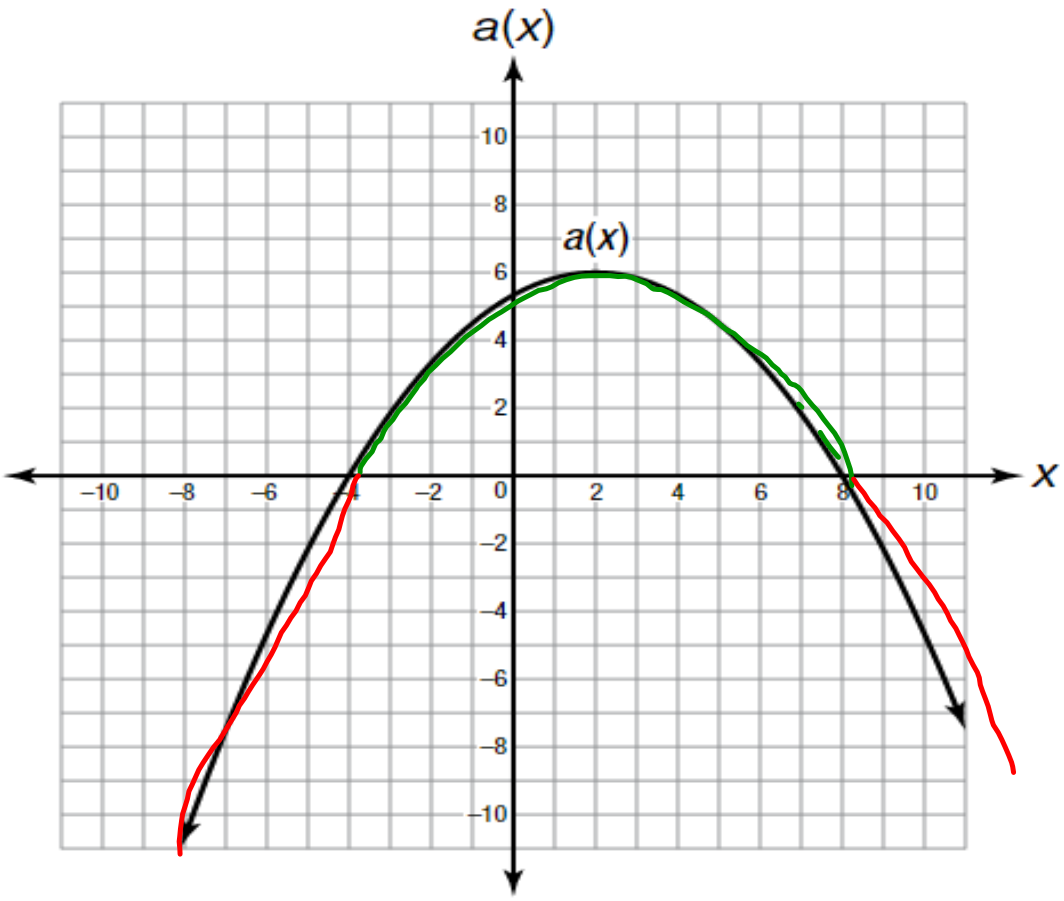
Warm-Up (EOC Type) 3/5/18

The graph below shows the function $a(x)$.



(1)

Over which interval is the function increasing and the value of the function positive?

(2)

A. $(-\infty, 2)$

B. (-4, 2)

C. (2, 8)

D.(-4, 0)

$(-4 < x < 8)$

DAY 6-5: GRAPHING IN INTERCEPT (FACTORED) FORM

Unit 3B: Quadratic Functions

Review

Graph the following equations in standard form and factor the quadratic (you may use a calculator to compute):

