UNIT 3C

The Great Quadratic - Graphing Quadratic Equations

The graph of a quadratic equation is called a _____.

A parabola has a maximum or minimum point called a _____.

There are three forms of a quadratic equation:

I. Intercept Form _____

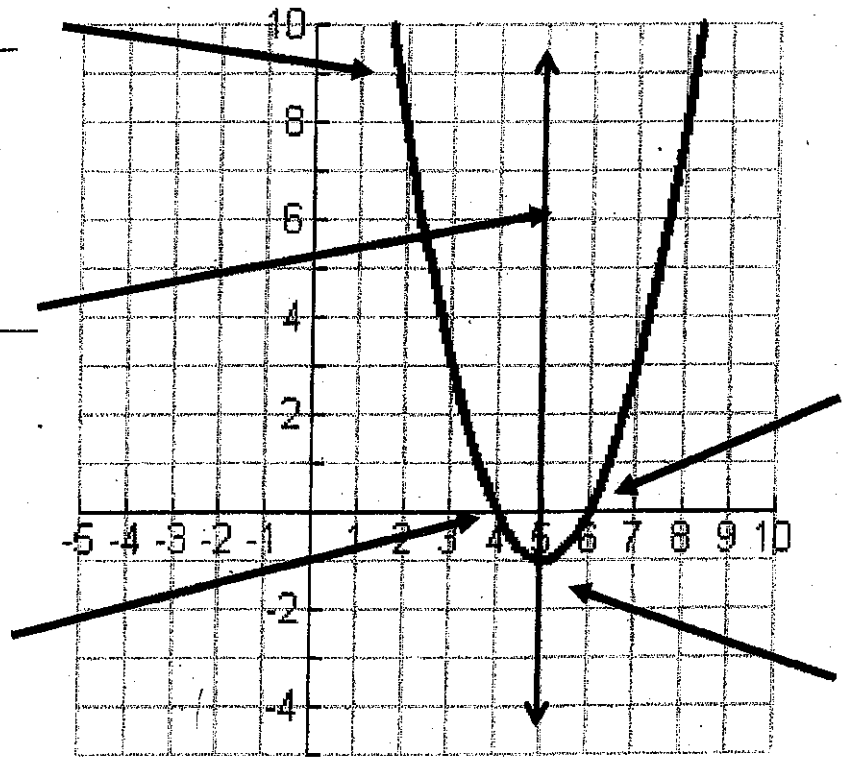
II. Vertex Form _____

III. Standard Form _____

The equation $x = \frac{-b}{2a}$ gives the equation of the _____.

This is a _____ line.

_____



_____ _____

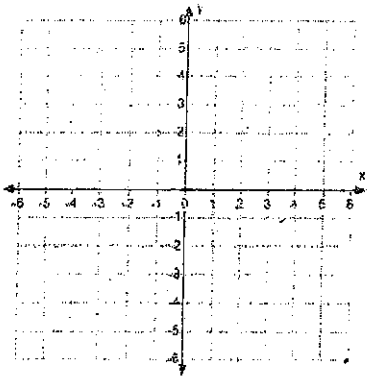
_____ _____

_____ _____

Use the table of values to graph each quadratic equation.

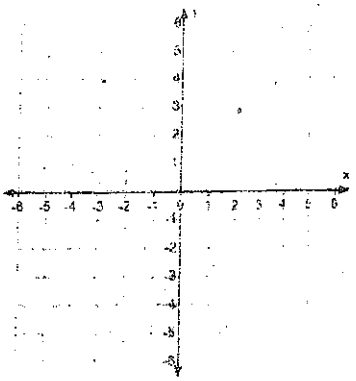
A. $y = x^2$

x	$y = x^2$
-2	
-1	
0	
1	
2	



B. $y = -x^2$

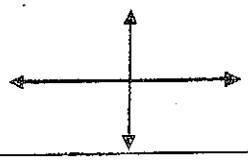
x	$y = -x^2$
-2	
-1	
0	
1	
2	



The graph of a quadratic function, _____ is called a _____.

Every parabola is _____ shaped.

If the leading coefficient (a) is positive the parabola will open _____. Ex. $y = 2x^2$



If the leading coefficient (a) is negative the parabola will open _____. Ex. $y = -3x^2$

Determine whether the parabola opens up or down.

