Advanced Algebra (H) Date _____

Quadratics 2.2 (Intercept Form; Increasing and Decreasing Parts of the Function)

I. Graph a quadratic function in standard form

Graph: $f(x) = -2x^2 - 8x + 1$

Label the axis of symmetry.

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

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

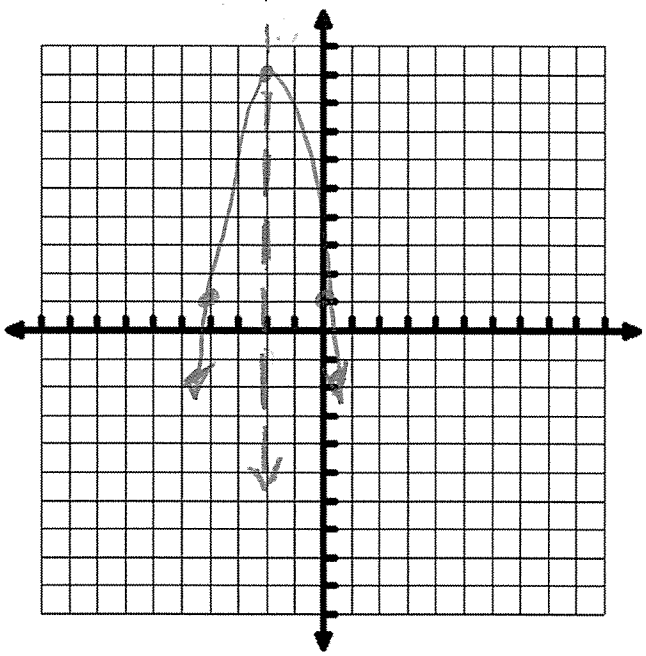
$f(-2) = -2(-2)^2 - 8(-2) + 1$

$= 9$

$(-2, 9)$

y-int = $(0, 1)$

sym pt $(-4, 1)$



II. A quadratic function in INTERCEPT FORM.

A quadratic function in the intercept form : $f(x) = a(x - p)(x - q)$

The axis of symmetry is $\frac{p+q}{2}$.

Graph: $f(x) = -2(x + 3)(x - 1)$

(What information can you find to help you with the graphing?)

$a = -\#$ → ↶↷

x-intercepts = $(-3, 0)$ $(1, 0)$

axis of sym: $\frac{-3+1}{2} = -1 \Rightarrow x = -1$

vertex = $(-1, 8)$

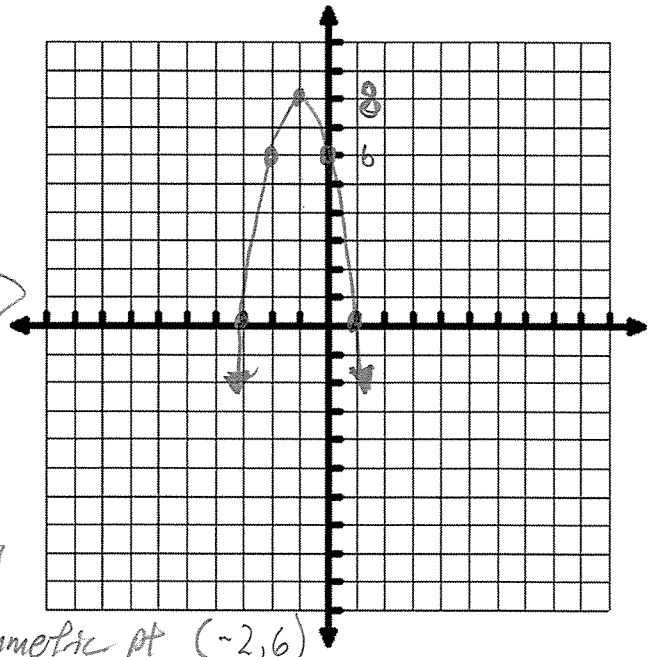
$f(-1) = -2(-1+3)(-1-1)$

$= 8$

y-int: $f(0) = -2(3)(-1)$ $(0, 6)$

$= 6$

Symmetric pt $(-2, 6)$



Graphing calculator mini-lesson: You can check your results by using the "TABLE" function on a graphing calculator. Do this by pressing "2nd" and "Graph". How can you find the vertex on this table.?

