Algebra II (Common Core) Summer Assignment
Due: September 12, 2016 (First day of classes)
Ms. Vella

In this summer assignment, you will be reviewing important topics from Algebra I that are crucial for Algebra II. Please watch the videos that correspond with each topic and take notes. Then answer each section of questions on the topic.

Directions:
1. Print out the attached packet.
2. Watch the corresponding videos and fill-in the notes. (Note: 4 videos with notes & extra practice)
3. Answer all of the following questions after each section of notes. Be sure to show all of your work **directly on the packet** to receive partial credit. (25 questions all together)
4. Staple all pages together, including notes and extra practice.

This assignment is essential in your further understandings of Algebra II. I will be collecting this assignment and it will be counting as a quiz in your first quarter grade. You will also be having a quiz in the first week of school to ensure your understandings of these topics. Please let me know if you have any questions at all!

Have a wonderful and relaxing summer!
Feel free to email me with questions!
vellab@cheznous.org

Name: ____ Date: _________________
Ms. Vella Quadratics Packet #1

Graphing Quadratic Equations
Video Link- http://www.showme.com/sh/?h=6qYD2wq

What is the standard form of a quadratic equation?

The functions have a **quadratic** term, **linear** term, and a **constant** term.

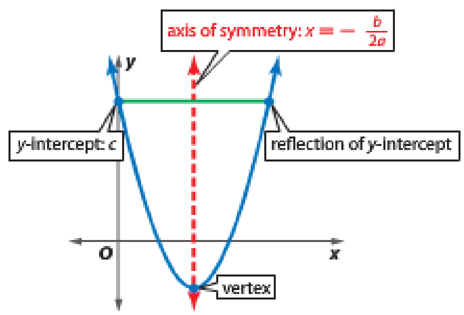
What shape does the graph of a quadratic take? ______________________

Key Vocabulary
Y-intercept- where the parabola intersects the _________________. Plug in 0 for x to find the y coordinate. Ex: $y = x^2 + 2x + 3 \rightarrow y = (0)^2 + 2(0) + 3 \rightarrow y = 3 \rightarrow (0,3)$

X-intercept- where the parabola intersects the _____________ or where our y is equal to 0. Also known as the **roots,** ____________ or _______________ to a quadratic equation.

_______________- highest or lowest point of the parabola.

Axis of Symmetry- a line through the graph of a _________________ that divides the graph into two congruent halves. $x = -\frac{b}{2a}$



Remember to graph a quadratic we can always plug into our calculate and generate the table
We can also use the trace function in our calculator to find the vertex, or x/y intercepts

Important Note: When our a-term is **positive** we will have a ________________, and when our a-term is negative we will have a ________________.

Solving Quadratic Equations by Graphing

**ALWAYS set quadratic equation equal to 0 when solving

Quadratic Function

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

$f(-2) = (-2)^2 - (-2) - 6$ or 0
$f(3) = 3^2 - 3 - 6$ or 0

−2 and 3 are zeros of the function.

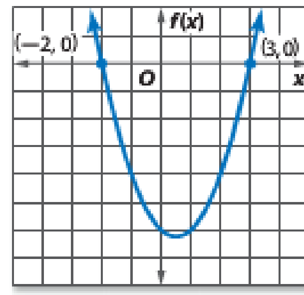
Quadratic Equation

$x^2 - x - 6 = 0$

$(-2)^2 - (-2) - 6$ or 0
$3^2 - 3 - 6$ or 0

−2 and 3 are roots of the equation.

Graph of Function



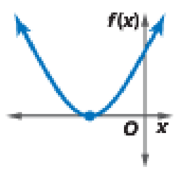
The x-intercepts are −2 and 3.

We can tell how many ________________________________ a quadratic equation has by looking at its graph.

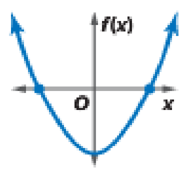
KeyConcept Solutions of a Quadratic Equation

Words A quadratic equation can have one real solution, two real solutions, or no real solutions.

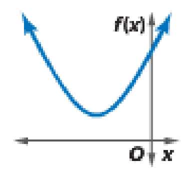
Models



one real solution



two real solutions



no real solution

Example 1 Two Real Solutions

Solve $x^2 - 3x - 4 = 0$ by graphing.

Example 2 One Real Solution

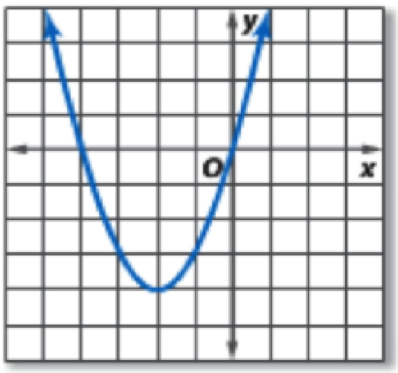
Solve $14 - x^2 = -6x + 23$ by graphing.

