April 8, 2019, Monday - welcome back!!

Remember to copy the problem and only the correct answer...

1. Look at the radical.

What is a rewritten form of the radical?

A. $-88\sqrt{6}$
B. $-96\sqrt{5}$
C. $-986\sqrt{6}$
D. $-2\sqrt{504}$

2. Look at the expression.

$2\sqrt{8} \cdot \sqrt{20}$

Which of these is equivalent to this expression?

A. $2\sqrt{28}$
B. $4\sqrt{10}$
C. $8\sqrt{10}$
D. $32\sqrt{10}$

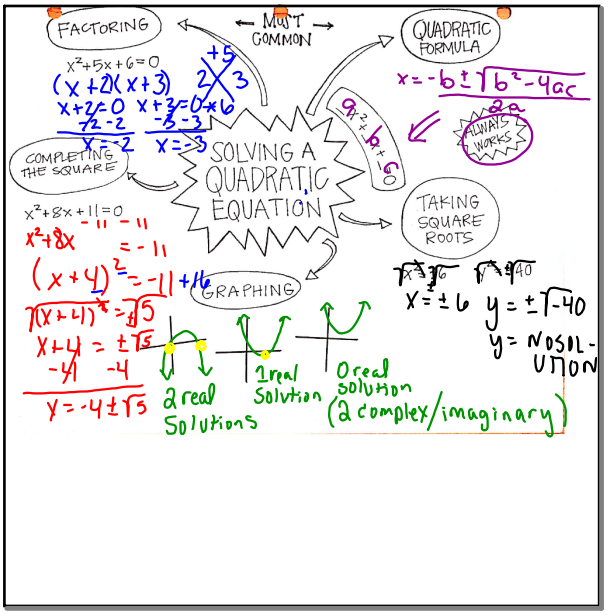
3. Which sum is rational?

A. $\sqrt{\pi} + 18$
B. $\sqrt{25} + 1.75$
C. $\sqrt{3} + 5.5$
D. $\pi + \sqrt{2}$

4. Which product is irrational?

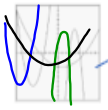
A. $\sqrt{2} \cdot \sqrt{50}$
B. $\sqrt{64} \cdot \sqrt{4}$
C. $\sqrt{9} \cdot \sqrt{49}$
D. $\sqrt{10} \cdot \sqrt{8}$

Answers to Unit 1.1 Sample Items
1. A 2. C 3. B 4. D



The "Parent" Quadratic

A **parent** function is the simplest function of a family of functions. The "**Parent**" Graph: ... The graph passes through the origin (0,0), and is contained in Quadrants I and II. This graph is known as the "**Parent** Function" for parabolas, or **quadratic** functions.



Child: Whatever...

Parent: You are going to do what I say!

Other facts about the parent quadratic $y = x^2$

- There is one solution
- opens up
- negative & positive slope
- $x \to \infty$ $f(x) \to \infty$
  $x \to -\infty$ $f(x) \to \infty$

Graphing Quadratics & Vocabulary Practice Name

1) Graph $f(x) = (x+3)^2$

parent graph

x	f(x)
-5	4
-4	1
-3	0
-2	1
-1	4
0	9

$f(x) = (x+3)^2$
$f(-5) = (-5+3)^2$
$f(-4) = (-4+3)^2$
$f(-3) = (-3+3)^2$
$f(-2) = (-2+3)^2$
$f(-1) = (-1+3)^2$
$f(0) = (0+3)^2$

