

## 4.2 The Vertex Form of a Quadratic Relation

April 24, 2007

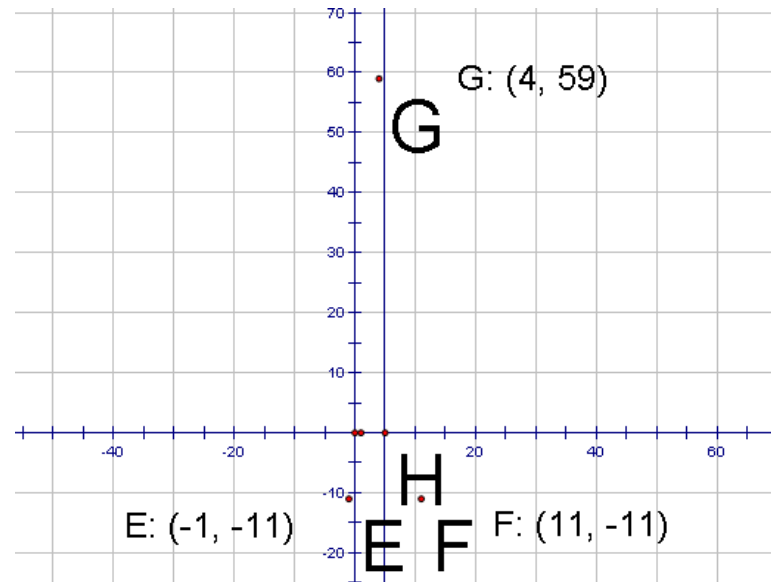
1. A parabola passes through points  $(-1, -11)$ ,  $(4, 59)$ , and  $(11, -11)$ . What are the coordinates of the vertex?

- a)  $(5, 61)$    b)  $(5, 73)$    c)  $(6, 59)$    d) There is not enough information to tell.

$$h = \frac{-1 + 11}{2}$$

$$h = \frac{10}{2}$$

$$h = 5$$



because the axis of sym is  $x=5$  and  $(4,59)$  is one to the left, and  $(6,59)$  is one to the right its more reasonable that  $(5,61)$  is the vertex than  $(5,73)$  given the step-pattern concept

2. Write each of the following in Standard Form.

a)  $y = 7(x + 2)^2 + 4$ ?

b)  $y = -2(x - 6)^2 + 1$ ?

c)  $y = (x + 3)^2 - 8$ ?

$$\begin{aligned} \text{a) } y &= 7(x+2)^2 + 4 \\ y &= 7(x+2)(x+2) + 4 \\ y &= 7(x^2 + 2x + 2x + 4) + 4 \\ y &= 7x^2 + 28x + 28 + 4 \\ y &= 7x^2 + 28x + 32 \end{aligned}$$

b)  $y = -2(x - 6)^2 + 1$ ?

$$\begin{aligned} y &= -2(x^2 - 12x + 36) + 1 \\ y &= -2x^2 + 24x - 72 + 1 \\ y &= -2x^2 + 24x - 71 \end{aligned}$$

c)  $y = (x + 3)^2 - 8$ ?

