Unit 6: Transformations

Lesson 1: Shifts

Objectives:

- I can identify parent functions
- I can identify different types of transformations (shifts) from parent functions
- I can sketch functions and their transformation (shifts)

Agenda:

- Use your skills
- Use all your skills
- Challenge your skills

Vocabulary:

- Function, parent function, transformed function, vertical shift, horizontal shift.

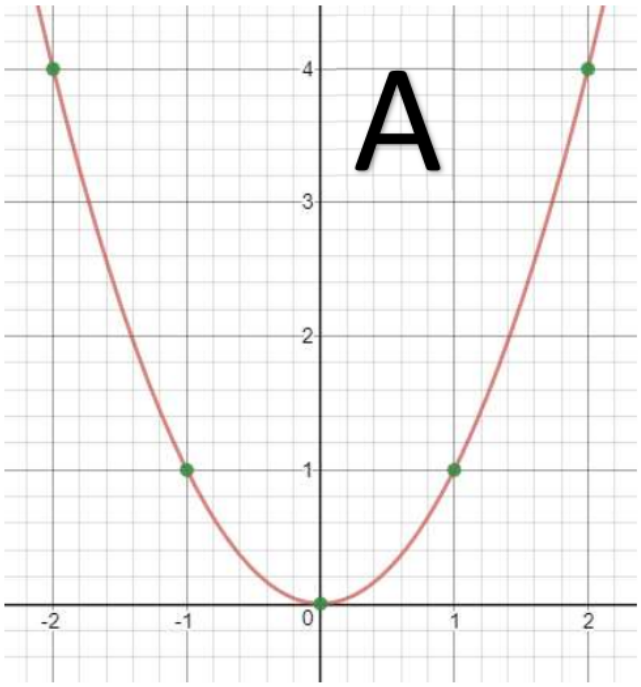
Focus Questions:

1. How do we describe the difference between the graphs of any function and its parent function?

Online support:
https://www.youtube.com/watch?v=nzwdRWmPH9o
https://www.youtube.com/watch?v=IFT2uznB7fM
https://www.youtube.com/watch?v=7S5HF38DnUY

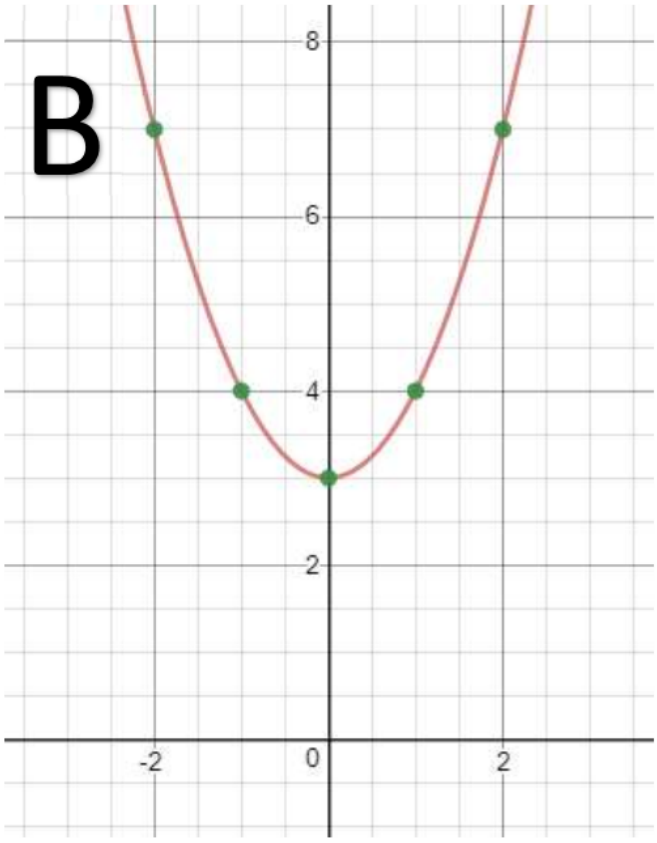
Online Practice:
https://www.purplemath.com/modules/fcntranq.htm
https://www.ixl.com/math/algebra-2/function-transformation-rules

