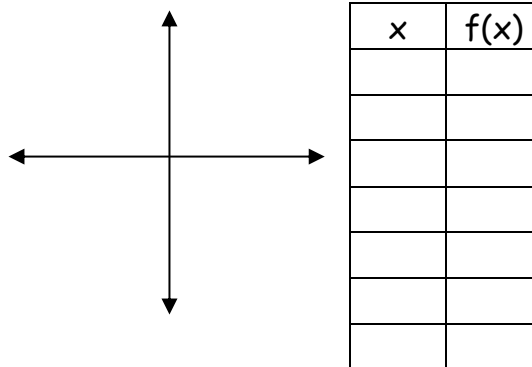


Parent Graph

Vertex:

x-intercepts:



Vertical Shifts: $x^2 + c$ vs. $x^2 - c$

Horizontal Shifts: $(x - c)^2$ vs. $(x + c)^2$

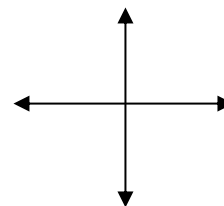
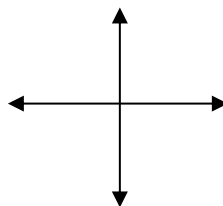
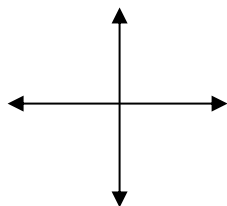
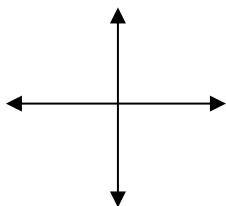
Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

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

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

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

4. $f(x) = (x + 2)^2$

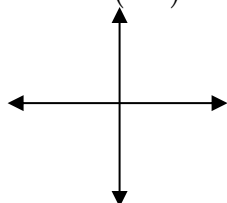
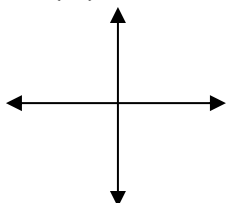


Reflections: $-x^2$ vs. $(-x)^2$

Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

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

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



Vertical Stretch: $cx^2, c > 1$

Vertical Shrink: $cx^2, c < 1$

Horizontal Stretch: $(cx)^2, c < 1$

Horizontal Shrink: $(cx)^2, c > 1$

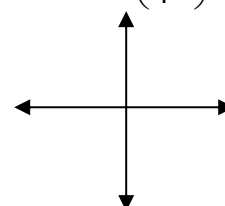
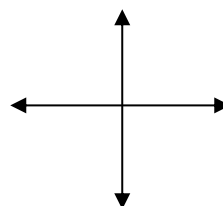
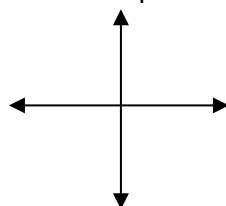
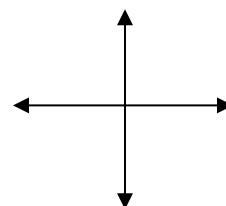
Describe the shift. Graph the transformed graph and identify the vertex and x-intercepts.

1. $f(x) = 4x^2$

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

3. $f(x) = (4x)^2$

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



Multiple Transformations: Describe the changes, vertex.

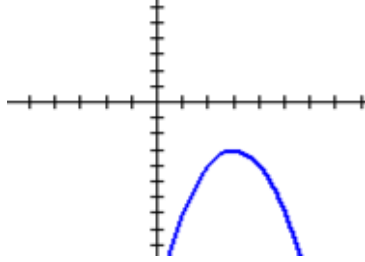
1. $y = -x^2 + 3$

2. $f(x) = -(x + 5)^2 - 2$

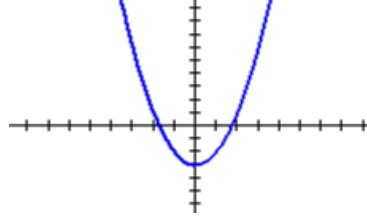
3. $y = -2(x^2 + 4)$

Identify the transformation(s), determine the vertex, and x-intercepts. Write an equation.

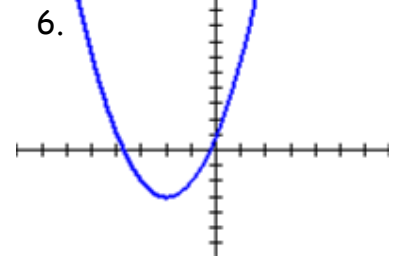
4.



5.



6.

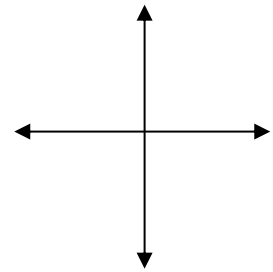
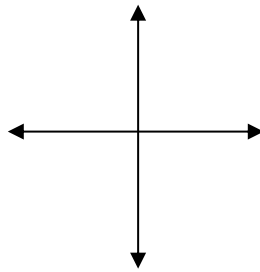
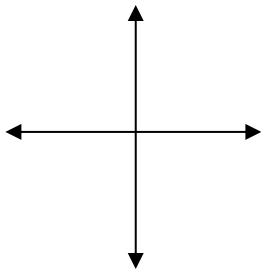


Sketch the graph. Describe the changes, vertex, and x-intercepts.

7. $y = -1/5 x^2$

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

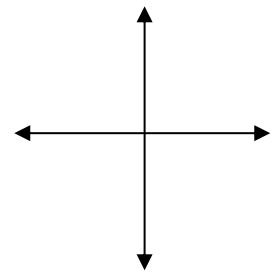
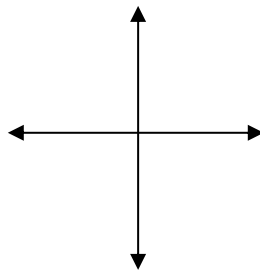
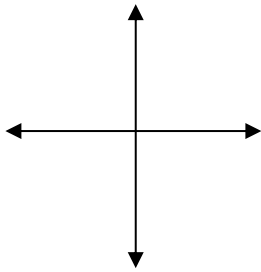
9. $y = -(2x)^2 + 1$



10. $f(x) = -\frac{1}{3}(x - 4)^2 + 1$

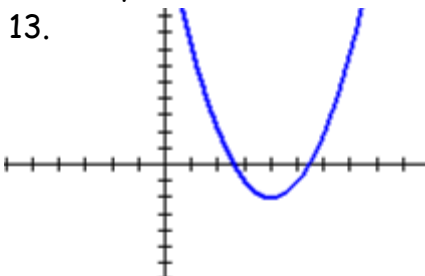
11. $y = (3(x + 2))^2 - 1$

12. $f(x) = 4(x + 3)^2$

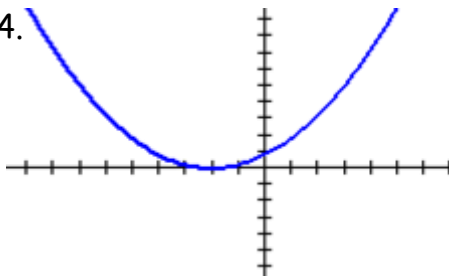


Identify the transformation(s), determine the vertex, and x-intercepts. Write an equation.

13.



14.



15.

