Reading Public Schools

Instilling a joy of learning and inspiring the innovative leaders of tomorrow

Mathematics Curriculum Guide	Honors Algebra 2

Course Description

This course reviews first year algebra skills and then expands the study of the real and complex number systems. Topics covered include exponents, radicals, logarithms, manipulation of algebraic expressions, factoring, solving equations, graphing, function concepts, conics, and sequences. Problem-solving and analysis are overarching themes that are addressed in all units. The use of graphing calculators as a tool is an integral component of the course.

Content Standards

Number and Quantity Content Standards

The Real Number System
- Extend the properties of exponents to rational exponents.
- Use properties of rational and irrational numbers.

Quantities
- Reason quantitatively and use units to solve problems.

The Complex Number System
- Perform arithmetic operations with complex numbers.
- Use complex numbers in polynomial identities and equations.

Algebra Content Standards

Seeing Structures in Expressions
- Interpret the structure of linear, quadratic, exponential, polynomial, and rational expressions.
- Write expressions in equivalent forms to solve problems.

Arithmetic with Polynomials and Rational Expressions
- Perform arithmetic operations on polynomials.
- Understand the relationship between zeros and factors of polynomials.
- Use polynomial identities to solve problems.
- Rewrite rational expressions.

Creating Equations
- Create equations that describe numbers or relationships.

Reasoning with Equations and Inequalities
- Understand solving equations as a process of reasoning and explain the reasoning.
- Solve systems of equations.
- Represent and solve equations and inequalities graphically

Function Content Standards

Interpreting Functions
- Understand the concept of a function and use function notation.
- Interpret functions that arise in applications in terms of the context (linear, quadratic, exponential, rational, polynomial, square root, cube root, trigonometric, logarithmic).
- Analyze functions using different representations.

Building Functions
- Build a function that models a relationship between two quantities.
- Build new functions from existing functions.

Linear, Quadratic, and Exponential Models
- Construct and compare linear, quadratic, and exponential models and solve problems.
- Interpret expressions for functions in terms of the situation they model.

Geometry Content Standards

Congruence
- Experiment with transformations in the plane.

Expressing Geometric Properties with Equations
- Use coordinates to prove simple geometric theorems algebraically.

Statistics and Probability Content Standards

Interpreting Categorical and Quantitative Data
- Interpret linear models.

Conditional Probability & the Rules of Probability
- Understand independence and conditional probability and use them to interpret data
- Use the rules of probability to compute probabilities of compound events.

Mathematical Practice Standards

- Making sense of problems and persevering in solving them
- Reasoning abstractly and quantitatively
- Constructing viable arguments and critiquing the reasoning of others
- Modeling with mathematics
- Using appropriate tools strategically
- Attending to precision
- Looking for and making use of structure
- Looking for and expressing regularity in repeated reasoning

Units	Essential Questions
Quadratic Functions & Equations	• How are quadratic functions and equations communicated? • How are quadratic functions used to understand/represent the universe in which we live? • How can writing a mathematical statement in different but equivalent ways highlight its various features?
Polynomials & Polynomial Functions	• How do we represent polynomial functions and equations? • How can writing a mathematical statement in different but equivalent ways highlight its various features?
Radical Functions & Rational Exponents	• How are radical functions used to understand/represent the universe in which we live? • Why do we simplify radical and exponential expressions? • Why is the inverse so important in mathematics?
Exponential & Logarithmic Functions	• How are exponential and logarithmic functions used to understand/represent the universe in which we live? • How do we represent exponential functions and equations? • Why is the inverse so important in mathematics?
Rational Functions	• How is it possible to keep getting closer and closer to something, but never to touch it? • How are operations with rational expressions similar to operations with fractions? • Why are rational functions discontinuous?
Conic Sections	• Why are they called "conic sections?" • How can the understanding of conic sections make more sense of the constructions and designs in our world? • What determines the type of conic section you will be using? • Why are there key vital coordinates, points and axes and how do they help me use and apply the conic section to solve problems?
Conditional Probability & The Binomial Theorem	• What makes conditional probability different from normal probability? • What is Pascal's triangle and how can it be used to find the coefficients of the terms of a binomial expansion? • What are similarities and differences between using Pascal's triangle versus Binomial theorem?

Classroom Structures and Key Learning Routines

- Whole class instruction
- Small group instruction
- Formative assessments
- Summative assessments
- Performance tasks
- Group projects
- Explorations with technology
- Real-world application problems
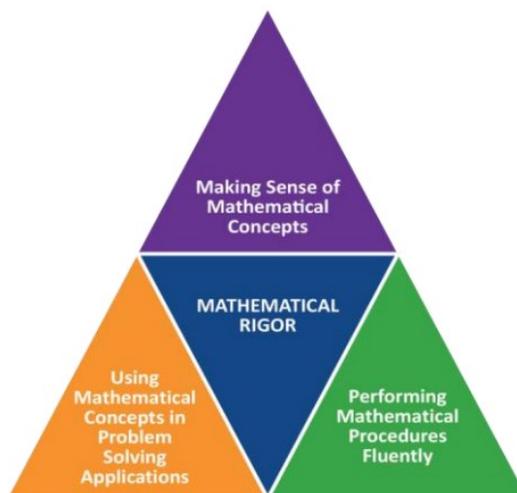
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Curriculum Guide	Curriculum guides are public documents aligned with the Massachusetts Department of Education Curriculum Frameworks. They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Each area of the curriculum is divided into general strands (broad categories) under which the standards fall. When we discuss "standards-based education" we mean that students are measured against their proficiency and growth towards meeting these standards. Curriculum guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.
Curriculum Map	Curriculum maps are internal documents utilized as planning tools for teachers. Curriculum maps keep a focus on the end-of-year standards and chart a course for the teaching and learning over the year. They are typically organized in a grade-level overview organized by month or marking period. Curriculum maps typically include: standards and expectations for the grade/content, essential skills/concepts, methods of assessment, and major content resources. Maps are never "done" as ongoing work of educators include revisions, additions, and revisits to the maps. They provide an overview for the year while also allowing educators to see a vertical picture of how the content develops as students progress through each grade.
Content Standards	The standards used as the foundation of our curriculum come directly from the Massachusetts Department of Education Curriculum Frameworks. State standards may be viewed here: http://www.doe.mass.edu/frameworks/
Mathematical **Practice Standards**	Mathematical Practice Standards are a set of skills/behaviors that are replicated in grades preK-12. These standards describe ways in which students engage with the mathematical content and the level of application grows increasingly complex as students progress vertically throughout their education.
Units	Units are the learning themes for the course. They are generally cumulative in nature, meaning that new units are based upon knowledge from previous units.
Essential Questions	Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities for inquiry into the learning and act as an umbrella to anchor the unit/lesson.
Activities	Activities identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The activities identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilize in their classrooms.