

Transformations of Functions

Unit 2, Day 2

Name

Master G

Date

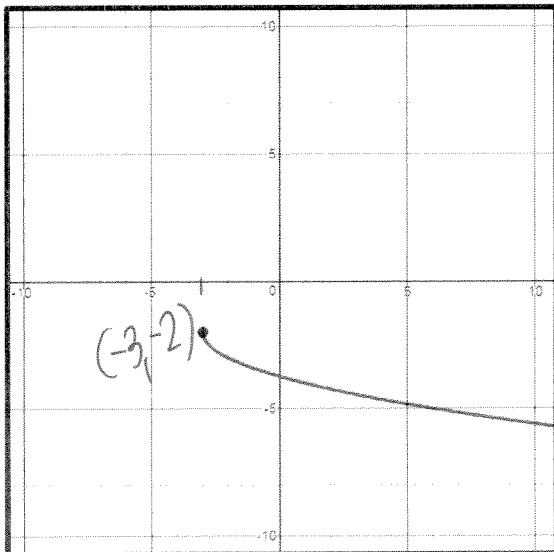
Block

- > We will work together using Desmos to explore the square function. You will then work on your own using Desmos to investigate transformations with the rest of the 10 Function Families.
- > Visit the website pwrhodesmath.weebly.com. Navigate to the Unit 2 page for Algebra 2 & Trigonometry, and click on the Desmos Transformations Activity link.
- > In Desmos, start by changing $f(x) = x^2$ to the parent function for a different function family. Change parameters a, h, and k using $g(x) = f(x)$. Make various changes to the parameters of each function to explore the effect each parameter has on the graph **and on the domain and range** of the function. For a better view of the graph, zoom in or out using the + or - button at the top right side of the screen.

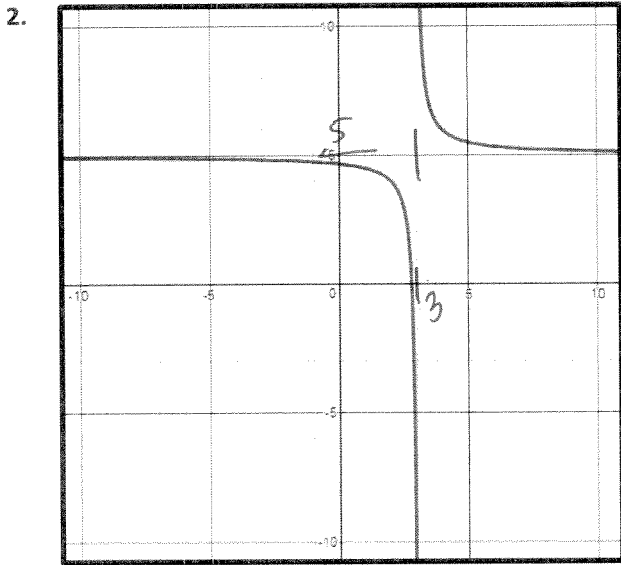
Function Family	Parent Function	Desmos typing instruction	Which parameter(s), if any, cause a change in the DOMAIN?	Which parameter(s), if any, cause a change in the RANGE?
Square Function	$f(x) = x^2$	$f(x) = x^2$	none; the domain will be all real numbers regardless of a change in a, h, or k.	k and a; because 'k' causes the graph to shift vertically, and when 'a' is negative the graph is reflected vertically
Cubic Function	$f(x) = x^3$	$f(x) = x^3$	None	None
Square Root Function	$f(x) = \sqrt{x}$	$f(x) = \sqrt{x}$	h	a & k will change it
Reciprocal Function	$f(x) = \frac{1}{x}$	$f(x) = 1/x$	h	k
Exponential Function	$f(x) = 2^x$	$f(x) = 2^x$	None	k & a
Sine Function	$f(x) = \sin(x)$	type: $f(x) = \sin(x)$ or use functions > trig > sin	None	a & k
Logarithmic Function	$f(x) = \log(x)$	type: $f(x) = \log(x)$ or use functions > misc > log	h	none
Greatest Integer Function	$f(x) = [x]$	functions > misc > ceil $f(x) = \text{ceil } x$	none	a
Identity Function	$f(x) = x$	$f(x) = x$	none	none
Absolute Value Function	$f(x) = x $	$f(x) = a x$	none	a & k

1-4: Using the appropriate parent function and what you have learned about transformations, write the function for each of the following graphs and state its domain and range using interval notation. For these graphs, 'a' is either 1 or -1. (Use Desmos to confirm that your function fits the graph.)

