

# **Readington Township Public Schools**

## **Grade 5 Honors Math Curriculum**

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## I. OVERVIEW

Readington Township Public Schools' K-5 mathematics curriculum provides students with a strong foundation in mathematics content while promoting and instilling the skills of problem solving, communication in mathematics, making mathematical connections, and reasoning. The Fifth Grade Honors course is a full-year course designed to provide honors level mathematics instruction to select students who exhibit a demonstrated need to increase content knowledge in mathematics while greatly accelerating the pace of instruction. The course is created with the goal of developing strong, cogent mathematical thinking, and independent mathematical problem solving skills.

The program is directly correlated to the sixth and seventh grade New Jersey Student Learning Standards (NJSLS). All 6<sup>th</sup> grade content is covered and students study approximately half of the 7<sup>th</sup> grade content. A typical progression for students successful in Honors Math 5 would be to move into 6<sup>th</sup> grade Pre-Algebra to gain the remaining 7<sup>th</sup> grade standards and all of the 8<sup>th</sup> grade standards.

## II. STUDENT OUTCOMES

These outcomes are linked to the [New Jersey Student Learning Standards for Mathematics](#).

### RATIOS AND PROPORTIONS (6.RP & 7.RP)

#### Understand ratio concepts and use ratio reasoning to solve problems.

1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*
2. Understand the concept of a unit rate  $a/b$  associated with a ratio  $a:b$  with  $b \neq 0$ , and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is  $3/4$  cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."<sup>1</sup>*
3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
  - a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
  - b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
  - c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
4. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

#### Analyze proportional relationships and use them to solve real-world and mathematical problems.

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
2. Recognize and represent proportional relationships between quantities.
3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

### THE NUMBER SYSTEM (6.NS & 7.NS)

1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for  $(2/3) \div (3/4)$  and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that  $(2/3) \div (3/4) = 8/9$  because  $3/4$  of  $8/9$  is  $2/3$ . (In general,  $(a/b) \div (c/d) = ad/bc$ .) How much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $3/4$ -cup servings are in  $2/3$  of a cup of yogurt? How wide is a rectangular strip of land with length  $3/4$  mi and area  $1/2$  square mi?*
2. Fluently divide multi-digit numbers using the standard algorithm.
3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two

whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express  $36 + 8$  as  $4(9 + 2)$ .*

5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
7. Understand ordering and absolute value of rational numbers.
8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate
9. 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.
10. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
11. Solve real-world and mathematical problems involving the four operations with rational numbers (extend to complex fractions).

### **EXPRESSIONS AND EQUATIONS (6.EE & 7.EE)**

#### **Apply and extend previous understandings of arithmetic to algebraic expressions.**

1. Write and evaluate numerical expressions involving whole-number exponents.
2. Write, read, and evaluate expressions in which letters stand for numbers.
3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression  $3(2 + x)$  to produce the equivalent expression  $6 + 3x$ ; apply the distributive property to the expression  $24x + 18y$  to produce the equivalent expression  $6(4x + 3y)$ ; apply properties of operations to  $y + y + y$  to produce the equivalent expression  $3y$ .*
4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions  $y + y + y$  and  $3y$  are equivalent because they name the same number regardless of which number  $y$  stands for.*

#### **Reason about and solve one-variable equations and inequalities.**

1. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
2. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
3. Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$  and  $x$  are all nonnegative rational numbers.
4. Write an inequality of the form  $x > c$  or  $x < c$  to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form  $x > c$  or  $x < c$  have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
5. Represent and analyze quantitative relationships between dependent and independent variables. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

#### **Use properties of operations to generate equivalent expressions. (7.EE)**

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
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.
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.

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.

### **GEOMETRY (6.G & 7.G)**

1. Solve real-world and mathematical problems involving area, surface area, and volume. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas  $V = lwh$  and  $V = Bh$  to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

### **STATISTICS AND PROBABILITY (6.SP)**

1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
5. Summarize numerical data sets in relation to their context.

## **III. ESSENTIAL QUESTIONS**

### **The Number System**

#### Numerical Expression and Factors

- How can you use repeated factors in real-life situations?
- Without dividing, how can you tell when a number is divisible by another number?
- How can you find the greatest common factor and least common multiple of two numbers?

#### Fractions and Decimals

- What does it mean to multiply or divide fractions?
- What does it mean to multiply or divide decimals?

#### Integers

- How can you represent numbers on a coordinate plane or number line in relation to 0?
- How can you use a number line to better understand integers?
- How can you use integers to represent real-life situations including the velocity and speed of an object?
- How can you tell if the sum or quotient of two integers is positive, negative or zero?
- How are adding integers and subtracting integers related?