Homework:
Finish the portfolio for Unit 5. Unit test is on Wednesday/Thursday (1- 8 and 1- 9-20)

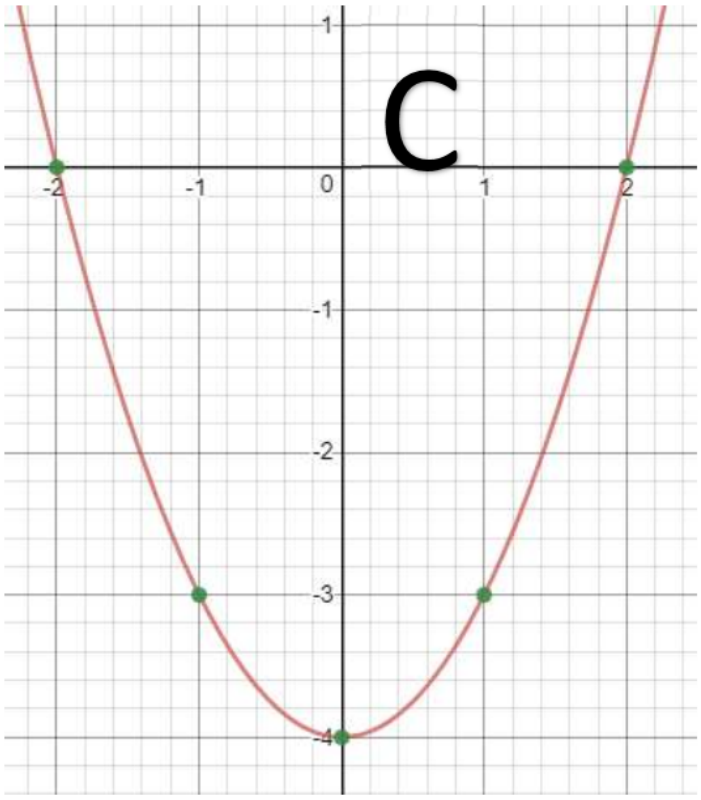


Parent Function

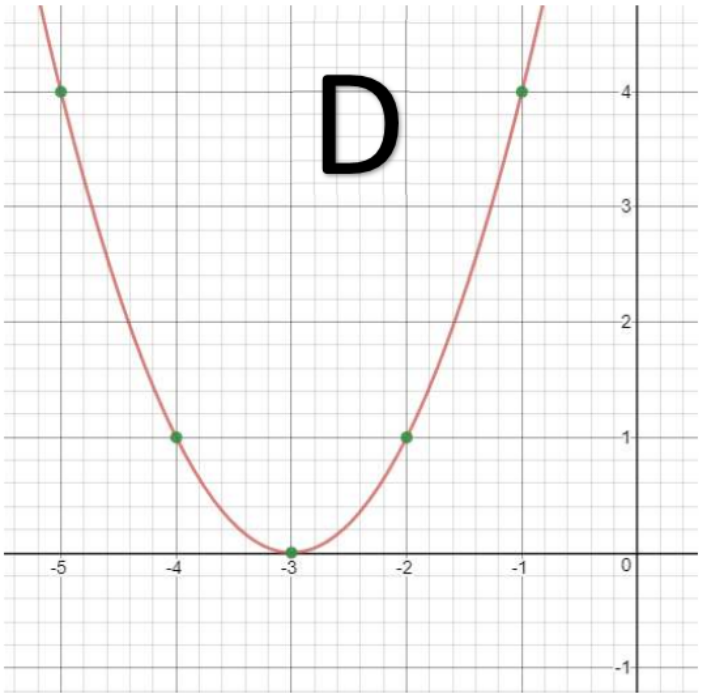
$f(x) = x^2$



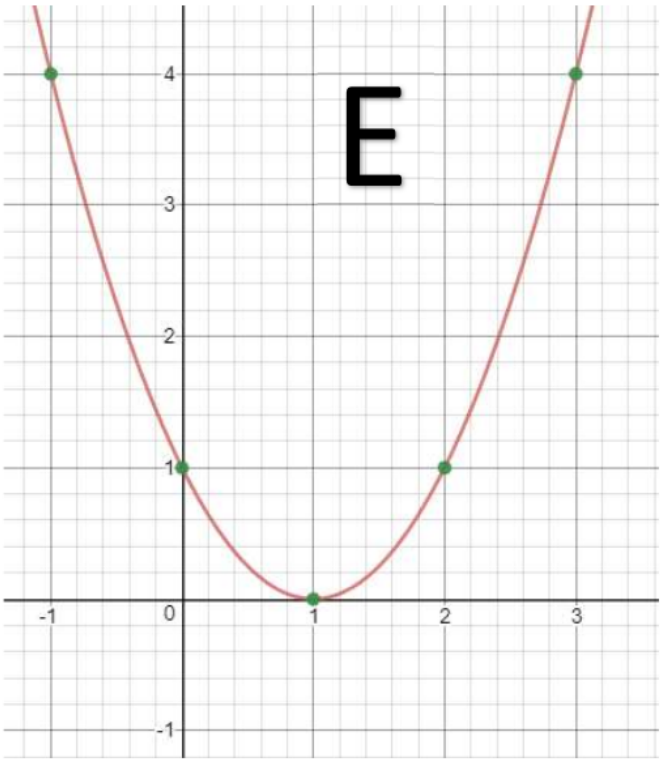
$t(x) = x^2 + 3$



$$w(x) = x^2 - 4$$



$$z(x) = (x + 3)^2$$



$$h(x) = (x-1)^2$$

Match the correct graph with the correct function

Do Now: one graphing question from the portfolio.

Lesson 6-1: Class Notes:

Vertical Shifts (C is a real #)	
$f(x)+C$	Vertical shift UP C units
$f(x)-C$	Vertical shift DOWN C units

Horizontal Shifts (C is a real #)		
$f(x+C)$	Horizontal	shift LEFT C units
$f(x-C)$	Horizontal	shift RIGHT C units

1) Name the parent function first then explain how each graph has changed from its parent function. You might sketch if you choose.

a) $f(x) = |x| - 3$ Abs value. |x| ⇒ |x|-3 ⇒ shifted down 3 units.

