



Manhattan Center for Science and Math High School

Mathematics Department Curriculum

Content/Discipline **Common Core Algebra 2 Term I**

<http://mcsmportal.net>

Marking Period 1

**Topic:** **Numbers and Functions.**

**Essential Questions:** **How do you use laws of exponents to simplify an algebraic expression involving monomials?**  
**How do you determine whether a relation is a function, both algebraically and graphically?**

Unit/Topics

**Unit 1. Numbers, Expressions, Equations, and Inequalities. 9 days**

Set of numbers. Properties of real numbers. Simplifying algebraic expressions.

Solving linear equations and inequalities.

Solving absolute value equations and inequalities.

Properties of the exponents.

**Unit 2. Functions as the building blocks of algebra. 9 days**

Relations and Functions.

Function Notation.

Domain and Range of a Function.

Key Features of Functions.

SWBAT/Objectives

**Unit 1.** Identify and use properties of real numbers

Simplify and evaluate algebraic expressions

Simplify expressions involving exponents

Solve linear equations and inequalities

Solve absolute value equations and inequalities

**Unit 2.** Identify domain and range of relations and functions

Write function using function notation

Evaluate and graph functions

Vocabulary/Key  
Terms

**Unit 1.** Variables, commutative, associative, and distributive properties, exponent.

**Unit 2.** Independent and dependent variables, domain, range, one-to-one function, function notation, intercepts, maximum/minimum.

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**Assessments:** **Homework:** to be given daily on each introduced topic.  
**Class discussions:** students will be expected to be prepared for class, participate in class activities and actively engage in class discussion.  
**Uniform Tests:** on concepts involving equations and functions.

**Common Core Standards:** **Unit 1.** A-SSE.B.3, A-SSE.A.1a, A-CED.A.1. A-APR.A.1  
**Unit 2.** F-IF.A.1, F-IF.A.2, F-BF.A.1b, F-BF.A.1c, F-BF.B.4a, F-BF.B.4c

**Differentiated Instruction:** MATHXL, a student-driven online learning platform, is used to differentiate instruction for all students in class and subject areas. All students are held to the Common Core-aligned standards. Teacher performs formative assessments through lessons to check student understanding, including cold-calling, student board work, and exit tickets. Teacher circulates room to perform further formative assessments and guide small groups and individuals.

**ELLs:** English Language Learners are paired with students who are fluent in English, and given extra time. Visual aids, including pictures and Smart boards help students make clear connections to the text.

**SWDs:** Students with special needs are grouped with helpers and given instructions or assessments with simplified language or extra time.

**High-Achievers:** Gifted students are given challenge problems during lessons, homework, and summative assessments, which earn extra credits.

**Resources/Books** Textbook Algebra 2 Common Core by Pearson, 2015 edition  
Website: [www.engageny.org](http://www.engageny.org) [www.MathXL.com](http://www.MathXL.com)  
Graphing calculator

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Homework: Per Teacher



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Marking Period 2

**Topic: Linear and Quadratic Functions. Systems of Equations. Complex Numbers.**

**Essential Questions:**

- How do we write the equations of a line in different forms?
- How do you decide which is the appropriate method of solution to a given system of linear equations?
- How does the concept of the zero product property allow you to find the roots of a quadratic function?
- Why does the discriminant determine the number and nature of the roots to a quadratic equation and how does it relate to the Quadratic Formula?
- When would you use the quadratic formula to find the roots of a quadratic function?
- How are the powers of  $i$  derived and how are they cyclic?

**Unit/Topics** **Unit 3. Linear Functions and Systems of Linear Equations. 11 days**

Direct and inverse variations.  
Average rate of change.  
Linear models.  
Graph of a piecewise function.  
Solving systems of three equations algebraically.

**Unit 4. Quadratic Functions and Equations. 13 days**

Factoring using GCF, difference of two perfect square and grouping.  
Solving quadratic equations by factoring, completing the square, and quadratic formula.  
Addition, subtraction, and multiplication of complex numbers.  
Nature of the roots of a quadratic equation.  
Solving parabolic motion problems.

