April 8, 2019, Monday - welcome back!!

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

1. Look at the radical.

$-8\sqrt{726}$

What is a rewritten form of the radical?

A. $-88\sqrt{6}$
B. -90.75
C. $-986\sqrt{6}$
D. $-2,904$

2. Look at the expression.

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

Which of these is equivalent to this expression?

A. $2\sqrt{28}$
B. 5
C. $8\sqrt{10}$
D. $32\sqrt{10}$

3. Which sum is rational?

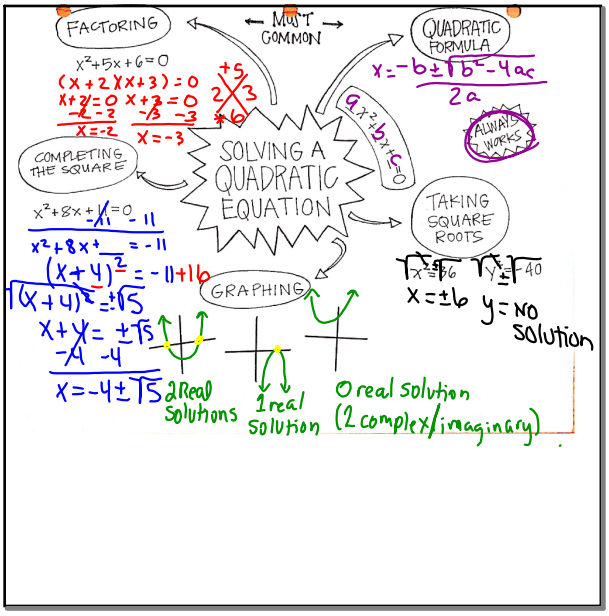
A. $\pi + 18$ = 21.14159
B. $\sqrt{25} + \sqrt{76}$ = -6.75
C. $\sqrt{3} + 5.5$ = -7.23205080 8
D. $\pi + \sqrt{2}$ = 5.141592654

4. Which product is irrational?

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

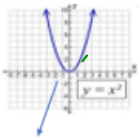
Answers to Unit 1.1 Sample Items
1. A 2. C 3. B 4. D

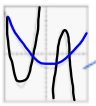
BS YK SBT mB



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.



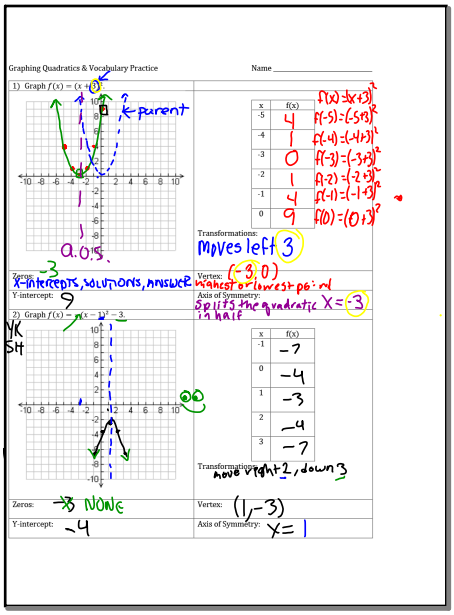


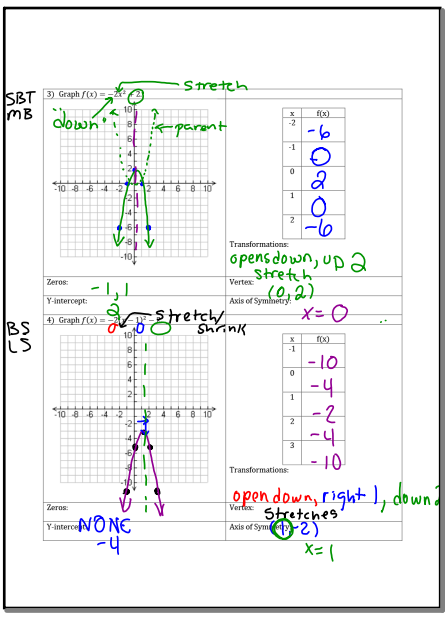
Child: Whatever...

Parent: You are going to do what I say!

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

- There is 1 solution $x=0, x=0$
- y-intercept = 0
- x-intercept = 0
- slope changes; increasing/decreasing
- open "up"





Characteristics of Quadratics

SAME FOR EVERY QUADRATIC GRAPH:

Zeros: x-intercepts (#, 0) *Y-intercept*: (0, #) *Domain*: $(-\infty, +\infty)$

Average Rate of change: From point $A(x_1, y_1)$ to point $B(x_2, y_2)$ is $\frac{y_2 - y_1}{x_2 - x_1}$

For a quadratic that OPENS UP:

Vertex: lowest point

Axis of Symmetry: x = ____ → x-value of the vertex

Range: (____, $+\infty$) → y-value of the vertex

Extrema: minimum at the vertex

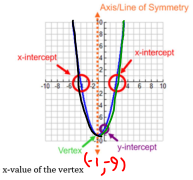
End Behavior:

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

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

Interval of Increase: RIGHT of the graph (____, $+\infty$) → x-value of the vertex

Interval of Decrease: LEFT of the graph $(-\infty$, ____) → x-value of the vertex



For a quadratic that OPENS DOWN:

Vertex: highest point

Axis of Symmetry: x = ____ → x-value of the vertex

Range: $(-\infty$, ____] → y-value of the vertex

Extrema: maximum at the vertex

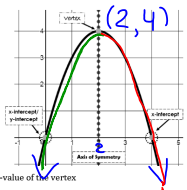
End Behavior:

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

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

Interval of Increase: LEFT of the graph $(-\infty$, ____) → x-value of the vertex

Interval of Decrease: RIGHT of the graph (____, $+\infty$) → x-value of the vertex



Transformations of Quadratics

$y = x^2$

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

- a fraction is a stretch
- a whole # is a shrink
- + is left, − is right
- + opens up, − opens down
- + moves up, − moves down

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

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, − opens down, shrink
3) $y = \frac{2}{3}(x-2)^2-1$ — right 2, down 1, + opens up, stretches
4) $y = -\frac{1}{3}(x+3)^2+6$ — left 3, down 6, open down, stretch
5) $y = \frac{1}{4}(x-2)^2+1$ — right 2, up 1, open down, wider or skinnier

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 = ax^2+bx+c
2. The shape of a quadratic equation is called a parabola
3. AOS
4. vertex
5. When the vertex is the highest point on the graph, we call that a max
6. When the vertex is the lowest point on the graph, we call that a min
7. Our solutions are the zeros/roots
8. Solutions to quadratic equations are called x-intercepts

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: (−2, 4); b. Axis of symmetry: x = −2; c. x-intercept(s): −4, 0; d. y-intercept: 0
10. a. Vertex: (−2, 0); b. Axis of symmetry: x = −2; c. x-intercept(s): −2; d. y-intercept: −4
11. a. Vertex: (3, 3); b. Axis of symmetry: x = 3; c. x-intercept(s): NONE; d. y-intercept: 8

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	

test review

9) $x^2 - 33 = -8x$

$+8x \quad +8x$

$x^2 + 8x - 33 = 0$

$ax^2+bx+c=0$

$a = 1, \; b = 8, \; c = -33$

$x = \frac{-8 \pm \sqrt{(8)^2 - 4(1)(-33)}}{2(1)}$

A $x = 3, -11$

4) $9x^2 - 36 = 0$

$+36 \quad +36$

$\frac{9x^2}{9} = \frac{36}{9}$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

16) Find and circle the error. Then give the correct answer by solving by completing the square.

$x^2 + 6x - 13 = 0$

$+13 \quad +13$

$x^2 + 6x = 13$

$x^2 + 6x + 9 = 13 + 9$

$(x+3)^2 = 13$

$x + 3 = \pm\sqrt{13}$

$x = -3 \pm \sqrt{13}$

$\sqrt{(x+3)^2} = \pm\sqrt{22}$

$x + 3 = \pm\sqrt{22}$

$-3 \quad -3$

$x = -3 \pm \sqrt{22}$

April 9, 2019, Tuesday

1. 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

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

Multiple Items
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 $x\to-\infty$, $f(x)\to$ _____

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

11. AROC [-1, 0]:

Slope Formula $m=\frac{y_2-y_1}{x_2-x_1}$

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

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

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

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

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 _____ Name _____

Quadratic Characteristics ~ TOTD

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

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

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

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

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

April 10, 2019, Wednesday

EOC

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 $x=-\frac{3}{2}$

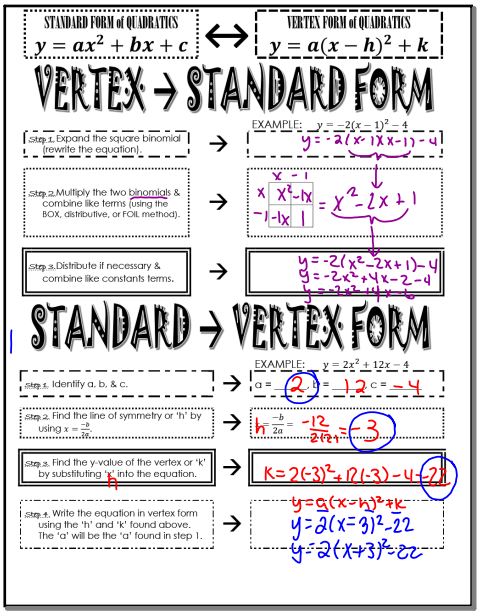
4. The expression $-x^2+70x-600$ represents a company's profit, for selling x items. For which number(s) of items sold is the company's profit equal to $0?

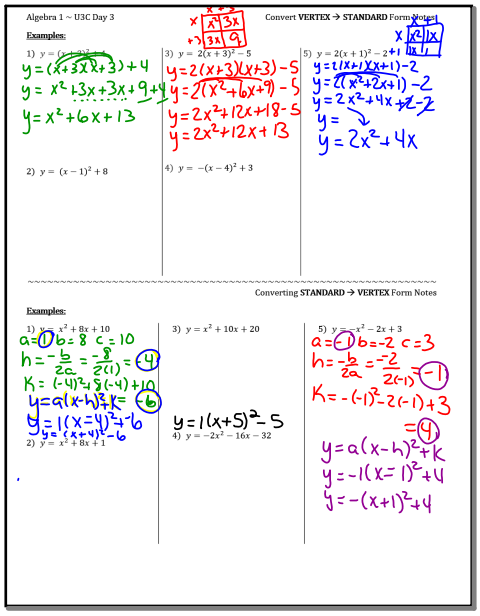
A. 0 items
B. 35 items
C. 10 items and 60 items
D. 20 items and 30 items

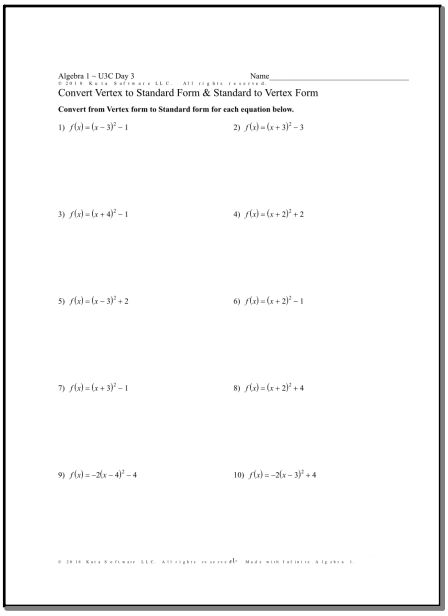
2. What is the vertex of the graph of $f(x)=x^2+10x-32$?

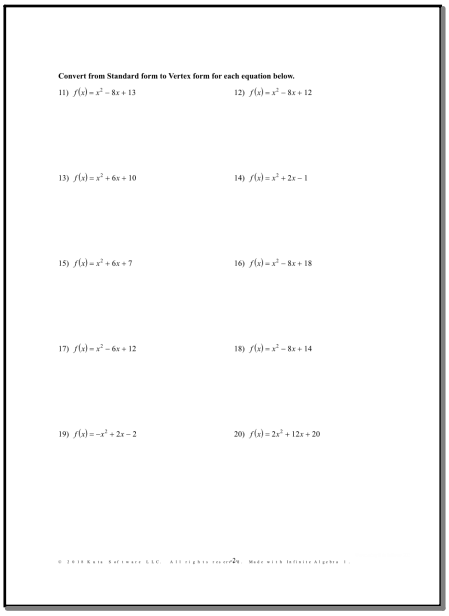
A. (5, 7)
B. (5, -9)
C. (-5, -9)
D. (-5, -34)