A. $y = 3x^2 + 8x + 6$

B. $y = x^2 + 4x - 1$

C. $y = -x^2 + 7x - 3$

D. $y = -8x^2 - 4$

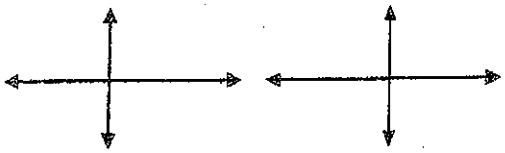
E. $y = -8x + 7x^2 - 3$

F. $y = 9 - 8x - x^2$

The _____ is the highest or lowest point on a parabola.

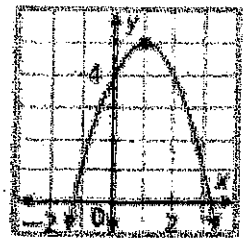
If the parabola opens up, then the vertex is a _____.

If the parabola opens down, then the vertex is a _____.

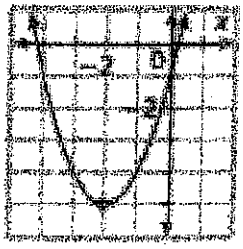


Identify the vertex of each parabola. Then give the minimum or maximum value of the function.

A.



B.



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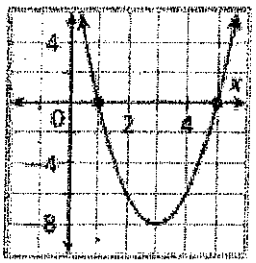
13.2 Axis of Symmetry and Vertex

Objective: *I CAN . . .* find the vertex and the axis of symmetry.

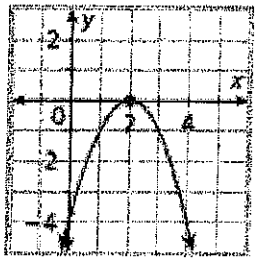
Axis of Symmetry	

Find the axis of symmetry of each parabola.

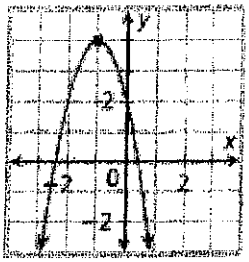
A.



B.



C.



Finding the Axis of Symmetry	**Given a quadratic function $y = ax^2 + bx + c$, the axis of symmetry is the vertical line**

Find the axis of symmetry for each graph.

A. $y = x^2 + 3x + 4$ **B.** $y = -3x^2 + 10x + 9$ **C.** $y = 2x^2 + 4x + 5$

Finding the Vertex	**Step 1) Find the x-value for the axis of symmetry.** **Step 2) Substitute the x-value into the equation to find the y-value.** **Step 3) Write the vertex as an ordered pair.**

Find the vertex of the graph:

A. $y = 5x^2 - 10x + 3$ **B.** $y = -x^2 - 2x$

13.4 Graphing Quadratics

Objective: ***I CAN . . .*** graph quadratic equations.

Graphing a Quadratic Function:

1. Find the **axis of symmetry**: $x = \frac{-b}{2a}$.
2. Find the **vertex** by plugging in the x-coordinate into the equation. (x,y)
3. Determine the number of solutions by finding the **discriminant**. $b^2 - 4ac$
4. If there are real solutions, find the **zeros** of the quadratic and plot each point.
5. Determine if the graph opens up/down and sketch a parabola (u-shaped).

Graph the quadratic equation.