$a = 1$ $b = -2$ $c = 1$

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

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

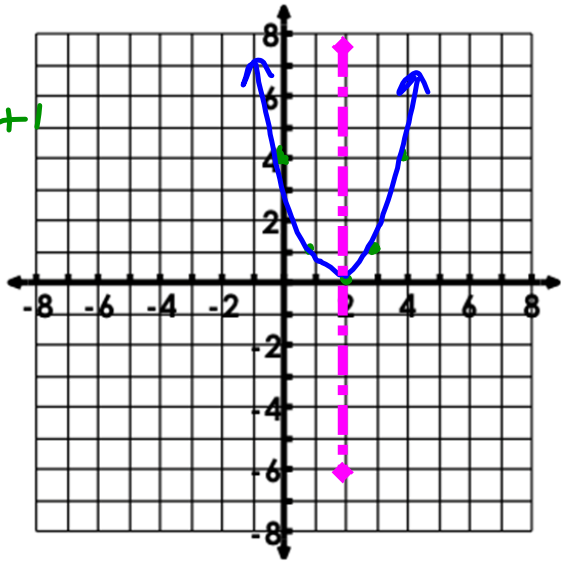
$f(1) = 0$

$x = \frac{-b}{2a}$

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

Vertex: $(1, 0)$

y-int: $(0, 1)$



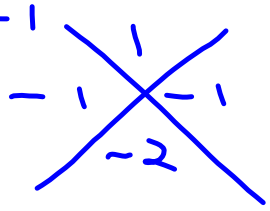
x	-1	0	1	2	3
y	4	1	0	1	4

$x^2 - 2x + 1$

Factored Form:

$(x-1)(x-1)$

$(x-1)^2$



x-int: $(1, 0)$

Review Continued

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

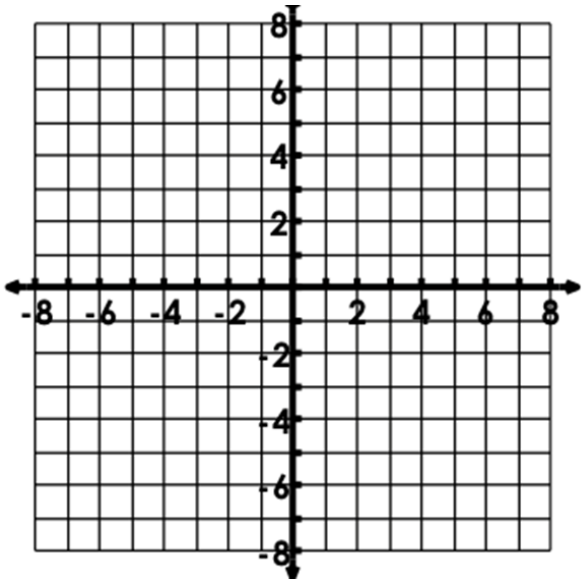
$a = 1\ b = 1\ c = -6$

$x = \frac{-b}{2a} = \frac{-1}{2(1)} = -\frac{1}{2}$

Vertex:

x					
y					

Factored Form:



What did you notice about the factored form and the x – intercepts of the graph?

The x-intercepts are the opposite of the #s in the factored form.

What did you notice about the x – value of the vertex and the x – intercepts?

The x-value of the vertex is one of the x-intercepts.

We learned in Unit 3A how to factor, but we can also graph in factored form!

Factored Form of a Quadratic Function:
$y = a(x - p)(x - q)$

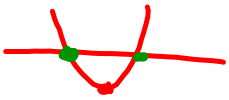
a determines how the graph opens

&

The x - intercepts are (p, 0) and (q, 0).

How do we graph in Factored Form?

Graphing in standard form is similar to graphing in standard form, but the way we find our vertex is different. We use a special formula to find the x - coordinate of our vertex, and substitute that value in our equation to determine the y - coordinate of our vertex. The formula is:



$$x = \frac{p+q}{2}$$

For example, say we have y = (x + 7) (x + 1), how would we find our vertex?

