

Warm Up

- Graph Paper ...Fold it Hot Dog and a tri-hamburger. (I want 6 sections on each side)
- Label Your graphs 1 – 12.
- Get out your homework

Unit 10 Quadratics
Lesson 1: Graphing Quadratics
a...Standard Form
b...Intercept/Factored Form
c...Vertex Form

Today

- **SWBAT**....write a quadratic function and graph it. Understand a vertex and maximum/minimum.
- **F-IF.B.4** Students will interpret key features of graphs and tables in terms of quantities. Sketch graphs showing key features given a verbal description. Identify the vertex (max or min) of the graph of a quadratic. Identify the axis of symmetry of the graph of a quadratic function. Identify the x and y intercepts of a graph of a quadratic function, if they exist. Identify intervals over which the graph of a function is increasing or decreasing. Describe the end behavior of graphs.
- **F-IF.C.7a** Students will graph functions given by an equation and show characteristics such as, but not limited to, intercepts, maxima, minima, and intervals of increase or decrease. Use the table feature on a graphing calculator to aid in setting an appropriate viewing window that will allow for viewing all key features of the graph of a quadratic function. Use technology to produce the graph of a quadratic function which shows the intercepts and vertex by using an appropriate viewing window. Identify relationships between coefficients and roots, and that once roots are known, a quadratic equation can be factored. Find the intercepts, maxima, and minima from the graphing calculator either graphically or in table form.

Vocab

- **Axis of Symmetry (AoS)** – line that cuts the parabola (u or n) in half perfectly (will always be a line straight up and down $x=#$)
- **Vertex** – the middle point of a parabola
- **Maximum** – the highest point (x^2 is negative)
- **Minimum** – the lowest point (x^2 is positive)

Basic Graphs

Find the zeros and vertex to draw the graph!

- 1. $f(x) = x^2 - 12x - 28$
- 2. $f(x) = x^2 + 3x - 18$
- 3. $f(x) = -x^2 + x + 6$

Medium Graphs

Find the zeros and vertex to draw the graph!

- 1. $y = 2x^2 + 4x + 2$
- 2. $y = -3x^2 + 9x - 6$
- 3. $y = 5x^2 - 30x - 35$

Advanced Graphs

Find the zeros and vertex to draw the graph!

- 1. $y = -3x^2 - 32x + 11$
- 2. $y = 7x^2 - 4x - 3$
- 3. $y = 3x^2 + 17x + 10$

Intercept/Factored Form

Find the zeros and vertex to draw the graph!

- 1. $f(x) = -x^2 + x + 72$
- 2. $f(x) = -8x^2 - 18x + 18$
- 3. $f(x) = 16x^2 - 16x - 32$

Put it all together

Find the zeros and vertex to draw the graph!

- 1. $f(x) = (4 - x)(x + 1)$
- 2. $f(x) = (x - 2)(x - 1)$
- 3. $f(x) = (6x - 18)(2x + 8)$

Intercept/Factored Form

Find the zeros and vertex to draw the graph!

- 1. $f(x) = (x + 8)(x - 6)$
- 2. $f(x) = (x - 7)(x - 5)$
- 3. $f(x) = (9x + 27)(3x + 12)$

Intercept/Factored Form

Find the zeros and vertex to draw the graph!

- 1. $f(x) = (x + 2)(x - 4)$
- 2. $f(x) = (-x - 1)(x + 7)$
- 3. $f(x) = (3x + 9)(5x - 15)$

Vertex Form

Find the zeros and vertex to draw the graph!

- 1. $f(x) = -3(x - 2)^2 - 4$
- 2. $f(x) = 2(x + 5)^2 - 3$
- 3. $f(x) = (x + 2)^2 - 1$

Vertex Form

Find the zeros and vertex to draw the graph!

- 1. $f(x) = (x - 1)^2 - 6$
- 2. $f(x) = 2(x + 9)^2 + 8$
- 3. $f(x) = -(x + 7)^2 - 10$

Vertex Form

Find the zeros and vertex to draw the graph!

- 1. $f(x) = (x - 6)^2 + 10$
- 2. $f(x) = -6(x + 1)^2 - 7$
- 3. $f(x) = 2(x - 7)^2 - 4$

MIX IT UP

- Find the zeros and vertex to draw the graph!

$$1. f(x) = 4(x + 3)^2$$

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

$$3. f(x) = 3x^2 + 18x + 24$$

MIX IT UP

- Find the zeros and vertex to draw the graph!

$$1. f(x) = (2x + 10)(3x - 3)$$

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

$$3. f(x) = 2x^2 - 7x - 4$$

MIX IT UP

- Find the zeros and vertex to draw the graph!

$$1. f(x) = x^2 - 7x - 30$$

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

$$3. f(x) = (x - 7)(3x + 6)$$

Comparison

	Standard Form	Intercept Form	Vertex Form
Standard Form		Factor	
Intercept Form	Multiply		
Vertex Form			

Algebra 2
Re-Review 5.1

1. Complete this statement: The graph of a quadratic function is called a(n) _____.
2. Does the graph of $y = 3x^2 - x - 2$ open up or down? Explain.
3. Is $y = -2(x - 5)(x - 8)$ in standard form, vertex form, or intercept form?

