

SCHOOL DISTRICT OF THE CHATHAMS

Mathematics 7 Grade 7 Full Year

Course Overview

The Mathematics 7 curriculum focuses on problem solving applications integrated with ratios and proportional relationships, the number system, expressions and equations, and geometry. Successful completion of the course will provide students with the prerequisite knowledge necessary to succeed in future Geometry and Algebra courses. Cooperative group work and whole group discussion emphasize student involvement and participation to maximize understanding and achievement.

New Jersey Student Learning Standards

The New Jersey Student Learning Standards (NJSLS) can be located at www.nj.gov/education/cccs/2020/.

Ratios and Proportional Relationships:

- 7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. F
- 7.RP.A.2 Recognize and represent proportional relationships between quantities.
- 7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.

The Number System:

- 7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- 7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- 7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Expressions and Equations:

- 7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- 7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
- 7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
- 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities
- 8.EE.C.7 Solve linear equations in one variable.
- 8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

8.EE.B.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .

8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other

8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Geometry:

7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Functions:

8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Technology Standards

9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.

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9.1.8.CDM.1: Compare and contrast the use of credit cards and debit cards for specific purchases and the advantages and disadvantages of using each

9.1.8.CP.2: Analyze how spending habits affect one's ability to save.

9.1.8.FP.5: Determine how spending, investing, and using credit wisely contributes to financial well-being

9.1.8.PB.2: Explain how different circumstances can affect one's personal budget.

9.1.8.PB.3: Explain how to create a budget that aligns with financial goals.

9.1.8.PB.4: Construct a simple personal savings and spending plan based on various sources of income and different stages of life (e.g. teenager, young adult, family).

Career Ready Practices

CRP4. Communicate clearly and effectively and with reason.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

Interdisciplinary Connections

English Language Arts:

- SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics, texts, and issues, building on others' ideas and expressing their own clearly.

Social Studies

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- RH.6-8.7. Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

Science:

- S-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Units of Study

Unit 1 - Adding and Subtracting Rational Numbers (~12 days)

- How can we utilize a number line to represent rational numbers?
- What are the rules for adding and subtracting integers using absolute value?
- How can addition and subtraction of rational numbers be applied to real world problems?

Unit 2 - Multiplying and Dividing Rational Numbers (~12 days)

- What are the rules for multiplying and dividing integers?
- How can we evaluate expressions that involve rational numbers?
- What are the applications for multiplying and dividing rational numbers in the real world?

Unit 3 - Expressions (~15 days)

- What are the strategies for adding, subtracting, factoring, and expanding linear expressions with rational coefficients?
- Can we utilize various forms of expressions to relate their quantities to a given scenario?

Unit 4 - Equations and Inequalities (~22 days)

- How can we solve two-step equations?
- How can we expand our understanding of two-step equations to two-step inequalities?
- When will an equation have one, zero, or infinitely many solutions?

Unit 5 - Ratios and Proportions (~22 days)

- How can we utilize ratio tables to represent equivalent ratios?
- What does it mean for two quantities to be proportional?
- How can we apply our understanding of ratios and proportions to various problems?
- What strategies are useful when solving problems that involve scale drawings?

Unit 6 - Percents (~22 days)

- What strategies are useful when converting between fractions, decimals and percentages?
- When is it more appropriate to use a fraction, decimal or percentage in the context of a problem?
- How can we solve problems that involve percentages?
- What is the simple interest formula and how can we apply it in a real world situation?

Unit 7 - Graphing and Writing Linear Equations (~16 days)

- What are the key features on a graph of a linear equation?
- What are the benefits of using various forms of a linear equation?
- How do we interpret slopes and intercepts of a line in the context of a problem?
- How do we accurately graph linear equations?

Unit 8 - Systems of Linear Equations (~16 days)

- How can the solution to a system of linear equations be represented?
- What strategies are beneficial when solving systems of two linear equations algebraically?

- How can we estimate the solution to a system of linear equations?
- What real world context can be connected to systems of linear equations?