b) $f(x) = x^2 + 5$ Quadratic x^2 ⇒ x^2+5 shifted up 5 units

c) $f(x) = \sqrt{x-6}$ Square Root $\sqrt{x}$ ⇒ shifted right 6 units.

d) $f(x) = \sqrt[3]{x+2}$ cube Root. $\sqrt[3]{x+2}$ ⇒ shifted left 2 units.

e) $f(x) = (x-1)^3 + 4$ cube function ⇒ $(x-1)^3+4$ shifted Right 1 unit and up 4 units.

2) Give the name of the parent function, describe the transformation represented, and state the domain and range.

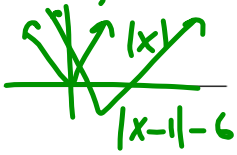
a) $g(x) = x^2 - 1$ Name: Quadratic

Sketch here: Transformation:

Domain: $(-\infty, \infty)$ Range: $y \geq -1$ $[-1, \infty)$

b) $f(x) = |x - 1| - 6$ Name: Abs Value

Transformation: shift 1 Right + 6 units down



Domain: $x = (-\infty, \infty)$ $x = \mathbb{R}$ Range : $[-1, \infty)$ $y \geq -1$

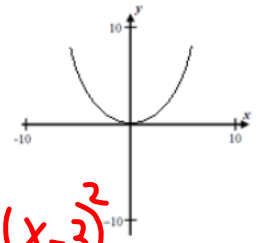
c) $f(x) = \sqrt{x - 4}$ Name: Square Rt