A. $y = x^2 + 2x + 1$

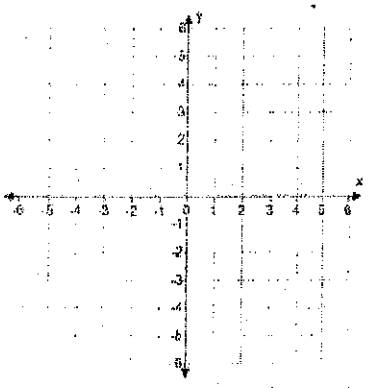
Axis of symmetry _____

Vertex: _____

Discriminant:_____

Zeros:_____

Opens:_____



B. $y = 9 - x^2$

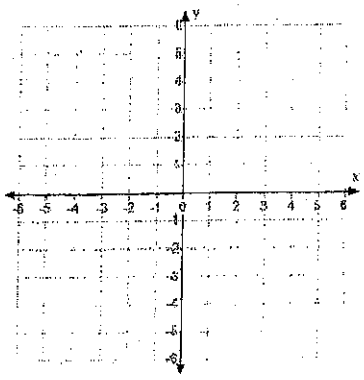
Axis of symmetry _____

Vertex: _____

Discriminant:_____

Zeros:_____

Opens:_____



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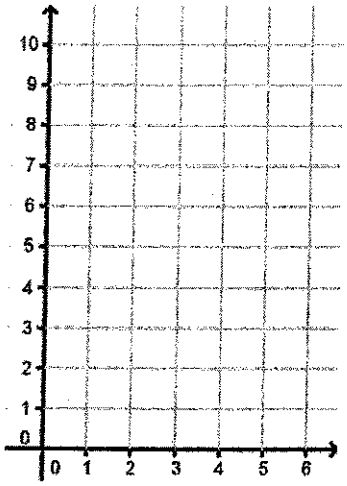
Name: Date: Period:

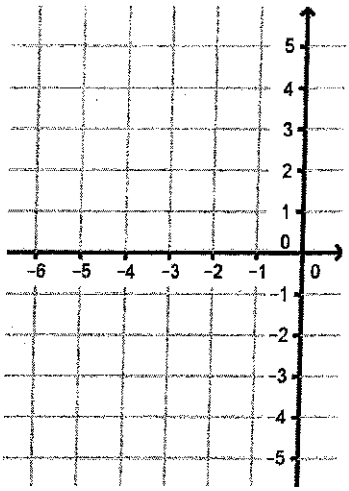
Practice Worksheet: Graphing Quadratic Functions in Vertex Form

For #1-6, label the axis of symmetry, vertex, y-intercept, and at least three more points on the graph.

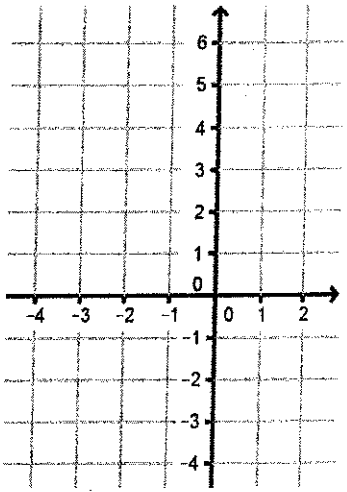
1] $y = (x-3)^2$
Axis of Symmetry is x=_____
Vertex: (____, ____)
Opens up or down?
Slope to point one unit from the vertex is _____.
y-intercept: (0,_____)



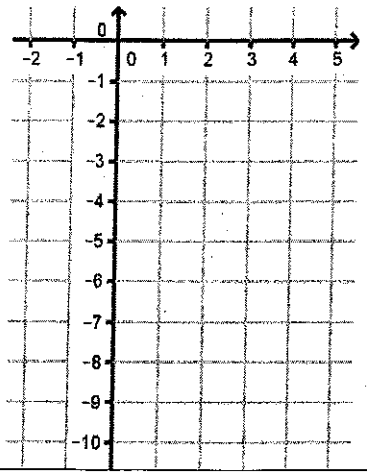
2] $y = -(x+3)^2 + 5$
Axis of Symmetry is x=_____
Vertex: (____, ____)
Opens up or down?
Slope to point one unit from the vertex is _____.
y-intercept: (0,_____)



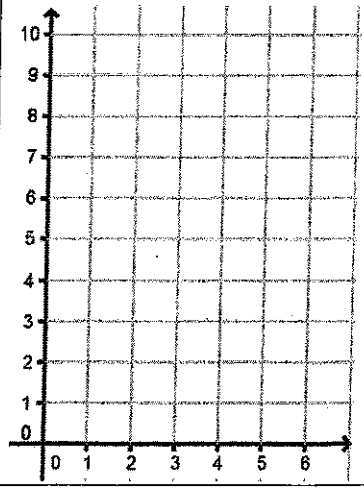
3] $y = 2(x+1)^2 - 3$
Axis of Symmetry is x=_____
Vertex: (____, ____)
Opens up or down?
Slope to point one unit from the vertex is _____.
y-intercept: (0,_____)



