

7.1 Function Family Reunion
A Solidify Understanding Task



During the past few years of math classes you have studied a variety of functions: linear, exponential, quadratic, polynomial, rational, radical, absolute value, logarithmic and trigonometric.

Like a family, each of these types of functions have similar characteristics that differ from other types of functions, making them uniquely qualified to model specific types of real world situations. Because of this, sometimes we refer to each type of function as a "family of functions."

- Match each function family with the algebraic notation that best defines it.

Function Family Name	Algebraic Description of the Parent Function
1. linear C	A. $y = k $
2. exponential G	B. $y = a \sin(bx)$ or $y = a \cos(bx)$ or $y = a \tan(bx)$
3. quadratic E	C. $y = mx + b$
4. polynomial H	D. $y = \log(x)$
5. rational F	E. $y = \frac{a}{x^2} + bx + c$
6. absolute value A	F. $y = \frac{1}{x}$ <i>function</i>
7. logarithmic D	G. $y = a \cdot b^x$
8. trigonometric B	H. $y = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_0$ <i>-x^5 + x^4 + x^3...</i>
9. radical I	I. $y = \sqrt{x}$ <i>radical</i>

pick a seat

:)

Complete matching section with new partner and raise your hand.

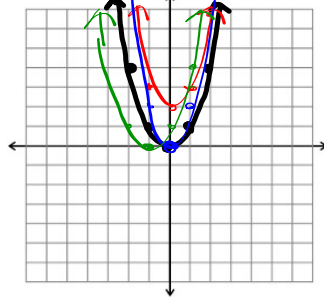
Just like your family, each member of a function family resembles other members of the family, but each has unique differences, such as being "wider" or "skinnier", "taller" or "shorter", or other

- Match each function family with the characteristic shape of the graph that fits it.

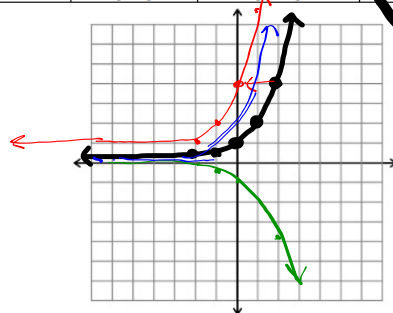
Function Family Name	Characteristic Shape of the Graph
1. linear F	A.
2. exponential D	B.
3. quadratic C	
4. polynomial B	
5. rational E	E.
6. absolute value G	
7. logarithmic H	G.
8. trigonometric I	
9. radical A	I.

x^4 + stuff
asymptote
inverse!

	pre-image (parent graph)	image 1	image 2	image 3
geometric notation	(x, y)	$(x, y) \rightarrow (x, y + 2)$	$(x, 2y)$	$(x - 1, y)$
function notation	$f(x) = x^2$	$f_1(x) = x^2 + 2$ <i>up 2</i>	$y = 2x^2$	$y = (x + 1)^2$ <i>left 1</i>
selected points that fit this image	$(-2, 4)$	$(-2, 6)$	$(-2, 8)$	$(-3, 4)$
	$(-1, 1)$	$(-1, 3)$	$(-1, 2)$	$(-2, 1)$
	$(0, 0)$	$(0, 2)$	$(0, 0)$	$(-1, 0)$
	$(1, 1)$	$(1, 3)$	$(1, 2)$	$(0, 1)$
	$(2, 4)$	$(2, 6)$	$(2, 8)$	$(1, 4)$



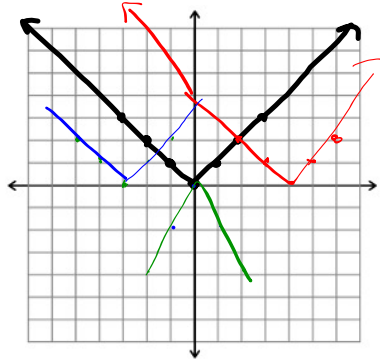
	pre-image (parent graph)	image 1 <i>left 2</i>	image 2 <i>reflection</i>	image 3 <i>translation</i>
geometric notation	(x, y)	$(x, 4y)$	$(x, -y)$	$(x - 1, y)$
function notation	$f(x) = 2^x$	$y = 2^{(x+2)}$	$y = -2^x$	$y = 2^{(x-1)}$
selected points that fit this image	$(-2, \frac{1}{4})$	$(-2, 1)$	$(-2, -\frac{1}{4})$	$(-3, \frac{1}{4})$
	$(-1, \frac{1}{2})$	$(-1, 2)$	$(-1, -\frac{1}{2})$	$(-2, \frac{1}{2})$
	$(0, 1)$	$(0, 4)$	$(0, -1)$	$(-1, 1)$
	$(1, 2)$	$(1, 8)$	$(1, -2)$	$(0, 2)$
	$(2, 4)$	$(2, 16)$	$(2, -4)$	$(1, 4)$