Steps for Graphing Quadratic Functions:

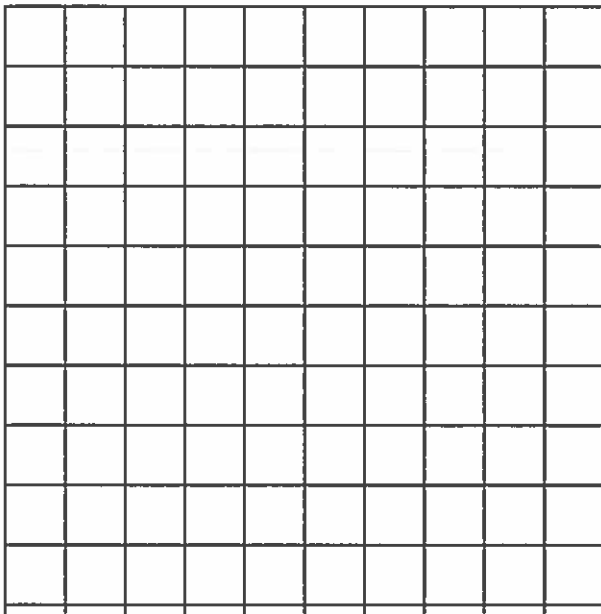
- *When given standard form $y = ax^2 + bx + c$:*
 - Find the x value of the vertex by finding $-\frac{b}{2a}$
 - Find the y value of the vertex by plugging the x value from the previous step into the function and evaluating for y
 - Put the original function into $Y=$ and go to the table of values to plot two more points on either side of the vertex
- *When given vertex form $y = a(x - h)^2 + k$:*
 - The vertex is given in the equation (h, k) ; be sure to take the opposite value for the x -coordinate from inside the parentheses
 - Put the original function into $Y=$ and go to the table of values to plot two more points on either side of the vertex
- *When given intercept form $y = a(x - p)(x - q)$:*
 - The x -intercepts are given in the function; be sure to take the opposite value than is inside the parentheses
 - Find the x value of the vertex by finding the halfway point of the x -intercepts by adding them together and dividing by two
 - Find the y value of the vertex by plugging the x value from the previous step into the function and evaluating for y

Steps for Writing Functions in Standard Form:

- *FOIL – First Outer Inner Last the two parentheses*
- *Combine like terms*
- *Distribute any constant that is in front of the parentheses*
- *Combine any other like terms*
- *If the function is given in vertex form, write the expression in the parentheses that is being squared twice, then follow the above steps*

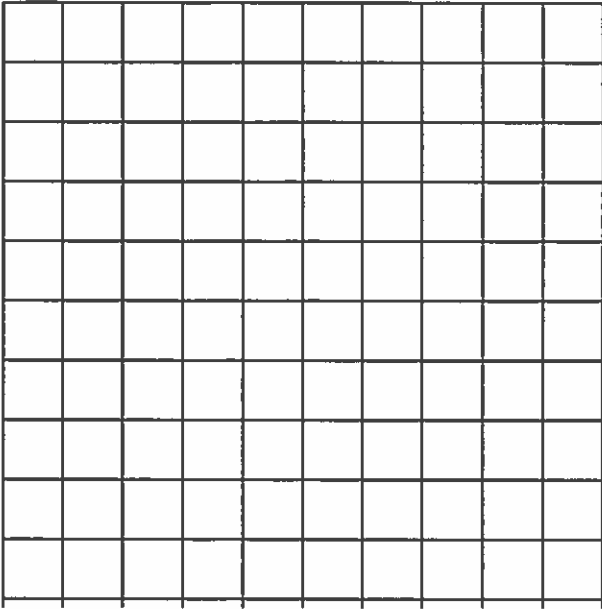
Example 1

Graph $y = x^2 - 4x + 7$. Be sure to state the vertex.

