Howdy!!!!

Coach Watson & Coach Webb

FOA

Algebra 1 Unit 8: Quadratic Functions Notes

Converting between Forms

$y = ax^2 + bx + c$ to $y = a(x - \#)(x - \#)$

Standard to Factored – Factor your expression (factor by GCF and/or into two binomials)

a. $y = x^2 + 4x - 12$

$y = (x + 6)(x - 2)$

3, 4
6, 2
12, 1

b. $y = 3x^2 - 6x$

$3x \quad 3x$

$y = 3x(x - 2)$

① GCF
② ( )( )

$y = a(x - \#)(x - \#)$ to $y = ax^2 + bx + c$

Factored to Standard – Multiply your expressions together and place in standard form. Multiply a value through last.

a. $y = (x - 3)(x + 4)$

	x	4
x	x^2	$4x$
-3	$-3x$	-12

$y = x^2 + 1x - 12$

b. $y = 2(x - 1)(x + 2)$

	x	2
x	x^2	$2x$
-1	$-1x$	-2

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

$2x^2 + 2x - 4$

Vertex to Standard – Expand your squared binomial, multiply the binomials, and add constants. Multiply a value through last.

a. $y = (x - 5)^2 - 12$

$(x - 5)(x - 5) - 12$

	x	-5
x	x^2	$-5x$
-5	$-5x$	25

$x^2 - 10x + 25 - 12$

$x^2 - 10x + 13$

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

$-3(x + 1)(x + 1) + 4$

	x	1
x	x^2	$1x$
1	$1x$	1

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

$-3x^2 - 6x - 3 + 4$

$-3x^2 - 6x + 1$

Standard to Vertex - Determine your vertex (h, k) and keep the same a-value.

a. $y = x^2 + 4x + 3$

b. $y = x^2 + 6x - 5$

y

TODAYS NOTES

Day 8 – Comparing Different Forms of Quadratic Functions

From days 5 – 8, you learned about three different forms of quadratic functions – vertex, standard, and factored form. Each form tells you something different about the graph.

Vertex Form	Standard Form	Intercept Form (Factored Form)
$y = a(x-h)^2 + k$ open up/down (h, k) is the vertex	$y = ax^2 + bx + c$ open up/down c is the y-intercept	$y = a(x-p)(x-q)$ open up/down p and q are x-intercepts
a always determines the way the graph opens		

Practice: Given a quadratic equation below, name the form the equation is in and describe the characteristics you gain from that form. Some equations might be considered two different forms.

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

Form: Vertex Form

Information: open down

Vertex: (2, 4)

b. $y = (x-4)(x+1)$

Form: Intercept Form

Information: opens up

x int: (4, 0) (-1, 0)

Zeros: x = 4 x = -1

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

Form: Vertex Form/Standard

Information: open up

Vertex: (0, 4)

y int: (0, 4)

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

Form: Vertex Form

Information: opens down

Vertex: (-6, 0)

e. $y = 4x^2 - 3x + 8$

Form: Standard

Information: up, [illegible]

y int: (0, 8)

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

Form: Vertex

Information: Opens up

Vertex: (+6, 1)

g. $y = x(2x+6)$

Form: [illegible] Intercept

Information:

Ignore

h. $y = (-3x-9)(x+4)$

Form: intercept form

Information: opens up

Algebra 1 Unit 8: Quadratic Functions Notes

Creating Equations Given Characteristics

You can create equations given specific characteristics such as the vertex or intercepts. Look at the problem situation from a group of students. Analyze why they have a thumbs up or a thumbs down for the problem below:

Write a quadratic function in factored form to represent a parabola that opens downward and has zeros at (-4, 0) and (2, 0).

Intercept
negative
x int

Sally
My function is f(x) = -(x – 2)(x + 4).

Alex
My function is f(x) = 2(x – 2)(x + 4).

not negative
Stretch 2

Julie
My function is f(x) = -0.5(x – 2)(x + 4).

Jeremy
My function is f(x) = ½(x – 2)(x + 4).

not negative
½ is a shrink

Monica
My function is f(x) = -2(x – 2)(x + 4).

Derek
My function is f(x) = -(x + 2)(x - 4).

Signs are incorrect

a. Which functions are similar to each other?

b. How is it possible to have more than one correct function?

c. What would you tell Alex, Jeremy, and Derek to correct their functions?

d. How many possible functions can you write to represent the given characteristics? Explain your reasoning.

Algebra 1 Unit 8: Quadratic Functions Notes

Write a quadratic function in vertex form to represent a parabola that opens upward and has a vertex at (-5, -2).

