GSE Algebra 1 **7.6 – linear shifts** Name: _____

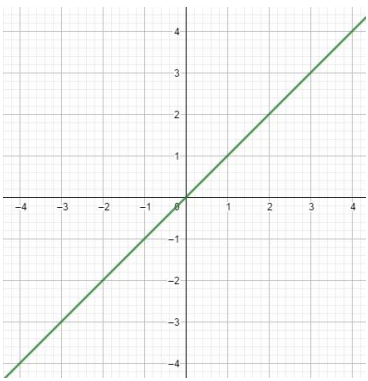
A line is going to shift very similar to a quadratic.

Let's look at what we have.

$y = x$

PARENT GRAPH

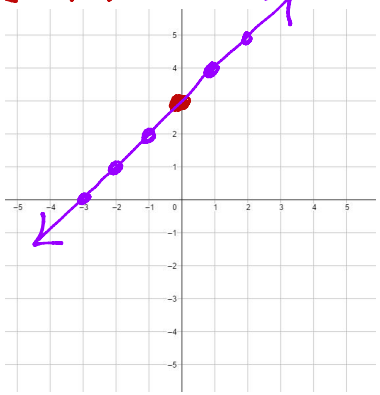
x-int: (0,0) y-int: (0,0)



$y = x + 3$

How do we move? UP 3 Slope: $\frac{1}{1}$

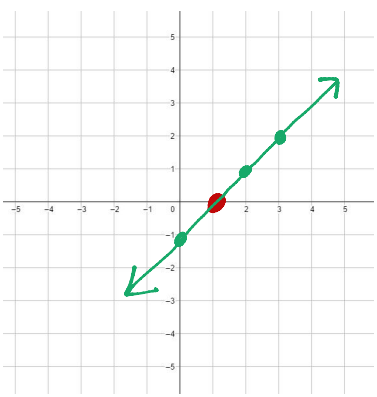
x-int: (-3,0) y-int: (0,3)



$y = (x - 1)$

How do we move? Right 1 Slope: $\frac{1}{1}$

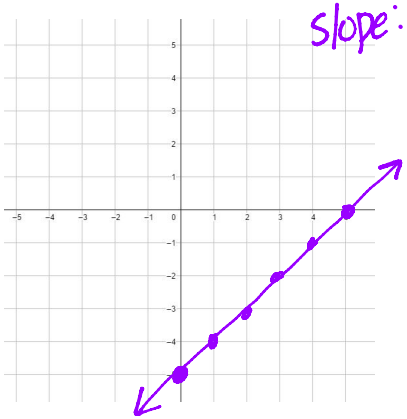
x-int: (1,0) y-int: (0,-1)



$y = x - 5$

How do we move? Down 5

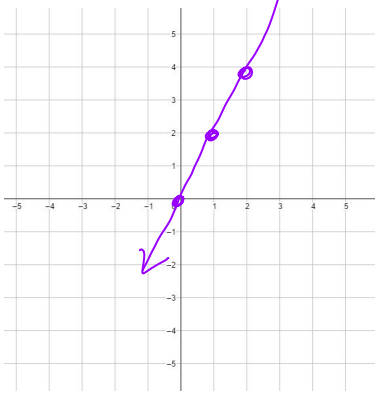
x-int: (5,0) y-int: (0,-5) Slope: $\frac{1}{1}$



$y = 2x$

How do we move? Slope: $\frac{2}{1}$ steeper → Vertical stretch

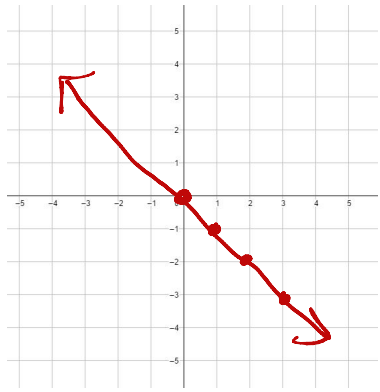
x-int: (0,0) y-int: (0,0)



$y = -x$

How do we move? Reflect over X-axis

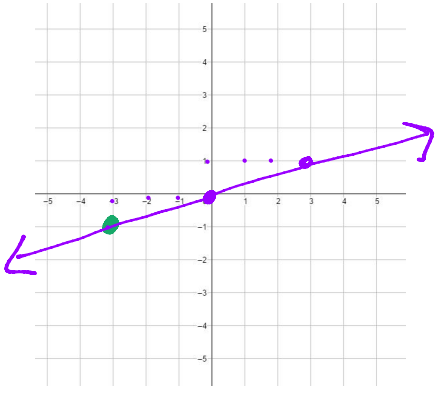
x-int: (0,0) y-int: (0,0)



$y = \frac{1}{3}(x+3) - 1$

How do we move? Horiz. stretch left 3 Down 1 Slope: $\frac{1}{3}$

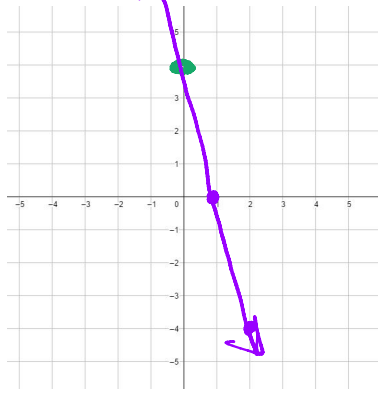
x-int: (0,0) y-int: (0,0)



$y = -4x + 4$

How do we move? Reflect Vert stretch Slope: -4 up 4

x-int: (1,0) y-int: (0,4)



Linear Quadratic

Compare linear to quadratics. How are these similar? How are they different?

