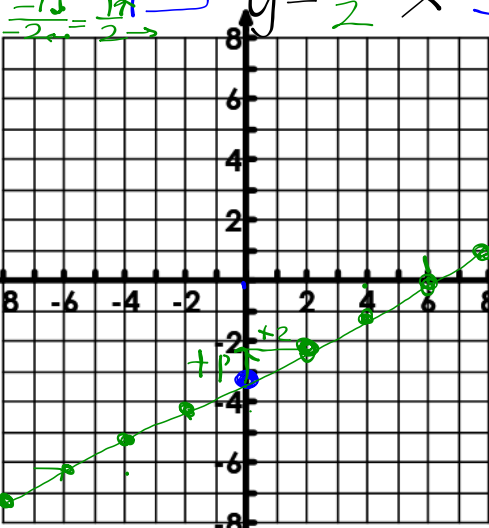
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Explore: For each of the following problems, write the equation of the line using the given parameters (slope and a point on the line).
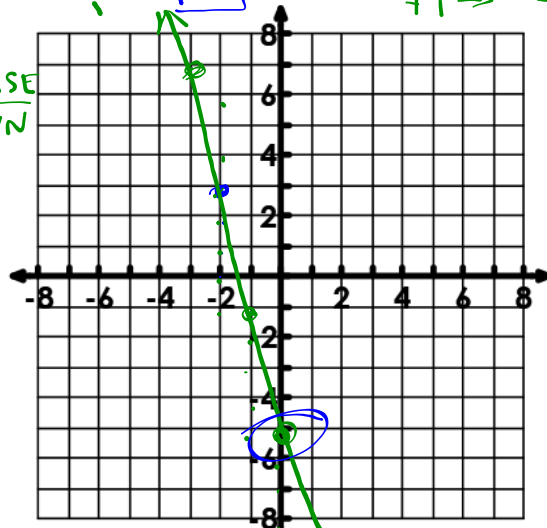
$$y = mx + b$$

a. m = ½, point (0, -3)

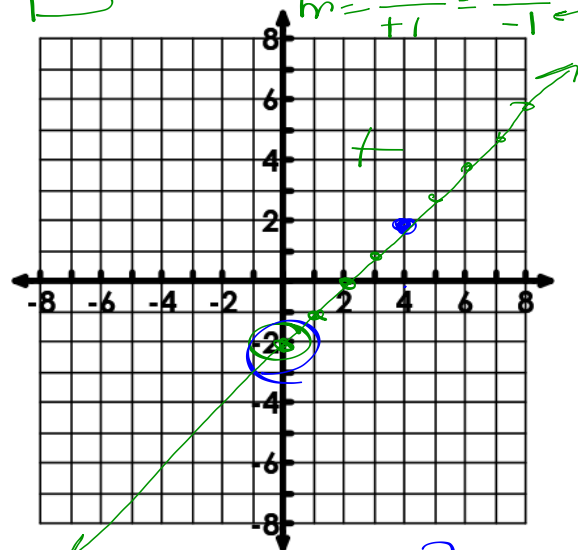$$y = \frac{1}{2}x - 3$$

$$\frac{-1\downarrow}{-2\leftarrow} = \frac{1\uparrow}{2\rightarrow}$$

$$m = \frac{RISE}{RUN}$$

Equation of the Line: $y = \frac{1}{2}x - 3$

b. m = -4, point (-2, 3)

$$m = \frac{-4\downarrow}{+1\rightarrow} = \frac{+4\uparrow}{-1\leftarrow}$$

Equation of the Line: $y = -4x - 5$

c. m = 1, point (4, 2)

$$m = \frac{+1}{+1} = \frac{-1\downarrow}{-1\leftarrow}$$

Equation of the Line: $y = x - 2$

d. m = -3/2, point (2, -4)