$X = \frac{-7+(-1)}{2}$

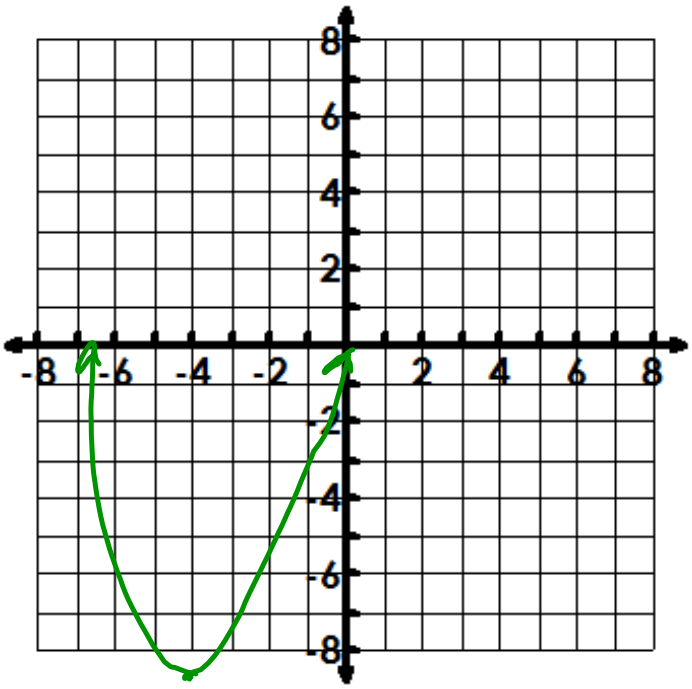
$= \frac{-8}{2}$

$X = -4$

$y = (-4+7)(-4+1)$

$y = (3)(-3) = -9$

$V = (-4, -9)$



Lets Practice!

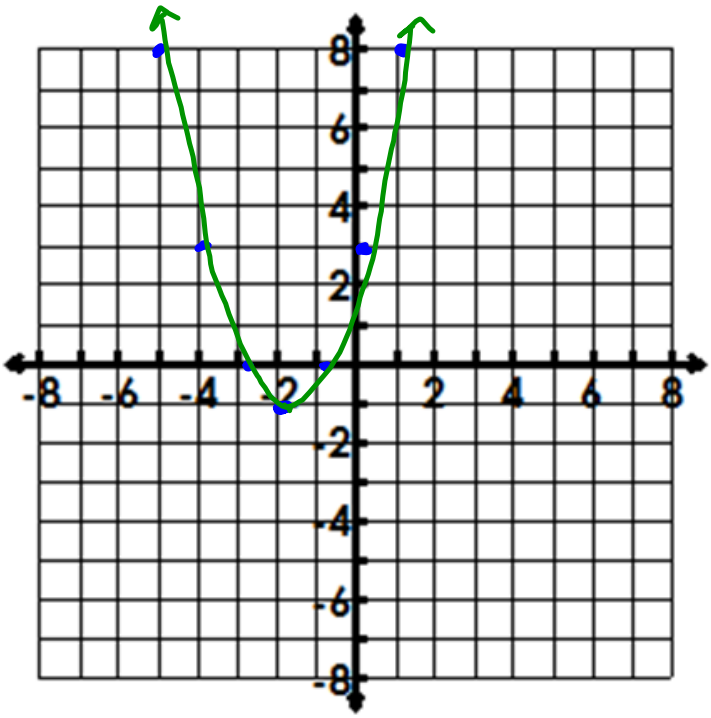
1. $y = (x+1)(x+3)$

x-intercepts: $x = -1$ & $x = -3$

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

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

Vertex = $(-2, -1)$



$1^2 = 1$

$2^2 = 4$

$3^2 = 9$

(-1+4) (-1-2)

