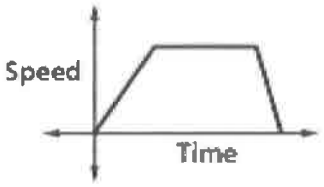
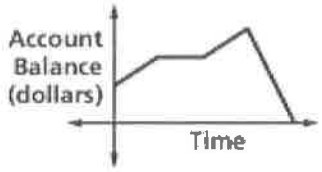
Transformations Unit – Interpreting Graphs WS#1 Name:_____

Identify the independent and dependent variables for each relation, and then describe what is happening in each graph.

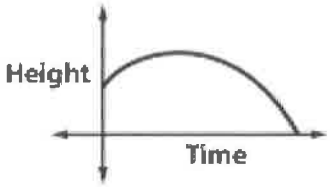
1. The graph represents the speed of a car as it travels to the grocery store.



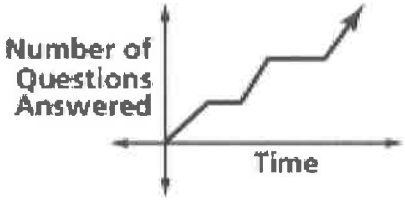
2. The graph represents the balance of a savings account over time.



3. The graph represents the height of a baseball after it is hit.



4. The graph below represents a student taking an exam.



5. Describe the pattern of the graph of each of the following situations as the graphs are read from left to right as increasing, decreasing, increasing and then decreasing, or decreasing and then increasing.
   a. The height of a child at birth and on each birthday from age 1 to age 6

   b. The balance that is due on a home mortgage from the date the house was purchased until it was sold 8 years later

   c. The height of a ball that is thrown upward from the top of a building from the time it is thrown until it hits the ground

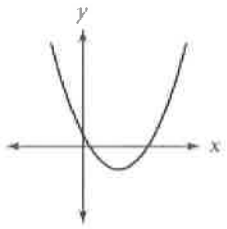
   d. The monthly electric bill for August of one year to July of the next year for a family living in Atlanta, Georgia, in a home with central air conditioning. (Assume that July and August are the hottest months and that the family uses natural gas for heating.)

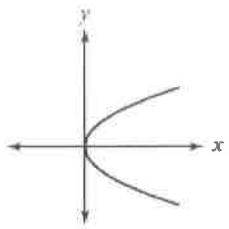
6. For each of the situations described in Exercise 1-5, describe the real-world meaning of the vertical intercept (y-intercept) of the graph, and the domain and range in context.

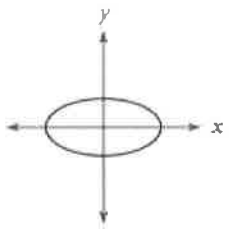
Transformations Unit – Interpreting Graphs WS#1 Name:_____

Function Notation

1. Determine whether or not each graph represents a function. Explain how you know.

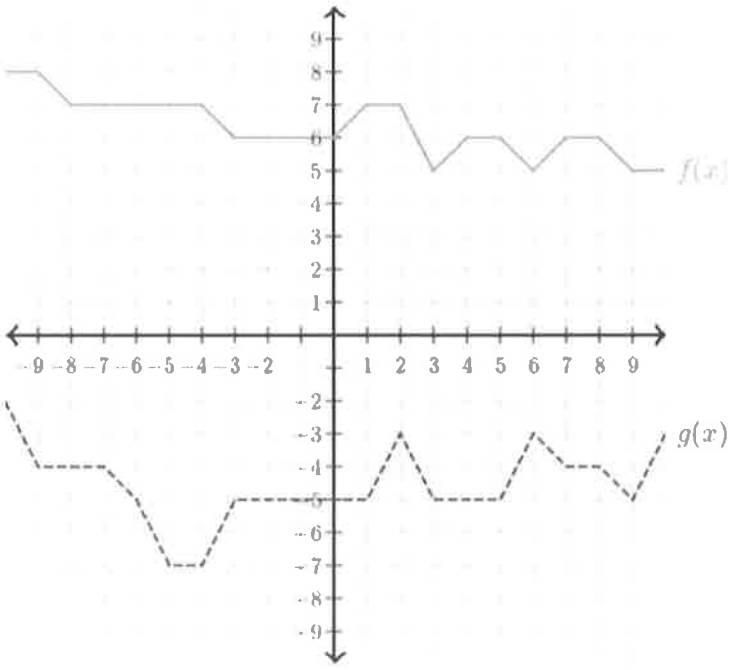
a. 

b. 

c. 

