

Chapter 12 Transformations Student Success Sheet (SSS)

Transformations

Olathe East High School – Intermediate Algebra

Name: _____
Hour: _____

Reminders:

- Homework is completed in **homework packet**.
- **All pages** in homework notebook should be done in pencil!

Need Help? Support is available!

- www.mhollan.weebly.com
- www.srushingoe.weebly.com

“There are no secrets to success. It is the result of preparation, hard work, and learning from failure.”

Concept #	What we will be learning...	# of Videos
1	Parent Functions & Transformations	1 Video
2	Graphing Absolute Value Functions (shifts only)	1 Video
3	Absolute Value Reflections & Graphing Quadratic Functions	1 Video
4	Writing Functions with Transformations	1 Video

Concept I: Parent Functions & Transformations

Parent Graph: the graph of the _____

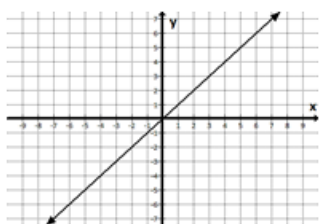
Is the simplest of the graphs in a family.

→ We use the parent graph as our "original" graph to apply transformations to and create the other members in a family of graphs

PARENT FUNCTION

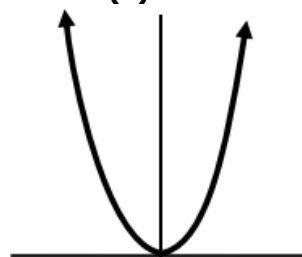
LINEAR

$$f(x) = x$$



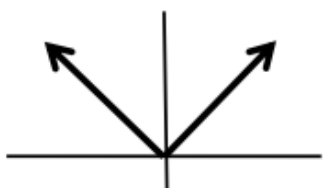
QUADRATIC

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



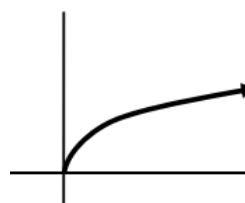
ABSOLUTE VALUE

$$f(x) = |x|$$

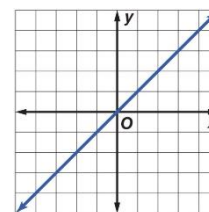
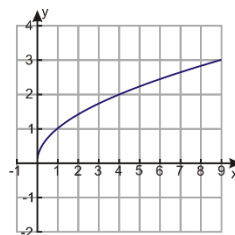
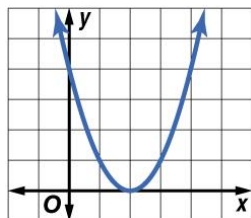
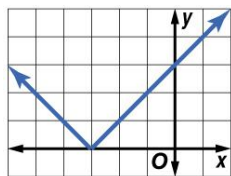


SQUARE ROOT

$$f(x) = \sqrt{x}$$



Identify the type of parent function represented by each graph. Then identify the domain and range of the graphed function.



Transformation "Rules"

	VERTICAL		HORIZONTAL	
Shift	$f(x) + k$	$f(x) - k$	$f(x - h)$	$f(x + h)$
	Vertical shift k units up	Vertical shift k units down	Horizontal shift h units right	Horizontal shift h units left

Reflect Reflect	$-f(x)$	$f(-x)$
	Vertical reflection over x-axis	Horizontal reflection over y-axis
	Transformation is applied outside the $f(x)$ Normal Thinking!	Transformation is applied inside the $f(x)$ Opposite Thinking On Inside (Horizontal) is (Hugged)

VERTEX FORM OF A PARABOLA

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

a : Indicates a reflection across the x-axis.
 h : Indicates a horizontal shift
 Remember opposite thinking here
 k : Indicates a vertical shift

Graph Opens: Up if $a =$ _____ and Down if $a =$ _____

Vertex of a Parabola: (_____ , _____)

Axis of symmetry: _____ ← That would be a vertical line that goes right through the vertex.

Describing And Applying Transformations Algebraically

Apply the transformation(s) to the indicated parent functions and leave un-simplified. Then describe the transformation(s) taking place.

<p>1. $f(x) = (x - 7)^2$</p> <p>Parent Function:</p> <p>Vertex: (,) A.O.S: $x =$ _____</p> <p>Opens: _____</p> <p>Transformation(s):</p>	<p>2. $f(x) = - x + 3$</p> <p>Parent Function:</p> <p>Vertex: (,) A.O.S: $x =$ _____</p> <p>Opens: _____</p> <p>Transformation(s):</p>
<p>3. $f(x) = x + 1 - 5$</p> <p>Parent Function:</p> <p>Vertex: (,) A.O.S: _____</p> <p>Opens: _____</p> <p>Transformation(s):</p>	<p>4. $f(x) = -(x + 2)^2 + 9$</p> <p>Parent Function:</p> <p>Vertex: (,) A.O.S: _____</p> <p>Opens: _____</p> <p>Transformation(s):</p>

5. Vertex: $(2, -3)$ A.O.S.: $x = 2$ $a = 2$

Parent Function: Quadratic

Opens: _____

$$f(x) = __ (______)^2 ______$$

6. Vertex: $(-2, 5)$ A.O.S.: $x = -2$ $a = -\frac{1}{2}$

Parent Function: Absolute Value

Opens: _____

$$f(x) = __ | ______ | ______$$

7. Vertex: $(0, 7)$ A.O.S.: $x = 0$ $a = \frac{1}{3}$

Parent Function: Quadratic

Opens: _____

$$f(x) = __ (______)^2 ______$$

8. Vertex: $(-3, 0)$ A.O.S.: $x = -3$ $a = -4$

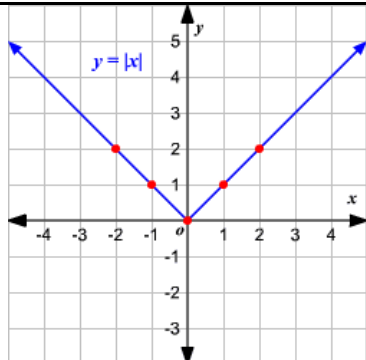
Parent Function: Absolute Value

Opens: _____

$$f(x) = __ | ______ | ______$$

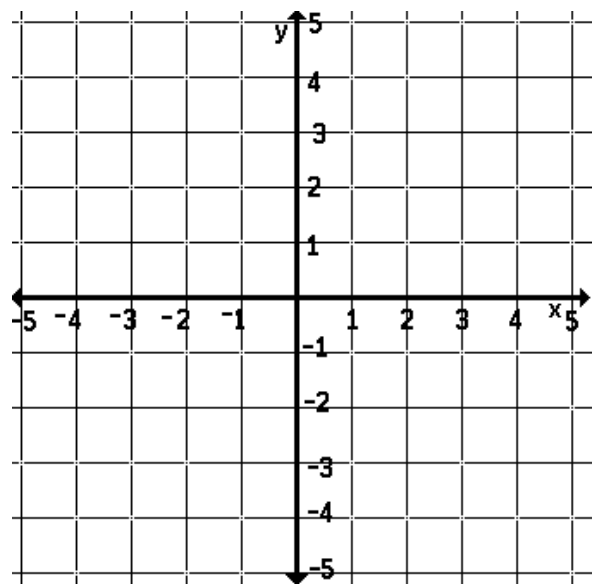
Concept 2: Graphing Absolute Value Functions

Absolute Value Functions



x	y	(x,y)
-3	3	(-3, 3)
-2	2	(-2, 2)
-1	1	(-1, 1)
0	0	(0, 0)
1	1	(1, 1)
2	2	(2, 2)
3	3	(3, 3)

Graph the absolute value parent function

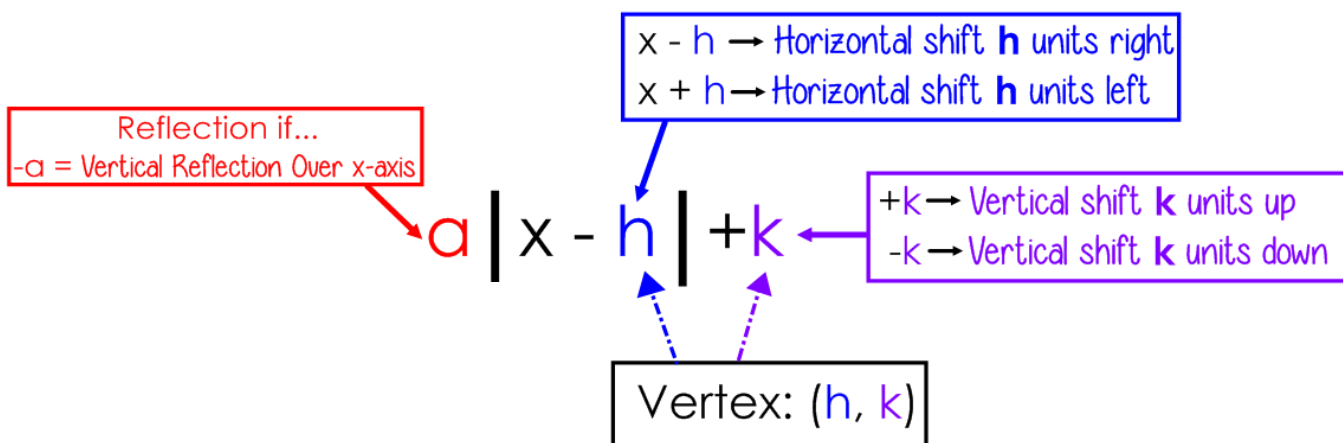


Transformation "Rules"

	VERTICAL		HORIZONTAL	
Shift	$f(x) + k$	$f(x) - k$	$f(x - h)$	$f(x + h)$
	Vertical shift k units up	Vertical shift k units down	Horizontal shift h units right	Horizontal shift h units left
Reflect	$-f(x)$		$f(-x)$	
	Vertical reflection over x-axis		Horizontal reflection over y-axis	
	Transformation is applied outside the $f(x)$ Normal Thinking!		Transformation is applied inside the $f(x)$ Opposite Thinking On Inside (Horizontal) is (Hugged)	

VERTEX FORM OF ABSOLUTE VALUE FUNCTION...

$$a \cdot |x - h| + k$$



A TRANSLATION MOVES A FIGURE UP, DOWN, LEFT, OR RIGHT.

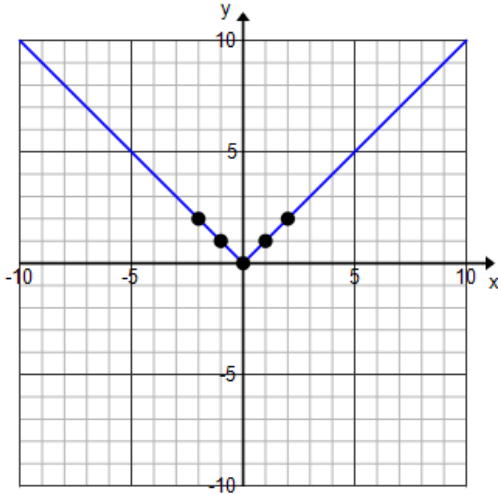
$f(x)$	$f(x) \pm k$	$f(x \pm h)$
Original – No translation	Vertical shift up or down	Horizontal shift left or right
$f(x) = x^2$	$f(x) = x^2 \pm k$	$f(x) = (x \pm h)^2$

Describe and Graph Shifts

The parent function is graphed for you. Identify the vertex of each new function, graph and describe the shift(s) being applied to $f(x) = |x|$.

1. $f(x) = |x| + 1$

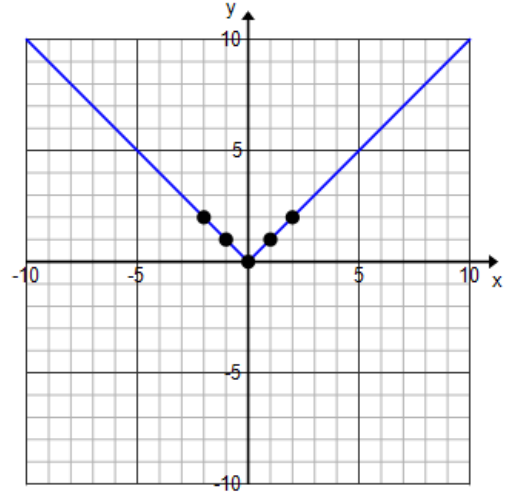
Vertex: (____, ____)



Transformation(s):

2. $f(x) = |x - 6|$

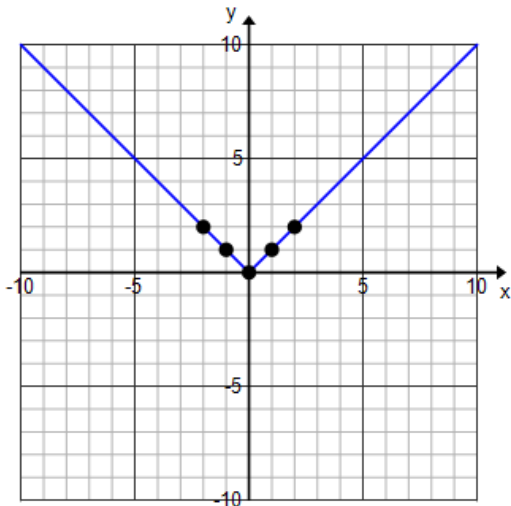
Vertex: (____, ____)



Transformation(s):

3. $f(x) = |x| - 8$

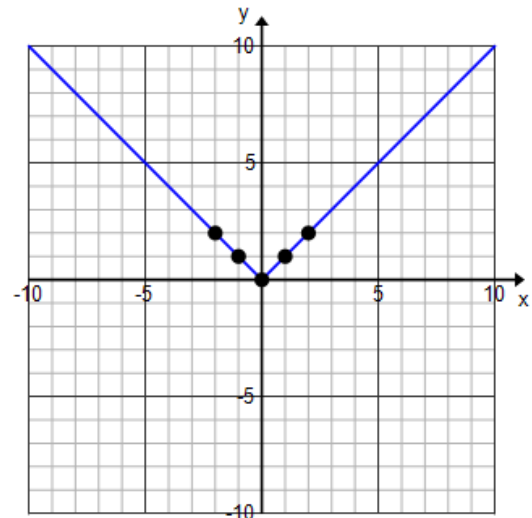
Vertex: (____, ____)



Transformation(s):

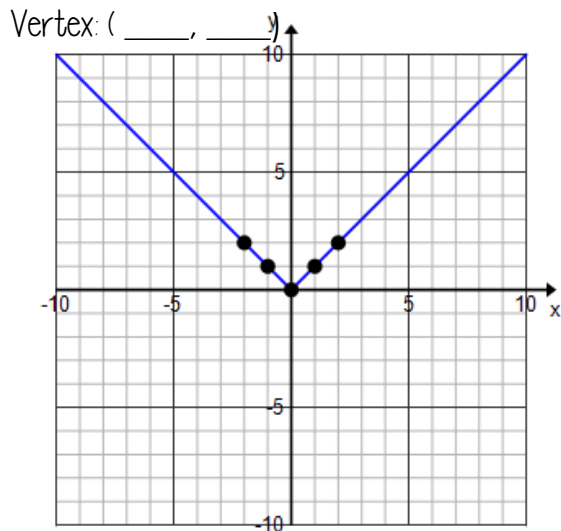
4. $f(x) = |x + 5|$

Vertex: (____, ____)



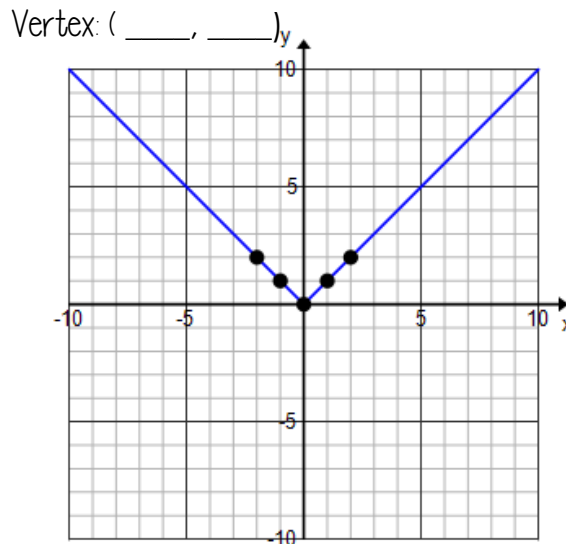
Transformation(s):

5. $f(x) = |x - 6| + 1$



Transformation(s):

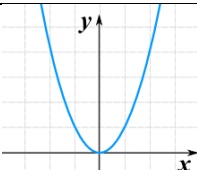
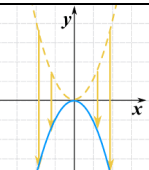
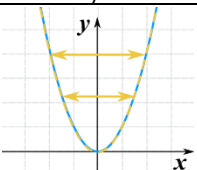
6. $f(x) = |x + 5| - 8$



Transformation(s):

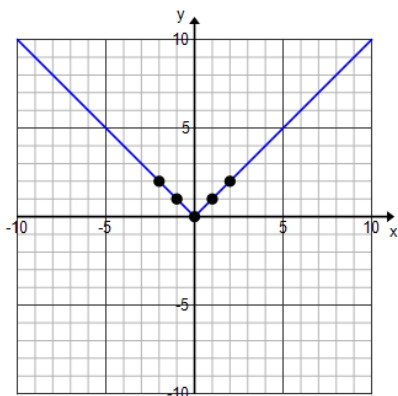
Concept 3: Reflections & Graphing Quadratic Functions

A REFLECTION FLIPS A FIGURE OVER A LINE CALLED THE LINE OF REFLECTION.

$f(x)$	$-f(x)$	$f(-x)$
Original – No translation	Vertical reflection over the x-axis	Horizontal reflection over the y-axis
		
$f(x) = x^2$	$f(x) = -x^2$	$f(x) = (-x)^2$

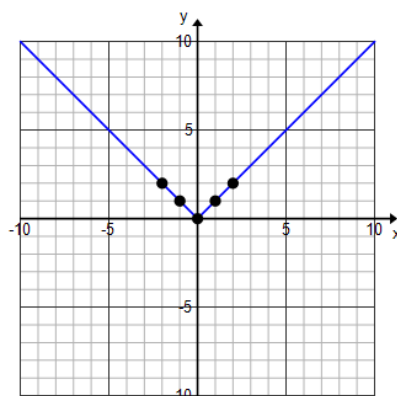
Describe and graph Reflections

1. $f(x) = -|x|$
Vertex: (_____, _____)



Transformation(s):

2. $f(x) = |-x|$
Vertex: (_____, _____)

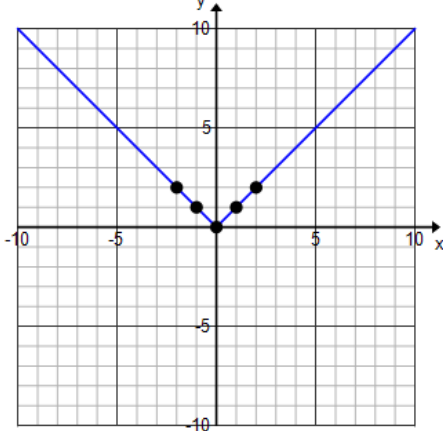


Transformation(s):

Describe and Graph Translations AND Reflections

3. $f(x) = -|x - 3| + 5$

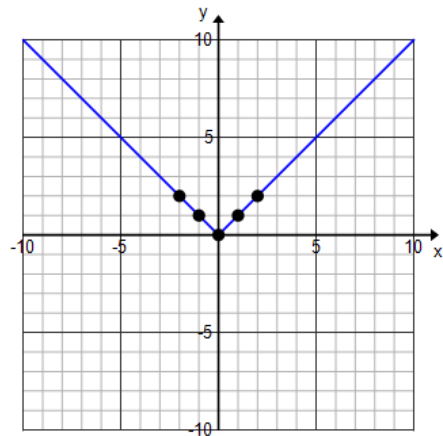
Vertex: (_____, _____)