$y = \frac{1}{2}(x+3)$ Horiz stretch, left 3

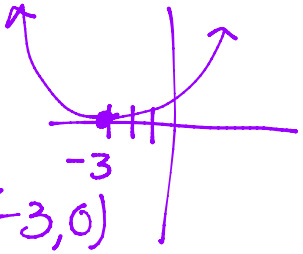
$y = -x - 3$ Reflect, Down 3

Shift same

Quad → x^2

line → x

$y = \frac{1}{2}(x+3)^2$ Horiz stretch, left 3



Vertex (-3,0)

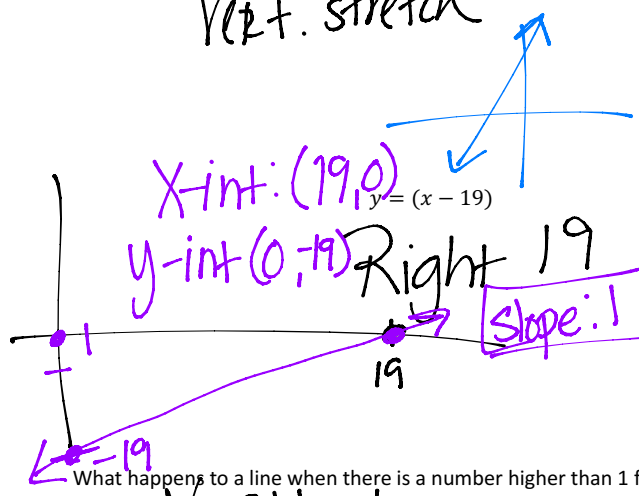
$y = -x^2 - 3$ Reflect, Down 3

no x-ints

Vertex (0,-3)

$y = 5(x+4) + 2$ left 4 up 2

Vert. stretch



$y = 5(x+4)^2 + 2$ ~~Vert~~ left 4 up 2

Vert stretch

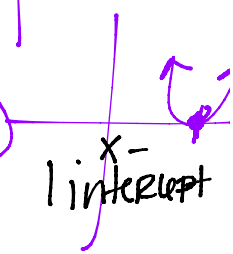
Vertex (-4,2)

no ~~X-ints~~

$y = (x-19)$

$y = (x-19)^2$ Right 19

Vertex (19,0)



What happens to a line when there is a number higher than 1 for a slope?

Vertical stretch → H. compress → steeper "tall"

What happens to a line when there is a number lower than 1 for a slope?

H. stretch → Flatter → V. compress

Write the equations for the following specific scenarios.

1) A quadratic that has been shifted 1 unit to the right and 5 units down.

$y = (x-1)^2 - 5$ → standard $y = x^2 - 2x - 4$

Vertex

$(x-1)(x-1) - 5$

	x	-1
x	x^2	$-1x$
-1	$-1x$	1

$x^2 - 2x + 1 - 5$

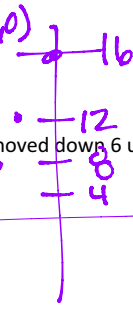
2) A line that has been reflected and moved up 6 units.

$y = -x + 6$ y-int $(0, 6)$

3) A line that has been vertically stretched by a factor of 4 and moved left 4 units.

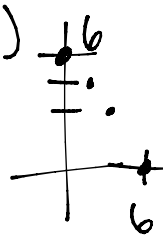
$y = 4(x+4)$ → $y = 4x + 16$ x-int: $(-4, 0)$

$0 = 4x + 16$ y-int $(0, 16)$



4) A quadratic that has been reflected over the x-axis, vertically shrunk by ¼ and moved down 6 units.

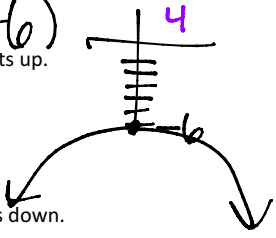
$y = -\frac{1}{4}x^2 - 6$ Vertex $(0, -6)$



5) A quadratic that has been moved 4 units left and 9 units up.

$y = (x+4)^2 + 9$

Vertex $(-4, 9)$



6) A line that has been translated 6 units right and 3 units down.

$y = (x-6) - 3$ → $y = x - 9$

3

y-int: $(0, -9)$

x-int: $(9, 0)$

7) A quadratic that has been vertically stretched by a factor of 7 and moved 3 units right.

$y = 7(x-3)^2$ Vertex $(3, 0)$

8) A line that has been horizontally stretched by $\frac{2}{3}$.

$y = \frac{2}{3}x$ Flat $\begin{matrix} x \\ y \end{matrix}$ ints: $(0, 0)$

9) A line that has been reflected, vertically stretched by a factor of 7 and down 9 units.

$y = -7x - 9$ y-int: $(0, -9)$