SM 2

Date: **Section:** 7.1

Objective: Recognize different forms of quadratic functions, find the vertex, axis of symmetry, and *y*-intercept of quadratic graphs.

What does quadratic mean?

Forms of Quadratic Functions:

_____ ***Form:*** $f(x)=ax^2+bx+c,$ where $a\neq 0.$ There are no parentheses.

Example:

_____ ***Form:*** $f(x)=a(x-p)(x-q),$ where $a\neq 0.$ Written as a multiplication problem.

Example:

_____ ***Form:*** $f(x)=a(x-h)^2+k,$ where $a\neq 0.$ x is only in the function once, and is part of a perfect square.

Example:

Examples: State whether each quadratic function is in standard, factored, or vertex form. Identify the values of *a*, *b*, and *c* for standard form; *a*, *p*, and *q* for factored form; or *a*, *h*, and *k* for vertex form.

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

b) $f(x)=-(x+4)^2-5$

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

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

e) $f(x)=3x(x-2)$

f) $f(x)=2(x+1)^2-3$

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

h) $f(x)=-3x^2+4$

i) $f(x)=5x^2$

_____***:*** The shape of the graph of a quadratic function.

_____***:*** A line that _____ a parabola in _____. If you were to fold a parabola along its axis of symmetry, the two sides would _____. The equation of the axis of symmetry looks like _____.

_____***:*** The "tip" of the _____ or the point at which it _____ _____.

_____***:*** The point where the graph crosses the _____. It should be written as an _____ _____: _____.

Finding the vertex in each form.

1) Vertex Form of a Quadratic Function:

- To find the vertex:
    - The sign of h is
    - The sign of k is

2) Standard Form:

- To find the vertex:
    - The x-coordinate of the vertex is
    - To find the y-coordinate,

3) Factored Form:

- To find the vertex:
    - The x-coordinate of the vertex is
    - To find the y-coordinate,

Finding the axis of symmetry, direction of opening, and *y*-intercept is the same in all forms.

Axis of Symmetry:

Direction of Opening:

- Opens up if a is _____.
- Opens down if a is _____.

Finding the *y*-intercept:

1.

2.

★ Don't forget:

Write the form each quadratic equation is in. Find the vertex and the direction of the opening of the graph for each of the following quadratic equations. Find the *y*-intercept and axis of symmetry.

a) $y = (x-7)^2 + 9$

$h =$ _____ , $k =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

b) $y = 3x^2 - 12x - 10$

$a =$ _____ , $b =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

c) $y = -(x+4)(x-6)$

$p =$ _____ , $q =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

d) $y = -x^2 + 4x - 10$

$a =$ _____ , $b =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

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

$h =$ _____ , $k =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

f) $y = \frac{1}{2}(x - 3)(x - 7)$

$p =$ _____ , $q =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

g) $y = -5x^2 - 10x + 12$

$a =$ _____ , $b =$ _____

Form: _____

Vertex:_____

Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

h) $y = \frac{2}{3}x^2 - 4$

$a =$ _____ , $b =$ _____

$h =$ _____ , $k =$ _____

Form: _____

Vertex:_____

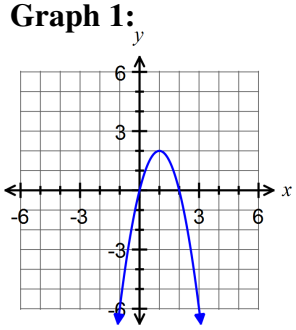
Axis of Symmetry: _____

Direction of opening:_____

y-intercept: _____

For each of the following graphs, find the vertex, axis of symmetry, and *y*-intercept.

Graph 1:



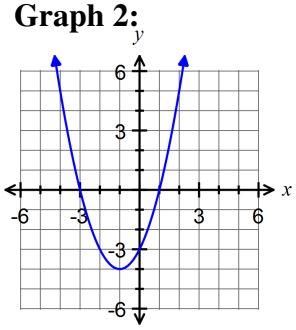
Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

Is the value of "*a*" positive or negative? _____

Graph 2:



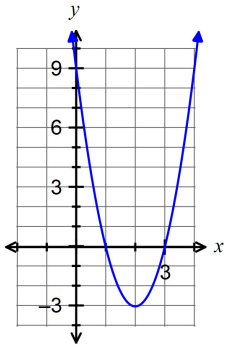
Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

Is the value of "*a*" positive or negative? _____

Graph 3:



Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

Is the value of "*a*" positive or negative? _____