Name: ______________________________________

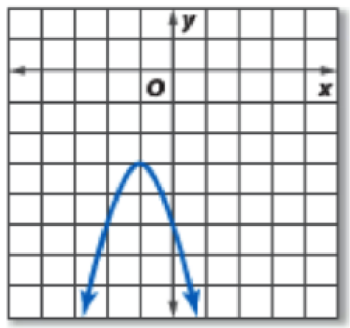
Graphing and Solving Quadratic Equations
Practice Problem Set

Use the related graph of each equation to determine its solutions.

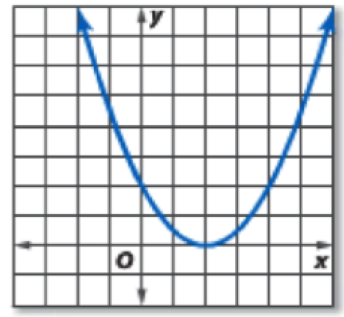
1. $x^2 + 4x = 0$



2. $-2x^2 - 4x - 5 = 0$



3. $0.5x^2 - 2x + 2 = 0$



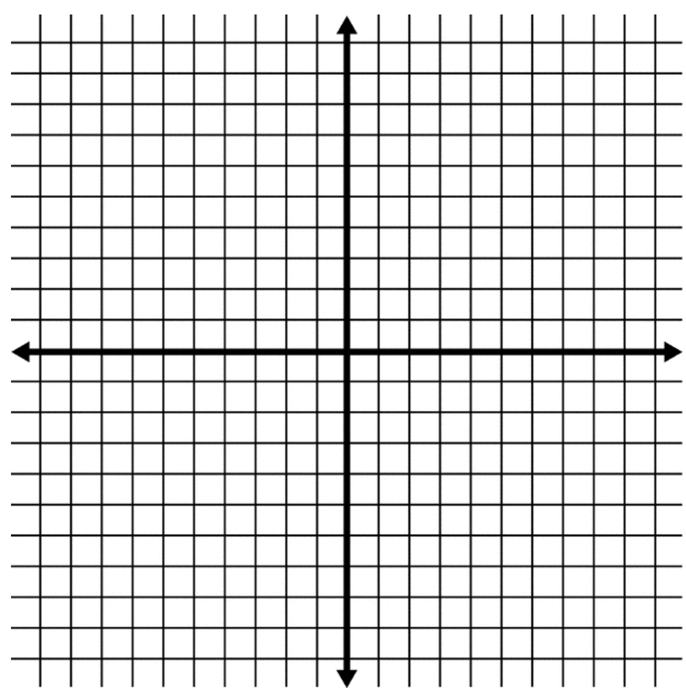
4. $f(x) = (x + 2)(x - 1)(x - 5)$

What is the y-intercept of $f(x)$?

What are the zeros of $f(x)$?

5. Graph the following equation on the axis below. State the y-intercept, vertex point, axis of symmetry, and the solutions of the equation.

$$y = x^2 - x - 6$$



Solving Quadratic Equations By Factoring

Video Link- http://www.showme.com/sh/?h=fi3RwX2

If we know the roots or zeros of a quadratic, we can generate the original quadratic equation.

Example:

The most common way to solve a quadratic is by ________________!

What are the steps of factoring?

Steps of Factoring:

1) GCF!!! Always look for a **greatest** _______________ **factor** first. Remember that a GCF can be both a __________________ and/or a ___________________.
2) If a is negative, factor out a negative one from each term.
3) Determine if $a = 1$ or $a \neq 1$.

If $a = 1$ then….

4) Double bubble! $(x\pm ?)(x\pm ?)$
5) Find two numbers that add to middle term (b-term) but multiply to last term (c-term)
6) Pay attention to your ____________!
7) Your GCF will remain on the outside when you are factoring.

Example: $x^2 - 5x + 6$

Example: $5x^2 - 15x$

Example: $3x^4 + 6x^3 - 9x^2$

Example: $3x^2 + 14x + 8$

Example: $2x^2 + 5x - 12$

If $a \neq 1$ then… (2 options)

Option 1- Guess and check!

3) Double Bubble!

4) Your first terms in your bubbles must multiply to your a-term in your quadratic.

5) Think about the factors of the last term in your quadratic and try substituting in to your double bubble. Ex: 12→ 2&6, 3 &4, or 12& 1.

6) Guess and check! FOIL back and see what works to get you to your original quadratic.

Example: $3x^2 + 14x + 8$

Option 2- $a \neq 1$ Method

3) Multiply your a to your c term. This will be come your new c-term, while you're a will become 1. Your b-term is not affected.

4) Factor this new quadratic using double bubble.

5) Divide the second term in each bubble by your original a-term.

6) Simplify as much as possible!

7) If this term is still a fraction, move the denominator in front of x.

8) Always check by foiling back!

Solving Quadratics by Factoring
We will use the factoring we learned above to solve quadratic equations.

Steps

1) Set the equation equal to 0. Be sure to keep the a-term of the quadratic _______________!
2) Check for a GCF!! Keep GCF on the outside.
3) Factor using either of the methods above.
4) Set each part of the equation equal to 0 and solve for x!
5) These are the ______________, _______________, or ______________ of your quadratic.

