

## Algebra 2 Transformation Rules Investigation

### Part 1: Transforming Parent Functions

The goal of this activity is for you to determine what controls and transforms different parent functions. You will graph these problems using Desmos so you can see the different colors on the graph. For each problem, graph the parent and the two transformations graph on the same coordinate plane. Record any patterns that you discover while graphing the problems below.

1.	$y =  x $	$y = - x $	$y = x^3$	$y = -x^3$	Pattern?
		$y =  -x $		$y = (-x)^3$	
	$y = x^2$	$y = -x^2$	$y = \sqrt{x}$	$y = -\sqrt{x}$	
		$y = (-x)^2$		$y = \sqrt{-x}$	
2.	$y =  x $	$y =  x - 4 $	$y = x^3$	$y = (x - 1)^3$	Pattern?
		$y =  x + 5 $		$y = (x + 5)^3$	
	$y = x^2$	$y = (x + 3)^2$	$y = \sqrt{x}$	$y = \sqrt{x + 4}$	
		$y = (x - 7)^2$		$y = \sqrt{x - 3}$	
3.	$y =  x $	$y =  x  + 2$	$y = x^3$	$y = x^3 - 7$	Pattern?
		$y =  x  - 3$		$y = x^3 + 3$	
	$y = x^2$	$y = x^2 - 5$	$y = \sqrt{x}$	$y = \sqrt{x} + 2$	
		$y = x^2 + 1$		$y = \sqrt{x} - 5$	
4.	$y =  x $	$y = 2 x $	$y = x^3$	$y = 3x^3$	Pattern?
		$y = \frac{1}{2} x $		$y = \frac{1}{3}x^3$	
	$y = x^2$	$y = 2x^2$	$y = \sqrt{x}$	$y = 4\sqrt{x}$	
		$y = \frac{1}{2}x^2$		$y = \frac{1}{4}\sqrt{x}$	

### Part 2: What does what?

- Negative in front
- Negative inside with  $x$
- Number inside with  $x$
- Number outside that adds or subtracts
- Number in front that multiplies

### Part 3: Writing Functions

Using the information you found above, write an equation for the new function after the given transformation. Once you have written the equation, determine if it correct by graphing.

1. Parent:  $y = |x|$   
Left 2 and up 3

2. Parent:  $y = x^2$   
Vertical flip and right 4

3. Parent:  $y = x^3$   
Vertical flip and down 5

4. Parent:  $y = |x|$   
Right 2 and up 1

5. Parent:  $y = \sqrt{x}$   
Down 2 and right 3

6. Parent:  $y = x^2$   
Horizontal flip, left 5

7. Parent:  $y = x^3$   
Right 3 up 4

8. Parent:  $y = \sqrt{x}$   
Vertical Flip left 4

9. Parent:  $y = x^2$   
Up 2 and right 5

10. Parent:  $y = |x|$   
Left 6 and up 4