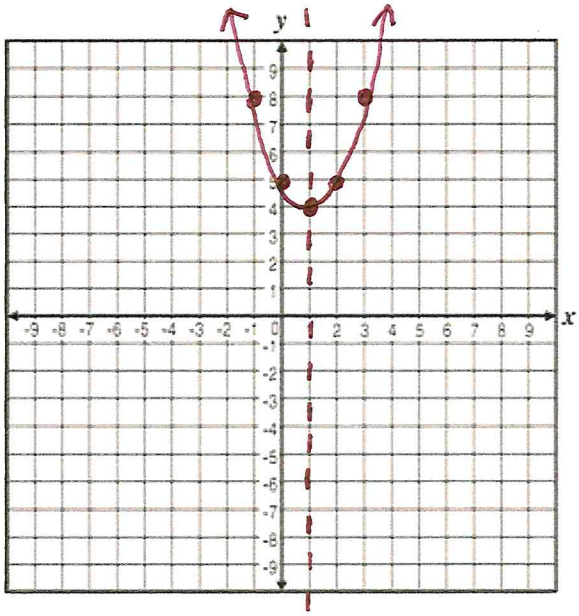
Name: Key Hour: _____ Date: _____

Quadratics Unit Test Review

- **Part 1 (Non-Calculator): Wednesday, December 20**
- **Part 2 (Calculator): Thursday, December 21**
- There will be cumulative material from past tests in a multiple-choice format, like the final exam will be at the end of the semester. These concepts are not covered in this review.

Non-Calculator Section:

1. Graph the following quadratic equations in *standard form*. Be sure to identify all key features and fill in the table with the ordered pairs you are plotting on the graph. Show all work!



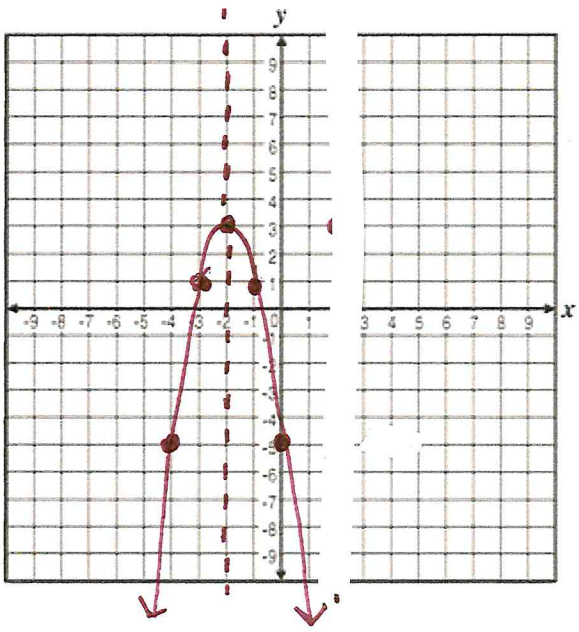
a) $y = x^2 - 2x + 5$

i) Axis of Symmetry: $x = 1$

ii) Vertex: $(1, 4)$

iii) Y-Intercept: $(0, 5)$

x	1	0	2	-1	3
y	4	5	5	8	8



b) $y = -2x^2 - 8x - 5$

i) Axis of Symmetry: $x = -2$

ii) Vertex: $(-2, 3)$

iii) Y-Intercept: $(0, -5)$

iv) Is the vertex a max of min?

x	-2	0	-4	-1	-3
y	3	-5	-5	1	1

2. Graph the following quadratic equations in *vertex form*. Be sure to identify all key features and fill in the table with the ordered pairs that you are plotting on the graph. Show all necessary work!

a) $y = -(x-2)^2 + 1$

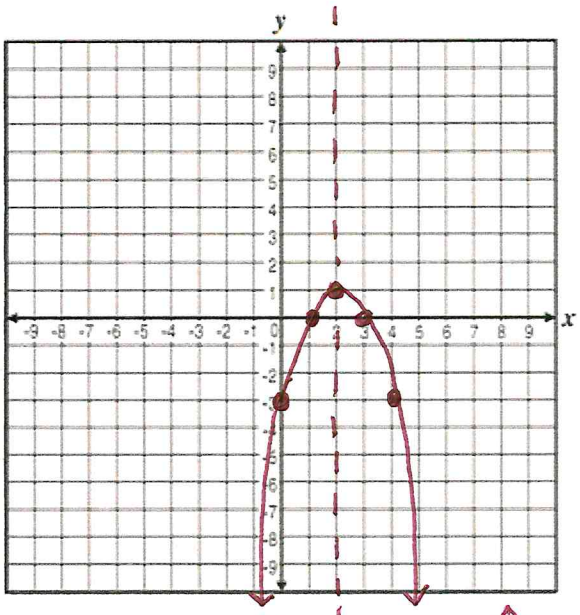
i) Vertex: (2, 1)

ii) Axis of Symmetry: $x = 2$

iii) Y-Intercept: (0, -3)

iv) Is the vertex a max or a min?

