

Reading Public Schools

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



Mathematics Curriculum Guide

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, and function concepts. 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 equations and inequalities in one variable.
- 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.

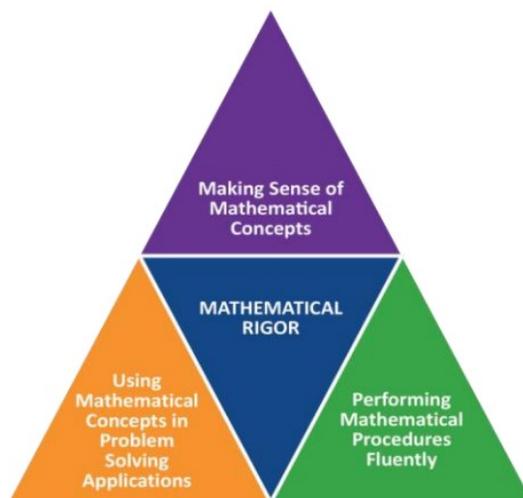
Mathematical Practice Standards

- 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
Expressions & Equations	<ul style="list-style-type: none"> • What is the difference between an expression and equation? • What does the solution of an equation represent?
Linear Systems	<ul style="list-style-type: none"> • How do we write, graph, and solve systems of equations? • What does the solution of a linear system represent? • What are the applications of linear systems in real-world problems?
Quadratic Functions & Equations	<ul style="list-style-type: none"> • How do we write, graph, and solve quadratic functions and equations? • How can writing a mathematical statement in different but equivalent ways highlight its various features? • What are the applications of quadratic functions in real-world problems?
Polynomials & Polynomial Functions	<ul style="list-style-type: none"> • How do we write, graph, and solve polynomial functions and equations? • How can writing a mathematical statement in different but equivalent ways highlight its various features? • What are the applications of polynomial functions in real-world problems?
Radical Functions & Rational Exponents	<ul style="list-style-type: none"> • How do we simplify radical and exponential expressions completely? • Why is the inverse so important in mathematics? • What are the applications of rational functions in real-world problems?
Exponential & Logarithmic Functions	<ul style="list-style-type: none"> • What is a logarithm? • How do I write, graph, and solve exponential functions and equations? • Why is the inverse so important in mathematics? • What are the applications of exponential and logarithmic equations in real-world problems?
Rational Functions	<ul style="list-style-type: none"> • How are operations with rational expressions similar to operations with fractions? • How do we simplify a rational expression completely? • Why are rational functions discontinuous? • How is it possible to keep getting closer and closer to something, but never to touch it?

Classroom Structures and Key Learning Routines

- Whole class instruction
- Small group instruction
- Formative assessments
- Summative assessments
- Performance tasks
- Group projects
- Explorations with technology



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Curriculum Guide Overview

Algebra 2

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.