2. Find each of the indicated function values.
   a. If $f(x) = -\sqrt{4x+1}$, find $f\left(-\frac{1}{4}\right)$, $f(0)$, $f(0.75)$, $f(2)$, and $f(12)$.
   b. If $f(x) = -x^2 + 3x + 5$, find $f(-3)$, $f(0)$, $f(2)$, $f(5)$, and $f(8)$.
   c. If $f(x) = \frac{2}{x-4}$, find $f(-4)$, $f(0)$, $f(5)$, $f(8)$, and $f(24)$.

3. Use the graph below to find each of the following.



a. $f(3)$	b. $g(3) + g(-4)$	c. $f(-3) + g(2)$
d. x *when* $f(x) = 8$	e. x *when* $g(x) = -2$	f. $2 \cdot f(-4) - 3 \cdot g(9)$
g. $3 + g(9)$	h. $4 - f(-5)$	i. $\sqrt{g(-8)}$

Translations and the Quadratic Family WS#2

Name _____ Period _____ Date _____

1. Describe the translations of the graph of $y = x^2$ needed to produce the graph of each equation.

a. $y = x^2 - 6$ **b.** $y = (x + 5)^2$ **c.** $y = x^2 + 2.5$

d. $y = (x - 10)^2$ **e.** $y = (x - 3)^2 - 9$ **f.** $y = (x + 7.5)^2 + 2.5$

2. Find the vertex of each parabola.

a. $y = x^2$ **b.** $y = x^2 + 3$ **c.** $y = x^2 - 4$

d. $y = (x - 2)^2$ **e.** $y = (x + 3)^2$ **f.** $y = (x + 1)^2 + 5$

g. $y = (x - 4)^2 - 10$ **h.** $y = 4 + (x - 7)^2$ **i.** $y = -8 + (x + 5)^2$

3. Each parabola described is the graph of $y = x^2$. Write an equation for each parabola and sketch its graph.

a. The parabola is translated left 3 units.

b. The parabola is translated up 1 unit.

c. The parabola is translated right 5 units.

d. The parabola is translated down 4 units.

e. The parabola is translated left 4 units and up 2 units.

f. The parabola is translated right 2 units and down 3 units.

4. Describe what happens to the graph of $y = x^2$ in the following situations.

a. y is replaced with $(y + 1)$. **b.** x is replaced with $(x - 5)$.

c. x is replaced with $(x + 3)$. **d.** y is replaced with $(y - 6)$.

5. Solve.

a. $x^2 = 49$ **b.** $x^2 + 6 = 31$ **c.** $x^2 - 12 = 52$

d. $(x + 4)^2 = 81$ **e.** $(x - 3)^2 = 100$ **f.** $(x + 7)^2 = 144$

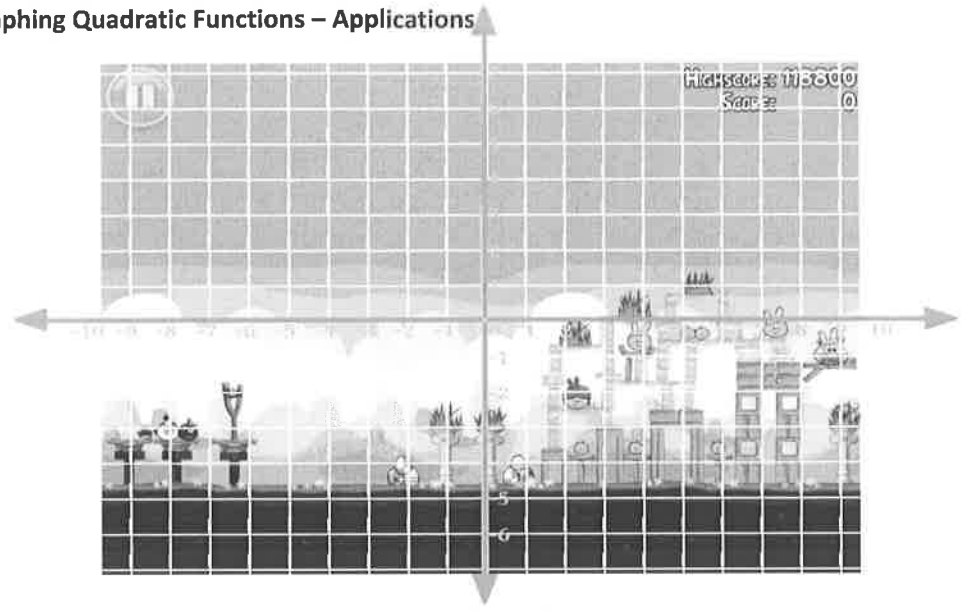
g. $x^2 = 17$ **h.** $x^2 - 11 = 19$ **i.** $(x + 2)^2 = 13$

j. $(x + 4)^2 - 5 = 31$ **k.** $14 + (x + 12)^2 = 35$ **l.** $-20 + (x - 5)^2 = 3$

WS#2

Graphing Quadratic Functions – Applications

1.