Solve: $16x^2 + 8x = 0$

Solve: $2x^2 - 6 = x$

Difference of Two Squares

Example: $x^2 - 64$

Solve: $x^2 = 36$

Name: ____

Factoring & Solving Quadratics by Factoring
Extra Practice

Write a quadratic equation in standard form with the given root(s).

1. $-8, 5$

Factor the following quadratics. Show all your work!

1) $9x^2 - 25$

2) $15x^2 + 7x - 2$

3) $3x^2 + 12x - 36$

4) $x^2 - 9x - 22$

Solve the following quadratic equations.

1) $x^2 - 4x = 24$

2) $-3x^2 - 10x + 8 = 0$

3) $5x^2 = 15x$

4) $10x^2 + 25x = 15$

5) 26. A boy standing on the top of a building in Albany throws a water balloon up vertically. The height, h (in feet), of the water balloon is given by the equation $h(t) = -16t^2 + 64t + 192$, where t is the time (in seconds) after he threw the water balloon. What is the value of t when the balloon hits the ground? Explain and show how you arrived at your answer.

The Quadratic Formula

Video Link-http://www.showme.com/sh/?h=EZYgq5A

How can we solve quadratics that can't be factored? ______________________________

Recall the standard form of our quadratic, $ax^2 + bx + c = 0$

What is the quadratic formula?

How do we use the quadratic formula?

1) Set the equation equal to 0
2) Identify your a, b and c coefficients. Take into account ____________!
3) Plug into the quadratic formula.
4) Simplify!

The quadratic formula **guarantees** solutions!

Note: How do we simplify radicals?

Example 1: $\sqrt{48}$

Example 2: $\sqrt{18}$

Solve the following quadratics:

a. $x^2 - 10x = 11$

b. $2x^2 + 6x - 7 = 0$

Name: ____

The Quadratic Formula
Extra Practice

Solve the following using the quadratic formula.

1. 14. Solve $x^2 - 12 = -7x$.
   (1) -3 and -4 (3) 3 and 4
   (2) $\frac{-7-\sqrt{97}}{2}$ and $\frac{-7+\sqrt{97}}{2}$ (4) $\frac{7-\sqrt{97}}{2}$ and $\frac{7+\sqrt{97}}{2}$

2. $9x^2 + 6x - 4 = 0$

3. $x^2 + 3 = -6x + 8$

4. The roots of the equation $2x^2 + 7x - 3 = 0$ are
   1) $-\frac{1}{2}$ and -3
   2) $\frac{1}{2}$ and 3
   3) $\frac{-7 \pm \sqrt{73}}{4}$
   4) $\frac{7 \pm \sqrt{73}}{4}$

5. $-3x^2 + 4x = -8$

Completing the Square
Video Link-http://www.showme.com/sh/?h=TD0Iap6

Another method of solving quadratics that always guarantees a solution.

Steps:

1) Set the equation equal to 0.
2) The a-term must equal 1! If it is not one, divide a through each term in equation.
3) Move the ________________ over to the other side of the equation.
4) Leave a blank space on both sides of the equation.
5) Add $\left(\frac{b}{2}\right)^2$ to this blank on both sides of the equation.
6) Simplify the right side of your equation. The left side of your equation is now a **perfect square ____________________**.
7) Factor the left side of your equation. Rewrite as $(x+?\,)^2$
8) Take the positive and negative square root of both sides of your equation.
9) Simplify your radical
10) Solve for *x*.

Example 1: $x^2 + 6x - 7 = 0$

Example 2: $2x^2 - 7x + 5 = 0$

Name: ___________________________________

Completing the Square
Extra Practice

1) 3. Solve for x: $x^2 - 4x + 4 = \frac{5}{2} + 4$

(1) $\left\{\frac{\sqrt{13}}{\sqrt{2}}, -\frac{\sqrt{13}}{\sqrt{2}}\right\}$

(2) $\left\{\frac{17}{2}, -\frac{17}{2}\right\}$

(3) $\left\{2+\frac{\sqrt{26}}{2}, 2-\frac{\sqrt{26}}{2}\right\}$

(4) $\left\{2+\frac{\sqrt{13}}{2}, 2-\frac{\sqrt{13}}{2}\right\}$

2) Brian correctly used a method of completing the square to solve the equation $x^2 + 7x - 11 = 0$. Brian's first step was to rewrite the equation as $x^2 + 7x = 11$. He then added a number to both sides of the equation. Which number did he add?

1) $\frac{7}{2}$

2) $\frac{49}{4}$

3) $\frac{49}{2}$

4) 49

3) If $x^2 + 2 = 6x$ is solved by completing the square, an intermediate step would be

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

2) $(x-3)^2 = 7$

3) $(x-3)^2 = 11$

4) $(x-6)^2 = 34$

4) Find the exact roots of $x^2 + 10x - 8 = 0$ by completing the square.

5) Solve $x^2 + 10 = -6x$ by the quadratic formula and completing the square. Explain how the two methods are related.