SM 2

Objective: Draw graphs with one transformation applied to a square root function, quadratic function, or absolute value function. Figure out the equation of a function from its graph.

Applying Transformations

1. **Identify the parent graph ($y = |x|$, $y = x^2$, or $y = \sqrt{x}$). (Does the equation have $| \ |$, ^{2}, or $\sqrt{\ }$?)**
2. **Fill in the x, y table for the parent graph.**
3. **Draw the graph of the parent graph with a dashed line.**
4. **Identify the transformation.**
5. **Fill in the new x, y table by adjusting the coordinates based on the transformation.**
6. **Draw the final graph with a solid line.**

Vertical Reflection:

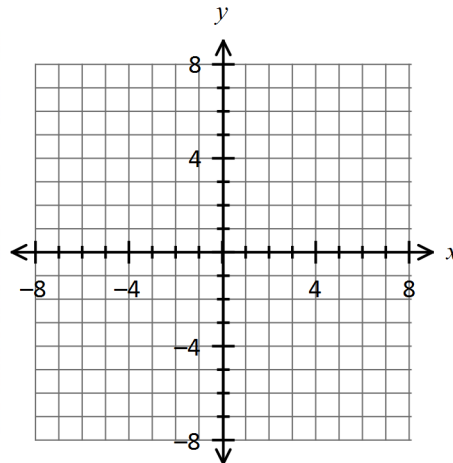★ **Change the signs on the parent graph y's (multiply them by -1).**

1. $y = -|x|$

Parent Graph:_____   Transformation:_____

x	y
−2	
−1	
0	
1	
2	

x	y

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

Parent Graph:_____   Transformation:_____

x	y
0	
1	
4	

x	y
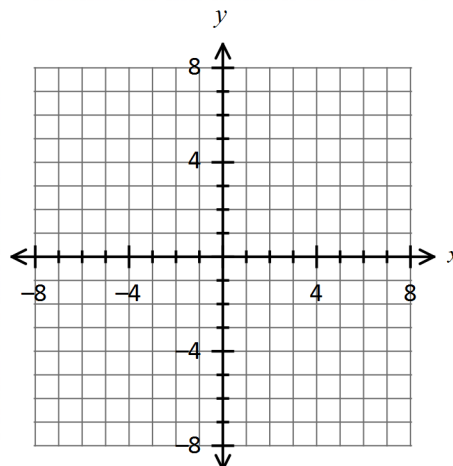
Vertical Stretch/Compression:

★ **Multiply the parent graph *y*'s by the number at the front of the equation.**

3. $y = 3|x|$

Parent Graph:_____

x	y
–2	
–1	
0	
1	
2	

Transformation:_____

x	y
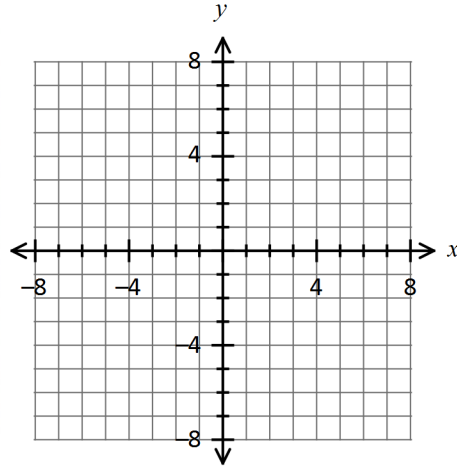
4. $f(x) = \frac{1}{2}x^2$

Parent Graph:_____

x	y
–2	
–1	
0	
1	
2	

Transformation:_____

x	y
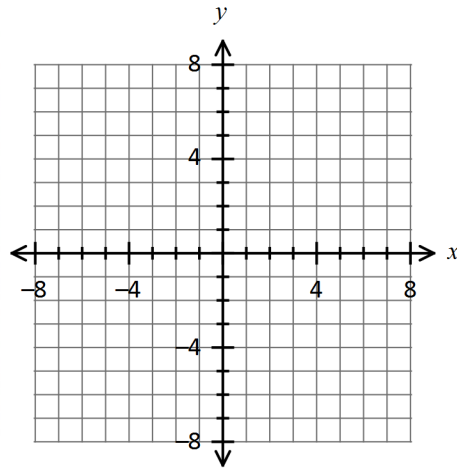
Vertical Translation:

★ **Add or subtract the number at the end of the equation to the parent graph y's. Use the SAME sign that the equation has.**

- **Example:** If the equation has a $+6$ at the end, add 6 to the y's (graph moves *up* 6).
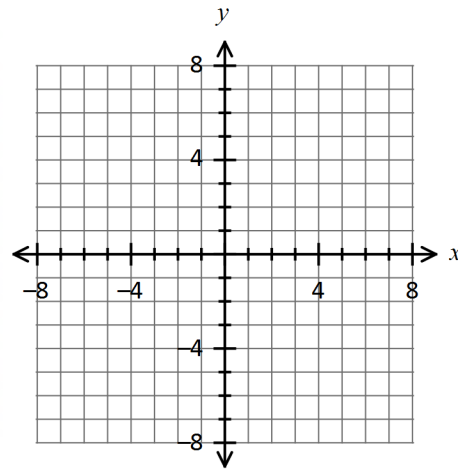- **Example:** If the equation has a -3 at the end, subtract 3 from the y's (graph moves *down* 3).

5. $f(x) = \sqrt{x} - 5$

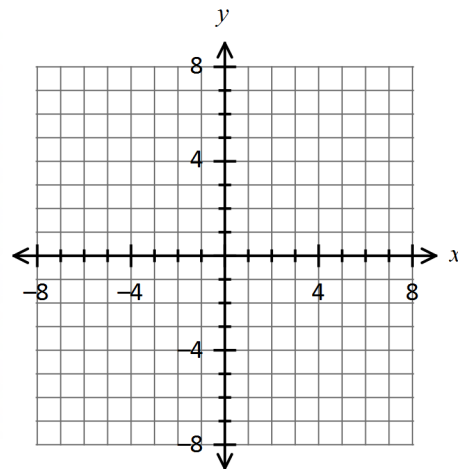Parent Graph:_____   Transformation:_____

x	y
0	
1	
4	

x	y

6. $y = x^2 + 2$

Parent Graph:_____   Transformation:_____

x	y
-2	
-1	
0	
1	
2	

x	y

Horizontal Translation:

★ **Change the parent graph *x*'s by doing the OPPOSITE of the $(x \pm \#)$ part of the equation.**
  - **Example:** If the equation has an $x+5$, *subtract* 5 from the *x*'s (graph moves *left* 5).
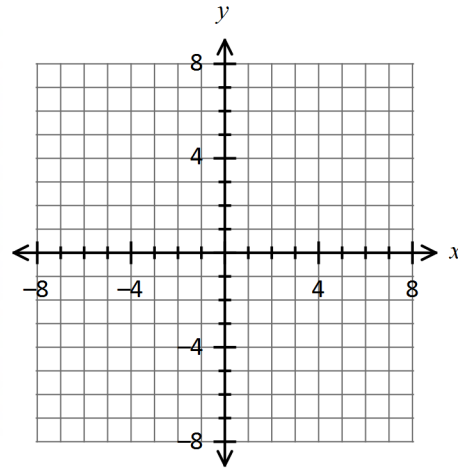 - **Example:** If the equation has an $x-1$, *add* 1 to the *x*'s (graph moves *right* 1).