Unit 9 - Exponents and Scientific Notation (~13 days)

- How can we use the properties of integer exponents to create an equivalent expression?
- How can we utilize powers of 10 to represent large and small quantities?
- What is scientific notation and why is it used?

Unit 10 - Real Numbers and the Pythagorean Theorem (~15 days)

- What is the square root of a number? Cube root? Nth root?
- What is the Pythagorean Theorem?
- How can we apply the converse of the Pythagorean Theorem to classify a right triangle?

Unit 11 - Geometric Shapes and Angles (~15 days)

- What is the formula for the circumference of a circle?
- What is the formula for the area of a circle?
- What strategies are useful when finding area and perimeter of composite shapes?

<h3>Learning Objectives/Discipline Standards of Practice</h3>

Learning Objectives:

- Explain how to model addition of integers on a number line
- Find sums of integers by reasoning about absolute values
- Explain why the sum of a number and its opposite is 0
- Use properties of addition to efficiently add rational numbers
- Explain how subtracting integers is related to adding integers
- Explain how to model subtraction of integers on a number line
- Find differences of integers by reasoning about absolute values
- Find differences of rational numbers by reasoning about absolute values
- Find distances between numbers on a number line
- Explain the rules for multiplying and dividing integers
- Evaluate expressions involving rational numbers
- Solve real-life problems involving multiplication and division of rational numbers
- Add, subtract, factor, and expand linear expressions with rational coefficients
- Understand that rewriting expressions in different forms can show how quantities are related
- Solve two-step equations
- Compare algebraic solutions to arithmetic solutions
- Solve two-step inequalities involving integers and rational numbers
- Solve multi-step equations with variables on both sides
- Identify whether an equation has one, none, or infinitely many solutions
- Understand ratios of rational numbers and use ratio tables to represent equivalent ratios
- Understand rates involving fractions and use unit rates to solve problems
- Determine whether two quantities are in a proportional relationship
- Use proportions to solve ratio problems
- Solve problems involving scale drawings
- Rewrite fractions, decimals, and percents using different representations
- Use the percent proportion to find missing quantities
- Find percentages of change in quantities
- Solve percent problems involving discounts and markups

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- Understand and apply the simple interest formula
- Identify key features of a graph
- Explain the meaning of different forms of linear equations
- Interpret the slopes and intercepts of a line
- Create graphs of linear equations
- Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously
- Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations
- Solve real-world and mathematical problems leading to two linear equations in two variables.
- Use the properties of integer exponents to generate equivalent expressions
- Use numbers expressed as the product of a single digit and a power of 10 to estimate very large or very small quantities
- Perform operations with numbers expressed in scientific notation and other forms
- Interpret scientific notation
- Understand the concept of a square root of a number
- Understand the pythagorean theorem
- Understand the concept of a cube root of a number
- Convert between different forms of rational numbers
- Understand the concept of irrational numbers
- Understand the converse of the Pythagorean Theorem
- Find the circumference of a circle
- Find the area of a circle
- Find perimeters and areas of composite figures
- Construct a polygon with given measures
- Use facts about angle relationships to find unknown angle measures

Discipline Standards of Practice:

MP.1: Make sense of problems and persevere in solving them

MP.2: Reason abstractly and quantitatively

MP.3: Construct viable arguments

MP.4: Model with Mathematics

MP.5: Use appropriate tools strategically

MP.6: Attend to precision

MP.7: Look for and make use of structure

MP.8: Look for and express regularity in repeated reasoning

<p>Instructional Resources and Materials</p> <p><i>Whole class resources have been identified with an asterisk.</i></p>
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Resources

Big Ideas Math Modeling Real Life - Grade 7, Larson and Boswell, National Geographic Learning, 2018*

Materials

- Scientific Calculator
- Desmos Graphing Calculator
- Graph paper

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Assessment Strategies

Assessment is designed to measure a student's mastery of a course standard and learning objective. Assessment can be used for both instructional purposes (formative assessment) and for evaluative purposes (summative assessment).

The following is a general list of the many forms assessment may take in learning.

- Tests
- Quizzes
- Projects
- Check-Ups
- Discussions
- Unit Assessments