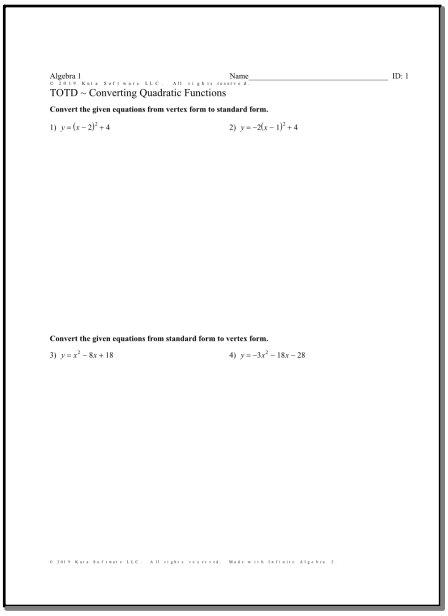
Multiple Items
4. C

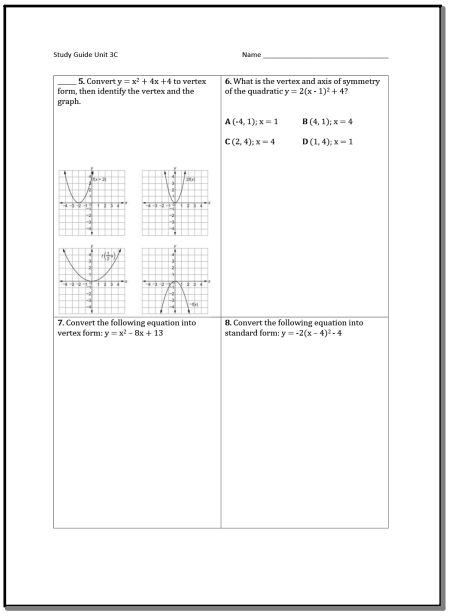

STANDARD FORM of QUADRATICS
$y = ax^2 + bx + c$
VERTEX FORM of QUADRATICS
$y = a(x-h)^2 + k$
VERTEX → STANDARD FORM
Step 1. Expand the square binomial (rewrite the equation).
Step 2. Multiply the two binomials & combine like terms (using the BOX, distributive, or FOIL method).
Step 3. Distribute if necessary & combine like constants terms.
EXAMPLE: $y = -2(x-1)^2 - 4$
STANDARD → VERTEX FORM
Step 1. Identify a, b, & c.
Step 2. Find the line of symmetry or 'h' by using $x = \frac{-b}{2a}$.
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.
EXAMPLE: $y = 2x^2 + 12x - 4$


Algebra 1 ~ U3C Day 3
Convert VERTEX → STANDARD Form Notes
Examples:
Converting STANDARD → VERTEX Form Notes
Examples:


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.


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


Algebra 1
Name
ID: 1
TOTD ~ Converting Quadratic Functions
Convert the given equations from vertex form to standard form.
Convert the given equations from standard form to vertex form.


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

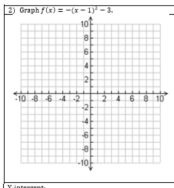
Study Guide Unit 3C Name _____

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: _____

2) 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, . . .

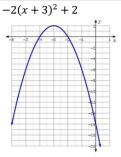
What is the explicit function, $f(n)$, that defines the sequence? Explain how you determined your answer. Write your answer in the space provided.

Name & Partne

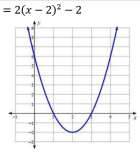
Match the given characteristics to the given graphs, then identify th

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:

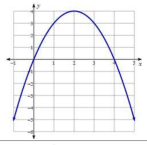
A. $y = -2(x+3)^2 + 2$



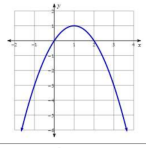
B. $y = 2(x-2)^2 - 2$



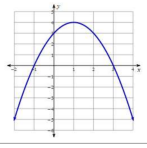
C. $y = -(x-2)^2 + 4$



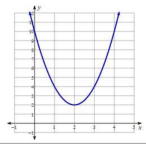
D. $y = -(x-1)^2 + 1$



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



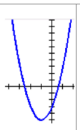
F. $y = 2(x-2)^2 + 2$



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

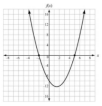
a) (2, -3); x = -3
b) (3, 4); x = 4
c) (3, 4); x = 3
d) (4, 3); x = 4

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.