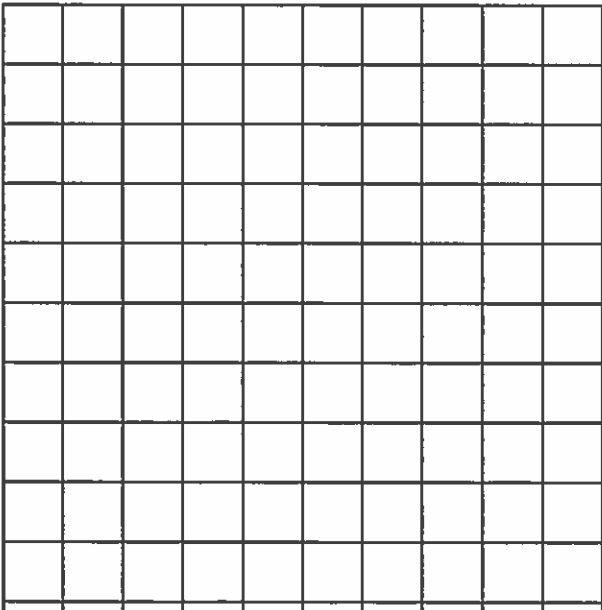


Example 2

Graph $y = 2(x + 1)^2 - 4$. Be sure to state the vertex.

**Example 3**

Graph $y = -(x + 2)(x - 1)$. Be sure to state the vertex.

**Example 4**

Write $y = -2(x + 4)(x - 3)$ in standard form.

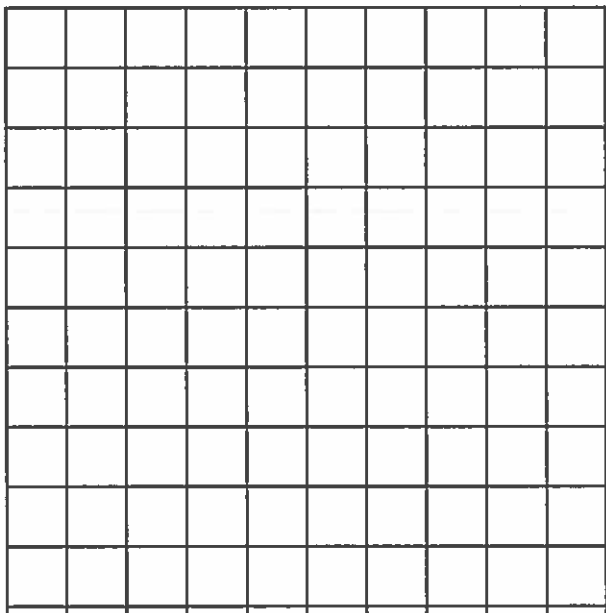
Example 5

Write $y = 4(x - 1)^2 + 5$ in standard form.

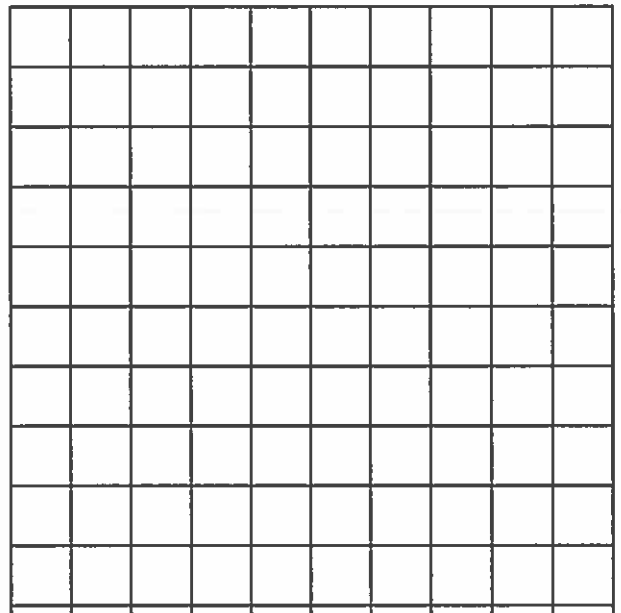
Practice

Graph the function. Be sure to state the vertex.