$$m = \frac{-3\downarrow}{+2\rightarrow} = \frac{+3\uparrow}{-2\leftarrow}$$

Equation of the Line: $y = \frac{-3}{2}x - 1$

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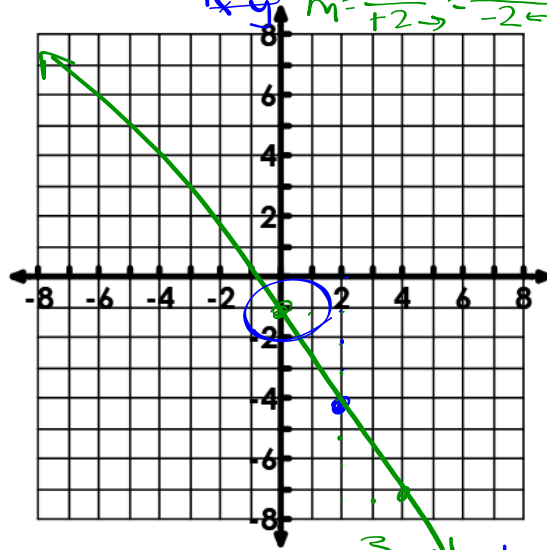
Writing Equations of Lines Given Slope & a Point

So far in Unit 2, you have been able to determine the y-intercept from either a graph or an equation in slope intercept form. How will you find the y-intercept or equation of a line without a graph or equation? You can use the slope intercept form to find the y-intercept or equation of a line if you know the slope and a point on the line.

Writing Equations Using Slope Intercept Form $y = mx + b$	Writing Equations Using Point Slope Form $(y - y_1) = m(x - x_1)$
✓ 1. Write the formula $y = mx + b$. ✓ 2. Substitute the value of the slope in for m and the value of the point in for x and y. 3. Solve the equation for b. 4. Substitute the value of m and the newly founded b into $y = mx + b$.	$y = mx + b$ $11 = 9(2) + b$ $11 = 18 + b$ $\underline{-18 \quad -18}$ $-7 = b$ $y = 9x - 7$	1. Write the formula $(y - y_1) = m(x - x_1)$. 2. Substitute the value of the slope in for m and the value of the point in for x_1 and y_1. 3. Solve the equation for y	$(y - y_1) = m(x - x_1)$ $y - 11 = 9(x - 2)$ $y - 11 = 9x - 18$ $+11 \qquad +11$ $y = 9x - 7$

Ex 1: Write the equation of a line with a slope of -3 and y-intercept of 2.

$m = -3 \qquad b = +2 \qquad y = -3x + 2$

Ex 2: Write the equation of a line if m = 9 and passes through the point (2, 11).

$m = 9$

$(2, 11)$
$x_1 \ y_1$

$m = \underline{9} \qquad b = \underline{-7}$

Equation: $\underline{y = 9x - 7}$

$x \ y$

Ex 3: Write the equation of a line with m = -8 and passes through the point (3, 12).

$y = mx + b$
$12 = -8(3) + b$
$12 = -24 + b$
$\underline{+24 \qquad +24}$
$36 = b$

$m = \underline{-8} \qquad b = \underline{+36}$

Equation: $\underline{y = -8x + 36}$

Ex 4: Write the equation of a line with m = 4 and passing through the point (2, 5).

$(y - y_1) = m(x - x_1)$
$y - 5 = 4(x - 2)$
$y - 5 = 4x - 8$
$\underline{+5 \qquad\qquad +5}$
$y = 4x - 3$

$m = \underline{4} \qquad b = \underline{-3}$

Equation: $\underline{y = 4x - 3}$

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Writing Equations of Lines from 2 pts on a graph

Explore: For each of the following problems, write the equation of the line using the given parameters (two points on the line).
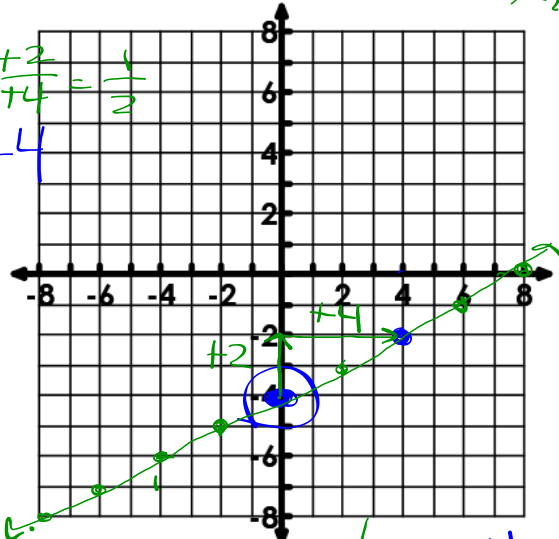
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

a. (4, -2) and (0, -4)