A. Draw a path for the bird that would hit the target (Pigs). Write an equation for the path.

B. Describe a reasonable domain and range for your function.

C. Compare the domain and range for this function to the domain and range of $f(x)=x^2$.

2. Although the playing surface of a football or soccer field appears to be flat, its surface is actually shaped like a parabola so that rain runs off to either side. The cross section of a field with synthetic turf can be modeled by $f(x)=-0.000234(x-80)^2+1.5$ where x and y are measured in feet.

A. Find the width of the field.

B. What is the maximum height of the field?

C. Explain how the width and height relate to domain and range.

3. The average gas mileage *m* in miles per gallon for a compact car is modeled by $m(s)=-0.015(s-47)^2+33$, where *s* is the car's speed in miles per hour. The average gas mileage for an SUV is modeled by $m_v(s)=-0.015(s-47)^2+15$. What kind of transformation describes this change and what does this transformation mean?

Reflections and the Square Root Family WS#3

Name _____ Period _____ Date _____

1. Describe what happens to the graph of $y = \sqrt{x}$ in each of the following situations.

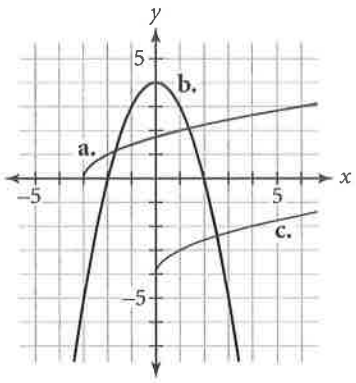
a. x is replaced with $(x + 6)$.

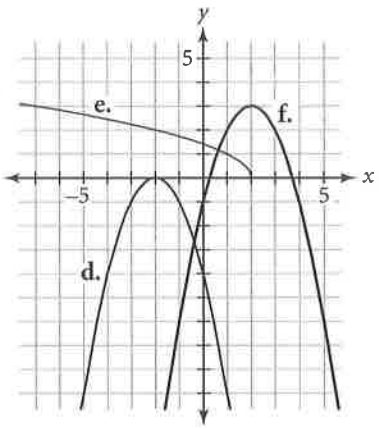
b. y is replaced with $(y - 5)$.

c. y is replaced with $(y + 1)$.

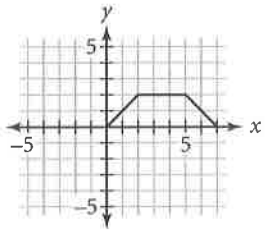
d. x is replaced with $(x - 8)$.

2. Each graph below is a transformation of the graph of either the parent function $y = x^2$ or the parent function $y = \sqrt{x}$. Write an equation for each graph.





3. Given the graph of $y = f(x)$, draw a graph of each of these related functions.



a. $y = -f(x)$ **b.** $y = f(-x)$ **c.** $y = -f(-x)$

4. Solve each equation for y to get two separate functions that could be entered into a graphing calculator. In each case, label the equations as Y_1 and Y_2. Then combine both functions to create a single relation that involves x and y.

a. $(y + 2)^2 = x$ **b.** $y^2 = x + 2$ **c.** $(y + 1)^2 = x - 6$

5. Use the function $h = -4.9t^2 + d$ to answer each question. (Round your answers to the nearest tenth of a second.)

a. If a ball is dropped from a height of 500 meters, how long will it take the ball to reach a height of 200 meters?

b. If a ball is dropped from a height of 175 meters, how long will it take the ball to reach a height of 50 meters?

c. If a ball is dropped from a height of 90 meters, how long will it take the ball to hit the ground?

WS#3

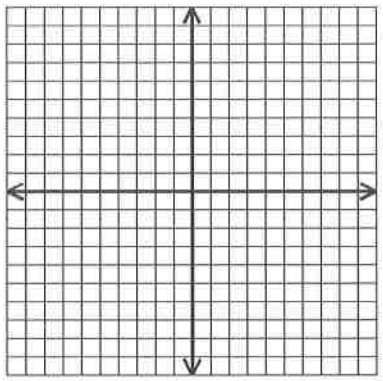
Reflections and the Square Root Family

Name:_____

Graph each function.

