Chapter 1.2/1.3 Graphing Linear and Absolute Value Functions

I. Graphing Linear Functions

A. Graphing a line in slope-intercept form

Slope – intercept form: $y = mx + b$ where m represents the slope and b represents the y-intercept. (constant value)

Slope Movements: Positive slope: $\frac{\text{up}}{\text{right}}$ or $\frac{\text{down}}{\text{left}}$ Negative slope: $\frac{\text{down}}{\text{right}}$ or $\frac{\text{up}}{\text{left}}$

The reason slope is symbolized by the letter "m" is because the French mathematician Rene Descartes is credited with creating the formula, and **monter** is a French word for slope.

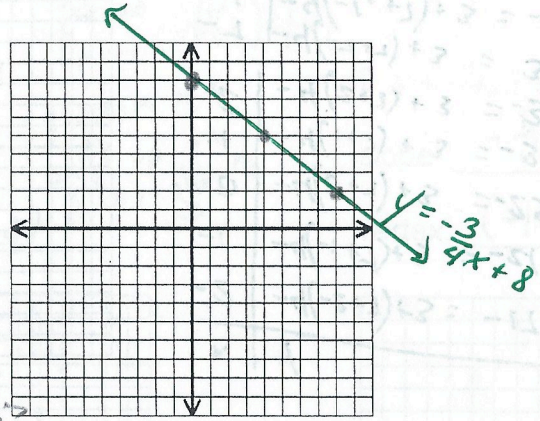
Graph the line using its slope and y-intercept.

Ex 1: $y = -\frac{3}{4}x + 8$

Slope= $-\frac{3}{4}$

y-int = 8

transformation from the parent fnxn
- shift up 8
- less steep
- reflection over x-axis

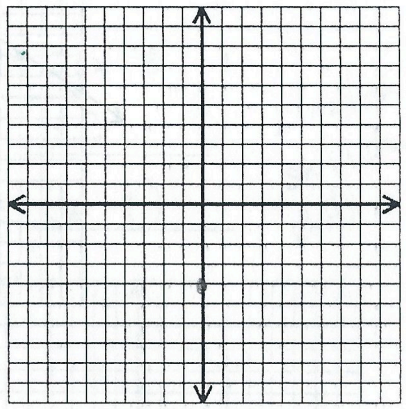


Ex 2: $y = 2x - 4$

Slope = $\frac{2}{1}$

y-int = -4

transformation



B. Change a linear function to slope-intercept form (solving for y).

1. move the x's to the right side of = and change their signs
2. divide each term by the number in front of y

Ex 3: $2x - y = 9$

$\frac{-2x}{} \quad \frac{-2x}{}$

$-y = 9 - 2x$

$\frac{-y}{-1} = \frac{-2x}{-1} + \frac{9}{-1}$

$y = 2x - 9$

same

$m = 2$

$b = -9$

Ex 4: $7x - 2y = -21$

$y = \frac{7}{2}x + 10.5$

m = slope = $\frac{7}{2}$

b = y-int = 10.5

C. Graphing a line in point-slope transformed function

$y = m(x - h) + b$

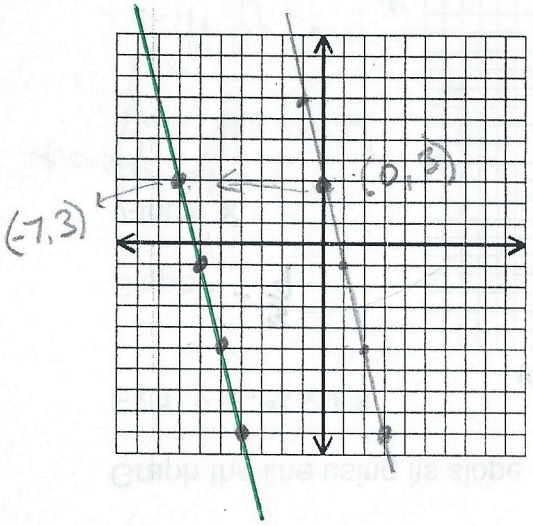
$y = a(x - h) + k$

Where a now represents the slope and (h , k) represents the starting point

Graph the following lines:

Ex 5: $y = -4(x + 7) + 3$ → shift

Slope: -4 Point: $(-7, 3)$



x	y
-2	$-4(-2+7)+3 = -17$
-1	$-4(-1+7)+3 = -21$
0	$-4(0+7)+3 = -25$
1	$-4(1+7)+3 = -31$
2	$-4(2+7)+3 = -33$
-7	$-4(-7+7)+3 = 3$
-6	$-4(-6+7)+3 = -1$
-5	$-4(-5+7)+3 = -5$
-4	$-4(-4+7)+3 = 9$

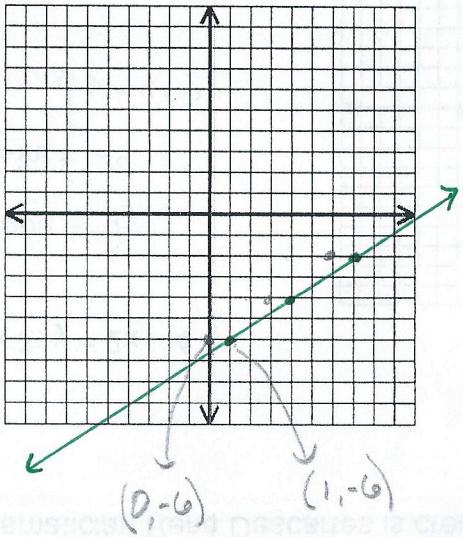
+h shift left

-h shift right

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

Ex 6: $y = {}^{2}/_{3}(x - 1) - 6$

Slope: $2/3$ Point: $(1, -6)$



II. Graphing Absolute Value Functions

The transformed absolute value function is $y = a\,|\,x - h\,| + k$. Since absolute value functions have linear characteristics we do not use actual transformations to graph instead we graph using the vertical stretch/shrink as a slope and the vertex as the beginning point.

Slope: a Vertex: (h, k)

The slope for absolute value functions while related to linear functions it is not the same.

Positive slope: $\frac{up}{right}$ *and* $\frac{up}{left}$ Negative slope: $\frac{down}{right}$ *and* $\frac{down}{left}$

Sketch the graph of each of the following absolute value functions.

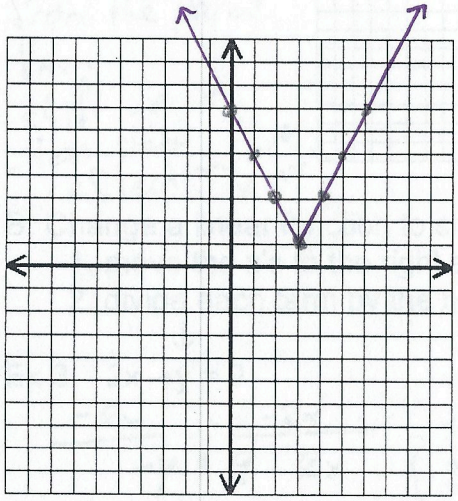
parent fnxn $f(x) = |x|$

1. $f(x) = 2\,|\,x - 3\,| + 1$

slope: 2

vertex: (3, 1)

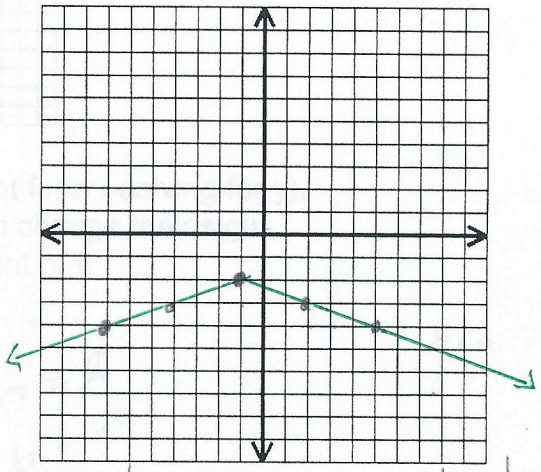
stretch x 2
shift up +1
shift right 3



2. $y = -\frac{1}{3}\,|\,x + 1\,| - 2$

slope: $-\frac{1}{3}$

vertex: (-1, -2)



parent function $y = |x|$

shrinks $-\frac{1}{3}$
shift down -2
shift left -1

3. $f(x) = -3\,|\,x - 6\,| - 1$

slope: -3

vertex: (6, -1)

stretch x 3
shift down 1
shift right 6