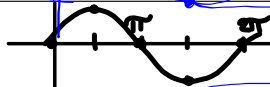
$y = 2^{x-2}$
 $y = 2^{x-4}$

left 2 or 4 times!
same thing!

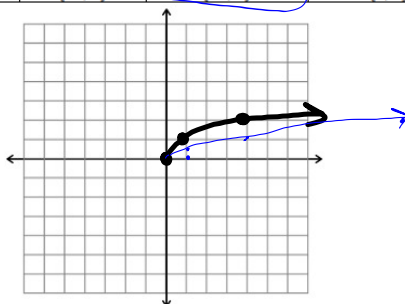
	pre-image (parent graph)	image 1	image 2	image 3
geometric notation	(x, y)	$(x, -2y)$	$x+4, y$	$(x-3, y)$
function notation	$f(x) = x $	$y = -2(x)$	$f(x) = x-4 $	$f(x) = x+3 $
selected points that fit this image	$(-2, 2)$	$(-2, -4)$	$(2, 2)$	$(-5, 2)$
	$(-1, 1)$	$(-1, -2)$	$(3, 1)$	$(-4, 1)$
	$(0, 0)$	$(0, 0)$	$(4, 0)$	$(-3, 0)$
	$(1, 1)$	$(1, -2)$	$(5, 1)$	$(-2, 1)$
	$(2, 2)$	$(2, -4)$	$(6, 2)$	$(-1, 2)$



	pre-image (parent graph)	image 1	image 2	image 3
geometric notation	(x, y)	$(x, y+2)$		
function notation	$f(x) = \sin(x)$	$y = \sin(x)+2$		
selected points that fit this image	$(0, 0)$	$(0, 2)$	$(0, 0)$	$(0, 0)$
	$(\pi/2, 1)$	$(\pi/2, 3)$	$(\pi/4, 1)$	$(\pi/2, -2)$
	$(\pi, 0)$	$(\pi, 2)$	$(\pi/2, 0)$	$(\pi, 0)$
	$(3\pi/2, -1)$	$(3\pi/2, 1)$	$(3\pi/4, -1)$	$(3\pi/2, 2)$
	$(2\pi, 0)$	$(2\pi, 2)$	$(\pi, 0)$	$(2\pi, 0)$



	pre-image (parent graph)	image 1	image 2	image 3
geometric notation	(x, y)	$(x, 1/2 y)$		
function notation	$f(x) = \sqrt{x}$	$y = 1/2 \sqrt{x}$		
selected points that fit this image	$(0, 0)$	$(0, 0)$	$(0, 0)$	$(3, 0)$
	$(1, 1)$	$(1, 1/2)$	$(1/2, 1)$	$(4, 1)$
	$(4, 2)$	$(4, 1)$	$(2, 2)$	$(7, 2)$
	$(9, 3)$	$(9, 3/2)$	$(9/2, 3)$	$(12, 3)$
	$(16, 4)$	$(16, 2)$	$(8, 4)$	$(19, 4)$



Name _____

Modeling With Functions | 7.1

Ready, Set, Go!

Ready

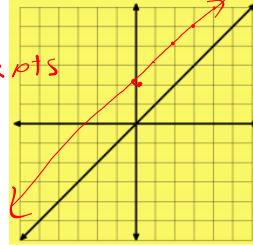
Topic: Transformations



1. Graph the following linear equations on the grid. The equation $y = x$ has been graphed for you. For each new equation explain what the number 2 does to the graph of $y = x$. Pay attention to the y-intercept, the x-intercept, and the slope. Identify what changes in the graph and what stays the same.