**SWBAT/Objectives**

**Unit 3.** Identify situations involving direct and inverse variations

- Define and find average rate of change
- Write equations of a line in different forms
- Solve systems with three variables by substitution and elimination

**Unit 4.** Factor special quadratic expressions

- Solve quadratic equation by completing the square, factoring, and quadratic formula
- Determine the nature of the roots using discriminant

<b>Vocabulary/Key Terms</b>	<p><b>Unit 3.</b> Direct variation, average rate of change, point-slope form, piecewise function, consistent/inconsistent system.</p> <p><b>Unit 4.</b> Greatest common factor, difference of two squares, quadratic formula, rational/irrational/complex roots Imaginary unit, discriminant.</p>
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<b>Common Core Standards:</b>	<p><b>Unit 3.</b> A-CED.A.2, F-BF.A.1, A-CED.A.4, F-IF.B.4, F-LE.B.5, F-IF.C.8, F-IF.C.9, F-IF.B.6, A-REI.C.5,A-REI.C.6</p> <p><b>Unit 4.</b> A-CED.A.3, A-CED.A.4, A-REI.D.11, A-REI.C.7, A-REI.B.4b, A-APR.B.3, N-CN.A.1, N-CN.C7</p>
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Marking Period 3

**Topic:** Polynomial, Radical, and Rational Functions.

**Essential Questions:** For a polynomial function, how are factors, zeros and x-intercepts related?  
For a polynomial equation, how are factors and roots related?  
When you square each side of a radical equation, is the resulting equation equivalent to the original?  
How do you know when a rational expression can be simplified?

**Unit/Topics**

**Unit 5. Polynomial Functions. 11 days**

Polynomials, Linear Factors and Zeros.

Solving polynomial Equations.

Theorems About Roots of Polynomial Equations.

The Fundamental Theorem of Algebra

Polynomials Models in the Real World

**Unit 6. Radical Functions and Rational Exponents. 9 days**

Roots and Radical Expressions

Multiplying and Dividing Radical Expressions

Rational Exponents

Solving Radical Equations

**Unit 7. Rational Functions. 9 days**

Rational Expressions.

Adding and Subtracting Rational Expressions.

Solving Rational Equations.

**Project: Building Polynomial Functions. 5 days**

Explore the connections between linear and quadratic functions.

Graph parabola based on two linear factors.

Build polynomials of degree 3.

<b>SWBAT/Objectives</b>	<p><b>Unit 5.</b> Classify polynomials  Graph polynomial functions and describe end behavior  Analyze the factored form of a polynomial and write a polynomial function from its zeros  Solve polynomial equations by factoring, by graphing, by using the Rational Root Theorem, by using the Fundamental Theorem of Algebra  Divide polynomials using long division and syntetic division</p> <p><b>Unit 6.</b> Find n-th roots  Multiply and divide radical expressions  Add and subtract radical expressions  Simplify expressions with rational exponents  Solve radical equations</p> <p><b>Unit 7.</b> Simplify rational expressions  Multiply and divide rational expressions  Add and subtract rational expressions  Solve rational equations</p> <p><b>Project.</b> Explain the relationship between linear factors of a polynomial function and the graph of the function  Based on the graph of two lines, sketch the parabola that is the product of the two linear expressions  Given the graph of polynomial, find the equations of lines that could be components of the polynomial.</p>
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<b>Vocabulary/Key Terms</b>	<p><b>Unit 5.</b> End behavior, monomial, multiplicity, polynomial function, relative maximum and minimum, standard form of a polynomial function, syntetic division, turning point.  <b>Unit 6.</b> n-th root, radical equation, radicand, rational exponent, rationalize the denominator, square root equation.  <b>Unit 7.</b> Rational equation, rational expression, rational function</p>
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