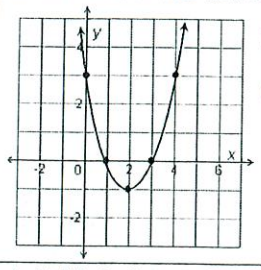
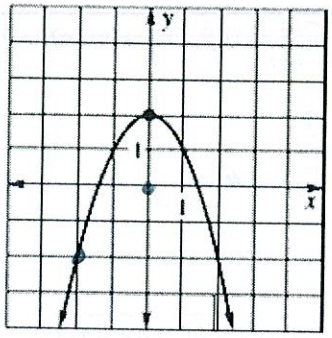
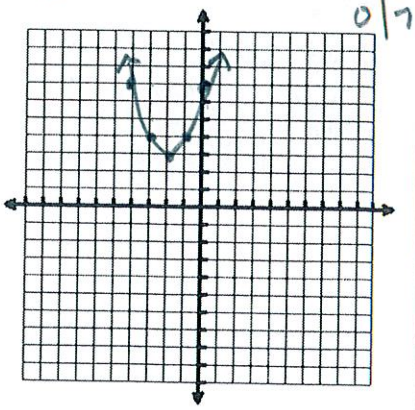
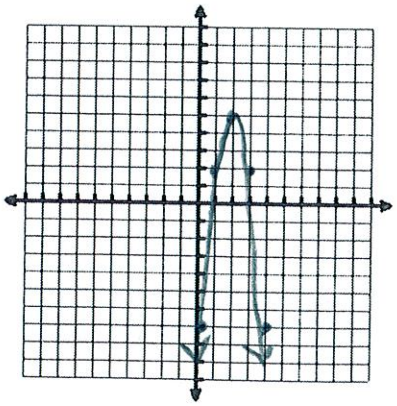
Algebra I
Unit 3B Review – Graphing Quadratics

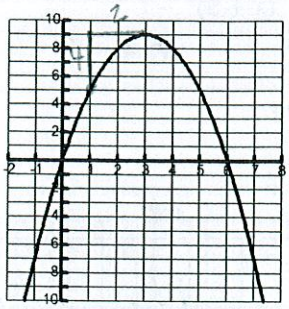
Name:_____
Date: _____ Period: _____

What you need to know & be able to do	Things to remember	Examples	
1. Describe transformations from an equation or graph	$Y = a(x-h)^2 + k$ a: stretches/shrinks & reflects h: shifts left & right k: shifts up & down vertex: (-h, k)	1. Describe the transformations and name the vertex: $y = -2(x+3)^2 - 9$ Reflection Stretch Left Down	2. Describe the transformations:  Right 2 Down 1
2. Create a function using transformations	Determine your, a, h, and k values	3. Opens down, shifts up 3 units and shrinks by ¼ $\frac{1}{4}(x-0)^2+3$ $\frac{1}{4}x^2+3$	4. Shifts left 5 and reflects across the x-axis $-(x+5)^2$
3. Describe all characteristics of a quadratic function		5.  $(-2,-2)$ $\frac{2--2}{0--2} = \frac{4}{2}$ $(0,2)$ Vertex: (0,2) Axis of Symmetry: x = 0 Interval of Increase: (-∞,0) Interval of Decrease: (0, ∞) Extrema: MAX Max/Min Value: y = 2 Domain: (-∞,∞) Range: (-∞, 2) Y-Intercept: (0, 2) Zeroes: (-1.5, 0) (1.5,0) End Behavior: As x → -∞, y → -∞ As x → ∞, y → -∞ R.O.C on the interval $-2 \le x \le 0$: 2	
4. Graph a function in standard or vertex form	1. Find your vertex. 2. Create a table with 3 values to the left and right of vertex. 3. Graph	6. $y = x^2 + 4x + 7$ $x = \frac{-b}{2a}$ $(x+2)^2+3$ $= \frac{-4}{2(1)}$ $x = -2$ $(-2)^2 + 4(-2) + 7$ 3 x | y -4 | 7 -3 | 4 -2 | 3 -1 | 4 0 | 7 	7. $y = -3(x-2)^2 + 5$ x | y 0 | -7 1 | 2 2 | 5 3 | 2 4 | -7 

5. Convert a function from vertex to standard form	Remember to multiply your "a" value after you have multiplied your binomials	8. $y = (x+2)^2 - 8$ $(x+2)(x+2)$ $x^2+2x+2x+4$ $x^2+4x+4-8$ $\boxed{x^2+4x-4}$	9. $y = -3(x-5)^2 + 1$ $(x-5)(x-5)$ $x^2-5x-5x+25$ $-3(x^2-10x+25)$ $-3x^2+30x-75+1$ $\boxed{-3x^2+30x-74}$
6. Convert a function from standard form to vertex form.	Find the vertex and identify your "a" value.	10. $y = -x^2 - 14x - 59$ $x = \frac{-b}{2a}$ $= \frac{14}{2(-1)}$ $= -7$ $\boxed{-(x+7)^2 - 10}$ $-(-7)^2 - 14(-7) - 59$	11. $y = x^2 + 6x + 9$ $x = \frac{-b}{2a}$ $= \frac{-6}{2(1)}$ $x = -3$ $\boxed{(x-3)^2}$ $(-3)^2 + 6(-3) + 9$
7. Find the average rate of change given an equation	Find two points and then use slope formula	12. Calculate the average rate of change for $y = x^2 + 1$ on the interval $0 \le x \le 2$. $(0, 1)$ $(2, 5)$ $\frac{5-1}{2-0} = \frac{4}{2} = 2$	
8. Apply properties of quadratics to solve problems	Decide what your x and y represents. Make sure you answer what the question was asking	13. The equation for the cost of manufacturing lawn mowers is $y = 0.008x^2 - 0.04x + 75$. What number of lawn mowers should be produced to minimize costs? What is the minimum cost? $x = \frac{-b}{2a}$ $= \frac{0.04}{2(.008)}$ $x = 2.5$ You need a min. of 2.5 lawn mowers to produce the min cost of $74.95	14. The height in feet of a rocket after x second is given by $y = -16x^2 + 128x$. What is the maximum height reached by the rocket and how long does it take to reach that height? $x = \frac{-b}{2a}$ $= \frac{-128}{2(-16)}$ $x = 4$ It takes 4 sec to reach the max height of 256 ft.