Sally
My function is $f(x) = 3(x + 5)^2 - 2$

Jeremy
My function is $f(x) = \frac{1}{4}(x + 5)^2 - 2$

Alex
My function is $f(x) = -2(x + 5)^2 - 2$

Monica
My function is $f(x) = (x + 5)^2 - 2$

Julie
My function is $f(x) = 2(x - 5)^2 + 2$

a. What would you tell Alex and Julie to correct their functions?

Practice: For the given characteristics, write a function to the best you can.

a. Vertex at (-5, 3) and opens down

b. x-intercepts at (3, 0) and (-5, 0) and opens up

c. y-intercept at (0, 7) and opens down

d. x-intercepts at (0, 0) and (2, 0) and opens down

e. Vertex at (-3, 0) and opens down

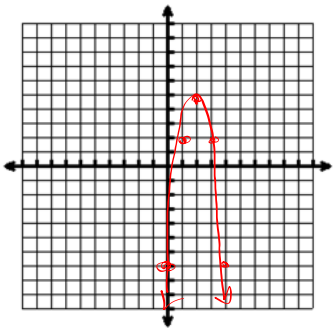
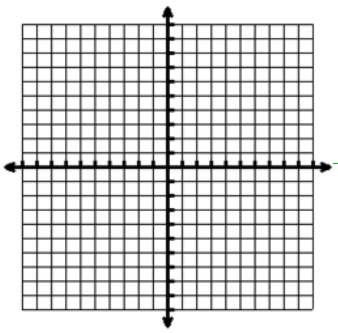
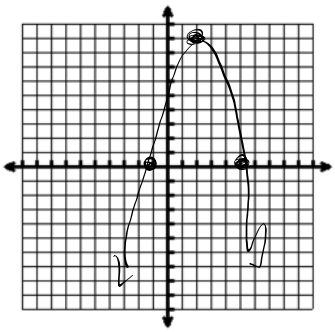
f. y – intercept at (0, -2) and opens up

Review

8.2 Review Guide – Graphs and Equations of Parabolas

Name:_____

Date: _____ Period: _____

What you need to know & be able to do	Things to remember	Examples
1. Graph in vertex form	1. Determine your vertex. 2. Create a table with 2 values to the left and right of the vertex. 3. Graph.	a. Graph the following equation: $y=-3(x-2)^2+5$  Vertex Form (2, 5) x: 0 1 2 3 4 y: -7 2 5 2 -7
2. Graph in standard form	1. Determine your vertex $\left(x=\frac{-b}{2a}\right)$. 2. Create a table with 2 values to the left and right of the vertex. 3. Graph.	a. Graph the following equation: $y=x^2+4x+7$  A: 1 B: 4 C: 7 $x=\frac{-b}{2a}=\frac{-4}{2(1)}=\frac{-4}{2}=-2$ $(-2)^2+4(-2)+7=3$ x: -4 -3 -2 -1 0 y: 7 4 3 4 7
3. Graph in factored form	1. Determine your x-intercepts and plot them. 2. Determine you vertex (find the middle of the two x-intercepts or use $x=\frac{p+q}{2}$). 3. Plot vertex and graph.	a. Graph the following equation: $y=-(x+1)(x-5)$  $x=-1$ $x=5$ middle $x=2$ $-(2+1)(2-5)$ 9

<table>
<tr><td rowspan="2">14. Different Forms of Quadratics</td><td rowspan="2">Vertex Form:
$y = a(x - h)^2 + k$
(h, k) is vertex

Standard Form:
$y = ax^2 + bx + c$
(0, c) is y-intercept

Factored Form:
$y = a(x - p)(x - q)$
(p, 0) & (q, 0) are x-intercepts

A determines if graph opens up or down</td><td>a. Determine the form and associated characteristics: $y = 2(x + 4)(x - 3)$</td><td>b. Determine the form and associated characteristics: $y = (x - 5)^2 + 9$</td></tr>
<tr><td>c. Determine the form and associated characteristics: $y = -x^2 + 6x - 1$</td><td>d. Determine the form and associated characteristics: $y = -(x + 2)^2$</td></tr>
<tr><td rowspan="2">15. Converting between forms</td><td rowspan="2">Vertex Form:
$y = a(x - h)^2 + k$
(h, k) is vertex

Standard Form:
$y = ax^2 + bx + c$
(0, c) is y-intercept

Factored Form:
$y = a(x - p)(x - q)$
(p, 0) & (q, 0) are x-intercepts

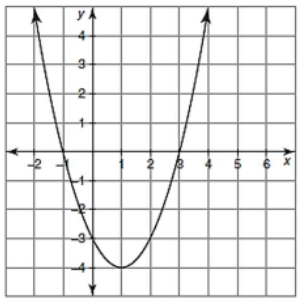
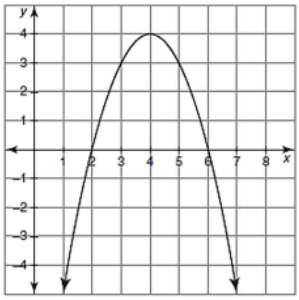
A determines if graph opens up or down
Use your Converting Between Forms graphic organizer.</td><td>a. What characteristics can you describe in $y = (x + 4)(x - 7)$?