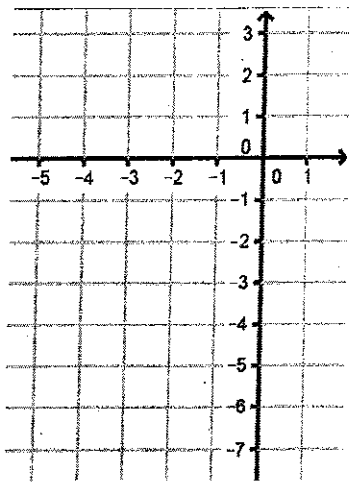
4] $y = -2(x-2)^2 - 1$
Axis of Symmetry is x=_____
Vertex: (____, ____)
Opens up or down?
Slope to point one unit from the vertex is _____.
y-intercept: (0,_____)



5] $y = \frac{1}{2}(x-3)^2 + 2$
Axis of Symmetry is x=_____
Vertex: (____, ____)
Opens up or down?
Slope to point one unit from the vertex is _____.
y-intercept: (0,_____)



6] $y = -\frac{1}{4}(x+2)^2 + 1$
Axis of Symmetry is x=_____
Vertex: (____, ____)
Opens up or down?
Slope to point one unit from the vertex is _____.
y-intercept: (0,_____)



Name: Date: Period:

Practice Worksheet: Graphing Quadratic Functions in Intercept Form

For #1-6, label the x-intercepts, axis of symmetry, vertex, y-int., and at least one more point on the graph.

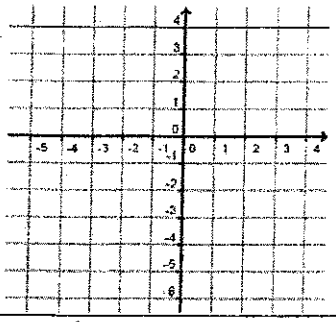
1] $y = \frac{1}{2}(x+4)(x-2)$

x-intercepts: (_____, 0) (_____, 0)

Axis of Symmetry is x=_____

Vertex: (____, ____)

y-intercept: (0,_____)



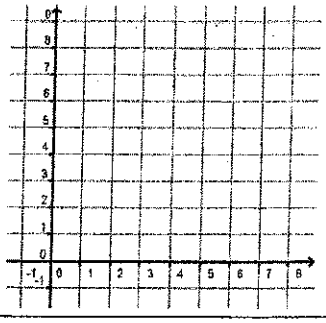
2] $y = -\frac{1}{2}x(x-8)$

x-intercepts: (_____, 0) (_____, 0)

Axis of Symmetry is x=_____

Vertex: (____, ____)

y-intercept: (0,_____)



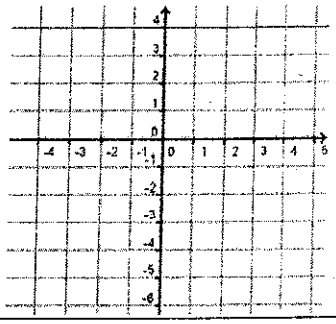
3] $y = (x+2)(x-2)$

x-intercepts: (_____, 0) (_____, 0)

Axis of Symmetry is x=_____

Vertex: (____, ____)

y-intercept: (0,_____)



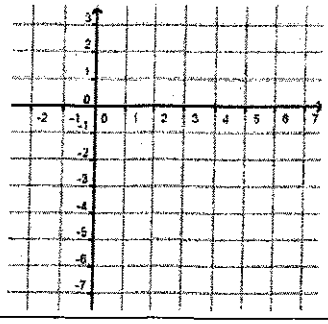
4] $y = -\frac{1}{3}(x+1)(x-5)$

x-intercepts: (_____, 0) (_____, 0)

Axis of Symmetry is x=_____

Vertex: (____, ____)

y-intercept: (0,_____)



