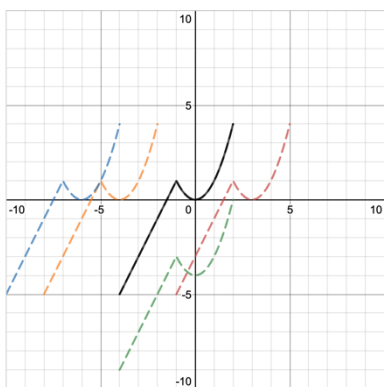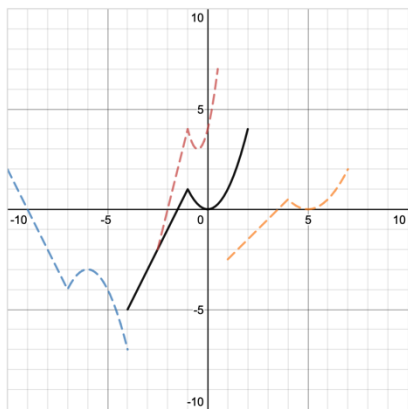# What's my Transformation?

We have spent time making a graph library of some parent functions. But what about all those other more complicated functions? Today we will explore how many functions are simply transformations of the parent function using Desmos. Go to student.desmos.com and type in the class code.

1. Why is there really only one parabola in the world (**slide 2**)?

2. What happened to the parabola when you typed in $f(x - 4)$ (**slide 6**)?

3. Record your answers from **slide 7**. Use colored pencils to trace each of the parabolas so they match the ones on Desmos.

Graph	Function
Red	
Orange	
Green	
Blue	

4. Starting in **slide 9**, the parabolas don't just shift around the page, they're actually getting wider and narrower! Record your answers from **slide 13**. Use colored pencils to trace the parabolas.

Graph	Function
Red	
Orange	
Blue	

5. Based on what you learned in the Desmos activity, answer the following questions:
    a. What's the difference between the graphs of $y = x^2 - 4$ and $y = (x - 4)^2$?

    b. What's the difference between the graphs of $y = 3x^2$ and $y = \dfrac{1}{3}x^2$?

CALC MEDIC

Lesson 3.2 – Transformations of Functions

Transformation	Function Notation	Characteristics
Vertical Shift		Moves up when… Moves down when…
Horizontal Shift		Moves right when… Moves left when…
Vertical Dilations		Dilation factor: Stretches in the y-direction when… Shrinks/compresses in the y-direction when…
Horizontal Dilations		Dilation factor: Shrinks/compresses in the x-direction when… Stretches in the x-direction when…
Reflection over x-axis		
Reflection over y-axis		

Check Your Understanding

1. List the parent function and then the transformations that occurred to the parent function.
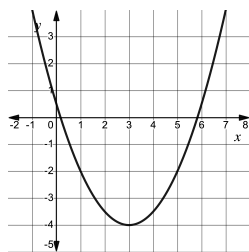
   a. $f(x) = 2x^2 - 3$
   $h(x) = -(4x)^3$

   b. $g(x) = |x - 4|$

   c.

2. Give the equation of the parent function $y = \sqrt{x}$ after it has been shifted left 7 and up 2.

3. (Multiple Choice) The graph of g below is a transformation of a parent function. Which function correctly describes the graph of $g(x)$?

   A) $g(x) = (x + 3)^2 - 4$

   B) $g(x) = 2(x + 3)^2 - 4$

   C) $g(x) = \dfrac{1}{2}(x - 3)^2 - 4$

   D) $g(x) = \left(\dfrac{1}{2}x - 3\right)^2 - 4$

CALC MEDIC

4. (Multiple Choice) Pilar's parents give him an allowance amount $a(t)$, based on his age, t, in years. Which of the following expressions would give the allowance amount of Pilar's younger sister, who is three years younger than he is?

A) $a(t) - 3$

B) $a(t) + 3$

C) $a(t - 3)$

D) $a(t + 3)$