$$(x+3)(x+3)$$

$$y = x^2 + 6x + 9 - 8$$

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

3. What is the  $y$ -intercept of the relation  $y = 4(x - 2)^2 - 11$ ?

- a) -11   b) -2   c) 4   **d) 5**

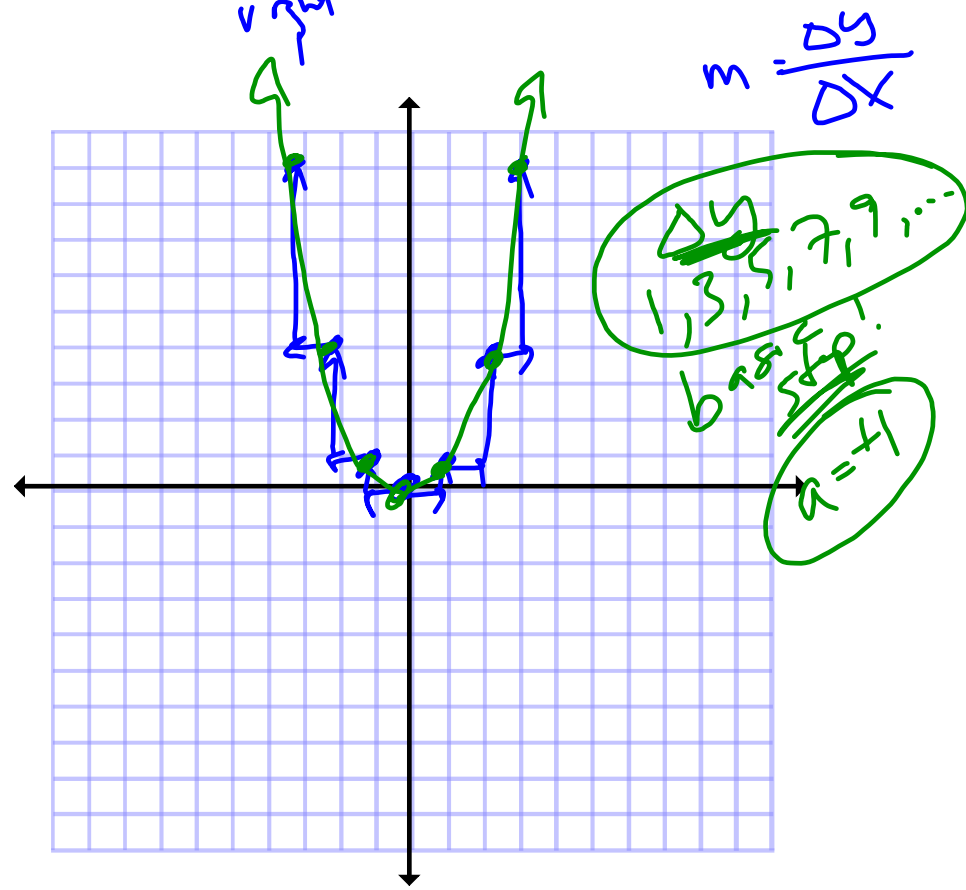
$$\begin{aligned}x &= 0 \\y &= 4(-2)^2 - 11 \\y &= 4(4) - 11 \\y &= 16 - 11 \\y &= 5 \quad (0, 5)\end{aligned}$$

