

# LESSON

# 24

# What's My Transformation?

## LEARNING OBJECTIVES

- Today I am: completing the Desmos activity, *What's My Transformation?*
- So that I can: describe how to move a function left, right, up, down or stretch it.
- I'll know I have it when I can: summarize my findings.

## Opening Exercise

Having the parent graphs can help us more accurately model real world data. To more accurately describe data, we'll learn how to move or transform the parent function.

**You will need:** a class code for the Desmos activity *What's My Transformation?*, Chromebook

1. As you complete the Desmos activity, answer the questions below.

- A. Screen 8 – Take a moment to make some notes about how to move around the graph of a function  $f(x)$  using symbols instead of movable points.

To move a function left or right,  $f(x+a)$  left  $a$ ,  $f(x-a)$  right  $a$

To move a function up or down,  $f(x)+a$  up  $a$ ,  $f(x)-a$  down  $a$

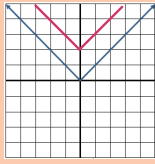
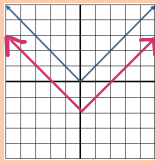
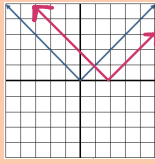
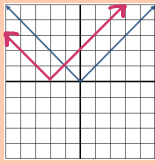
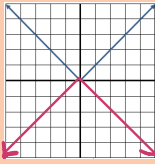
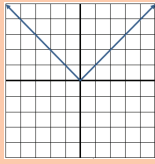
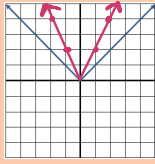
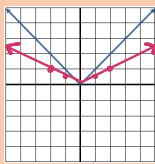
- B. Screen 12 – Take a moment to make some notes about how to stretch the graph of a function  $f(x)$  using symbols instead of movable points.

To stretch a function vertically,  $a f(x)$   $a > 1$

To stretch a function horizontally,  $f(ax)$   $0 < a < 1$

2. Complete the Lesson Summary. For each sketch of the absolute value function, determine your own value for  $k$ ,  $h$  and  $a$  for the transformation.

## Lesson Summary

Type of Transformation	Academic Language for the Transformation	Resulting Effect	Resulting Expression	Sketch of Transformation	
Slide Up	Vertical Translation Up	Graph moves up $k$ units for $k > 0$ .	$f(x) + k$ ↑		$k = 2$
Slide Down	Vertical Translation Down	Graph moves down $k$ units for $k > 0$ .	$f(x) - k$ ↓		$k = 2$
Slide Right	Horizontal Translation Right	Graph moves right $h$ units for $h > 0$ .	$f(x - h)$ →		$h = 2$
Slide Left	Horizontal Translation Left	Graph moves left $h$ units for $h > 0$ .	$f(x + h)$ ←		$h = 2$
Flip Up or Down	Vertical Reflection	Graph is reflected over the <u>x-axis</u> .	$-f(x)$		
Flip Across	Horizontal Reflection	Graph is reflected over the <u>y-axis</u> .	$f(-x)$		
Stretch Vertically		Graph is stretched vertically by a factor of $a$ , if $a > 1$ .	$a \cdot f(x)$		$a = 2$
Shrink Vertically		<span style="color: red; font-size: 1.2em;">shrink</span> → Graph is compressed vertically by a factor of $a$ , if $0 < a < 1$ .	$a \cdot f(x)$		$a = 1/2$

NAME: \_\_\_\_\_ PERIOD: \_\_\_\_\_ DATE: \_\_\_\_\_

# Homework Problem Set

*order of transformations*

- horizontal shift
- vertical/horizontal stretch/shrink
- reflection
- vertical shift

For each equation below, state the parent graph and the transformations of the parent graph that is described by the equation.

1.  $f(x) = 2x + 3$

- vertical stretch  
w/ factor of 2  
- vertical shift 3 units  
up

2.  $f(x) = 2x^3 + 3$

3.  $f(x) = 2|x| + 3$

4.  $f(x) = \sqrt{x-1}$

- horizontal shift  
right one unit

5.  $f(x) = |x - 1|$

6.  $f(x) = 2^x - 1$

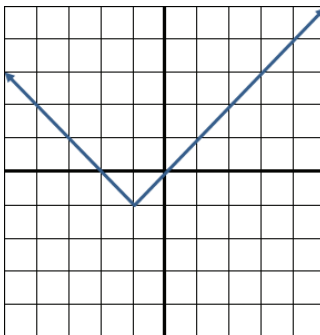
7.  $f(x) = -|x| + 7$

8.  $f(x) = -x^2 + 7$

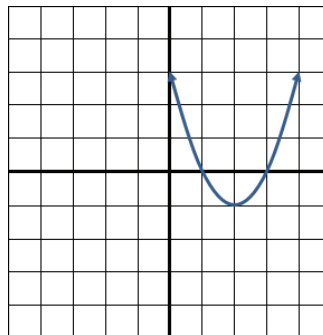
9.  $f(x) = -x + 7$

Write an equation for each graph below. Then use at least three values of  $x$  to check your equation. Plot those points in your graph.

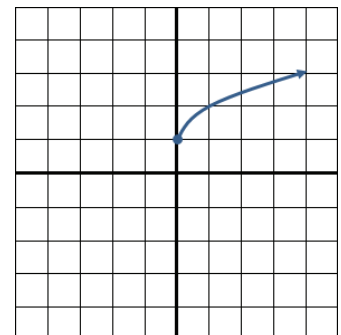
10.



11.



12.