Transformations: Shifted left 3

Zeros: x-intercepts, solutions, -3

Vertex: (-3, 0) lowest or highest point, cuts the quadratic in half

Axis of Symmetry: $x = -3$

Y-intercept: 9

2) Graph $f(x) = -(x-1)^2 - 3$

PV JD EP

x	f(x)
-1	-7
0	-4
1	-3
2	-4
3	-7

Vertex

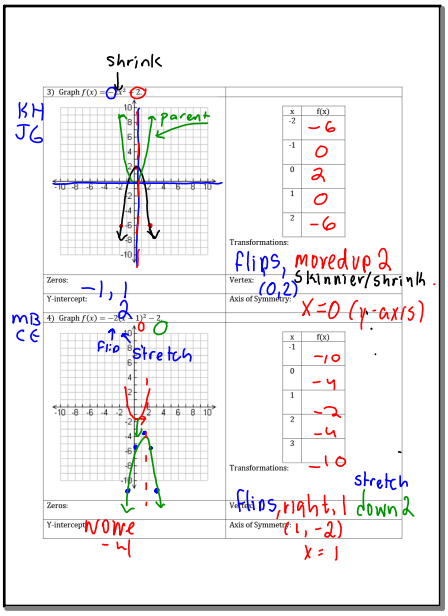
Transformations: flips, moves right (1), moves down (3)

Zeros: none

Y-intercept: -4

Vertex: (1, -3)

Axis of Symmetry: $x = 1$



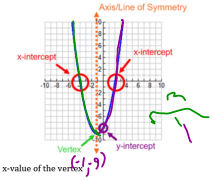
Characteristics of Quadratics

SAME FOR EVERY QUADRATIC GRAPH:

Zeros: x-intercepts (#, 0) solutions, answers
Y-intercept: (0, #)
Domain: $(-\infty, +\infty)$ or $\mathbb{R}$
Average Rate of change: From point $A(x_1, y_1)$ to point $B(x_2, y_2)$ is $\frac{y_2 - y_1}{x_2 - x_1}$ slope formula

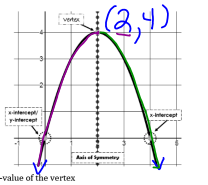
For a quadratic that OPENS UP:

Vertex: lowest point
Axis of Symmetry: $x = -1$ → x-value of the vertex
Range: $[-9, +\infty)$ → y-value of the vertex
Extrema: minimum at the vertex
End Behavior:
As $x \to -\infty$, $f(x) \to +\infty$
As $x \to +\infty$, $f(x) \to +\infty$
Interval of Increase: RIGHT of the graph $(-1, +\infty)$ → x-value of the vertex
Interval of Decrease: LEFT of the graph $(-\infty, -1)$ → x-value of the vertex



For a quadratic that OPENS DOWN:

Vertex: highest point
Axis of Symmetry: $x = 2$ → x-value of the vertex
Range: $(-\infty, 4]$ → y-value of the vertex
Extrema: maximum at the vertex
End Behavior:
As $x \to -\infty$, $f(x) \to -\infty$
As $x \to +\infty$, $f(x) \to -\infty$
Interval of Increase: LEFT of the graph $(-\infty, 2)$ → x-value of the vertex
Interval of Decrease: RIGHT of the graph $(2, +\infty)$ → x-value of the vertex



Transformations of Quadratics

Use words like:
shifts left/right
shifts up/down
opens up/down
stretch or shrinks

numbers > 1 = shrink
numbers between 0 & 1 (a fraction) = stretch

+ number moves to the right
+ number moves to the left

$$f(x) = \pm a(x \mp h)^2 \pm k$$

+ opens up
− opens down

+ number moves up
− number moves down

Describe:

1) $y = 2(x+2)^2 + 2$ — left 2, up 2, opens up, shrink

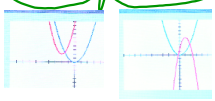
2) $y = -3(x-1)^2 + 5$ — right 1, up 5, down, shrink

3) $y = \frac{2}{3}(x-2)^2 - 1$ — right 2, down 1, opens up, stretches

4) $y = -\frac{1}{4}(x+3)^2 - 6$ — left 3, down 6, opens down, stretches

5) $y = \frac{1}{2}(x-2)^2 + 1$ — right 2, up 1, opens down, neither shrinks or stretches

predict

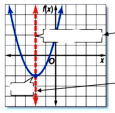


Algebra 1 ~ U3C Day 1 **Characteristics & Vocab of Quadratic Functions**

Fill in each blank using the word bank.

vertex	minimum	axis of symmetry	x-intercepts
parabola	maximum	zeros/roots	$ax^2 + bx + c$

1. Standard form of a quadratic function is y = _____
2. The shape of a quadratic equation is called a _____



3. _____
4. _____
5. When the vertex is the highest point on the graph, we call that a _____.
6. When the vertex is the lowest point on the graph, we call that a _____.
7. Our solutions are the _____.
8. Solutions to quadratic equations are called _____.