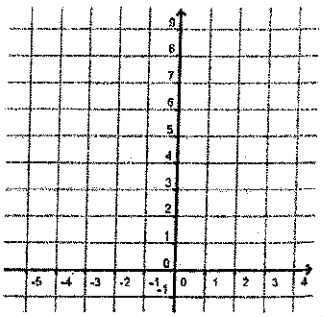
5] $y = 4(x+2)(x+1)$

x-intercepts: (_____, 0) (_____, 0)

Axis of Symmetry is x=_____

Vertex: (____, ____)

y-intercept: (0,_____)



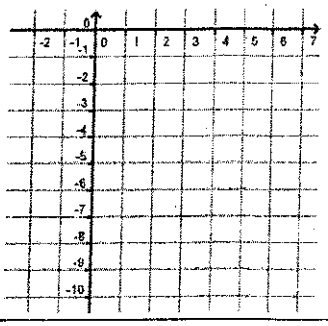
6] $y = -(x-3)(x-3)$

x-intercepts: (_____, 0) (_____, 0)

Axis of Symmetry is x=_____

Vertex: (____, ____)

y-intercept: (0,_____)



Name: Date: Period:

Practice Worksheet: Graphing Quadratic Functions in Standard Form

1] For any quadratic of the form $y = ax^2 + c$, the axis of symmetry is always the line _____.

2] If the axis of symmetry of a quadratic is $x = 2$ and $(-1, 3)$ is on the graph, then the point (____, ____) must also be on the graph.

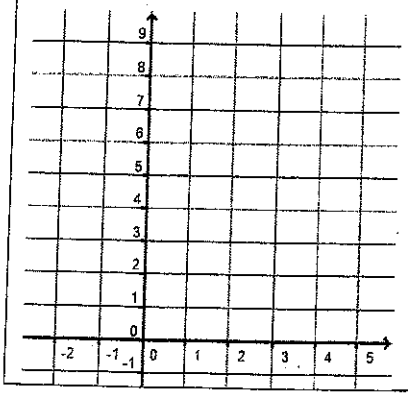
3] For any quadratic of the form $y = ax^2 + c$, the y-intercept is always the same point as the _____.

4] The graph of $y = 2x^2 + 4x + 3$ passes through the point (1, _____) and (-1, _____).

For #5-12, label the axis of symmetry, vertex, y-intercept, and at least three more points on the graph.

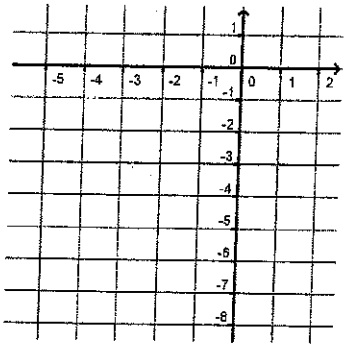
5] $y = x^2 - 4x + 8$
a = b = c =
Opens up or down?
Is vertex a max or min?
y-intercept:
Axis of Symmetry is x=_____

Vertex: (____, _____)



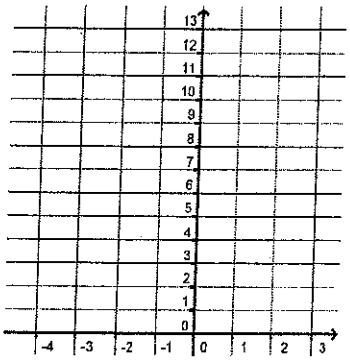
6] $y = 2x^2 + 8x$
a = b = c =
Opens up or down?
Is vertex a max or min?
y-intercept:
Axis of Symmetry is x=_____

Vertex: (____, _____)



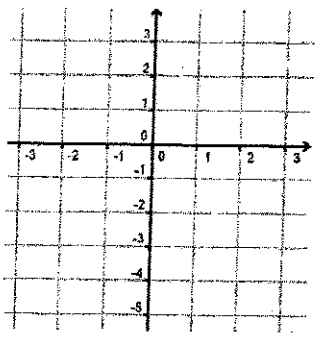
7] $y = -3x^2 - 12x + 1$
a = b = c =
Opens up or down?
Is vertex a max or min?
y-intercept:
Axis of Symmetry is x=_____

Vertex: (____, _____)



8] $y = -\frac{3}{2}x^2 + 3$
a = b = c =
Opens up or down?
Is vertex a max or min?
y-intercept:
Axis of Symmetry
is x=_____

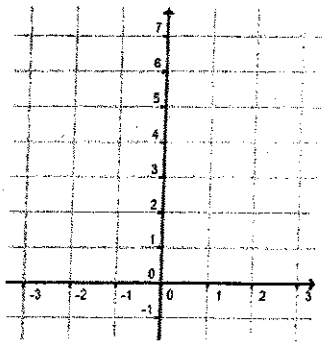
Vertex: (____, _____)



Find the coordinates (2, _____) and (-2, _____) to guide the shape of the parabola.