$m = \frac{+2}{+4} = \frac{1}{2}$

$b = -4$

b. (-2, 2) and (3, -3)

$m = \frac{-5}{+5} = -1$

Equation of the Line: $y = \frac{1}{2}x - 4$
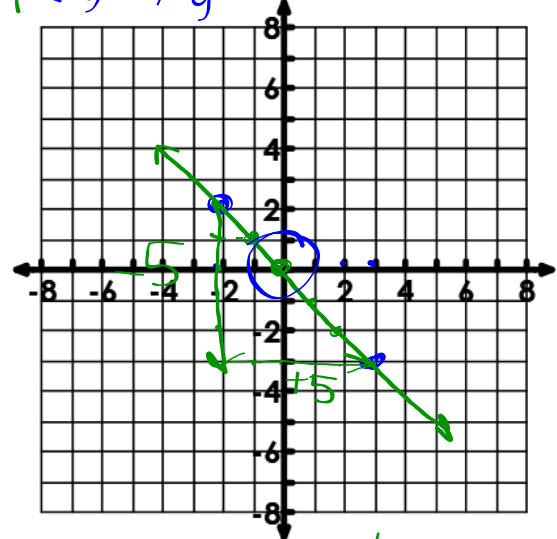
Equation of the Line: $y = -1x$

c. (5, 1) and (-5, -5)

$m = \frac{-6}{-10} = \frac{3}{5}$
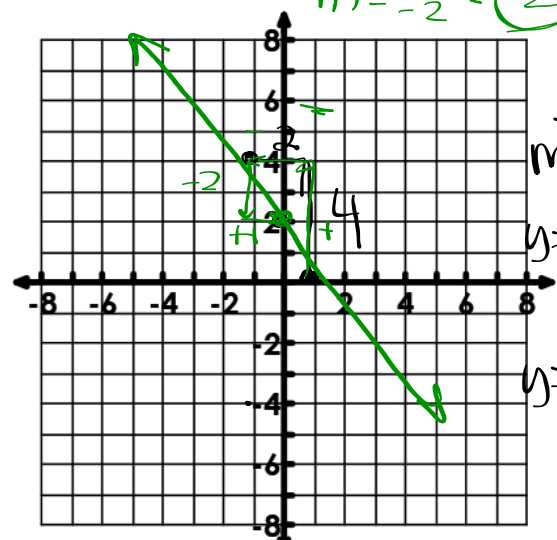
$b = -2$

d. (-1, 4) and (1, 0)

$m = \frac{+4}{-2} = -2$

$m = -2$

$y = 2$

$y =$
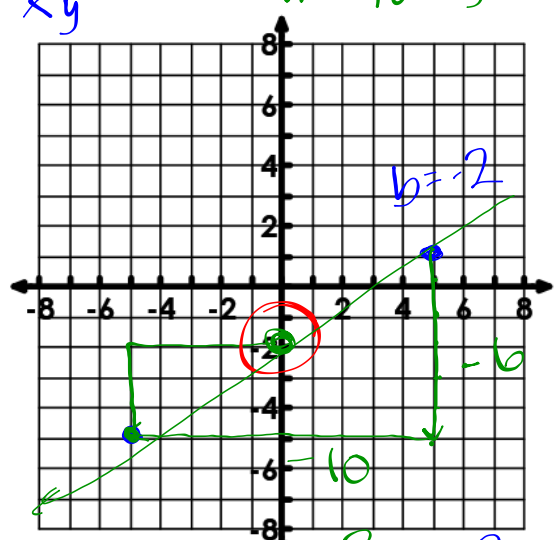
Equation of the Line: $y = \frac{3}{5}x - 2$

Equation of the Line: $y = -2x + 2$

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$$8x - 3y = 6$$
$$-8x \qquad\qquad -8x$$
$$\frac{-3y}{-3} = \frac{-8x + 6}{-3}$$
$$y = \frac{8}{3}x - 2$$