

CC Algebra 2 - Regents Review

Unit #6: Quadratic Functions and Their Algebra: Video 1/2

Video by Mr. Williamson
Newfield Senior High School

Based on Kirk Weiler's
emathinstruction lessons

Unit 6 Video Overview

In Video 1:

- Video Overview
- Unit 6 Lesson Overview
- CCLS Associated with Unit 6 (3 slides)
- Basics of Quadratic Functions
- Factoring (3 slides)
- The Zero Product Law

In Video 2:

- Quadratic Inequalities
- Completing the Square
- Equations of Circles
- Equations Parabolas
- Summary

Unit 6: Lesson Overview

- 6.1 Quadratic Functions Review
- 6.2 Factoring
- 6.3 Trinomial Factoring
- 6.4 Complete Factoring
- 6.5 Factoring By Grouping
- 6.6 The Zero Product Law
- 6.7 Quadratic Inequalities in One Variable
- 6.8 Completing the Square and Shifting Parabolas
- 6.9 Modeling with Quadratic Functions
- 6.10 Equations of Circles
- 6.11 The Locus Definition of a Parabola

CCLS Associated with Unit 6 Slide 1/3

- ❖ A.SSE.2 – Use the structure of an expression to identify ways to rewrite it. Tasks are limited to polynomial, rational, or exponential expressions.
- ❖ A.APR.3 – Identify zeroes of polynomials when suitable factorizations are available, and use the zeroes to construct a rough graph of the function defined by the polynomial. Tasks include quadratic, cubic, and quartic polynomials and polynomials for which factors are not provided.
- ❖ A.CED.1 – Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. Tasks are limited to exponential equations with rational or real exponents or rational functions.

CCLS Associated with Unit 6 Slide 2/3

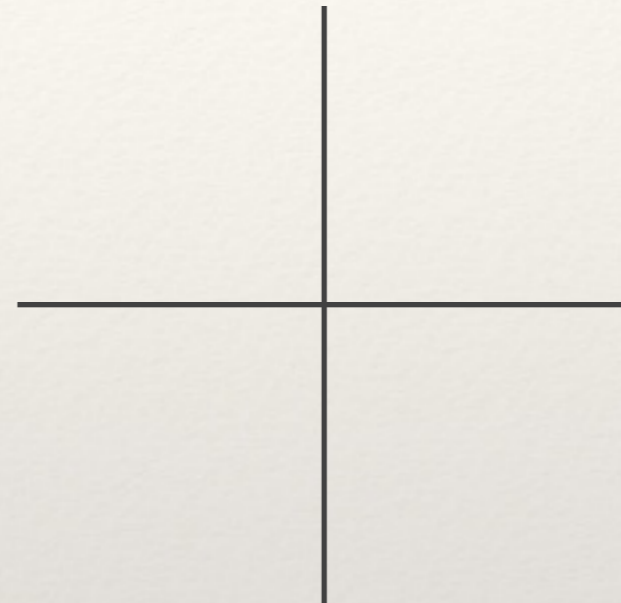
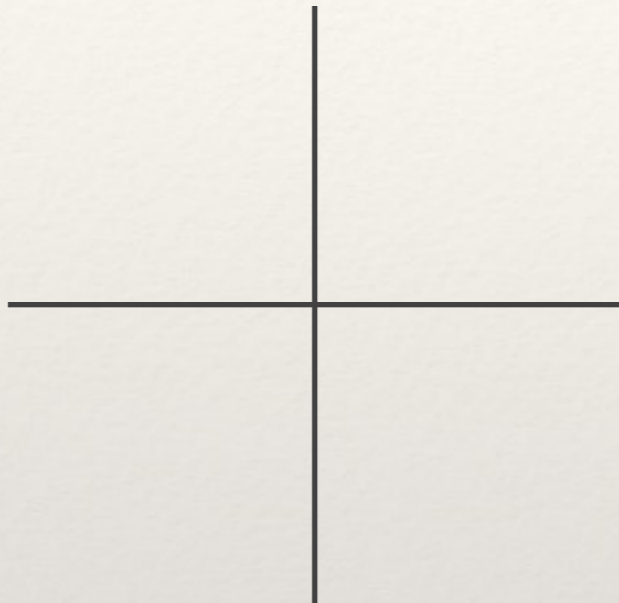
- ❖ A.REI.4 – Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. Tasks are limited to simple rational or radical equations.
- ❖ A.REI.7 – Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
- ❖ G.GPE.2 – Derive the equation of a parabola given a focus and directrix.