7. $y = |x+4|$

Parent Graph:_____   Transformation:_____

x	y
−2	
−1	
0	
1	
2	

x	y

8. $f(x) = (x-3)^2$

Parent Graph:_____   Transformation:_____

x	y
−2	
−1	
0	
1	
2	

x	y
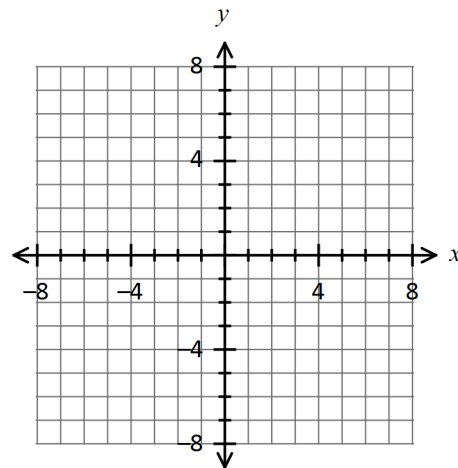
9. $f(x) = \sqrt{x-1} + 4$

Parent Graph:_____   Transformation:_____

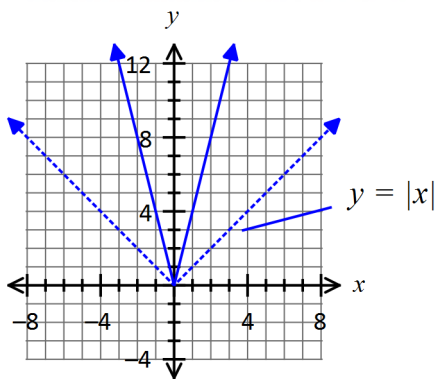| x	y
0	
1	
4	

x	y
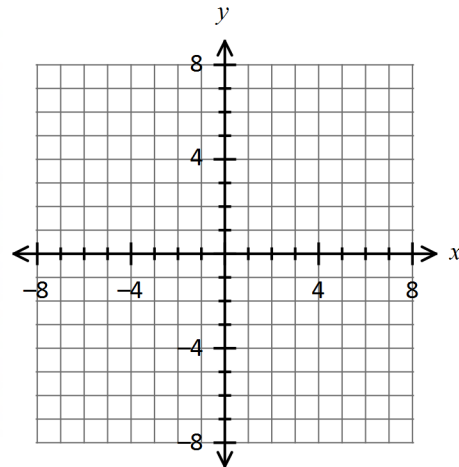
On each graph, the parent graph is shown as a dashed line, and a transformed graph is shown as a solid line. Determine what transformation of the parent graph was performed and write an equation of the final graph.
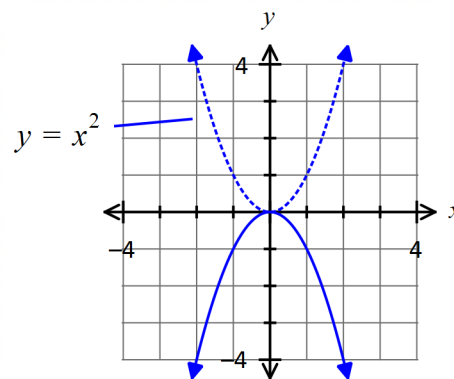
10.

$y = |x|$

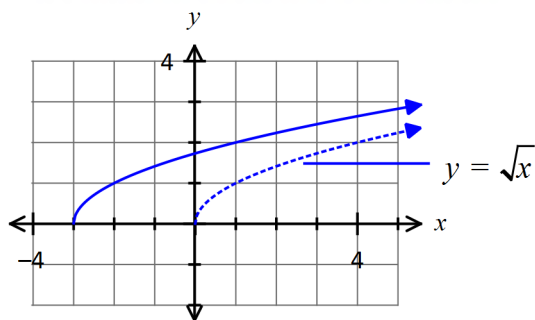Transformation:_____

Equation:_____

11.

$y = x^2$

Transformation:_____

Equation:_____

12.

$y = \sqrt{x}$

Transformation:_____

Equation:_____

13.

$y = |x|$

Transformation:_____

Equation:_____