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



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

i) Vertex: (4, 1)

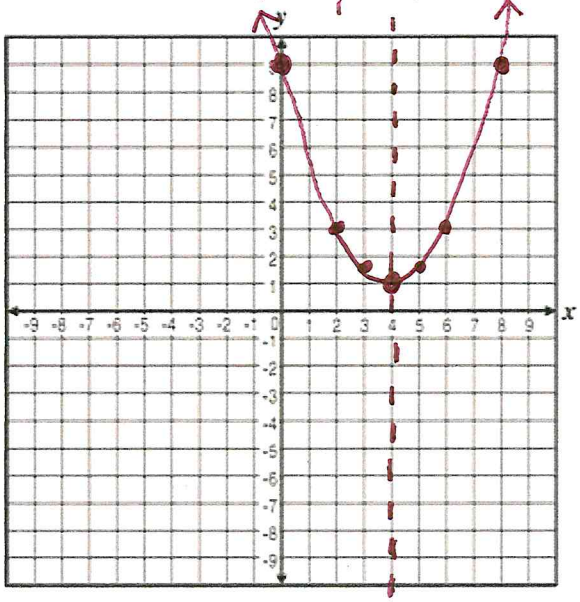
ii) Axis of Symmetry: $x = 4$

iii) Y-Intercept: (0, 9)

iv) Is the vertex a max or a min?

v)

x	4	0	8	3	5
y	1	9	9	1.5	1.5



3. Compute the sum, difference or product of the following complex numbers. **Use a separate sheet of paper to show your work to receive credit.** See next page for answers

59. $(2 + 3i)(4 + 5i)$ **60.** $(5 + 4i) - (-1 - 2i)$ **61.** $(1 + 2i)(-1 - 2i)$

62. $(-1 + 4i)(1 - 2i)$ **63.** $(6 + 2i) + (1 - 2i)$ **64.** $(3 + 2i)(3 + 2i)$

65. $(-2 + 3i) + (4 + 5i)$ **66.** $(5 + 4i)(1 + 2i)$ **67.** $(-1 - 5i)(-1 + 5i)$

4. Simplify the complex radicals.

a) $\sqrt{-36} = \pm 6i$ c) $\sqrt{-100} = \pm 10i$ e) $\sqrt{-81} = \pm 9i$ f) $\sqrt{-49} = \pm 7i$

b) $\sqrt{-20} = \pm 2i\sqrt{5}$ d) $\sqrt{-28} = \pm 2i\sqrt{7}$ f) $\sqrt{-300} = \pm 10i\sqrt{3}$ g) $\sqrt{-42} = \pm i\sqrt{42}$

Non-Calculator Section

3) Add/Subtract/Mutiply Complex

* remember, $i^2 = -1$! *

59. $-7 + 22i$

60. $6 + 6i$

61. $3 - 4i$

62. $7 + 6i$

63. $7 + 0i$

64. $5 + 12i$

65. $2 + 8i$

66. $-3 + 14i$

67. $26 + 0i$

Calculator Section:

1. The table below shows the data that represents the height of a ball thrown by a shot-putter as it travels a distance of x meters.

Distance (m)	Height (m)
7	8
20	15
33	24
47	26
60	24
67	21

* You may receive slightly different answers for #1 and #2 depending on how you round #

a) Define the variables *x* and *y*:

x = distance (m) y = height (m)

b) Find the quadratic model to fit this data.

$y = -0.011x^2 + 1.060x + 0.242$

c) Find the height of the ball if it travels a distance of 55 meters.

plug in 55 for x

about 25.267 m

d) Find the distance the ball traveled when it's at a height of 20 meters.

