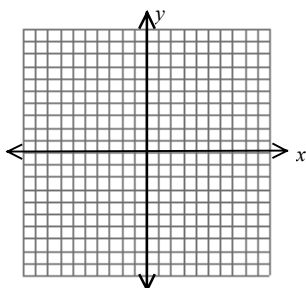


## Transformations of Functions Exploration

1. Complete the table of values below for each function. Use the table of values to help you graph each function.

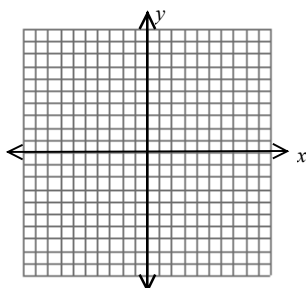
$$f(x) = x^2$$

$x$	$f(x)$
-4	
-3	
-2	
-1	
0	
1	
2	
3	
4	



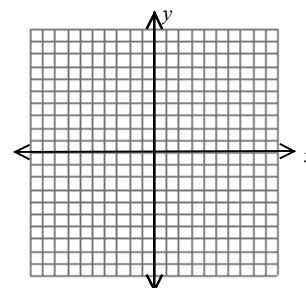
$$f(x) = x^2 + 3$$

$x$	$f(x)$
-4	
-3	
-2	
-1	
0	
1	
2	
3	
4	



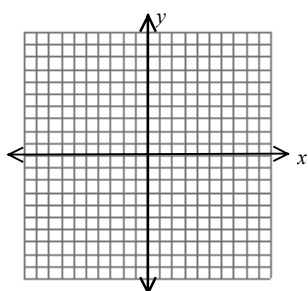
$$f(x) = (x - 2)^2$$

$x$	$f(x)$
-4	
-3	
-2	
-1	
0	
1	
2	
3	
4	



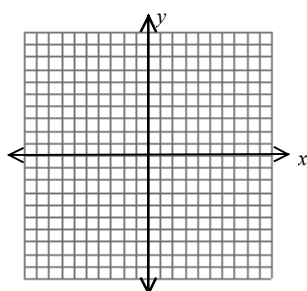
$$f(x) = -x^2$$

$x$	$f(x)$
-4	
-3	
-2	
-1	
0	
1	
2	
3	
4	



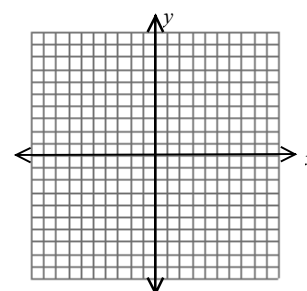
$$f(x) = (-x)^2$$

$x$	$f(x)$
-4	
-3	
-2	
-1	
0	
1	
2	
3	
4	



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

$x$	$f(x)$
-4	
-3	
-2	
-1	
0	
1	
2	
3	
4	



*Student Activity*

2. On graph paper, complete a table of values for each function using the  $x$  values listed. Use the table of values to help you graph each function.

a)  $\{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$

$$f(x) = |x|, \quad f(x) = |x| + 3, \quad f(x) = |x - 2|, \quad f(x) = -|x|, \quad f(x) = |-x|, \quad f(x) = .5|x|,$$

b)  $\{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$

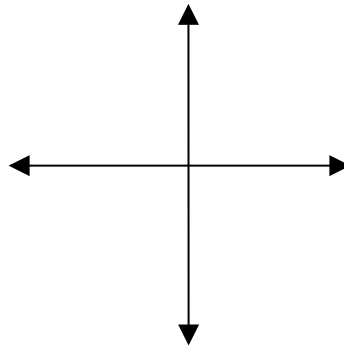
$$f(x) = x^3 \quad f(x) = x^3 - 2 \quad f(x) = (x + 3)^3 \quad f(x) = -x^3 \quad f(x) = (-x)^3 \quad f(x) = 2x^3$$

c)  $\{-3, -2, -1, 0, 1, 2, 3, 4, 5\}$

$$f(x) = \sqrt{x} \quad f(x) = \sqrt{x} - 2 \quad f(x) = \sqrt{x + 3} \quad f(x) = -\sqrt{x} \quad f(x) = \sqrt{-x} \quad f(x) = 3\sqrt{x}$$

3. Complete the table of values for  $f(x) = x^4$ . Use your table of values to help you sketch the graph of  $y = f(x)$ .

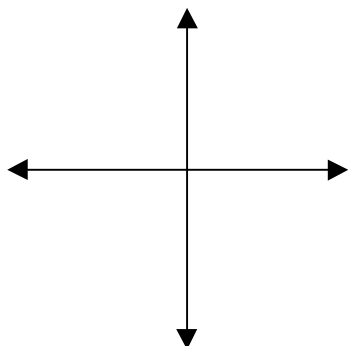
$x$	$f(x)$
2	
1.5	
1	
.5	
0	
-.5	
-1	
-1.5	
-2	



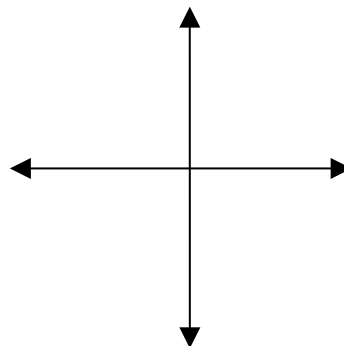
4. Use the graph of  $f(x) = x^4$  and your observations from problems 1 and 2 to help you graph  $y = g(x)$ .