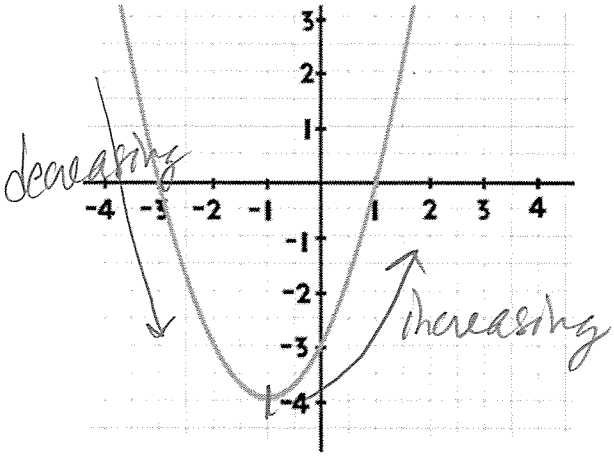
III. Identifying the increasing and decreasing parts of a quadratic function.

Example A:
Identify the vertex: $(-1, -4)$

Identify in interval notation the domain at which the graph....

is increasing: $(-1, \infty)$

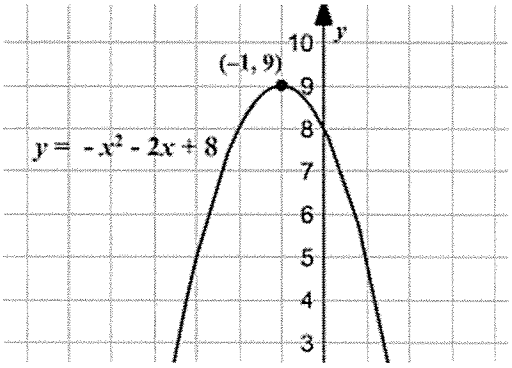
is decreasing: $(-\infty, -1)$



Example B:
Identify in interval notation the domain at which the graph....

is increasing: $(-\infty, -1)$

is decreasing: $(-1, \infty)$

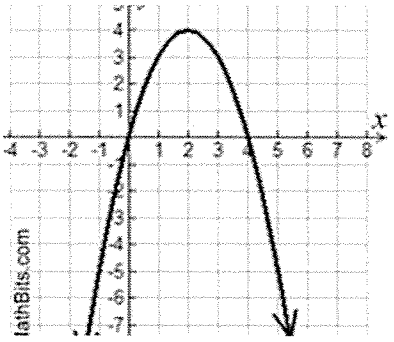


Example C:
Identify in interval notation the domain at which the graph....