CCLS Associated with Unit 6 Slide 3/3

- ❖ F.IF.4 – For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions.
- ❖ F.BF.3 – Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.* Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions.

Basics of Quadratic Functions

Graphs:



Axis of Symmetry:

Domain and Range:

Factoring (Slide 1/3)

❖ Common Factoring

$$8x^3 - 12x^2$$

❖ Trinomial Factoring (a=1)

$$x^2 - 9x + 20$$

❖ Difference of Perfect Squares

$$4 - 25x^2$$

Factoring (Slide 2/3)

❖ Trinomial Factoring ($a \neq 1$)

$$6x^2 - 17x + 10$$

❖ Factoring by Grouping

$$4x^3 + 8x^2 - 25x - 50$$

Factoring (Slide 3/3)

- ❖ Sum and Difference of Perfect Cubes

$$27y^3 + 8$$

$$x^3 - 125$$

- ❖ Complete Factoring

$$x^6 - 63x^3 - 64$$

$$4x^2 - 24x + 32$$

The Zero Product Law

Solve the following equation for all values of x by applying the Zero Product Law.

$$4x^3 + 6x^2 = 16x + 24$$

End of Video 1

- ❖ In the second review video, I will go over:
 - Quadratic Inequalities
 - Completing the Square
 - Equations of Circles
 - Equations of Parabolas
 - Summary

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Review from Video 1

- ❖ Just a quick recall of what we reviewed in the first video:
 - ❖ Basics of Quadratic Functions
 - ❖ Factoring
 - ❖ The Zero Product Law

Review Material in This Video

- ❖ In this video review, I will go over:
 - Quadratic Inequalities
 - Completing the Square
 - Equations of Circles
 - Equations of Parabolas
 - Summary

Quadratic Inequalities

- ❖ Rewrite the inequality in factored form, compared to zero.
- ❖ Find the critical values by applying the Zero Product Law.
 - ❖ Factored < 0 : Factored > 0 :

Solve the following inequalities. Represent your answer both algebraically and on a number line.

$$x(x + 5) \leq 14$$

$$5x^2 - 31x + 7 > 20x - 3$$

Completing the Square

Find the vertex of the following parabolas by completing the square.

$$f(x) = x^2 + 8x - 10$$

$$g(x) = -2x^2 + 6x + 5$$

Equations of Circles

Equation:

Center:

Radius:

Find the center and radius of the following circle by Completing the Square.

$$x^2 + y^2 + 8x - 12y = 20$$

Equations of Parabolas

Equation:

Focus:

Directrix:

Find the equation of the parabola with a focus at $(4, 9)$ and directrix at $y = 5$.

Summary of Most Important Information

- ❖ Students should be able to:
 - ❖ Identify aspects of a parabola by examining its graph or its equation.
 - ❖ State the domain and range of a quadratic function.
 - ❖ Completely factor a polynomial.
 - ❖ Apply the Zero Product Law to solve a quadratic equation.
 - ❖ Solve a quadratic inequality and represent your answer algebraically and graphically.
 - ❖ Apply the Completing the Square method to find the vertex of a parabola.
 - ❖ Apply the equation of a circle to graph the circle, or to find the center and radius.
 - ❖ Find the equation of a parabola given its focus and directrix.