Transformation: 4 units to the Right

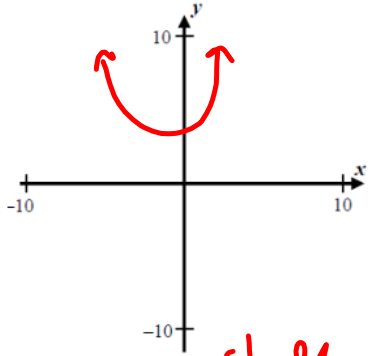
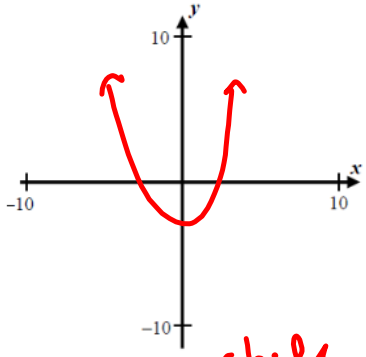
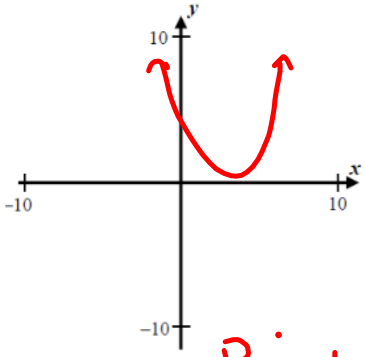
Domain: $[4, \infty)$ Range : $[0, \infty)$

Practice:

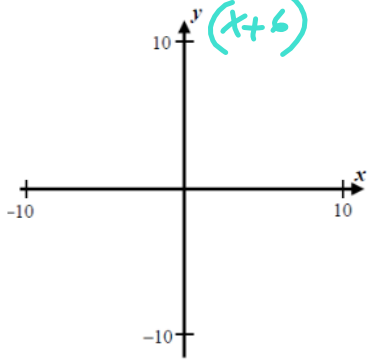
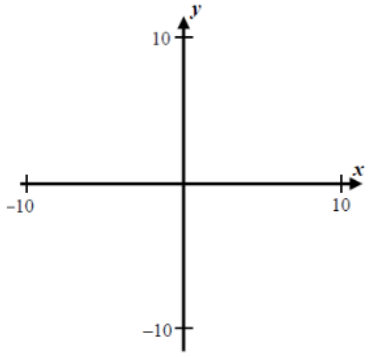
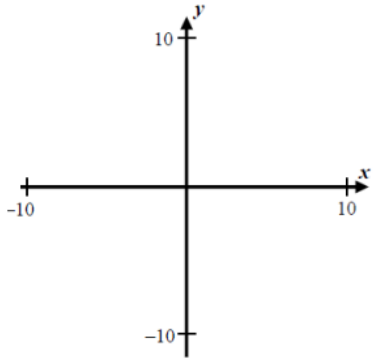
Sketch the following transformations. $f(x) = x^2$ parent function: quadratic



Use the Function Transformation word bank above to describe the transformation that changed the parent function f(x) to the transformed functions

$g(x) = f(x) + 5$	$g(x) = f(x) - 1$	$g(x) = f(x - 2)$
$g(x) = x^2 + 5$	$g(x) = x^2 - 1$	$g(x) = (x-2)^2$
		
Transformation: shift up 5 units	Transformation: shift down 1 unit	Transformation: Right 2 units

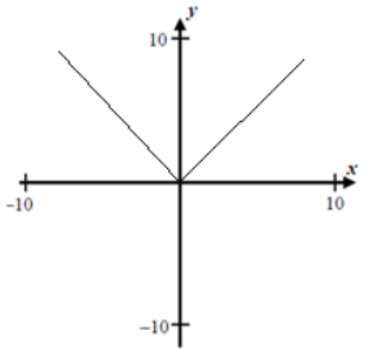
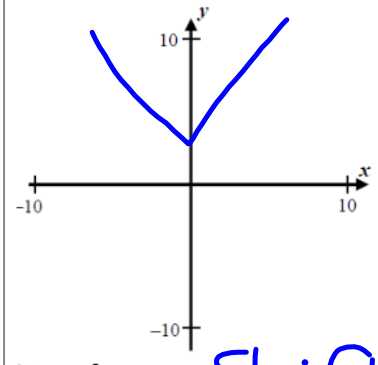
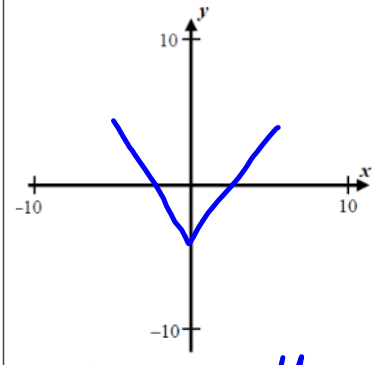
$f(x) = x^2$