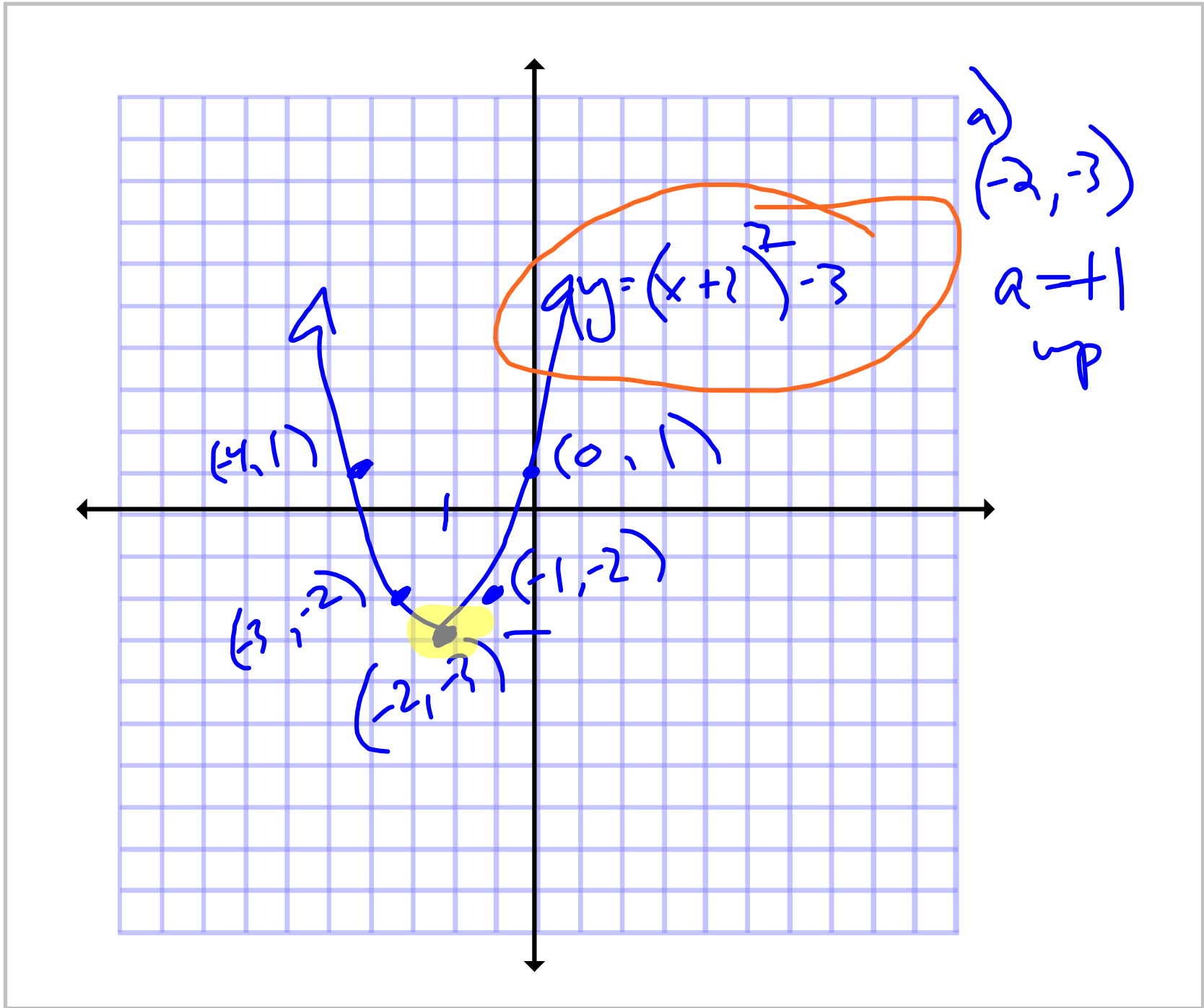
# THE STEP PATTERN

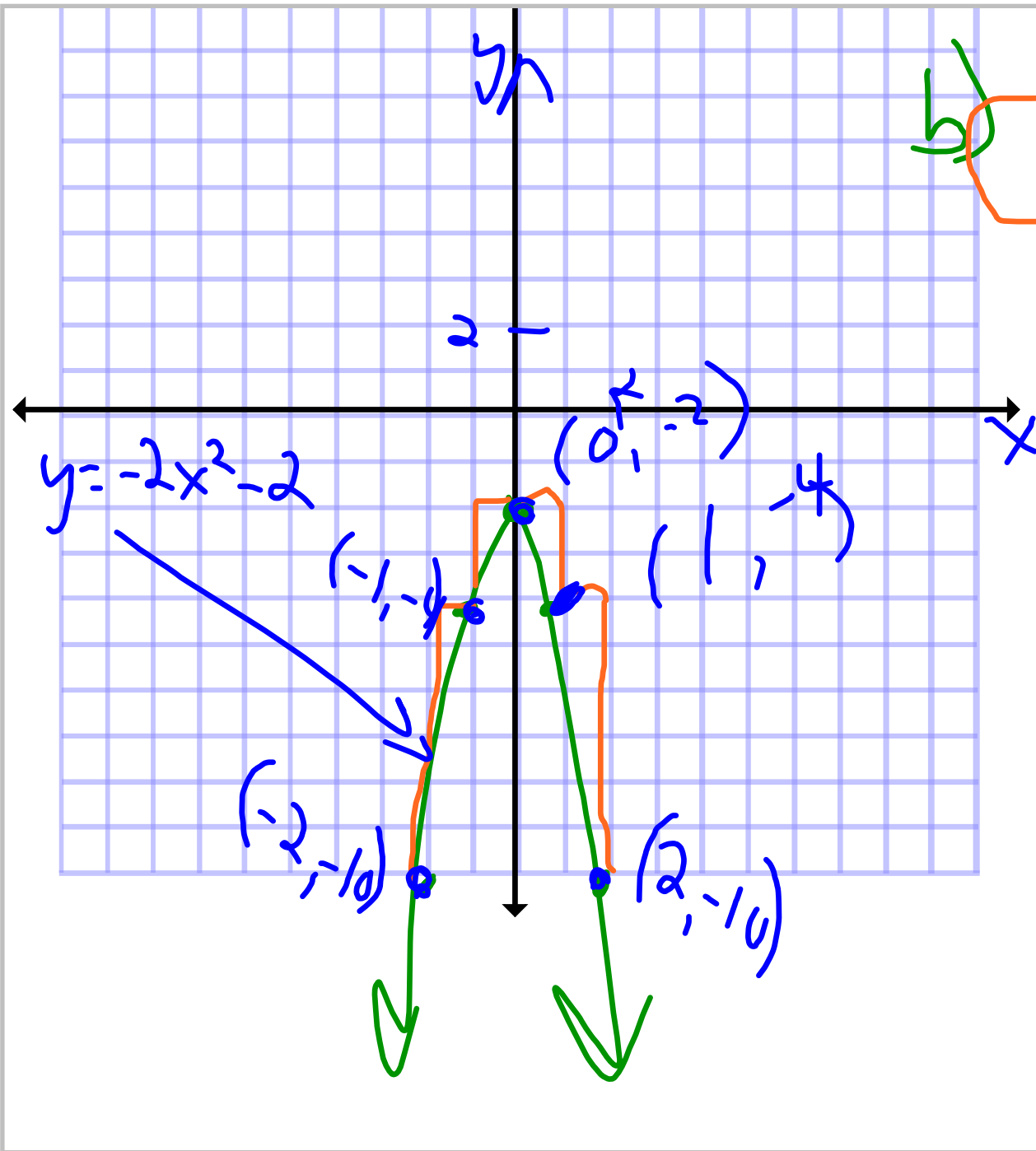
1. Complete the table of values for  $y = x^2$  and graph using the slopes.

