

Reading Public Schools

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



Mathematics Curriculum Guide

Grade 8

Course Description

In grade 8, students will use linear equations and systems of linear equations to represent, analyze and solve a variety of problems. Students will extend on this knowledge to describe the association between two quantities in bivariate data. They will also strategically choose and implement procedures to solve linear equations in one variable, knowing that when they use the properties of equality they will maintain the solution of the original equation. Students will solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. They will explore the concept of a function as a rule and they will understand that functions describe situations where one quantity determine another. Their study of functions will take a deeper look at linear functions and how slope and the y-intercept makes the function behave. Students will observe distance and angle behaviors under transformations on the coordinate plane. They will understand and use the Pythagorean Theorem and its converse to find lengths in polygons. Students will complete working with volume by solving problems involving cones, cylinders, and spheres. During all these critical areas, students are encouraged to apply their critical thinking through word problems.

Content Standards

The Number System

- Know that there are numbers that are not rational, and approximate them by using rational numbers.

Expressions and Equations

- Work with radicals and integer exponents.
- Understand the connections between proportional relationships, lines, and linear equations.
- Analyze and solve linear equations and pairs of simultaneous linear equations.

Functions

- Define, evaluate, and compare functions.
- Use functions to model relationships between quantities.

Geometry

- Understand congruence and similarity using physical models, transparencies, or geometry software.
- Understand and apply the Pythagorean Theorem.
- Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Statistics and Probability

- Investigate patterns of association in bivariate data.

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

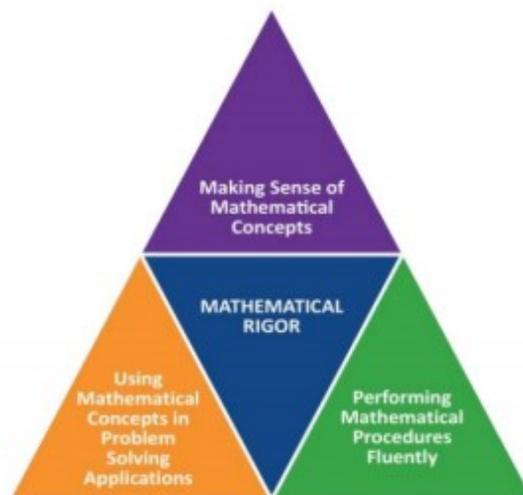


Units	Essential Questions
Real Numbers	<ul style="list-style-type: none"> • Why does one need to distinguish between rational and irrational numbers? • How does one locate irrational numbers on a number line?
Expressions and Equations	<ul style="list-style-type: none"> • Why does one need to express a number in a form with integer exponents? • Why does one need to write numbers in scientific notation? • What is the advantage of performing operations on numbers expressed in scientific notation rather than numbers in standard form? • Why is there a need to represent relationships between variables in more than one way? • When is a relationship between two variables proportional? • How does thinking of a unit rate as the slope of a line help to solve problems? • How does one interpret the number of solutions to linear equations in one variable? • What applications require solving simultaneous linear equations?
Functions	<ul style="list-style-type: none"> • Why does one need to define a function? • When should functions be evaluated and compared? • How does knowing the algebraic properties of a function help to graph that function? • What applications could be represented by variables that are not related by a linear function? • Why would one use functions to model relationships between quantities? • What are the distinguishing characteristics of a graph of a function?
Geometry	<ul style="list-style-type: none"> • Why does one need to perform transformations on figures? • How does knowing two figures are congruent or similar help one to solve problems? • How can one use the Pythagorean Theorem to solve real world and mathematical problems? • How can one use volume to solve real-world and mathematical problems? • What is the relationship, if any, between volume of cones, cylinders, and spheres?
Statistics and Probability	<ul style="list-style-type: none"> • Why is it important to describe patterns of an association between two quantities? • When is a scatterplot used to determine if there is an association between two quantities? • When is a two-way table used to determine if there is an association between two variables? • How are radical expressions represented?

Structures for Learning

During instructional time, students and teachers may be engaged in...

- 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 Overview

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.

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/>

Priority Areas

Priority areas are defined by the state of Massachusetts as the most critical areas in each grade level on which instructional time should focus.

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.

Content Standards

The Content Standards describe what students should know and be able to do once within the area of mathematics.

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.