Reading Public Schools

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

Mathematics Curriculum Guide   Grade 7/8

Course Description

In this course, students will focus on topics from the critical areas in both 7th and 8th grade math. 7th grade critical areas include: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples. 8th grade critical areas include (1) formulating and reasoning about expressions and equations (including modeling an association in bivariate data with a linear equation) and solving linear equations and systems of linear equations; (2) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem. During all these critical areas, students are encouraged to apply their critical thinking through word problems.

Content Standards

Ratios and Proportional Relationships
- Analyze proportional relationships and use them to solve real-world and mathematical problems.

The Number System
- Apply and extend previous understandings of all operations with fractions to all rational numbers
- Know that there are numbers that are not rational and approximate them.
- Work with radicals and integer exponents

Statistics and Probability
- Use random sampling to draw inferences about a population
- Draw informal comparative inferences about two populations
- Investigate chance processes and develop, use, and evaluate probability models.
- Investigate patterns of association in bivariate data.

Expressions and Equations
- Understand and solve multistep equations and inequalities.
- Understand the connections between proportional relationships, rate of change and slope, lines and linear equations.
- Analyze and solve linear equations and pairs of simultaneous linear equations.

Geometry
- Draw, construct, and describe geometrical figures and their relationships.
- Solve real world problems involving angles, area, surface area and volume of prisms, cylinders, cones, spheres.
- Understand congruence and similarity.
- Understand and apply the Pythagorean Theorem.

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

Mathematics	Grade 7/8

Units	Essential Questions
Real Numbers and Exponents	• How do operations with integers relate to the same operations with rational numbers? • 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 does one need to distinguish between rational and irrational numbers? • How does one locate irrational numbers on a number line?
Expressions and Equations	• How can you solve real-world and mathematical problems with numerical and algebraic equations? • Why are inverse operations important in the equation solving process? • How can properties of operations help to generate equivalent expressions that can be used in solving problems? • 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? • Why is there a need to represent relationships between variables in more than one way?
Proportional and Linear Relationships	• When is a relationship between two variables proportional? • How can percents show proportional relationships between quantities and be used to solve problems? • What are the different ways we can use to find percents? • What types of percents are we finding? • How can you represent a relationship between two quantities using ratios and rates? • How do you simplify complex fractions when finding unit rates? • What is the significance of a solutions to a system of equations? • How do you use linear equations to represent real life situations? • How do you use linear inequalities to represent real life situations?
Geometry	• How are radius and diameter used in finding circumference and what is the relationship? • What are the major classifications of angles? • How can you find and compare the areas and volumes of similar solids? • 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 and surface area to solve real-world and mathematical problems?
Statistics and Probability	• How can you investigate chance processes, and develop, use, and evaluate probability models? • How are tables, lists, tree diagrams, or simulations used to find the probability of an event? • How is probability used to find the frequency of an event? • How can sampling be used to draw inferences about one or more populations? • What are the different types of sampling and how are what would they represent? • 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?

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
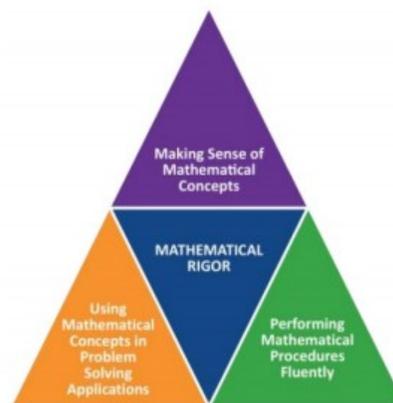
As of 12/2020

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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.
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.