Convert to standard form. What new characteristic can you give?</td><td>b. What characteristics can you describe in $y = (x + 3)^2 - 5$

Convert to standard form. What new characteristic can you give?</td></tr>
<tr><td>c. What characteristics can you describe in $y = x^2 + 6x + 4$

Convert to vertex form. What new characteristic can you give?</td><td>d. What characteristics can you describe in $y = x^2 - 5x - 24$

Convert to factored form. What new characteristic can you give?</td></tr>
<tr><td>16. Create equations given characteristics</td><td>Use your Converting Between Forms graphic organizer. Determine the best form to represent the given characteristics</td><td>a. Given: X-intercepts of (7, 0) and (-8, 0) and graph opens up</td><td>b. Given: Vertex of (-3, -6) and graph has a maximum</td></tr>
</table>

17. Create equations given graphs	Vertex Form: $y = a(x - h)^2 + k$ (h, k) is vertex Standard Form: $y = ax^2 + bx + c$ (0, c) is y-intercept Factored Form: $y = a(x - p)(x - q)$ (p, 0) & (q, 0) are x-intercepts Equations can only be written in vertex or factored form from a graph and then have to be converted to standard form.	a.  Vertex Form: Intercept Form: Standard Form:	b.  Vertex Form: Intercept Form: Standard Form:

Practice

Algebra 1 Unit 8: Quadratic Functions Practice

Day 9 – Different Forms of Quadratics
Practice Assignment

Name: _____

Date: _____ **Block:** _____

Directions: For the table below, identify each characteristic that can be EASILY determined from looking at the equation (requires no calculations). You will not fill in answers for every box.

Equation	Graph Opens	Vertex	X-Intercepts	Y-Intercept
1. $y = (x + 4)^2 - 5$				
2. $y = -2(x + 3)(x - 2)$				
3. $y = -x^2 + 3$				
4. $y = x^2 + 5x - 14$				
5. $y = -(x + 1)^2$				
6. $y = (x - 7)(x + 5)$				
7. $y = x^2 + 8x + 12$				
8. $y = -2(x - 3)^2 + 1$				

Convert the following equations to the specific form and give the additional characteristics you can determine from the new form.

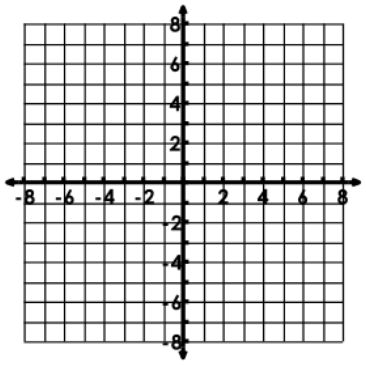
Equation 1 to standard:	Equation 4 to factored:	Equation 6 to standard:	Equation 7 to vertex:

Algebra 1 Unit 8: Quadratic Functions Practice

Review: Identify the form each quadratic equation is in. Then graph the equations by calculating the vertex and creating an xy chart.

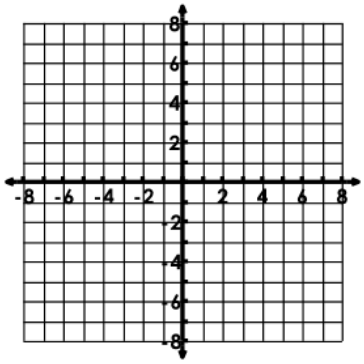
9. Graph $y = (x - 4)(x + 2)$

Form: _____



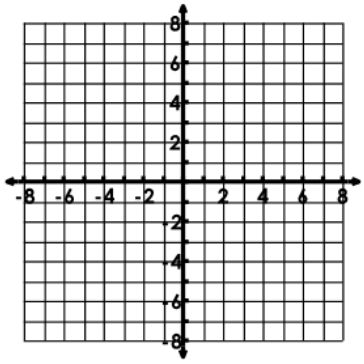
10. Graph $y = x^2 + 4x - 5$

Form: _____



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

Form: _____



Attachments

Syllabus - Math I A.doc