2. $y = (x + 4)(x - 2)$

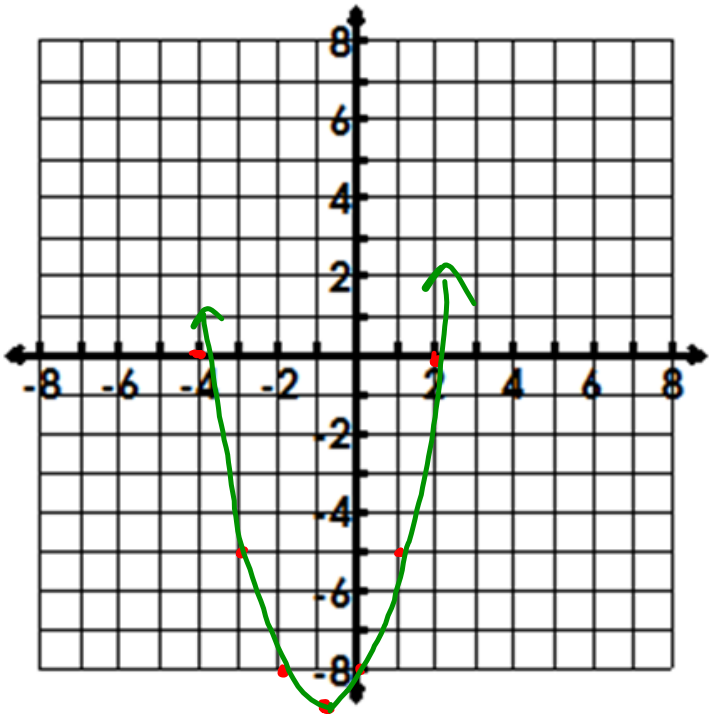
(3) (-3)