9] $y = 2x^2 - 1$
a = b = c =
Opens up or down?
Is vertex a max or min?
y-intercept:
Axis of Symmetry
is x=_____

Vertex: (____, _____)



Find the coordinates (2, _____) and (-2, _____) to guide the shape of the parabola.

Graphing Quadratics

Vertex Form

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

1. Vertex (h, k)
2. Axis of Symmetry $x = h$
3. Calculate y – intercept (0, y)
4. optional
   Create a table of 5 values to show symmetry.

Intercept Form

$$y = a(x-p)(x-q)$$

1. x-intercepts:
   (p, 0) and (q, 0)
2. Vertex x-coordinate:
   Find midpoint b/w x-intercepts by averaging the x-coordinates.
3. Vertex y-coordinate:
   Substitute value for x-coordinate into equation to find corresponding y-coordinate.
4. Axis of Symmetry
   $$x = \frac{p+q}{2}$$
5. Calculate y – intercept (0, y)
6. optional
   Create a table of 5 values to show symmetry.

Standard Form

$$y = ax^2 + bx + c$$

1. Vertex x-coordinate:
   $$x = \frac{-b}{2a}$$
2. Vertex y-coordinate:
   Substitute value for x-coordinate into equation to find corresponding y-coordinate.
3. Axis of Symmetry
   $$x = \frac{-b}{2a}$$
4. Calculate y – intercept (0, y)
5. optional
   Create a table of 5 values to show symmetry.

Algebra I
Graphing Quadratic Functions - B

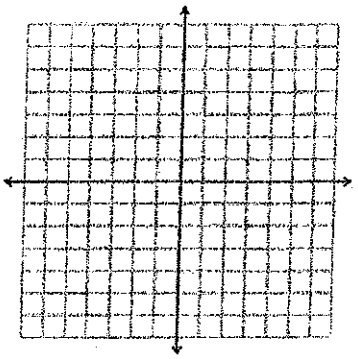
Name: _____

Date: _____ Period: _____ Score: _____/

Graph each quadratic function. Complete all the necessary steps to be able to fill in the important characteristics.