Find the a. vertex, b. axis of symmetry, and c. x-intercepts, and d. y-intercept of each quadratic function from its graph.

9. a. Vertex: _____ b. Axis of symmetry: x = ____ c. x-intercept(s): _____ d. y-intercept: _____

10. together — a. Vertex: (−2, 0) b. Axis of symmetry: x = −2 c. x-intercept(s): −3, −1 d. y-intercept: 4

11. a. Vertex: _____ b. Axis of symmetry: x = ____ c. x-intercept(s): _____ d. y-intercept: _____

Pick 9 or 11

test review

a = 1, b = 10, c = −200

5) $x^2 + 10x - 200 = 0$

$$x = \frac{-10 \pm \sqrt{(10)^2 - 4(1)(-200)}}{2(1)}$$

$x = 10, -20$

$ax^2 + bx + c = 0$

10) $x^2 - 5x = 14$

$-14 \quad -14$

$x^2 - 5x - 14 = 0$

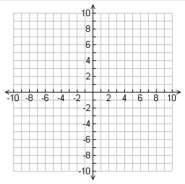
$a = 1$, $b = -5$, $c = -14$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-14)}}{2(1)}$$

$x = 7, -2$ C

Graphing Quadratics Using Tables

1) Graph $f(x) = x^2$.



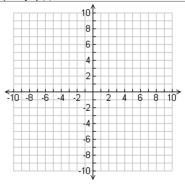
x	f(x)
-2	
-1	
0	
1	
2	

Transformations:

Zeros: Vertex:

Y-intercept: Axis of Symmetry:

2) Graph $f(x) = x^2 - 4$.



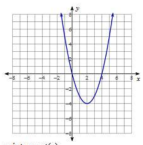
x	f(x)
-2	
-1	
0	
1	
2	

Transformations:

Zeros: Vertex:

Y-intercept: Axis of Symmetry:

TOTD ~ U3C Day 1 Name _____



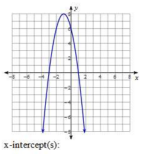
x-intercept(s):

y-intercept:

Vertex:

Axis of Symmetry:

TOTD ~ U3C Day 1 Name _____



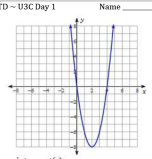
x-intercept(s):

y-intercept:

Vertex:

Axis of Symmetry:

TOTD ~ U3C Day 1 Name _____



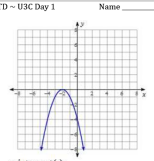
x-intercept(s):

y-intercept:

Vertex:

Axis of Symmetry:

TOTD ~ U3C Day 1 Name _____



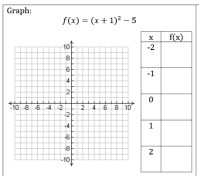
x-intercept(s):

y-intercept:

Vertex:

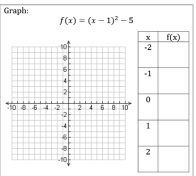
Axis of Symmetry:

Graph: $f(x) = (x+1)^2 - 5$



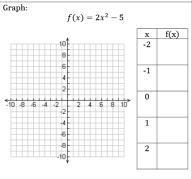
x	f(x)
-2	
-1	
0	
1	
2	

Graph: $f(x) = (x-1)^2 - 5$



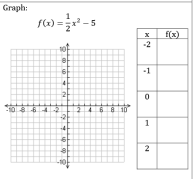
x	f(x)
-2	
-1	
0	
1	
2	

Graph: $f(x) = 2x^2 - 5$



x	f(x)
-2	
-1	
0	
1	
2	

Graph: $f(x) = \frac{1}{2}x^2 - 5$



x	f(x)
-2	
-1	
0	
1	
2	

April 9, 2019, Tuesday

This equation can be used to find h, the number of hours it will take Flo and Bryan to mow their lawn.

$$\frac{h}{3}+\frac{h}{6}=1$$

How many hours will it take them to mow their lawn?

A. 6
B. 3
C. 2
D. 1

A) $\frac{6}{3}+\frac{6}{6}\overset{?}{=}1$

B) $\frac{3}{3}+\frac{3}{6}\overset{?}{=}1$

C) $\frac{2}{3}+\frac{2}{6}\overset{?}{=}1$

D) $\frac{1}{3}+\frac{1}{6}\overset{?}{=}1$

4. Look at the steps used when solving $3(x-2)=3$ for x.

$3(x-2)=3$	Write the original equation.
$3x-6=3$	Use the Distributive Property.
$3x-6+6=3+6$	Step 1
$3x=9$	Step 2
$\frac{3x}{3}=\frac{9}{3}$	Step 3
$x=3$	Step 4

Which step is the result of combining like terms?

A. Step 1
B. Step 2
C. Step 3
D. Step 4

Answers to Unit 2.1 Sample Items
1. C 2. C 3. B 4. B

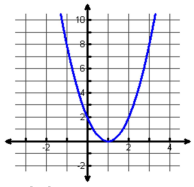
Algebra 1 ~ U3C Day 2 Characteristics of Quadratics Notes

Characteristics of Quadratics

1. Zeros:
2. Y-intercept:
3. Domain:
4. Vertex:
5. Axis of Symmetry:
6. Range:
7. Extrema:
8. Interval of Increase:
9. Interval of Decrease:
10. End Behavior:

As x→−∞, f(x) →_____

As x→+∞, f(x) →_____

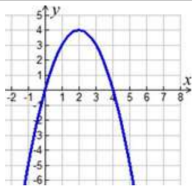


11. AROC [-1, 0].

1. Zeros:
2. Y-intercept:
3. Domain:
4. Vertex:
5. Axis of Symmetry:
6. Range:
7. Extrema:
8. Interval of Increase:
9. Interval of Decrease:
10. End Behavior:

As x→−∞, f(x) →_____

As x→+∞, f(x) →_____



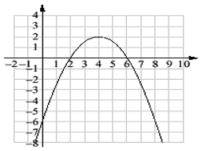
11. AROC [0, 2].

Quadratic Characteristics/Transformations HW Name _____

1. Zeros:
2. Y-intercept:
3. Domain:
4. Vertex:
5. Axis of Symmetry:
6. Range:
7. Extrema:
8. Interval of Increase:
9. Interval of Decrease:
10. End Behavior:

As x→−∞, f(x) →_____

As x→+∞, f(x) →_____

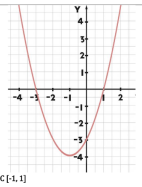


11. AROC [2, 4]

1. Zeros:
2. Y-intercept:
3. Domain:
4. Vertex:
5. Axis of Symmetry:
6. Range:
7. Extrema:
8. Interval of Increase:
9. Interval of Decrease:
10. End Behavior:

As x→−∞, f(x) →_____

As x→+∞, f(x) →_____



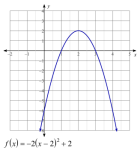
11. AROC [-1, 1]

Describe the transformations.

1.	$y=x^2+2$	6.	$y=x^2-2$
2.	$y=2x^2$	7.	$y=\frac{1}{2}x^2$
3.	$y=(x-2)^2$	8.	$y=(x+2)^2$
4.	$y=-(x-1)^2+1$	9.	$y=(x-1)^2-1$
5.	$y=\frac{1}{2}(x-2)^2$	10.	$y=-2(x+1)^2-1$

Name _____ Quadratic Characteristics ~ TOTD

1)



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

Transformations:

Domain:

Range:

x-intercept(s):

y-intercept:

Vertex:

Axis of Symmetry:

Interval of Increase:

Interval of Decrease:

Extrema:

End Behavior:

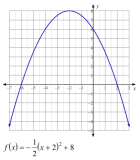
As x→−∞, $f(x)$→_____

As x→+∞, $f(x)$→_____

AROC from (0, _____) to (2, _____):

Name _____ Quadratic Characteristics ~ TOTD

2)



$f(x)=-\frac{1}{2}(x+2)^2+8$

Transformations:

Domain:

Range:

x-intercept(s):

y-intercept:

Vertex:

Axis of Symmetry:

Interval of Increase:

Interval of Decrease:

Extrema:

End Behavior:

As x→−∞, $f(x)$→_____

As x→+∞, $f(x)$→_____

AROC (-2, _____) to (0, _____):

April 10, 2019, Wednesday

SAMPLE ITEMS

1. What are the zeros of the function represented by the quadratic expression $2x^2+x-3$?

A. $x=-\frac{3}{2}$ and $x=1$
B. $x=-\frac{2}{3}$ and $x=1$
C. $x=-1$ and $x=\frac{2}{3}$
D. $x=-1$ and $x=-\frac{3}{2}$

2. What is the vertex of the graph of $f(x)=x^2+10x-9$?

A. (5, 66)
B. (5, –9)
C. (–5, –9)
D. (–5, –34)

4. The expression $-x^2+70x-600$ represents a company's profit for selling x items. For which number(s) of items sold is the company's profit equal to $0?

A. 0 items
B. 35 items
C. 10 items and 60 items
D. 20 items and 30 items

STANDARD FORM of QUADRATICS $y = ax^2 + bx + c$ ↔ **VERTEX FORM of QUADRATICS** $y = a(x - h)^2 + k$

VERTEX → STANDARD FORM

EXAMPLE: $y = -2(x - 1)^2 - 4$

Step 1. Expand the square binomial (rewrite the equation). →

Step 2. Multiply the two binomials & combine like terms (using the BOX, distributive, or FOIL method). →

Step 3. Distribute if necessary & combine like constants terms. →

STANDARD → VERTEX FORM

EXAMPLE: $y = 2x^2 + 12x - 4$

Step 1. Identify a, b, & c. → a = _____, b = _____, c = _____

Step 2. Find the line of symmetry or 'h' by using $x = \frac{-b}{2a}$. → $x = \frac{-b}{2a} =$

Step 3. Find the y-value of the vertex or 'k' by substituting 'x' into the equation. →

Step 4. Write the equation in vertex form using the 'h' and 'k' found above. The 'a' will be the 'a' found in step 1. →

Algebra 1 ~ U3C Day 3 Convert **VERTEX → STANDARD** Form Notes

Examples:

1) $y = (x + 3)^2 + 4$

2) $y = (x - 1)^2 + 8$

3) $y = 2(x + 3)^2 - 5$

4) $y = -(x - 4)^2 + 3$

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

Converting **STANDARD → VERTEX** Form Notes

Examples:

1) $y = x^2 + 8x + 10$

2) $y = x^2 + 8x + 1$

3) $y = x^2 + 10x + 20$

4) $y = -2x^2 - 16x - 32$

5) $y = -x^2 - 2x + 3$

Algebra 1 ~ U3C Day 3 Name_____

Convert Vertex to Standard Form & Standard to Vertex Form

Convert from Vertex form to Standard form for each equation below.

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

2) $f(x) = (x + 3)^2 - 3$

3) $f(x) = (x + 4)^2 - 1$

4) $f(x) = (x + 2)^2 + 2$

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

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

7) $f(x) = (x + 3)^2 - 1$

8) $f(x) = (x + 2)^2 + 4$

9) $f(x) = -2(x - 4)^2 - 4$

10) $f(x) = -2(x - 3)^2 + 4$

Convert from Standard form to Vertex form for each equation below.

11) $f(x) = x^2 - 8x + 13$

12) $f(x) = x^2 - 8x + 12$

13) $f(x) = x^2 + 6x + 10$

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

15) $f(x) = x^2 + 6x + 7$

16) $f(x) = x^2 - 8x + 18$

17) $f(x) = x^2 - 6x + 12$

18) $f(x) = x^2 - 8x + 14$

19) $f(x) = -x^2 + 2x - 2$

20) $f(x) = 2x^2 + 12x + 20$

Algebra I Name_____ ID: 1

TOTD ~ Converting Quadratic Functions

Convert the given equations from vertex form to standard form.

1) $y = (x - 2)^2 + 4$

2) $y = -2(x - 1)^2 + 4$

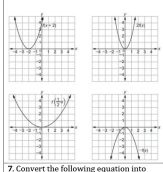
Convert the given equations from standard form to vertex form.

3) $y = x^2 - 8x + 18$

4) $y = -3x^2 - 18x - 28$

Study Guide Unit 3C Name _____

5. Convert $y = x^2 + 4x + 4$ to vertex form, then identify the vertex and the graph.



6. What is the vertex and axis of symmetry of the quadratic $y = 2(x - 1)^2 + 4$?

A (-4, 1); x = 1 **B** (4, 1); x = 4

C (2, 4); x = 4 **D** (1, 4); x = 1

7. Convert the following equation into vertex form: $y = x^2 - 8x + 13$

8. Convert the following equation into standard form: $y = -2(x - 4)^2 - 4$

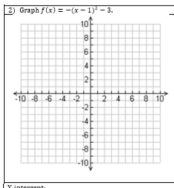
Study Guide Unit 3C Name _____

Find the a. vertex, b. axis of symmetry, and c. x-intercepts, and d. y-intercept of each quadratic function from its graph.

10.

a. Vertex: _____
b. Axis of symmetry: x = ___
c. x-intercept(s): _____
d. y-intercept: _____

3) Graph $f(x) = -(x-1)^2 - 3$.



x	f(x)
-1	
0	
1	
2	
3	

Transformations:

Y-intercept: Axis of Symmetry:

April 11, 2019, Thursday

SAMPLE ITEM

1. A certain population of bacteria has an average growth rate of 2%. The formula for the growth of the bacteria's population is $A = P_0 \cdot 1.02^t$, where P_0 is the original population and t is the time in hours.

   If you begin with 200 bacteria, about how many bacteria will there be after 100 hours?

   A. 7
   B. 272
   C. 1,449
   D. 20,000

2. The points (0, 1), (1, 5), (2, 25), and (3, 125) are on the graph of a function. Which equation represents that function?

   A. $f(x) = 2^x$
   B. $f(x) = 3^x$
   C. $f(x) = 4^x$
   D. $f(x) = 5^x$

...quiz

Item 17

Extended Constructed-Response

Part A What are the zeros of the function $f(x) = x^2 - 6x + 8$? Explain how you determined your answer. Write your answer in the space provided.

Part B Explain how you know that the function $g(x) = x^2 - 6x + 10$ has a minimum value and not a maximum value. Find the minimum value of the function. Write your answer in the space provided.

Part A

Part B

Item 17

Exemplar Response

Points Awarded	Sample Response
4	Part A: The zeros are 2 and 4. **AND** To find the zeros, I set the value of the function equal to 0. Then I factored the quadratic expression on the right side of the equation. Next, I used the Zero Product Property to set each factor equal to 0. Then I solved each of the resulting equations for x. These values of x are the zeros of the function. *Or other valid explanation.* **AND** Part B: The coefficient of the x^2 is positive, so the function opens up, which means it has a minimum value instead of a maximum. *Or other valid explanation.* **AND** The minimum value of the function is 1.
3	The student correctly answers three of the four parts.
2	The student correctly answers two of the four parts.
1	The student correctly answers one of the four parts.
0	*Response is irrelevant, inappropriate, or not provided.*

Note: If a student makes an error in one part that is carried through to subsequent parts, then the student is not penalized again for the same error.

April 12, 2019, Friday

Constructed-Response

The first four terms of a sequence are shown.

16, 48, 144, 432, . . .

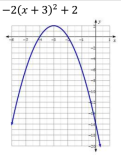
What is the explicit function, $f(n)$, that defines the sequence? Explain how you determined your answer. Write your answer in the space provided.

Name & Partne

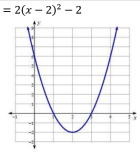
Match the given characteristics to the given graphs, then identify th

Graph: _____ Domain: $(-\infty, \infty)$ Range: $[-2, \infty)$ Vertex: Axis of Symmetry: Zeros: y-intercept: Int of Increase: $(2, \infty)$ Int of Decrease: $(-\infty, 2)$ Extrema: _____ at _____ End Behavior: As x → −∞, f(x) → _____ As x → ∞, f(x) → _____ Transformations: **Stretch 2, Right 2, Down 2**	Graph: _____ Domain: $(-\infty, \infty)$ Range: Vertex: Axis of Symmetry: $x = 2$ Zeros: y-intercept: $(0, 10)$ Int of Increase: Int of Decrease: Extrema: **MIN @ (2, 2)** End Behavior: As x → −∞, f(x) → _____ As x → ∞, f(x) → _____ Transformations:
Graph: _____ Domain: $(-\infty, \infty)$ Range: Vertex: Axis of Symmetry: Zeros: y-intercept: $(0, 0)$ Int of Increase: Int of Decrease: Extrema: _____ at _____ End Behavior: As x → −∞, f(x) → $-\infty$ As x → ∞, f(x) → $-\infty$ Transformations: **Reflects x-axis, Right 2, Up 4**	Graph: _____ Domain: $(-\infty, \infty)$ Range: $(-\infty, 2]$ Vertex: Axis of Symmetry: $x = -3$ Zeros: y-intercept: Int of Increase: Int of Decrease: Extrema: _____ at _____ End Behavior: As x → −∞, f(x) → $-\infty$ As x → ∞, f(x) → $-\infty$ Transformations:

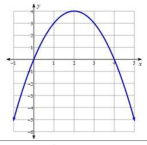
A. $y = -2(x+3)^2 + 2$



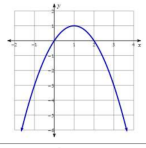
B. $y = 2(x-2)^2 - 2$



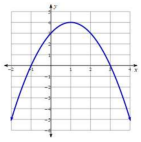
C. $y = -(x-2)^2 + 4$



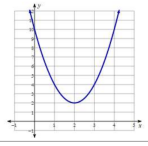
D. $y = -(x-1)^2 + 1$



E. $y = (x-1)^2 + 4$



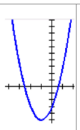
F. $y = 2(x-2)^2 + 2$



Algebra 1 ~ U3C Day 4 Unit 3C Test Review Part 1 Name _____

Graph the following equation. Then, write the characteristics for the graph.

1. $2(x+1)^2 - 5$



- Vertex: _____
- Axis of Sym.: _____
- Domain: _____
- Range: _____
- Increase: _____
- Decrease: _____
- Y-Int: _____
- End Behavior:

  As $x \to -\infty$, $f(x) \to$ _____

  As $x \to +\infty$, $f(x) \to$ _____

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

- Vertex: _____
- Axis of Sym.: _____
- Domain: _____
- Range: _____
- Increase: _____
- Decrease: _____
- Y-Int: _____
- End Behavior:

  As $x \to -\infty$, $f(x) \to$ _____

  As $x \to +\infty$, $f(x) \to$ _____

Describe the transformations to the parent function in the given equations.

3. $y = -(x+2)^2 - 5$

4. $y = 3(x-4)^2 + 2$

Write the quadratic equation of the graph that has been....

5. shifted down 1 and shrunk by a factor of ½

6. reflected over the x-axis and has shifted right 2

Change the equations to standard form.

7. $y = 2(x-1)^2 + 4$

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

Change the equations to vertex form.

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

10. $y = x^2 + 8x + 1$

11. What is the vertex and axis of symmetry of the quadratic $y = 2(x-3)^2 + 4$?

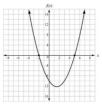
a) (2, -3); x = -3
b) (3, 4); x = 4
c) (3, 4); x = 3
d) (4, 3); x = 4

12. Identify the vertex of $f(x) = x^2 + 10x - 9$?

a) (5, 66)
b) (5, -9)
c) (-5, -9)
d) (-5, -34)

13. Which function is shown in the graph?

a) $f(x) = x^2 - 3x - 10$
b) $f(x) = x^2 + 3x - 10$
c) $f(x) = x^2 + x - 12$
d) $f(x) = x^2 - 5x - 8$



14. Tell whether the graph of the quadratic function $y = -2x^2 - 5x + 15$ opens up or down, and why.

a) Because $a < 0$, the parabola opens down.
b) Because $a < 0$, the parabola opens up.
c) Because $a > 0$, the parabola opens down.
d) Because $a > 0$, the parabola opens up.