Graph part (b) and $y=20$ find intersections

25.3 meters OR 71.1 meters (both answers are needed)

2. Use the given table to answer the following questions:

Time in hours	Depth of water
4	1
11	8
15	11
20	10

a) Define the variables *x* and *y*:

x = time (hours) y = depth (feet)

b) Find the quadratic model to fit this data.

$y = -0.057x^2 + 1.940x - 5.963$

c) Use your model to find the depth of the water after 24 hours. ← plug in 24 for x

about 7.765 feet

d) Find the time when the water is 4 feet deep. ← graph part (b) and $y=4$ find both intersections

6.3 hours, 27.7 hours

3. The shape of an arch can be modeled by the equation $h(x) = -0.025x^2 + 2x$, where *h(x)* represents the height of the arch in feet and *x* represents the distance from one end of the arch to the other.

a) Define the variables: x = distance (feet) y = height (feet)

b) What is the width of the arch?

80 feet

c) What is the maximum height of the arch?

40 feet

d) What is the reasonable domain and range?

Domain: [0, 80]

Range: [0, 40]

4. The height of a ball, in feet, can be represented by the following equation where t is time in seconds

$y = -16t^2 + 60t + 20$

a) Define each variable. x= time (seconds) y= height (feet)

b) During what time is the ball in the air?

about 4.06 seconds

c) What is the maximum height of the ball?

76.25 feet

d) What is the reasonable domain and range?

Domain: $[0, 4.06]$ Range: $[0, 76.25]$

5. Solve the following by either factoring, taking the square root or the quadratic formula. **Use a separate piece of paper to do your work.**

a) $6x^2 + 5x = 4$ $x = -\frac{4}{3}$ $x = \frac{1}{2}$

b) $x^2 - 6x - 3 = 0$ $x = 3 \pm 2\sqrt{3}$

c) $4x^2 + 72 = 0$ $x = \pm 3i\sqrt{2}$

d) $x^2 + 6x + 8 = 0$ $x = -4$ $x = -2$

e) $(x + 5)^2 + 100 = 0$ $x = -5 \pm 10i$

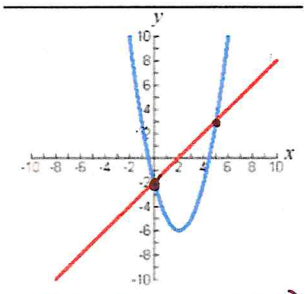
f) $3x^2 + 4x + 2 = 0$ $x = -\frac{2}{3} \pm \frac{i\sqrt{2}}{3}$

g) $x^2 - 10x + 25 = 0$ $x = 5$

h) $9x^2 - 6x - 11 = 0$ $x = \frac{1}{3} \pm \frac{2\sqrt{3}}{3}$

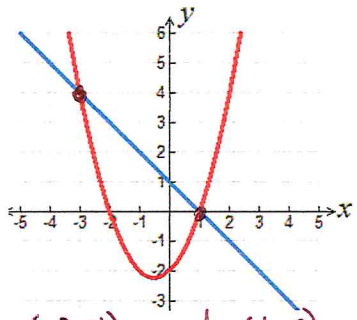
6) Solve the system of equations. **For parts (c) and (d) do you work on a separate piece of paper.**

a)



(-2,0) and (5,3)

b)



(-3,4) and (1,0)

c) $y = x^2 + 4x - 2$

$y = 6x - 3$

(1, 3)

d) $y = x^2 - 5x + 7$

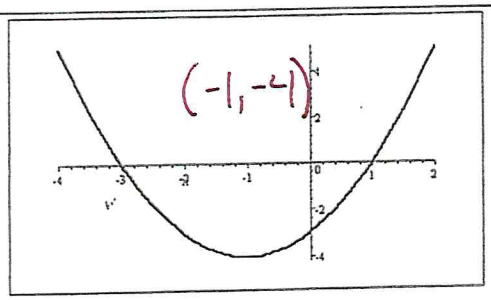
$y = 2x + 1$

(1, 3) and (6, 13)

7) Use the following representations of three different quadratic functions to answer parts (a)-(c).

$f(x) = 2x^2 - 8x + 6$

(2, -2)



(-1, -4)

-7	5
-6	0
-5	-3
-4	-4
-3	-3
-2	0
-1	5
0	12
1	21

a) Find the vertex of each representation.

b) Is each vertex a max or a min?

c) Which of the following has the least (smallest) min?

the graph and table have the lowest mins at $y = 4$