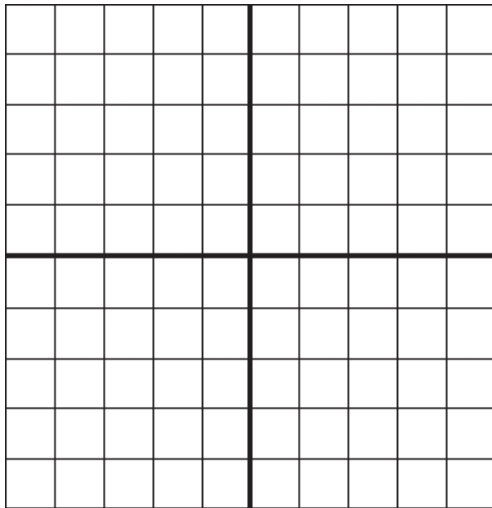


Graph the parent graph of each with a solid curve. State the transformation described by each equation and then graph the equation with a dotted curve. Check your graph by choosing two or three values of  $x$  and substituting them into the equation to find the  $y$ -value.

13.  $f(x) = (x + 1)^2 - 3$

Transformation:

Checked with points:

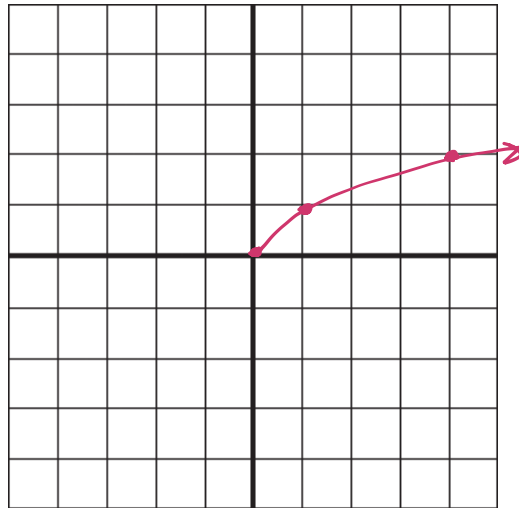


14.  $f(x) = \sqrt{x - 1} - 2$

Transformation:

- horizontal shift right 1  
- vertical shift down 2

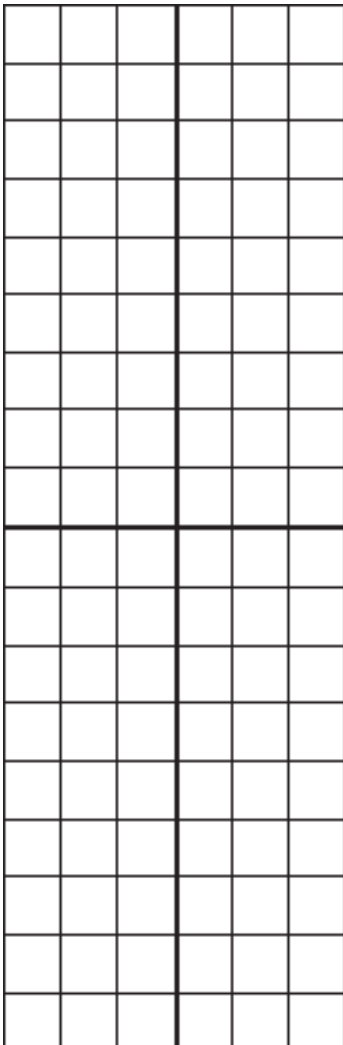
Checked with points:



15.  $f(x) = (x - 1)^3 + 1$

Transformation:

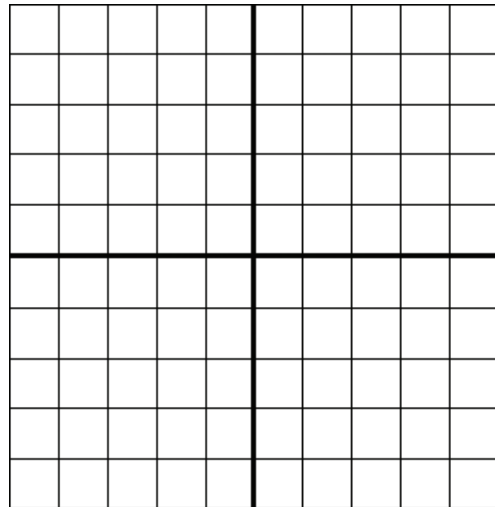
Checked with points:



16.  $f(x) = |x| - 4$

Transformation:

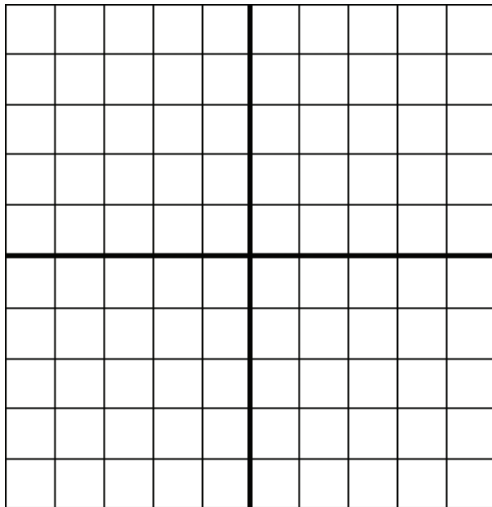
Checked with points:



17.  $f(x) = -(x - 3)^2 + 1$

Transformation:

Checked with points:



18.  $f(x) = -\sqrt{x + 2} + 1$

Transformation:

Checked with points:

