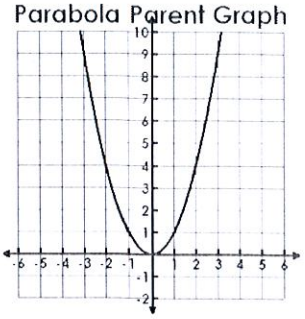
Name: _____ Date: _____

Transformations of Vertex Form

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

Parabola Parent Graph



What does a do to the parent graph?

- (-a) reflect over the x-axis
- (a>1) stretches (gets skinny)
- (0<a<1) shrinks (gets fat)

What does *h* do to the parent graph?

- (+h) moves left
- (-h) moves right

What does *k* do to the parent graph?

- (+K) moves up
- (-K) moves down

Determine what transformations are applied in the following functions.

1. $f(x) = (x-3)^2 + 5$
   - h: right 3
   - K: up 5

2. $f(x) = -(x-2)^2 + 7$
   - a: reflect x-axis
   - h: right 2
   - K: up 7

3. $f(x) = \frac{1}{3}(x+3)^2 - 2$
   - a: shrink by 1/3
   - h: left 3
   - K: down 2

4. $f(x) = 4(x-3)^2 + 8$
   - a: stretch by 4
   - h: right 3
   - K: up 8

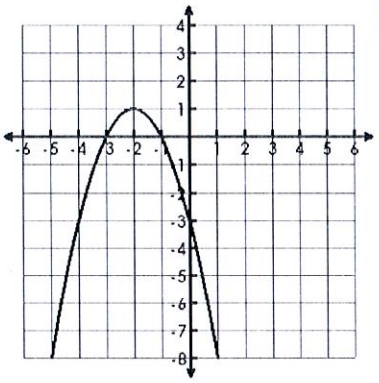
Writing Equations of Quadratics in Vertex Form

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

Vertex: (h, k)

Given the graph of the quadratic, find a, h, & k. Then write the equation in vertex form.

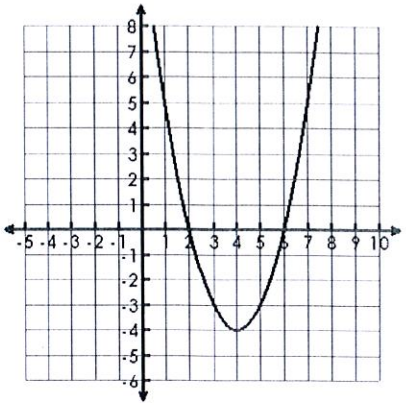
5.



- a = -1
- h = -2
- k = 1
- f(x) = $-1(x-(-2))^2+1$

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

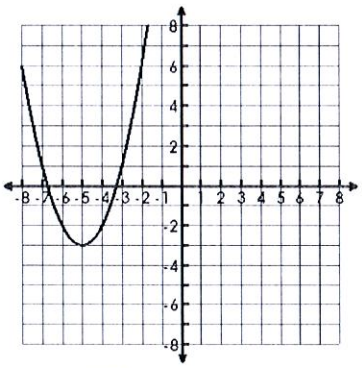
6.



- a = 1
- h = 4
- k = -4
- f(x) = $1(x-4)^2+(-4)$

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

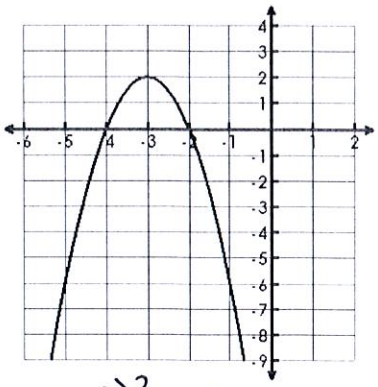
7.



- a = 1
- h = -5
- k = -3
- f(x) = $1(x-(-5))^2+(-3)$

$f(x) = (x+5)^2-3$

8.



- a = -2
- h = -3
- k = 2
- f(x) = $-2(x-(-3))^2+2$

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

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

Vertex: (h, k)
Axis of Symmetry: x = h

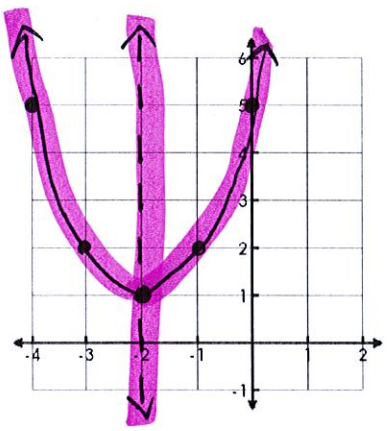
Steps to Graphing in VERTEX form:

- Find the vertex. Plot it.
- Find the axis of symmetry. Graph this lightly as a dashed vertical line.
- On your calculator: TABLE, EDIT FUCTION, ENTER, START = <enter your h-value>, CALC, ENTER. Scroll up and down to get other ordered pairs.
- Connect in a u-shape with arrows at each end.

Graph & identify the vertex and axis of symmetry.

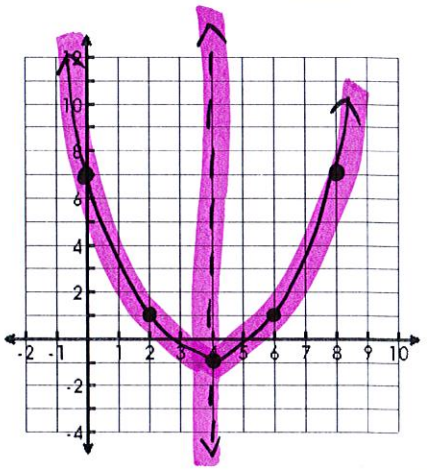
9. $f(x) = (x+2)^2 + 1$

Vertex: (-2, 1)
Axis of Symmetry: x = -2



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

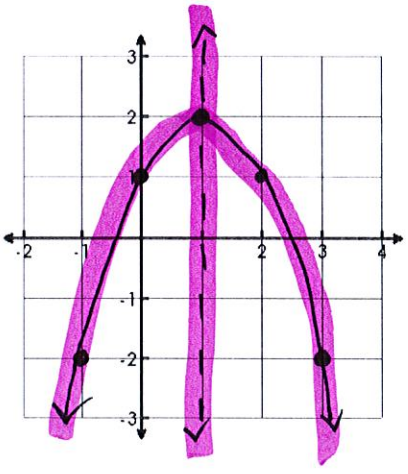
Vertex: (4, -1)
Axis of Symmetry: x = 4



Graph & identify the vertex and axis of symmetry.

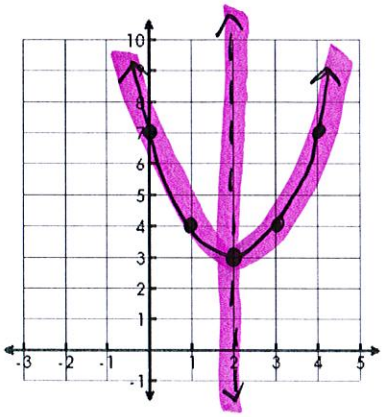
11. $f(x) = -(x-1)^2 + 2$

Vertex: (1, 2)
Axis of Symmetry: x = 1



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

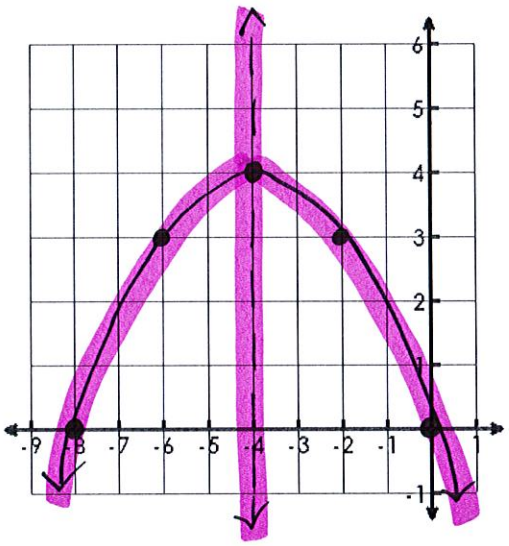
Vertex: (2, 3)
Axis of Symmetry: x = 2



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

Vertex: (-4, 4)

Axis of Symmetry: x = -4



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

Vertex: (-3, -3)

Axis of Symmetry: x = -3