is increasing: $(-\infty, 2)$

is decreasing: $(2, \infty)$

vertex $(2, 4)$



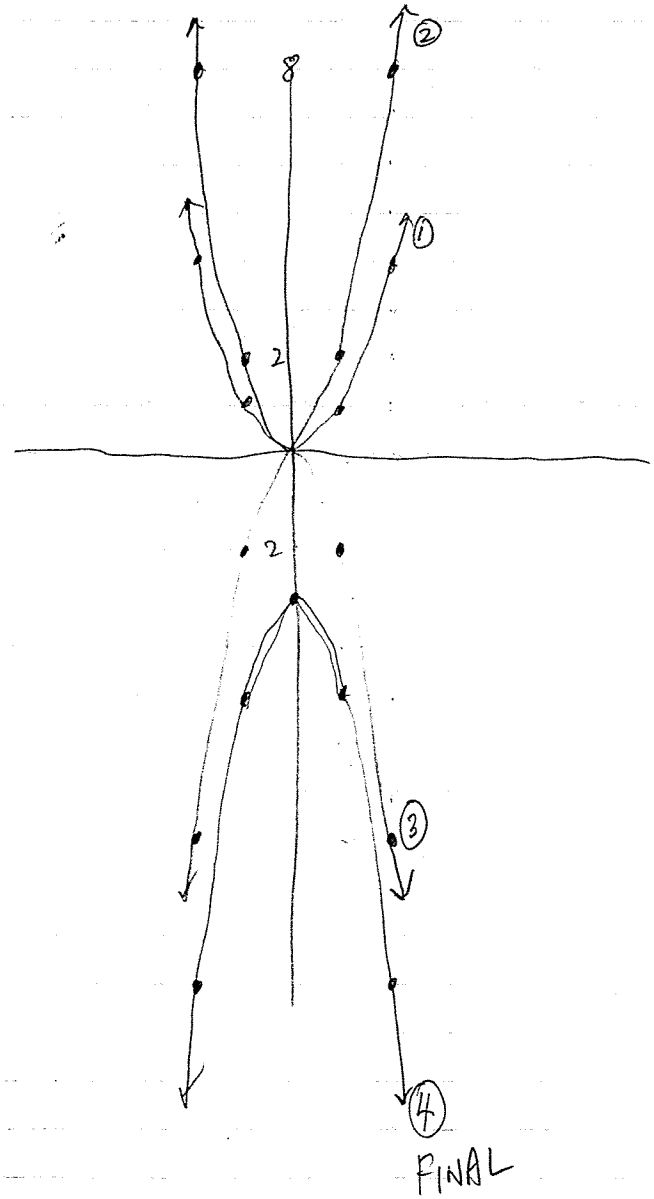
Ex 1

$y = x^2$

vertical sketch (factor of 2) $y = 2x^2$

reflection x-axis $y = -2x^2$

translate 3 down $y = -2x^2 - 3$



Ex 2

$y = x^2$

translate 3 down $y = x^2 - 3$

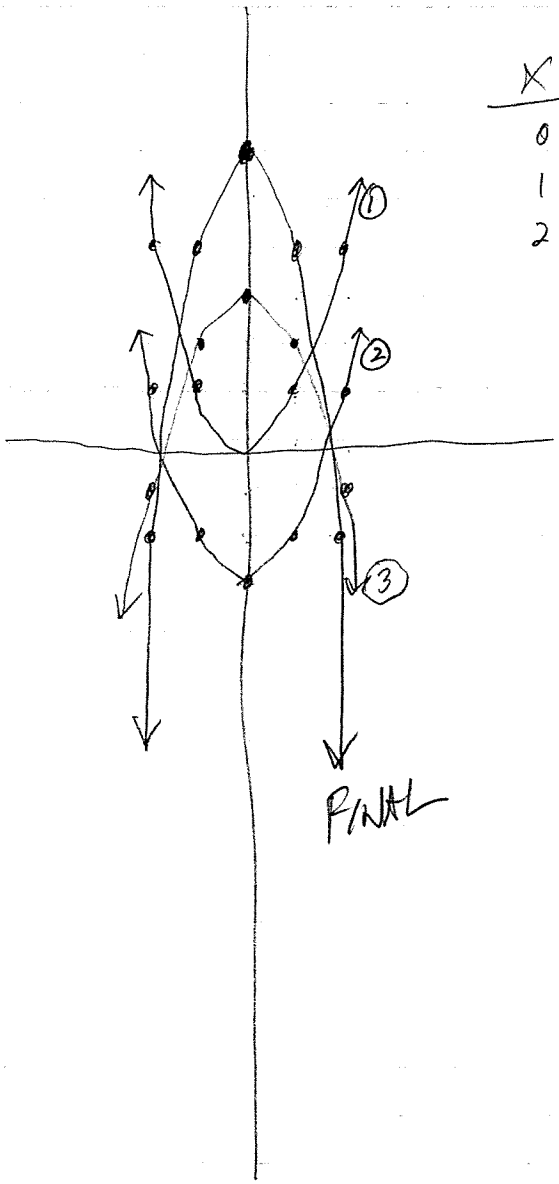
reflect x-axis $y = -(x^2 - 3)$

$y = -x^2 + 3$

vertical sketch factor of 2 $y = 2(-x^2 + 3)$

$= -2x^2 + 6$

x	y
0	6
1	4
2	-2



Advanced Algebra (H) Date _____

Quadratics 2.1 Writing equations of Transformations of Quadratic Functions

Question: Is the order of the transformations important?

Example 1: The function $y=x^2$ undergoes a vertical stretch by a factor of 2, then a reflection across the x-axis, and then a translation 3 units down. Write a rule for g, the new function, and identify the vertex. Check with your calculator.

① $h(x) = 2x^2$

② $h(x) = -2x^2$

③ $g(x) = -2x^2 - 3$ $\Rightarrow$ $g(x) = -2(x-0)^2 - 3$

vertex $(0, -3)$

Example 2: The function $y = x^2$ is translated 3 units down, then reflected across the x-axis, followed by a vertical stretch by a factor of 2. Write a rule for g, the new function, and identify the vertex. Check with your calculator.

① $h(x) = x^2 - 3$

② $h(x) = -(x^2 - 3)$

$= -x^2 + 3$

③ $h(x) = 2(-x^2 + 3)$

④ $g(x) = -2x^2 + 6$

$g(x) = -2(x-0)^2 + 6$

vertex $(0, 6)$

* See graphs →

Example 3: Let the graph of g be a translation 3 units right and 2 units up, followed by a reflection in the y-axis of the graph of $f(x) = x^2 - 5x$. Write a rule for g.

Working function

① $h(x) = f(x-3) + 2$ ← shift f up 2x

↑ Input into f

② $h(x) = (x-3)^2 - 5(x-3) + 2$ plug $(x-3)$ into $f(x)$

$= x^2 - 6x + 9 - 5x + 15 + 2$ } simplify

③ $h(x) = x^2 - 11x + 26$

④ Reflection: $h(-x) = (-x)^2 - 11(-x) + 26$

⑤ final: $g(x) = x^2 + 11x + 26$