$X = \frac{-4+2}{2} = \frac{-2}{2}$

$X = -1$

x-intercepts: $X = -4$ & $X = 2$

Vertex = $(-1, -9)$



$1^2 = 1$

$2^2 = 4$

$3^2 = 9$

3. $y = -3(x - 7)(x + 3)$

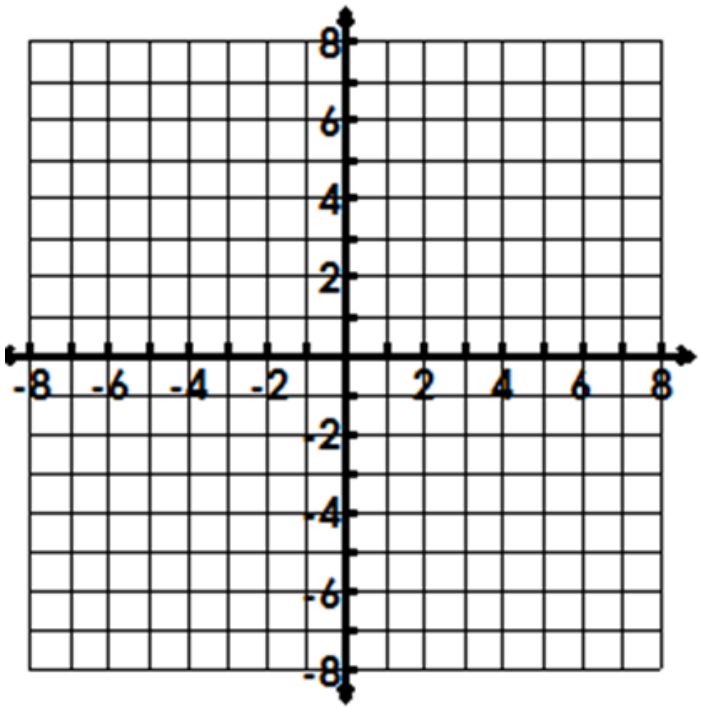
x-intercepts: $x = 7$ & $x = -3$

$x = \frac{7-3}{2} = 2$

$-3(2-7)(2+3)$

$-3(-5)(5)$

Vertex = $(2, 75)$



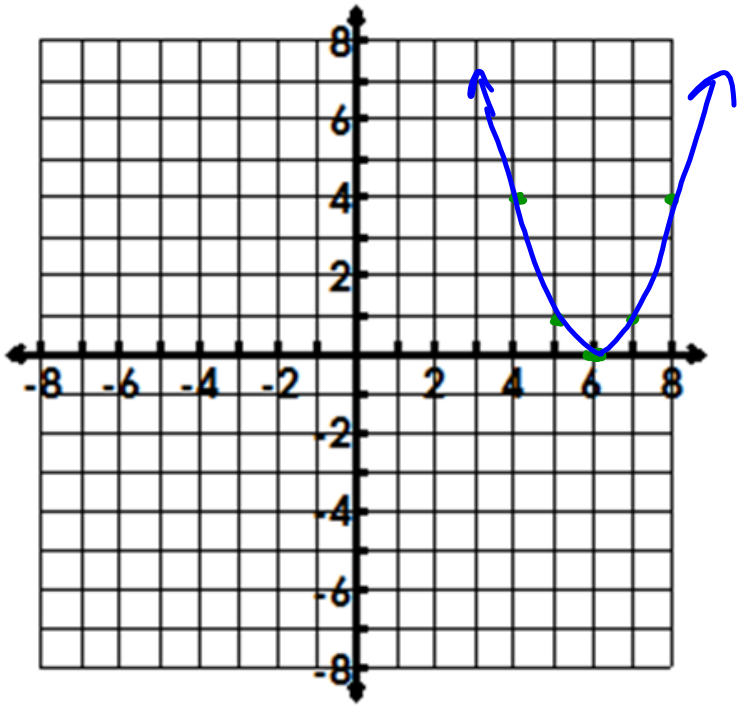
$(x-6)(x-6)$

4. $y = (x - 6)^2$

x-intercepts: $x = 6$ & _____

$x = \frac{6+6}{2} = 6$

Vertex = $(6, 0)$



Steps for Graphing in Intercept or Factored Form

1. Find the vertex. After using the formula $x = \frac{p+q}{2}$ to find our x- coordinate of our vertex, we substitute that x back into our equation, and our solution is the y-coordinate of our vertex.

2. Determine your two x – intercepts.

3. Plot your points and connect them from left to right!

EXAMPLE 1

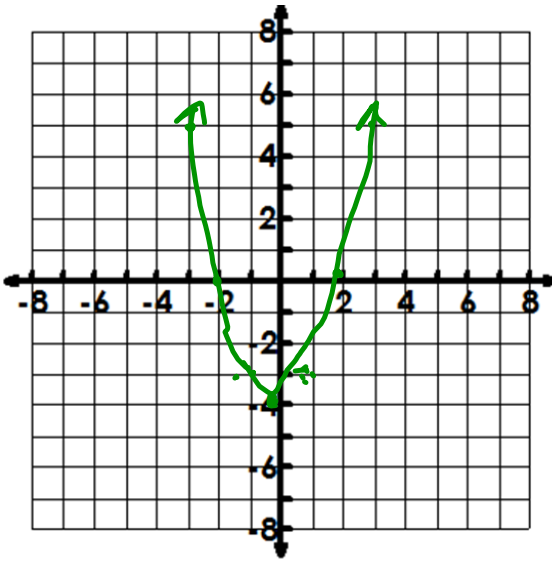
Example 1: Graph y= (x + 2)(x – 2).

x – intercepts: $(x=-2)(x=2)$

Vertex: $\frac{-2+2}{2}=0$

$f(0)=(0-2)\cdot(0+2)$

$(0,-4)$ $2\cdot-2=-4$



EXAMPLE 2

Example 2: Graph: $y = -(x+1)(x-7)$.

