Name______________________________

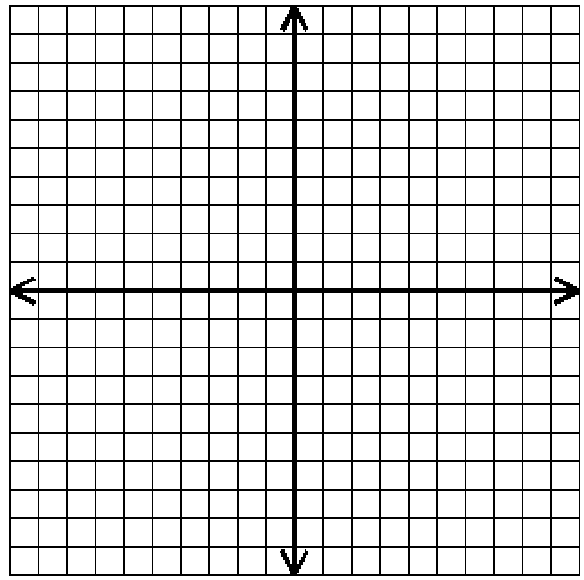
TRANSFORMATIONS OF QUADRATIC FUNCTIONS – Day 1

Recall that the most basic linear function is the **linear parent function** with the equation _________.

The most basic quadratic function is the **quadratic parent function** with the equation __________.

1. Make a table and graph the quadratic parent function, $y = x^2$.

x	y



Vertex:____________

Axis of Symmetry:___________

Intercepts: ____________________

Domain:______________________

Range:______________________

Changing the parameters of the quadratic parent function affects the graph in various ways.
Let's see how…

Graph the following functions on your calculator, and describe the change.

2. $y_1 = x^2$
$y_2 = 2x^2$
$y_3 = 5x^2$

How does the graph of $y = x^2$ change?

3. $y_1 = x^2$
$y_2 = \frac{1}{2}x^2$
$y_3 = \frac{1}{5}x^2$

How does the graph of $y = x^2$ change?

4. $y_1 = x^2$
$y_2 = -x^2$

How does the graph of $y = x^2$ change?

5. $y_1 = x^2$
$y_2 = x^2 + 5$
$y_3 = x^2 - 5$

How does the graph of $y = x^2$ change?

In the general equation $y = ax^2 + d$…

If $a > 1$, the graph ______________ vertically.

When $0 < a < 1$, the graph ______________ vertically.

When $a < 0$, the graph ______________ across the x-axis.

Changing a causes a **vertical stretch**, **compression**, and/or **reflection**.

When $d > 0$, the graph shifts _______ d units.

When $d < 0$, the graph shifts _______ d units.

Changing d causes a **vertical translation**.

EXAMPLES: Match the equations to the graphs, and determine the domain and range.