\*  $y = x^2$  is the simplest quadratic because  $bx = 0$ ,  $c = 0$ , and  $a = +1$

x	y	Delta y	Delta x	Slope		x	y	Delta y	Delta x	Slope
0	0	1	1	1/1		0	0	1	-1	1/-1
1	1	3	1	3/1		-1	1	3	-1	3/-1
2	4	5	1	5/1		-2	4	5	-1	5/-1
3	9	7	1	7/1		-3	9	7	-1	7/-1
4	16	9	1	9/1		-4	16	9	-1	9/-1
5	25					-5	25			







b)  $y = -2x^2 - 2$

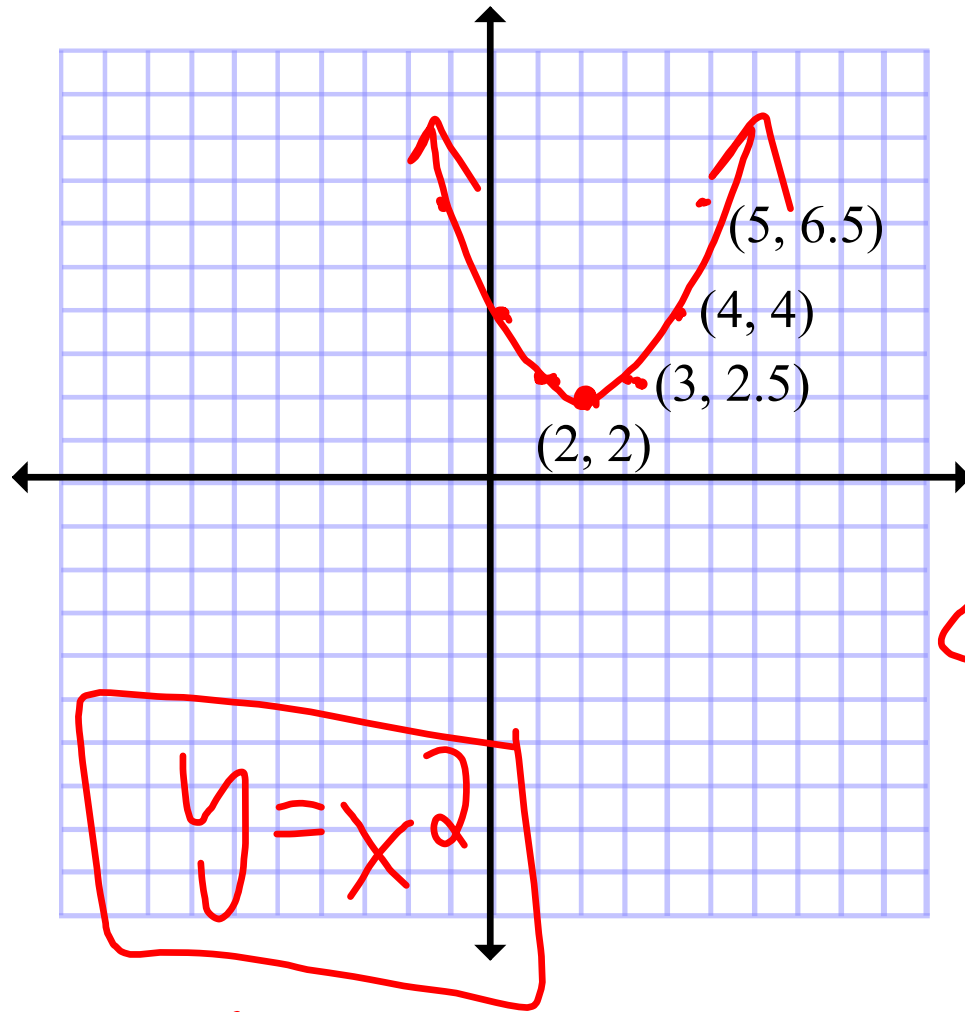
$h = 0$

$(x - 0)$

$(x - 0)^2 = -2$

$(0, -2)$   
 $a = -2$

$-2, -4, -10, -18, \dots$



(0, 0)  
 ...  
 ...

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

$$h = 2$$

$$k = 2$$

$$(2, 2)$$

$\Delta y$

$$a = \frac{1}{2}$$

1, 3, 5, ...  
 $\frac{1}{2}, 1\frac{1}{2}, 2\frac{1}{2}, \dots$

#3. important numbers to remember... 1, 3, 5, 7, 9...

\*remember to multiply the numbers above by...

"a" .....  $y = a(x-h) + k$

#4. to use the step pattern, the equation must be in...  
vertex form

#5. to use the step pattern, plot the vertex first, then  
use the new step to plot points, then draw your  
parabola through the points

\*of course, label everything used