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

x	y



x-int #1: _____

x-int #2: _____

AOS: _____

Vertex: _____

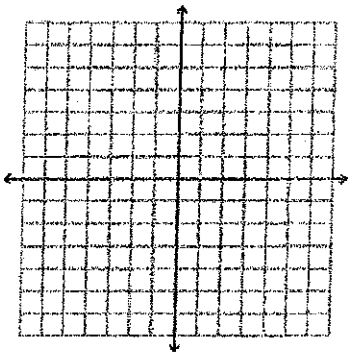
y-intercept: _____

Opens up or down? _____

Is vertex a max or min? _____

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

x	y



AOS: _____

Vertex: _____

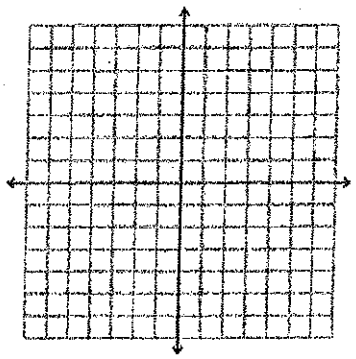
y-intercept: _____

Opens up or down? _____

Is vertex a max or min? _____

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

x	y



AOS: _____

Vertex: _____

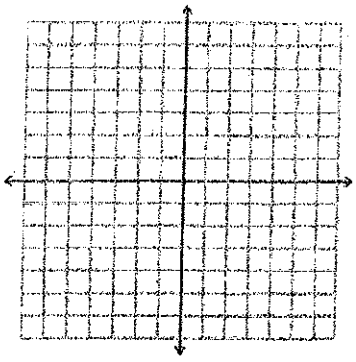
y-intercept: _____

Opens up or down? _____

Is vertex a max or min? _____

4) $h(x) = 2(x+3)(x+4)$

x	y



x-int #1: _____

x-int #2: _____

AOS: _____

Vertex: _____

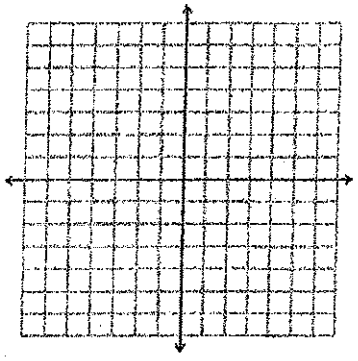
y-intercept: _____

Opens up or down? _____

Is vertex a max or min? _____

5) $f(x) = -\frac{1}{4}(x+3)^2 - 1$

x	y



AOS: _____

Vertex: _____

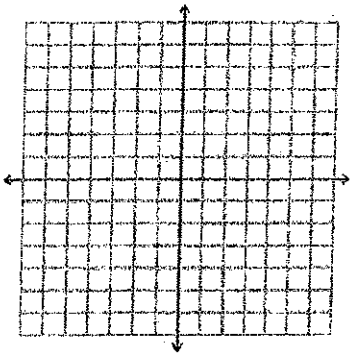
y-intercept: _____

Opens up or down? _____

Is vertex a max or min? _____

6) $g(x) = 2x^2 + 6x$

x	y



AOS: _____

Vertex: _____

y-intercept: _____

Opens up or down? _____

Is vertex a max or min? _____

Converting Quadratics

The 3 forms of quadratics are:

VERTEX: _____ STANDARD: _____ INTERCEPT: _____

INTERCEPT FORM

- To convert from standard to intercept form, factor.
- To convert from vertex to intercept form, put in standard form and then factor.

1. $y = x^2 - 3x + 2$

2. $y = x^2 - 100$

3. $y = x^2 + 3x - 18$

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

5. $y = x^2 - x - 132$

6. $y = 4x^2 + 4x + 1$

7. $y = 4x^2 + 5x - 6$

8. $y = 12x^2 + 17x + 6$

9. $y = 25x^2 - 9$

10. $y = 15x^2 + 8x - 16$

STANDARD FORM

- To convert from intercept to standard form, FOIL the binomials and then distribute the "a" value.
- To convert from vertex to standard form, FOIL the binomials and then distribute the "a" value and then combine the "k" value.

11. $y = (x-5)(x+2)$

12. $y = -\frac{1}{4}(4x-5)(x+3)$

13. $y = 3(2x-3)(x-1)$

14. $y = (3x-2)^2 + 5$

15. $y = (x-8)^2 + 13$

16. $y = 2(x+5)^2 - 23$

17. $y = -2(x-11)^2 + 17$

18. $y = (\frac{1}{3}x+4)(2x-5)$

VERTEX FORM

- To convert from intercept to vertex form, identify the vertex $\left(\frac{p+q}{2}, f(\frac{p+q}{2})\right)$ and the "a" value and plug into vertex form.
- To convert from standard to vertex form, identify the vertex $\left(-\frac{b}{2a}, f(-\frac{b}{2a})\right)$ and the "a" value and plug into vertex form.

21. $y = x^2 - 8x + 2$

22. $y = x^2 + 12x + 2$

23. $y = -2x^2 + 6x - 3$

24. $y = 4x^2 - 4x + 15$

25. $y = (x+3)(x-9)$

26. $y = 2(x+5)(x+7)$

Algebra 1
Converting Match Game

Name: _____

I worked with: _____

Start with		Letter Choice	Start With		Letter Choice
1. $f(x) = 2x^2 + 4x - 48$	S to I		8. $f(x) = 2x^2 + 4x - 48$	S to V	
2. $h(x) = -(x - 10)(x + 3)$	I to S		9. $d(x) = 2(x - 9)^2$	V to S	
3. $a(x) = \frac{1}{3}(x + 3)^2 + 5$	V to S		10. $g(x) = \frac{1}{3}(x - 1)(x - 12)$	I to S	
4. $g(x) = -3x^2 - 6x + 24$	S to V		11. $g(x) = -3x^2 - 6x + 24$	S to I	
5. $h(x) = 4x^2 - 8x + 3$	S to I		12. $h(x) = 4x^2 - 8x + 3$	S to V	
6. $f(x) = -4x^2 - 40x - 84$	S to I		13. $b(x) = x^2 - 10x - 24$	S to I	
7. $b(x) = x^2 - 10x - 24$	S to V		14. $f(x) = -4x^2 - 40x - 84$	S to V	