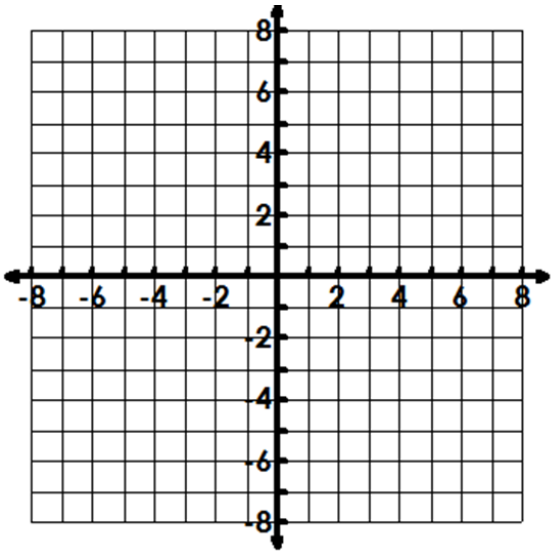
x – intercepts: $x = -1 \quad x = 7$

Vertex: $\frac{-1+7}{2} = 3$

$f(3) = -1(3+1)(3-7)$

$-1((4)(-4))$

$(3, 16) \quad -1(-16)$



EXAMPLE 3

Example 3: Graph y= 2(x -1)(x - 3).

x – intercepts:

Vertex: $x = 1$ $x = 3$

$1^2 = 1 \cdot 2 = 2$

$2^2 = 4 \cdot 2 = 8$

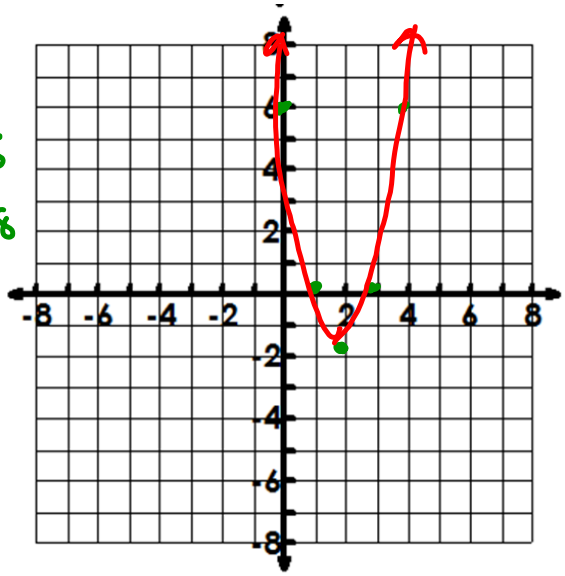
$3^2 = 9 \cdot 2 = 18$

(2, -2)

$f(2) = 2(2-1)(2-3)$

$= 2(1)(-1)$

$f(2) = -2$



EXAMPLE 4

Example 4: Graph: $y = -(x - 3)^2$ $= (x-3)(x-3)$

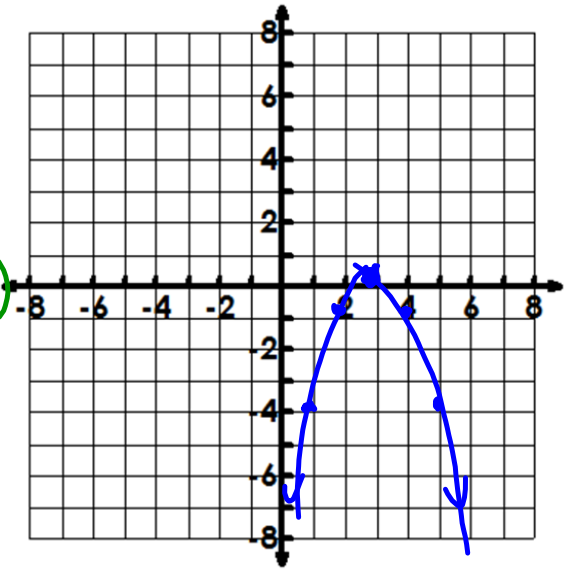
x – intercepts: $x = 3$ $V = (3, 0)$

Vertex: $\frac{3+3}{2} = 3$

$f(3) = -(3-3)(3-3)$

$0 \cdot 0$

$f(3) = 0$



HW: Day 6 Graphing in Intercept Form a - d, # 1 - 8

Due on Tuesday, 3/6/18