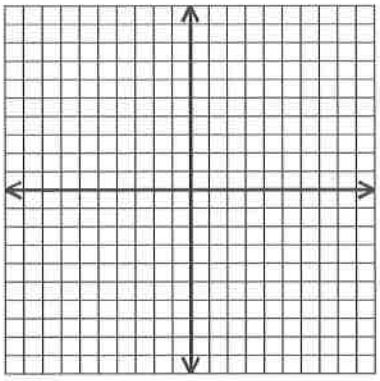
6. $h(x) = -\sqrt{x} - 3$

D: _____ R: _____



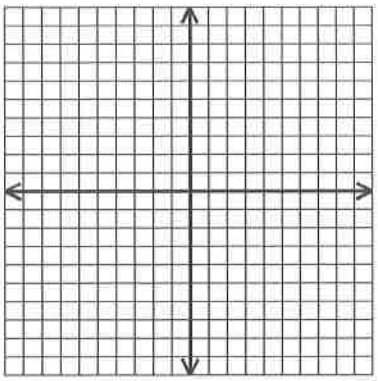
7. $f(x) = \sqrt{-x} + 1$

D: _____ R: _____



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

D: _____ R: _____



Write the equation for each of the following.

9. Start with the graph of $f(x) = \sqrt{x}$. Shift it 2 units to the right and 1 unit down.

_____

10. Start with the graph of $f(x) = \sqrt{x}$. Shift it 5 units down.

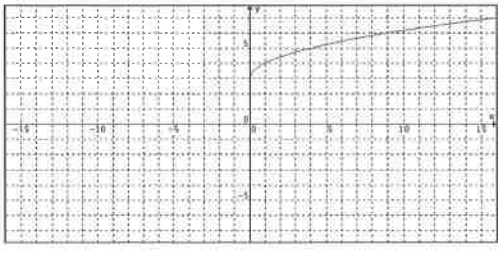
_____

11. Start with the graph of $f(x) = \sqrt{x}$. Reflect it across the x-axis.

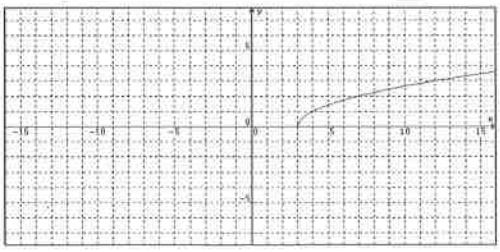
_____

12. Start with the graph of $f(x) = \sqrt{x}$. Give it a vertical reflection and shift it four units left and five units down.

14. _____



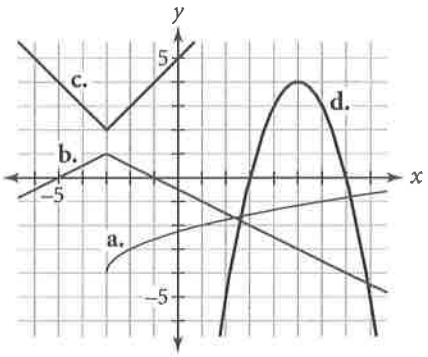
15. _____



Stretches and Shrinks and the Absolute-Value Family WS#4

Name _____ Period _____ Date _____

1. Each graph is a transformation of one of the parent functions you've studied. Write an equation for each graph.



2. Describe the transformations of the graph of $y = |x|$ needed to produce the graph of each equation.

a. $y = |x - 3|$ b. $y = -|x|$ c. $y = |-x|$

d. $y = \left|\frac{x}{4}\right|$ e. $y = 3|x|$ f. $y = |3x|$

g. $y = -|x| + 5$ h. $y = |x + 2| - 1$ i. $y = 1.5\left|\frac{x}{2}\right|$

j. $\frac{y}{0.5} = -|x|$ k. $y = -3|x + 4| + 6$ l. $\frac{y}{2} = |x - 1| - 2$

3. Find the vertex of the graph of each equation in Exercise 2 and sketch the graph.

4 Solve each equation for y.

a. $\frac{y}{2} = \left|\frac{x}{4}\right|$ b. $y - 2 = -4(x + 1)^2$ c. $\frac{y}{-3} = \sqrt{x} + 1.5$

d. $\frac{y - 3}{2} = (x + 1)^2$ e. $\frac{y + 1}{-3} = \sqrt{x + 2}$ f. $\frac{y - 5}{3} = \left|\frac{x + 2}{4}\right|$

WS#4