Transformation(s):

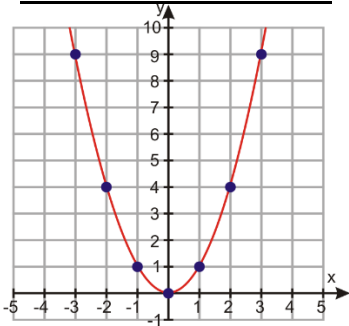
4. $f(x) = -|x| - 1$

Vertex: (_____, _____)



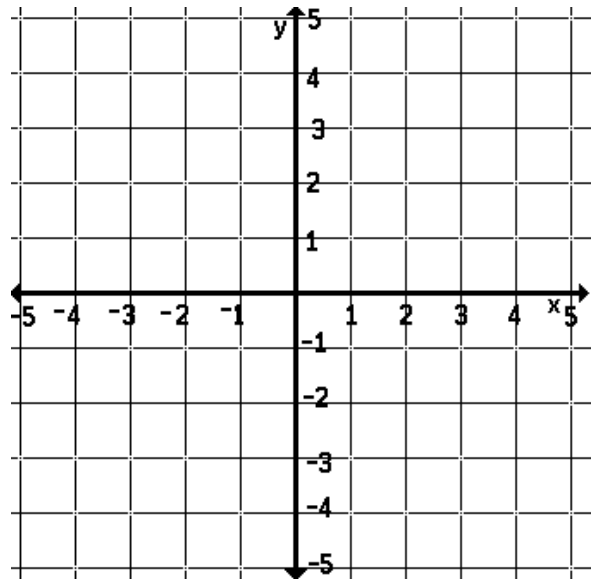
Transformation(s):

Quadratic Functions



x	x^2	y	(x,y)
-3	$(-3)^2$	9	$(-3, 9)$
-2	$(-2)^2$	4	$(-2, 4)$
-1	$(-1)^2$	1	$(-1, 1)$
0	$(0)^2$	0	$(0, 0)$
1	$(1)^2$	1	$(1, 1)$
2	$(2)^2$	4	$(2, 4)$
3	$(3)^2$	9	$(3, 9)$

Graph the quadratic parent function.

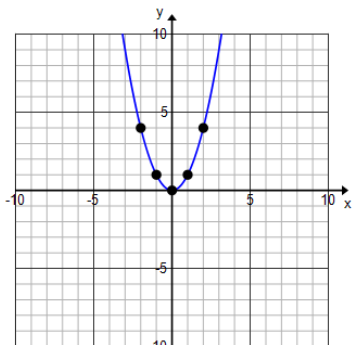


Describe and Graph Shifts

The parent function is graphed for you. Identify the vertex of each new function, graph and describe the shift(s) being applied to $f(x) = x^2$.

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

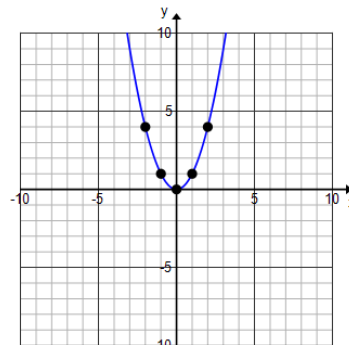
Vertex: (_____, _____)



Transformation(s):

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

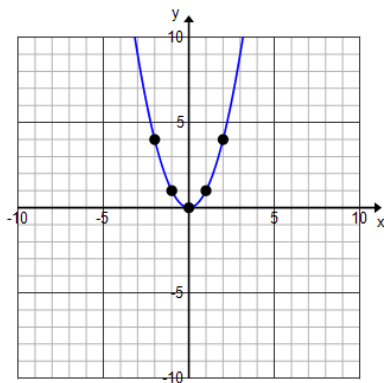
Vertex: (_____, _____)



Transformation(s):