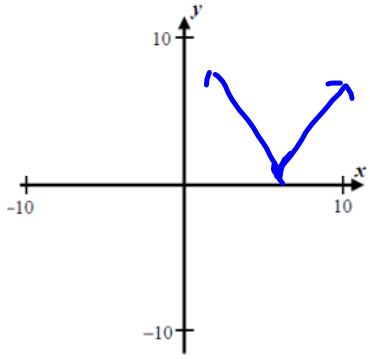
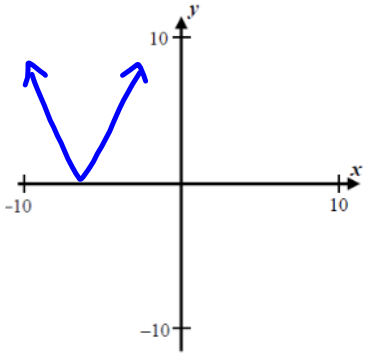
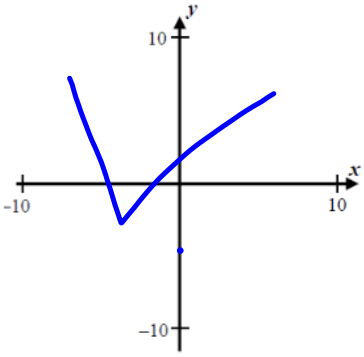
$g(x) = f(x+6)$	$= (x+3)^2 - 2$	$(x-4)^2 + 1$
$g(x) = f(x+6)$ $(x+6)^2$	$g(x) = f(x+3) - 2$	$g(x) = f(x-4) + 1$
		
Transformation:	Transformation:	Transformation:

Name: _____ Date: _____

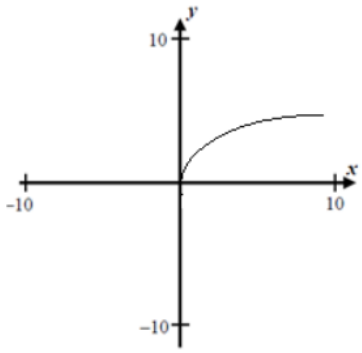
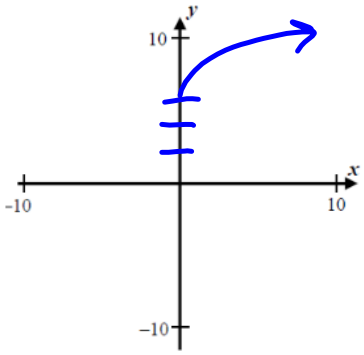
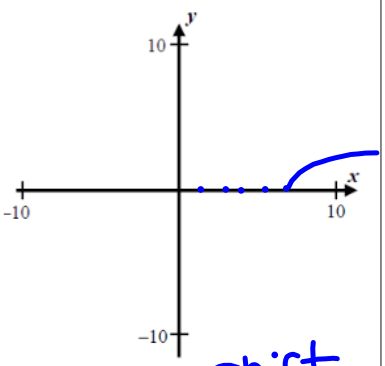
Homework 6-1: Due after the Unit test.

Sketch the following transformations from f(x) without a calculator. Use the Function Transformation word bank above to describe the transformation that changed the parent function f(x) to the transformed functions

Parent Function $f(x) = \|x\|$	$t(x) = \|x\| + 2$	$w(x) = \|x\| - 4$
		
	Transformation: Shifted up 2	Transformation: Shifted down 4 units.

$z(x) = \|x - 3\|$	$h(x) = \|x + 5\|$	$h(x) = \|x + 3\| - 4$
		
Transformation: shift 3 right	Transformation: shift Left 5	Transformation: shifted ← 3 ↓ 4

Sketch the following transformations from f(x) without a calculator. Use the Function Transformation word bank above to describe the transformation that changed the parent function f(x) to the transformed functions

Parent Function $f(x) = \sqrt{x}$	$t(x) = \sqrt{x} + 3$	$w(x) = \sqrt{x - 5}$
		
	Transformation: shifted up 3 units	Transformation: shift right 5 units