

Algebra II (Common Core) Summer Assignment
Due: September 11, 2017 (First full 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 an in-class 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: _____
Ms. Vella

Date: _____
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? _____

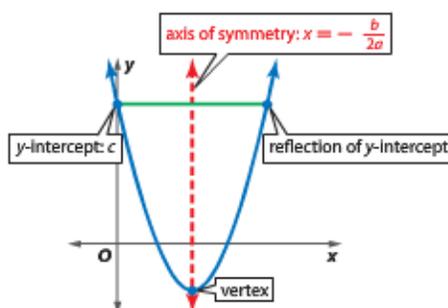
Key Vocabulary

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 calculator 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

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

$$f(-2) = (-2)^2 - (-2) - 6 \text{ or } 0$$

$$f(3) = 3^2 - 3 - 6 \text{ or } 0$$

-2 and 3 are zeros of the function.

Quadratic Equation

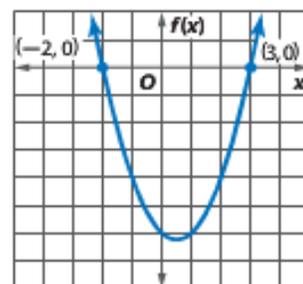
$$x^2 - x - 6 = 0$$

$$(-2)^2 - (-2) - 6 \text{ or } 0$$

$$3^2 - 3 - 6 \text{ or } 0$$

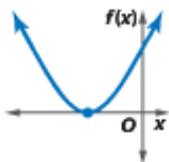
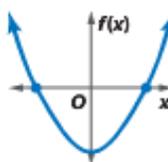
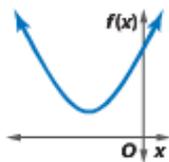
-2 and 3 are roots of the equation.

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	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>one real solution</p> </div> <div style="text-align: center;">  <p>two real solutions</p> </div> <div style="text-align: center;">  <p>no real solution</p> </div> </div>

Example 1 Two Real Solutions

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

Example 2 One Real Solution

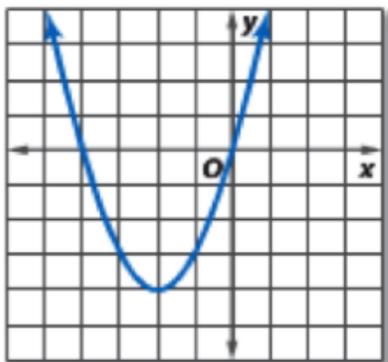
Solve $14 - x^2 = -6x + 23$ by graphing.

Name: _____

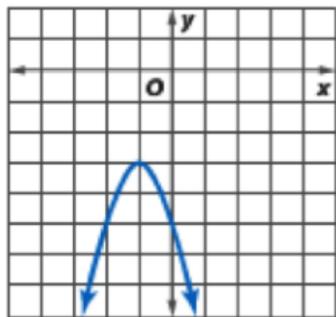
**Graphing and Solving Quadratic Equations
Practice Problem Set**

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

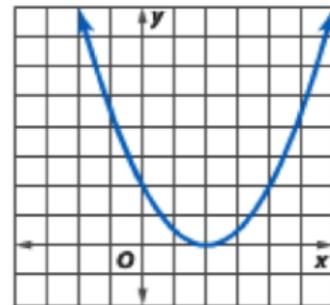
1. $x^2 + 4x = 0$



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



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



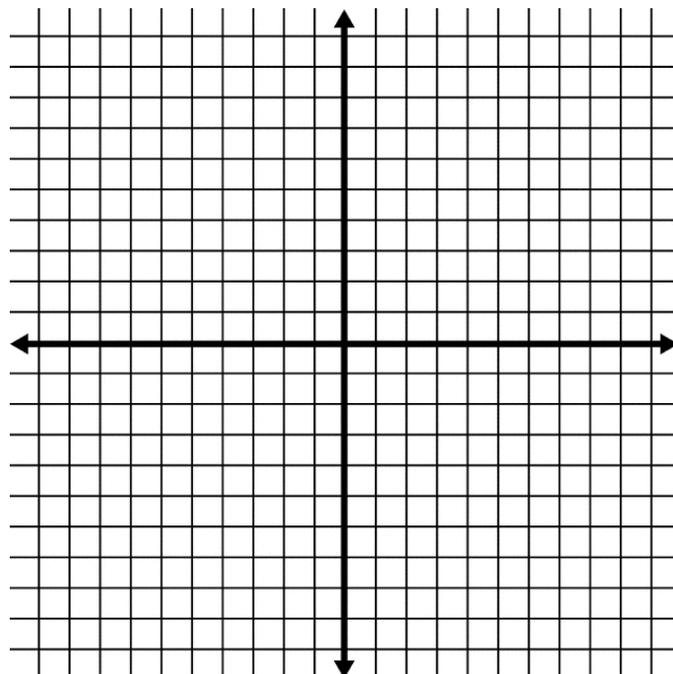
4. $f(x) = (x + 2)(x - 1)(x - 5)$

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: $12 \rightarrow 2 \& 6, 3 \& 4, \text{ or } 12 \& 1$.
 - 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 become 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

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

1) $-\frac{1}{2}$ and -3

2) $\frac{1}{2}$ and 3

3) $\frac{-7 \pm \sqrt{73}}{4}$

4) $\frac{7 \pm \sqrt{73}}{4}$

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) $\left\{ \frac{\sqrt{13}}{\sqrt{2}}, -\frac{\sqrt{13}}{\sqrt{2}} \right\}$ (3) $\left\{ 2 + \frac{\sqrt{26}}{2}, 2 - \frac{\sqrt{26}}{2} \right\}$

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