7. $f(x) = (x - 4)^2 - 7$

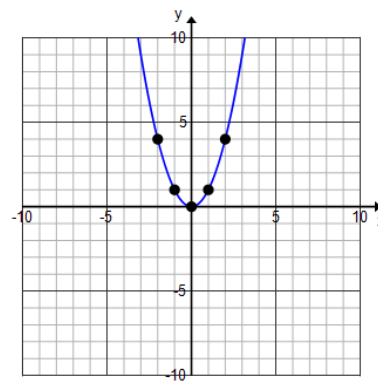
Vertex: (_____, _____)



Transformation(s):

8. $f(x) = -(x + 5)^2 + 6$

Vertex: (_____, _____)



Transformation(s):

Concept 4: Writing Functions

Write the equation for the graph described from the original graph of $f(x) = x^2$.

1. Translated 5 units up

$f(x) = (______)^2 ______$

2. Translated 4 units down

$f(x) = (______)^2 ______$

3. Translated 6 units to the right

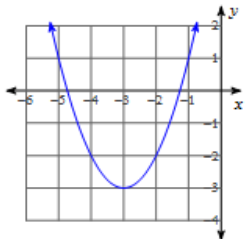
$f(x) = ______ (______)^2 ______$

4. Translated 2 units to the left and reflected over the x-axis

$f(x) = ______ (______)^2 ______$

Each of the graphs below represents a transformation of the graph $f(x) = x^2$. Write an equation in vertex form for each graph.

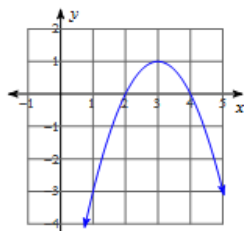
5.



Vertex: (,)

$f(x) =$ _____

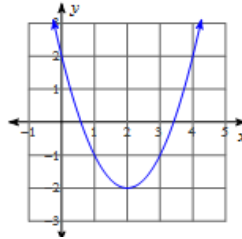
6.



Vertex: (,)

$f(x) =$ _____

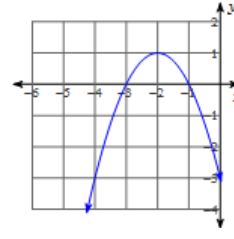
7.



Vertex: (,)

$f(x) =$ _____

8.



Vertex: (,)

$f(x) =$ _____

For each problem, identify whether the graph of the parabola opens up/down and has a max/min. Find the equation for the axis of symmetry and the vertex.

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

10. $f(x) = -(x - 5)^2 + 8$

11. $f(x) = (x + 3)^2 - 6$

Vertex: _____

Vertex: _____

Vertex: _____

Max/Min

Max/Min

Max/Min

A.O.S.: _____

A.O.S.: _____

A.O.S.: _____

Opens Up/Opens Down

Opens Up/Opens Down

Opens Up/Opens Down

Shifts Left or Right _____

Shifts Left or Right _____

Shifts Left or Right _____

Shifts Up or Down _____

Shifts Up or Down _____

Shifts Up or Down _____

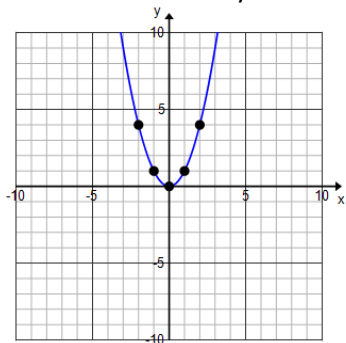
Graphing Review:

12. $f(x) = -(x - 5)^2 + 9$

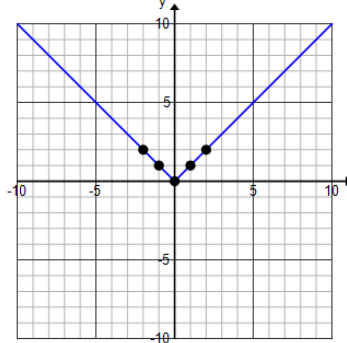
13. $f(x) = -|x + 6| + 5$

Vertex: (_____, _____)

Vertex: (_____, _____)



Transformation(s):



Transformation(s):