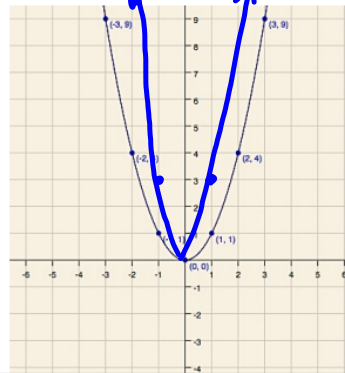
- a. $y_1 = x + 2$
- b. $y_2 = x - 2$
- c. $y_3 = 2x$

*Same: slope.
 2 diff. x & y intercepts*



2. Graph the following quadratic equations on the grid. The equation $y = x^2$ has been graphed for you. For each new equation explain what the number 3 does to the graph of $y = x^2$. Pay attention to the y-intercept, the x-intercept(s), and the rate of change. Identify what changes in the graph and what stays the same.

- a. $y_1 = x^2 + 3$
- b. $y_2 = x^2 - 3$
- c. $y_3 = (x - 3)^2$
- d. $y_4 = (x + 3)^2$



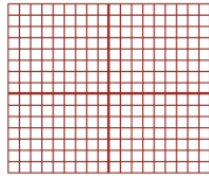
e. $y_5 = 3x^2$
*stretch of 3
 3x's as fast.*

Set

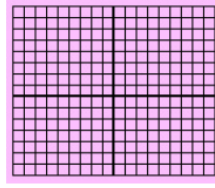
Topic: Transformations on Parent functions

Sketch the graph of the parent function and the graph of the transformed function on the same set of axes.

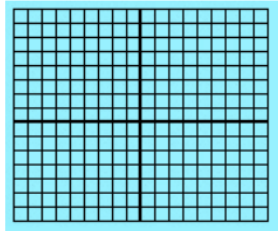
3. $f(x) = |x|$, and $g(x) = |x + 3|$



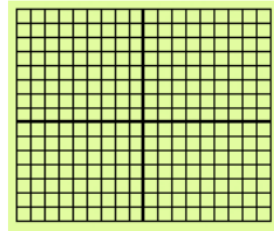
4. $h(x) = 2^x$, and $j(x) = 2^{-x}$



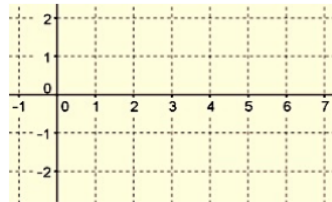
5. $r(x) = x^2$, and $s(x) = -\frac{1}{2}x^2 + 5$



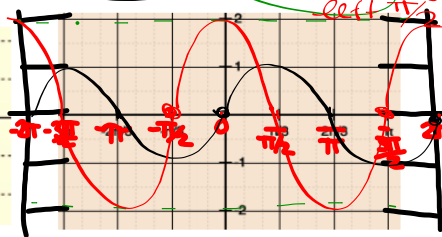
6. $v(x) = \frac{1}{x}$, and $w(x) = -\frac{1}{x}$



7. $k(x) = \log(x)$, and $m(x) = -1 + \log(x)$



8. $p(x) = \sin(x)$, and $q(x) = 2\sin(x + \frac{\pi}{2})$



Go Topic: Evaluating functions

Find the function values: $f(-2)$, $f(0)$, $f(1)$, and $f(3)$. Indicate if the function is undefined for a given value of x .

9. $f(x) = |x + 5|$
 $f(-2) = |-2 + 5| = 3$
 $f(0) = |0 + 5| = 5$
 $f(1) = |1 + 5| = 6$
 $f(3) = |3 + 5| = 8$
 (81 = 8)

10. $f(x) = |x - 2|$
 $f(-2) = |-2 - 2| = 4$

11. $f(x) = x|x|$

12. $f(x) = 3^x$
 $3^2 = 3^{\frac{1}{2}} = 9$
 $3^0 = 1$
 $3^1 = 3$
 $3^3 = 27$

13. $f(x) = 3^{x+2}$

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

15. $f(x) = \frac{x}{x}$

16. $f(x) = \frac{x}{(x-4)}$

17. $f(x) = \frac{x}{(x+2)} - 5$

18. $f(x) = \log_3 x$

19. $f(x) = \log_7(7)^x$
 $\log_7 7^{-2} \rightarrow \frac{-2}{1} = -2$
 or cancel
 $\log_7 7^0 = 0$
 $\log_7 7^1 = 1$
 $\log_7 7^3 = 3$

20. $f(x) = \log_{10} 1000 = 10^3 = 1000$
 $\log_{10} 1000 = 3$
 $-2(3) = -6$
 $0(3) = 0$
 $1(3) = 3$
 $3(3) = 9$