

Transformations of Quadratics

Today, we are going to be taking a look at what quadratic equations look like and how they can transform on the coordinate plane. Graphing Calculator or Software will be used to aid.

Part 1:

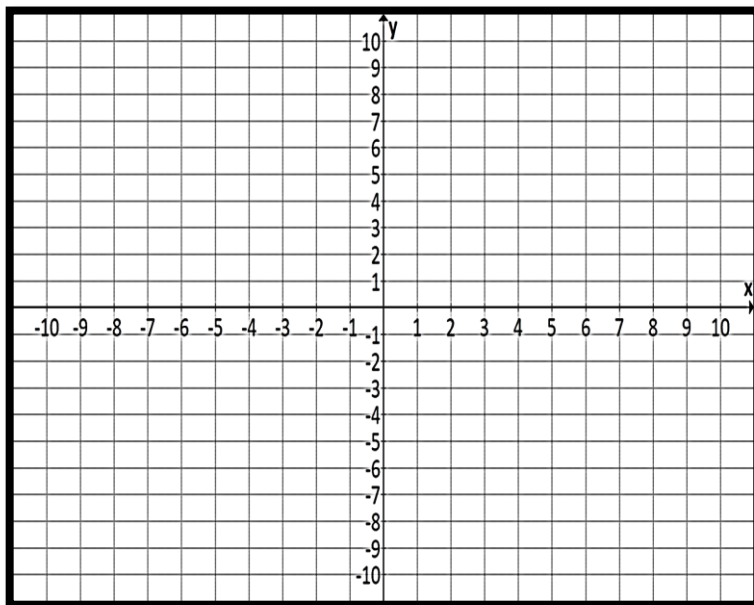
1. Complete the table of values and graph.

Color	
x	x^2
-2	
-1	
0	
1	
2	

Color	
x	$x^2 + 4$
-2	
-1	
0	
1	
2	

Color	
x	$x^2 - 5$
-2	
-1	
0	
1	
2	

2. Graph all three in their respective color.
3. What happened to the graphs compared to the first?
4. What is the coordinate of the vertices?
5. In general what can you say about the effect the k-value has on the graph of the equation $f(x) = x^2 + k$?



6. Using the equations below, describe what transformations that occurred compared to the parent function $f(x) = x^2$
 - a. $f(x) = x^2 + 2$
 - b. $f(x) = x^2 + 17$
 - c. $f(x) = x^2 - 12$
 - d. $f(x) = x^2 - 8$
7. Given the function $f(x) = x^2$, write a function that translates the graph of $f(x)$ up 4 units.

Part 2:

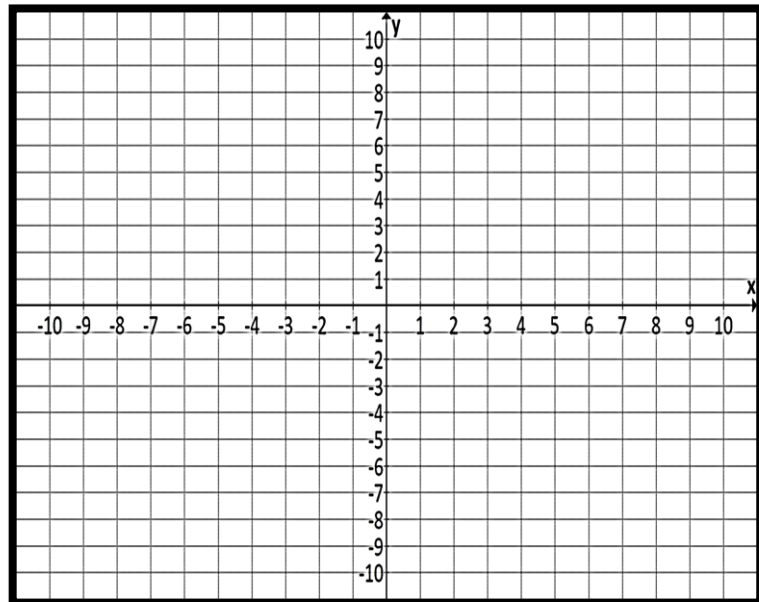
1. Complete the table of values and graph.

Color	
x	x^2
-2	
-1	
0	
1	
2	

Color	
x	$(x+3)^2$
-2	
-1	
0	
1	
2	

Color	
x	$(x-2)^2$
-2	
-1	
0	
1	
2	

- Graph all three in their respective color.
- What happened to the graphs compared to the first?
- What is the coordinate of the vertices?
- In general what can you say about the effect the h-value has on the graph of the equation $f(x) = (x-h)^2$?



6. Using the equations below, describe what transformations that occurred compared to the parent function $f(x) = x^2$

- | | | | |
|-------------------------|-------------------------|--------------------------|-------------------------|
| a. $f(x) = (x+5)^2$ | b. $f(x) = (x-4)^2$ | c. $f(x) = (x-7)^2$ | d. $f(x) = (x+12)^2$ |
| e. $f(x) = (x+5)^2 + 2$ | f. $f(x) = (x-4)^2 - 3$ | g. $f(x) = (x-11)^2 + 9$ | h. $f(x) = (x-1)^2 - 4$ |

7. Given the function $f(x) = x^2$, write a function that translates the graph of $f(x)$ right 8 units and up 2 units.

Part 3:

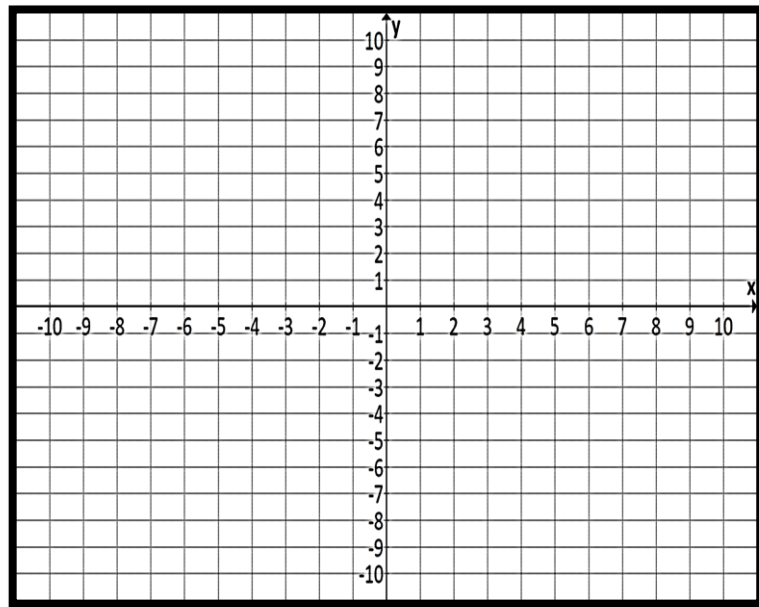
1. Complete the table of values and graph.

Color	
x	x^2
-2	
-1	
0	
1	
2	

Color	
x	$2x^2$
-2	
-1	
0	
1	
2	

Color	
x	$\frac{1}{2}x^2$
-2	
-1	
0	
1	
2	

- Graph all three in their respective color.
- What happened to the graphs compared to the first?
- What is the coordinate of the vertices?
- In general what can you say about the effect the a-value has on the graph of the equation $f(x) = ax^2$?



6. Using the equations below, describe what transformations that occurred compared to the parent function $f(x) = x^2$

- | | | | |
|----------------------|--------------------------------|--------------------------|------------------------------------|
| b. $f(x) = 5x^2$ | b. $f(x) = \frac{1}{4}x^2$ | c. $f(x) = 3x^2$ | d. $f(x) = \frac{5}{3}x^2$ |
| f. $f(x) = 2(x+8)^2$ | f. $f(x) = \frac{1}{2}x^2 - 3$ | g. $f(x) = 4(x-1)^2 + 9$ | h. $f(x) = \frac{7}{6}(x+2)^2 - 1$ |

7. Given the function $f(x) = x^2$, write a function that translates the graph with a vertical shrink of $\frac{2}{3}$ and shifted down 5 units.

Part 4:

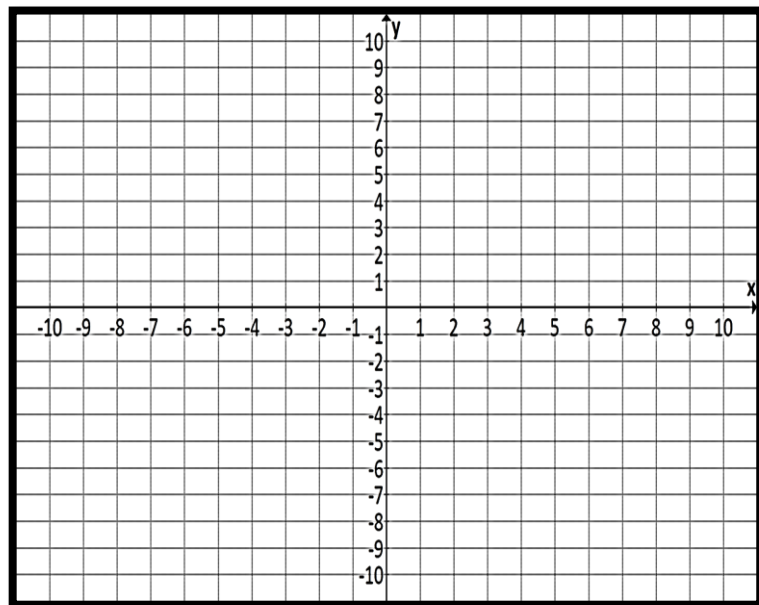
1. Complete the table of values and graph.

Color	
x	x^2
-2	
-1	
0	
1	
2	

Color	
x	$-x^2$
-2	
-1	
0	
1	
2	

Color	
x	$-2x^2$
-2	
-1	
0	
1	
2	

- Graph all three in their respective color.
- What happened to the graphs compared to the first?
- What is the coordinate of the vertices?
- In general what can you say about the effect of $-a$ -value has on the graph of the equation $f(x) = -ax^2$?



6. Using the equations below, describe what transformations that occurred compared to the parent function $f(x) = x^2$

- c. $f(x) = -4x^2$ b. $f(x) = -\frac{1}{4}x^2$ c. $f(x) = -x^2$ d. $f(x) = \frac{5}{3}x^2$
 g. $f(x) = -2x^2 - 5$ f. $f(x) = -\frac{1}{2}x^2$ g. $f(x) = -7(x+3)^2 - 4$ h. $f(x) = -\frac{1}{3}(x-1)^2 - 6$

7. Given the function $f(x) = x^2$, write a function that reflects the graph over the x -axis and left 5 units.

Part 5:

Given the following function, describe the transformations that would occur:

$$f(x) = -a(x - h)^2 + k$$

Vertex : $(-h, k)$

Part 6:

Given the following graphs, identify all the transformations that occurred. Then try to create the equation for each graph.