MATCHING BOX

A	$-4(x + 5)^2 + 16$	**G**	$-4(x + 7)(x + 3)$	**P**	$-4(x + 1)^2 - 1$
B	$2(x + 6)(x - 4)$	**H**	$2x^2 - 36x + 162$	**Q**	$(2x - 3)(2x - 1)$
C	$-3(x + 1)^2 + 27$	**J**	$4(x - 1)^2 - 1$	**R**	$2(x + 1)^2 - 50$
D	$-x^2 + 7x + 30$	**K**	$2(x - 6)(x + 4)$	**T**	$\frac{1}{3}x^2 - \frac{13}{3}x + 4$
E	$(x - 12)(x + 2)$	**M**	$\frac{1}{3}x^2 + 2x + 8$	**V**	$3(x - 4)(x + 2)$
F	$\frac{1}{3}x^2 + 6x + 8$	**N**	$-3(x + 4)(x - 2)$	**W**	$(x - 5)^2 - 49$

GOOD LUCK!!!!!! ☺

Unit 3c, Quiz 2 **CONVERTING QUADRATICS** Name: _____

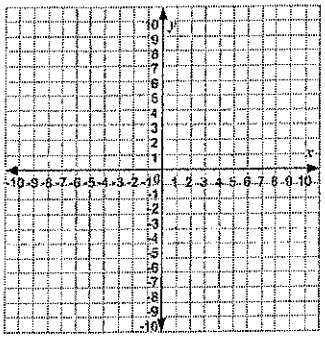
Convert the following quadratics into different forms. Then graph.

1. Convert $y = -3x^2 + 42x - 144$ from Standard form to:

a. Vertex form:

b. Intercept form

c. Graph



x-intercepts: _____ _____

a.o.s.: _____

vertex: _____

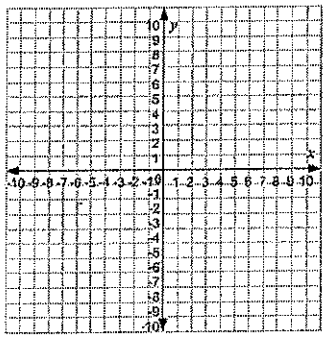
y-intercept: _____

2. Convert $y = (x+2)(x+6)$ from Intercept form to:

a. Standard form:

b. Vertex form

c. Graph



x-intercepts: _____ _____

a.o.s.: _____

vertex: _____

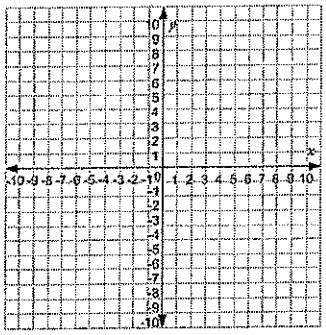
y-intercept: _____

3. Convert $y = 2(x-3)^2 - 8$ from Vertex form to:

a. Standard form:

b. Intercept form

c. Graph



x-intercepts: _____ _____

a.o.s.: _____

vertex: _____

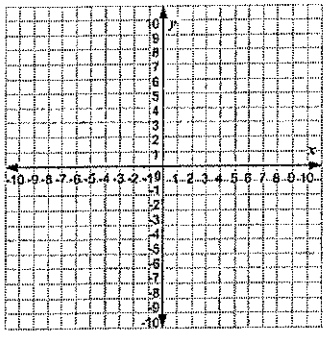
y-intercept: _____

4. Convert $y = x^2 - 2x - 8$ from Standard form to:

a. Vertex form:

b. Intercept form

c. Graph



x-intercepts: _____ _____

a.o.s.: _____

vertex: _____

y-intercept: _____