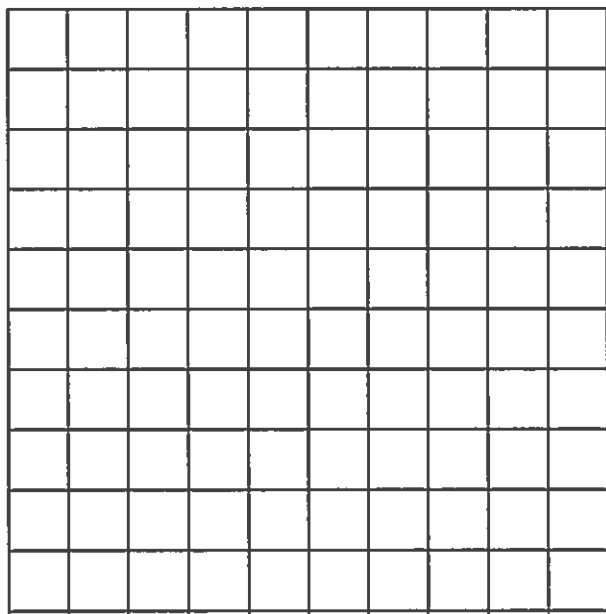
1. $y = x^2 + 3x - 4$



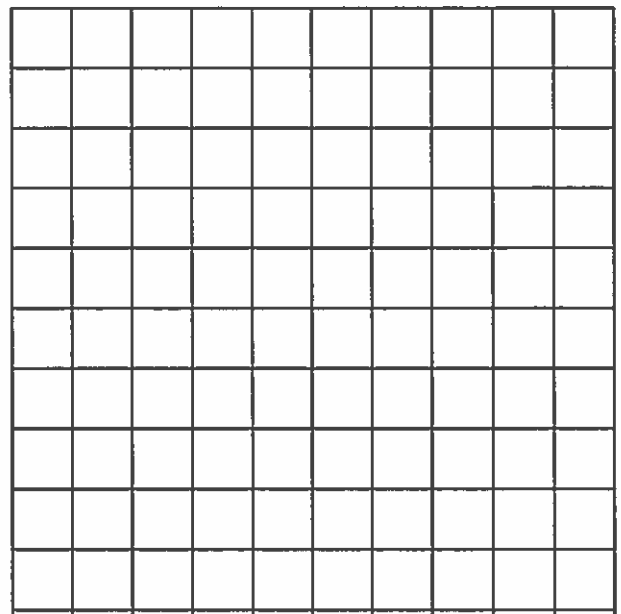
2. $y = \frac{1}{2}(x - 4)^2 + 2$



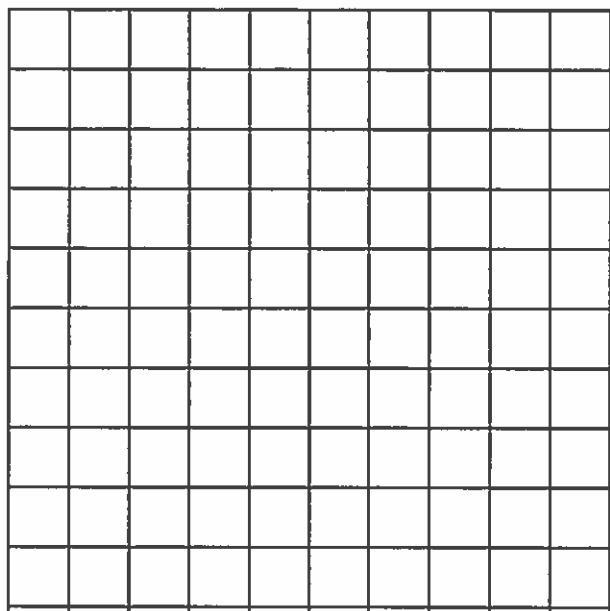
3. $y = -2x^2 + x + 5$



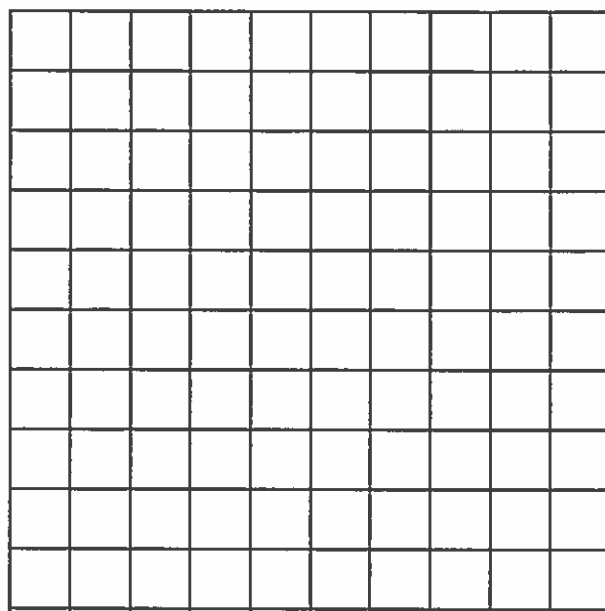
4. $y = 3(x + 4)(x - 1)$



5. $y = (x + 3)^2 - 4$



6. $y = -(x + 1)(x - 9)$



Write the function in standard form.

7. $y = (x + 1)(x + 2)$

8. $y = -(x + 2)^2 - 7$

9. $y = -\frac{1}{2}(x - 6)(x - 8)$

10. $y = \frac{2}{3}(x - 9)^2 - 4$