6. _____ $y = 2x^2$

   D: ________

   R: ________

7. _____ $y = -x^2 + 2$

   D: ________

   R: ________

8. _____ $y = x^2 - 2$

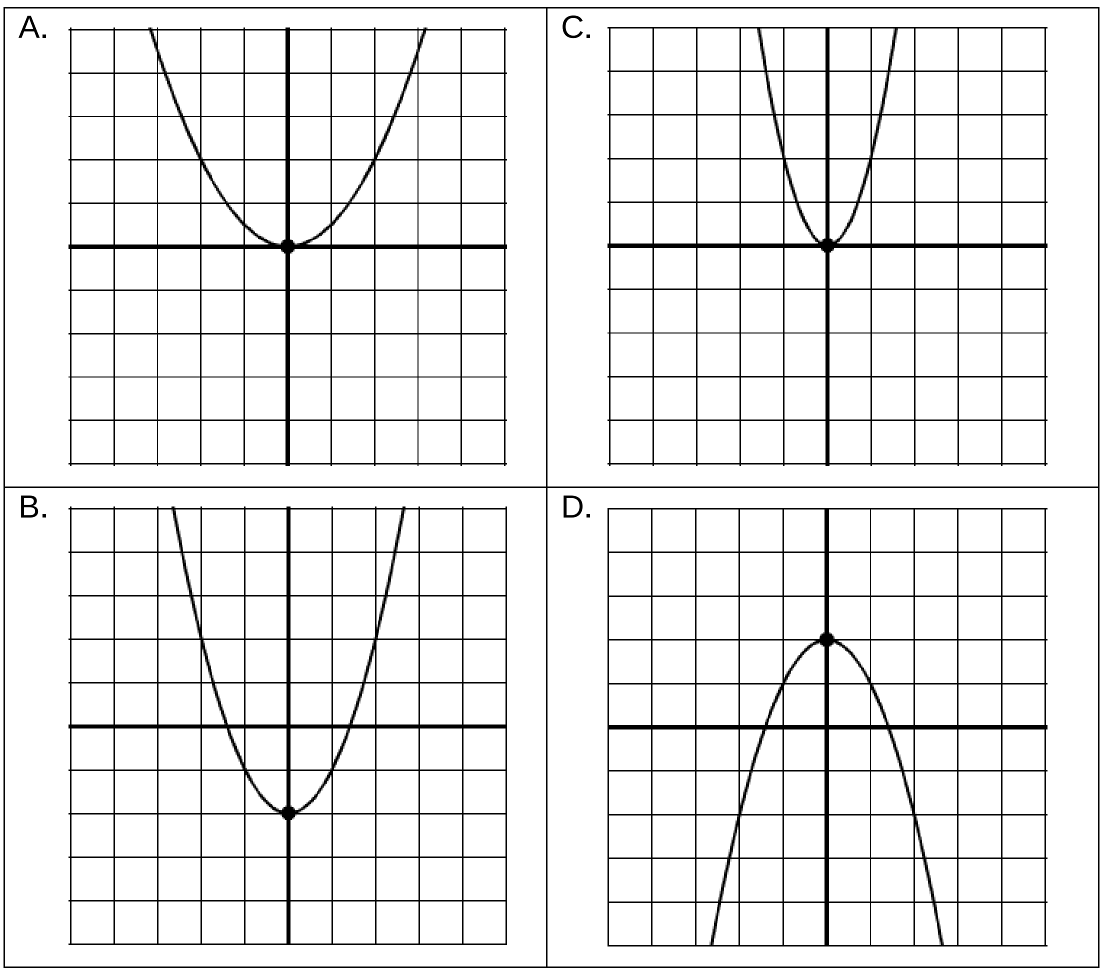
   D: ________

   R: ________

9. _____ $y = \frac{1}{2}x^2$

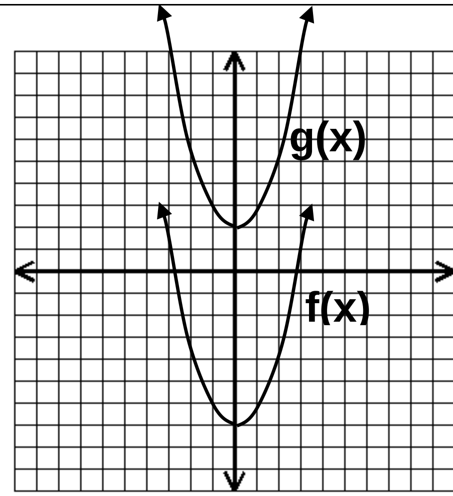
   D: ________

   R: ________



10. The graphs of f(x) and g(x) are shown.

a) If $f(x) = x^2 - 7$, what is the equation for g(x)?



b) How does the graph of f(x) compare to the graph of g(x)?

11. If $f(x) = x^2 + 3$ is shifted down 6 units, what would be the new equation for the translated function?

12. How does the graph of $y = 2x^2 + 4$ compare with the graph of $y = 2x^2 - 1$?

A. The graph of $y = 2x^2 + 4$ is 5 units above the graph of $y = 2x^2 - 1$.

B. The graph of $y = 2x^2 + 4$ is 3 units below the graph of $y = 2x^2 - 1$.

C. The graph of $y = 2x^2 + 4$ is 5 units to the right of the graph of $y = 2x^2 - 1$.

D. The graph of $y = 2x^2 + 4$ is 3 units to the left of the graph of $y = 2x^2 - 1$.

13. Start with the graph of $y = x^2$, write an equation that will…

a) Vertically compress it:_________________

b) Vertically stretch it:_____________________

c) Translate it up:___________________________

d) Translate it down:______________________________