- Draw a sketch of  $y = g(x)$  on the given axes.
- Explain why you sketched this graph.
- Use your graphing calculator to verify your graph.

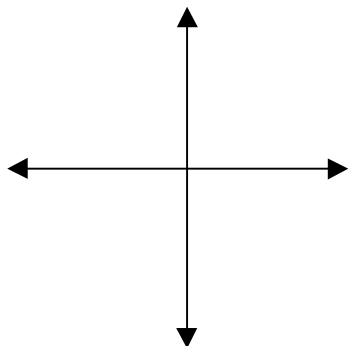
i.  $g(x) = x^4 + 1$



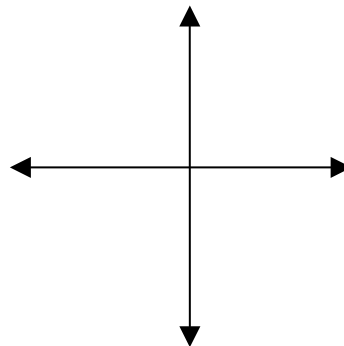
ii.  $g(x) = (x - 2)^4$



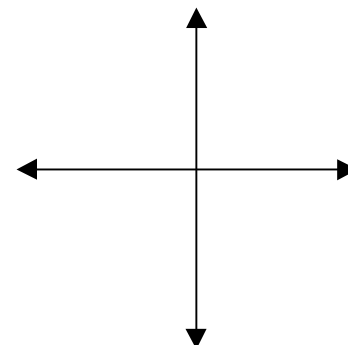
iii.  $g(x) = -x^4$



iv.  $g(x) = (-x)^4$

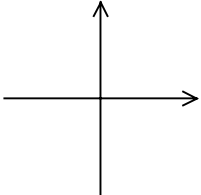
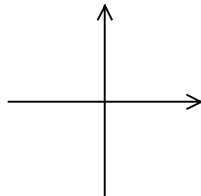
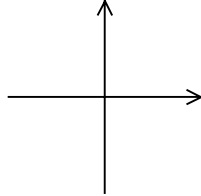
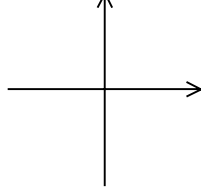
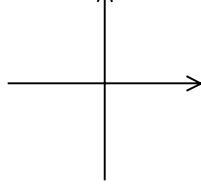
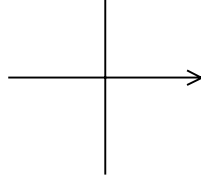


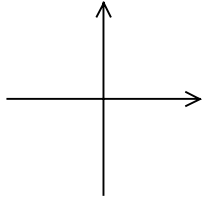
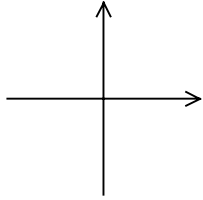
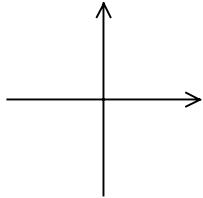
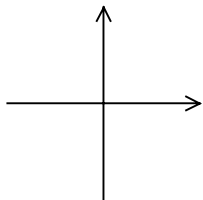
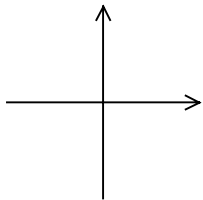
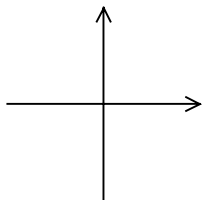
v.  $g(x) = \frac{1}{10}(x)^4$

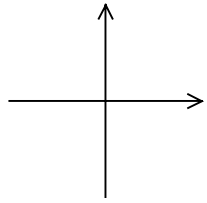


## Function – Domain – Range – Graph

Complete the chart by listing the domain and range of the function and then drawing a rough sketch of the graph.

Function	Domain	Range	Graph
Constant $f(x) = 2$			
Linear $f(x) = x$			
Absolute Value $f(x) =  x $			
Quadratic $f(x) = x^2$			
Square Root $f(x) = \sqrt{x}$			
Cubic $f(x) = x^3$			

Function	Domain	Range	Graph
Reciprocal $f(x) = \frac{1}{x}$			
Inverse Square $f(x) = \frac{1}{x^2}$			
Greatest Integer $f(x) = [x]$			
Exponential Growth $f(x) = b^x$ if $b > 1$			
$f(x) = e^x$			
Exponential Decay $f(x) = b^x$ if $0 < b < 1$			

Function	Domain	Range	Graph
Logarithmic $f(x) = \log_b x$ $b > 1$			
Natural Log $f(x) = \ln x$			