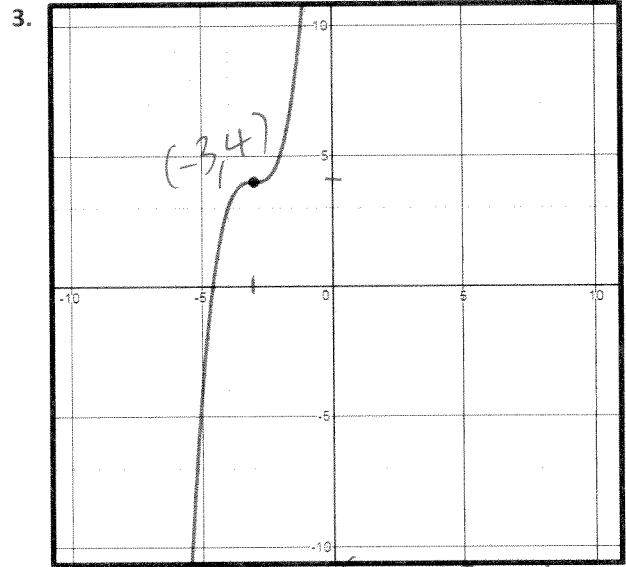
1.



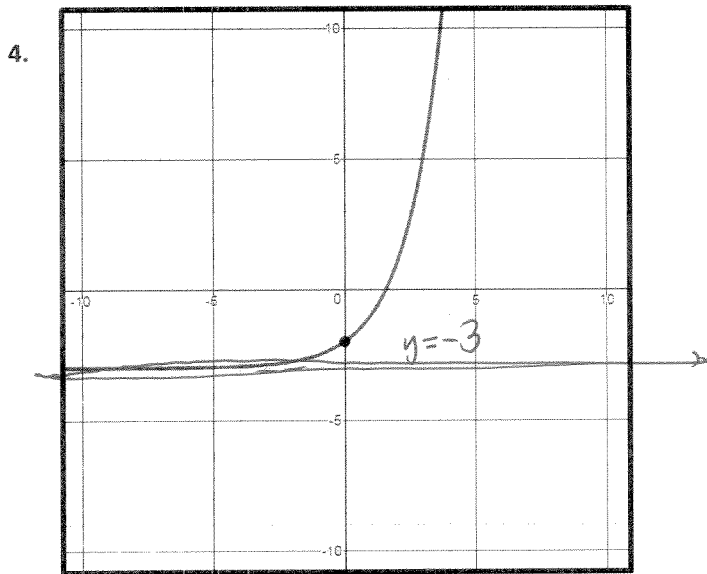
Equation: $f(x) = -\sqrt{x+3} - 2$
 Domain: $x \geq -3$ $[-3, \infty)$
 Range: $y \leq -2$ $(-\infty, -2]$



Equation: $f(x) = \frac{1}{x-3} + 5$
 Domain: $\mathbb{R}, x \neq 3 \quad (-\infty, 3) \cup (3, \infty)$
 Range: $\mathbb{R}, y \neq 5 \quad (-\infty, 5) \cup (5, \infty)$



Equation: $f(x) = (x+3)^3 + 4$
 Domain: $\mathbb{R} \quad (-\infty, \infty)$
 Range: $\mathbb{R} \quad (-\infty, \infty)$



Equation: $f(x) = 2^x - 3$
 Domain: \mathbb{R}
 Range: $y > -3 \quad (-3, \infty)$

5-8: Using the appropriate parent function and what you have learned about transformations, write a function or functions that has the given domain and range. (Use Desmos to confirm that your function fits the description.)

5. Write a square root function which has domain: $[2, \infty)$ and range: $(-\infty, 7]$

$f(x) = \sqrt{x-2} + 7$

6. Write a square function which has domain: $(-\infty, \infty)$ and range: $(-\infty, 7]$

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

7. Write two exponential functions which have domain: $(-\infty, \infty)$ and range: $(5, \infty)$

$f(x) = 2^{x-3} + 5$
 $f(x) = 2^x + 5$

8. Write a sine function which has domain: $(-\infty, \infty)$ and range: $[-4, 4]$

$f(x) = 4 \sin x$