9. Compare quadratic functions		15. Compare the vertex, y-intercept, and rate of change from $1 \le x \le 2$ for each of the functions. Which function has the highest vertex, largest y-intercept, and greatest rate of change?

A.



Vertex: (3,9) Y-int: (0,0) Avg R of C: 2

Greatest ROC

B.

X	Y
0	-26
1	-12
2	-2
3	4
4	6
5	4
6	-2

Vertex: (4,6) Y-int: (0,-26) Avg R of C: 10

(1, -12)
(2, -2)

$\frac{-2 - -12}{2-1} = \frac{-2+12}{1}$

C. $y = -x^2 + 4x + 6$

Vertex: (2,10) Y-int: (0,6) Avg R of C: 1

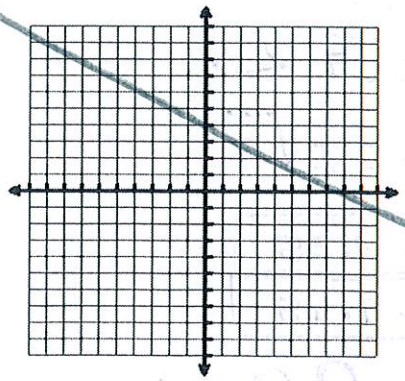
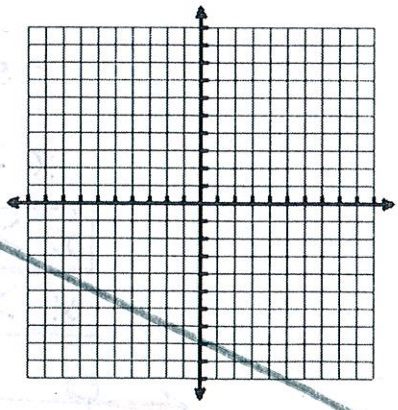
highest Largest

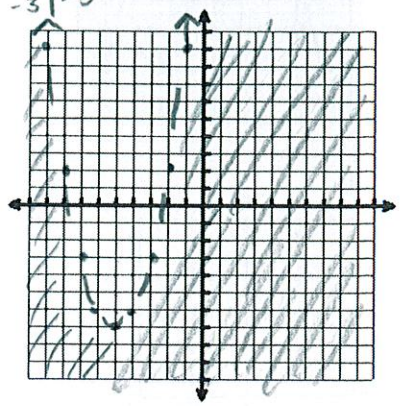
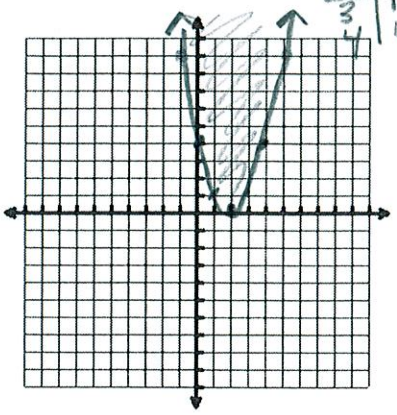
$x = \frac{-b}{2a}$

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

$x = 2$

(1, 9)
(2, 10)

12. Graph and solve systems of quadratics	Types of Solutions: Two solutions One solution No Solution	16. Solve: $y = x^2 + 4x - 5$ $y = 2x - 5$  Solution:	17. Solve: $y = x^2 + 8x + 6$ $y = 6x + 6$  Solution:

11. Graph quadratic inequalities * NO graphing inequal. on test *	Bonus practice Don't forget to shade and use solid/dashed lines	18. $y < (x+5)^2 - 7$ $0 < -7$? X | y -7 | -3 -6 | -6 -5 | -7 -4 | -6 -3 | -3  Name a point that is a solution: (0,0) Name a point that is not a solution: (-4,0)	$0 \geq 4$ X 19. $y \geq x^2 - 4x + 4$ $(x-2)^2$ X | y 0 | 4 1 | 1 2 | 0 3 | 1 4 | 4  Name a point that is a solution: (2,5) Name a point that is not a solution: (0,0)

Solve:

Solve using SQRT →

$y < (x+5)^2 - 7$

$0 < (x+5)^2 - 7$

$\sqrt{7} < \sqrt{(x+5)^2}$

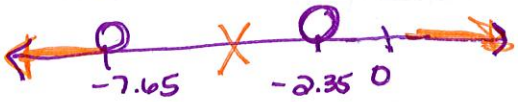
$\pm\sqrt{7} < x+5$

$-5 \pm \sqrt{7} < x$

$x > -5 \pm \sqrt{7}$

$\boxed{x > -2.35}$

$\boxed{x > -7.65}$



$(-\infty, -7.65) \cup (-2.35, \infty)$

$y \geq x^2 - 4x + 4$

$0 \geq x^2 - 4x + 4$

$0 \geq (x-2)(x-2)$

$x - 2 \leq 0 \quad x - 2 \leq 0$

$x \leq 2 \quad x \leq 2$

$[2, \infty)$