#### Rational Numbers

- How can you use a number line to order rational numbers?
- How can you use what you know about adding integers to add rational numbers?
- Why is the product of two negative rational numbers positive?

### **Expressions and Equations**

#### Algebraic Expression and Properties

- How can you write and evaluate an expression that represents a real-life problem?
- How can you write an expression that represents an unknown quantity?
- Does the order in which you perform an operation matter?

### Equations, Inequalities & Equations

- How can you use addition, subtraction, multiplication and/or division to solve an equation?
- How can you write an equation with two variables?
- How can you represent the solution to an inequality?
- How can you simplify an algebraic expression?
- How can you use algebra tiles to solve one-step and two-step equations?

### **Ratios and Proportional Relationships**

#### Ratios and Rates

- How can you find, represent, and compare the relationship between two quantities?
- What is the connection between ratios, fractions, and percent?
- How can you compare lengths between the customary and metric systems

#### Proportions

- How do rates help you describe real-life problems in words and graphically?
- How can proportions help you decide when things are “fair”?
- How can you use a graph or equation to show the relationship between two quantities that vary directly?

#### Percents

- How does the decimal point move when you rewrite a percent as a decimal and vice versa?
- How can you order numbers that are written as fractions, decimals, and percents?
- How can you use models to estimate percent questions?
- What is the percent of decrease and percent of increase?

### **Geometry**

#### Areas of Polygons

- How can you derive a formula for the area of a parallelogram, triangle, and trapezoid?
- How do you find the lengths of the line segments in a coordinate plane?

#### Surface Area and Volume

- How can you draw a three-dimensional figure?
- How can you find the area of the entire surface of a prism?
- How can you find the volume of a rectangular prism with fractional edge lengths?

### **Statistics and Probability**

#### Statistical Measures

- How can you find and describe the average of a data set?
- How can you describe the spread of a data set?

#### Data Displays

- How can you use intervals, tables, and graphs to organize data?
- How can you describe the shape of a distribution of a data set?
- How can you use quartiles to represent data graphically?

## **IV. STRATEGIES**

The curriculum will be presented through a variety of strategies, based in educational best practices. Students will be engaged in meaningful lessons and activities using guided and independent practice and cooperative learning. Students will participate in hands-on activities, use manipulatives or technology where appropriate, and participate actively in class discussions. Students will have the opportunity to work online, both in and out of class, to enhance their academic studies.

Teachers will encourage students to employ a number of problem-solving strategies, relevant to the situations they are in. They will demonstrate evidence of understanding through modeling, verbal descriptions and oral presentations. Students may also use tools of technology where needed to better enhance their ability to complete and defend their mathematical reasoning. Specific strategies that may be used include, but are not limited to:

- Teacher presentation and direct instruction
- Inquiry-based problem solving
- Math Talk (solve, explain, question, and justify)
- Whole & Small Group instruction - Guided and independent
- Problem-solving independently, in pairs and in small groups

- Online videos and other instructional methods inside and/or outside of class
- Online practice such as Reflex Math and IXL
- Online tutorials

## V. EVALUATION

Student growth will be evaluated by a variety of criteria with both formative and summative assessments being provided. Students grade will include the results of some, but not necessarily all, of these assessments listed here.

- Teacher observations & anecdotal records
- Homework assignments, classwork, and exit tickets.
- Notebooks
- Student projects
- Unit tests and quizzes and check-ups
- Benchmark unit assessments
- Performance-based assessments
- State-based assessments
- Class participation, discussion, and sharing
- Unit Tests, quizzes, district/state math assessments

## VI. REQUIRED RESOURCES

*Big Ideas Math: Advanced 1 Common Core Curriculum*, Larson, R. and Boswell, L. (2013).

Teaching Edition (Green) features Chapters 1-10

Teaching Edition (Orange) features Chapters 11-15

Student Edition textbook (Orange)

Student Edition Record and Practice Journal (Orange)

Online Teacher Dashboard

Internet Access in class

Students will be required to maintain a notebook for class and use a pencil for all work.

## SUPPLEMENTAL RESOURCES

Because the best problems and learning experiences come from a variety of sources, Other resources may also be used as reference or course activity for the course instructor and/or a student. the following tools may also be used by the instructor and students to best deliver this class to meet the needs of the specific students in attendance. These resources are publically available or will be provided by the school district. Other resources to be utilized may include, but not be limited to:

- Lappan, G. (2009). *Connected Mathematics 2*. Boston, MA: Pearson.
- [BrainPop](#)
- [Estimation180](#)
- [Freckle](#)
- [Gizmos](#)
- [Google Classroom](#)
- [Illustrative Mathematics](#)
- [IXL](#)
- [Padlet](#)
- [Reflex Math](#)
- [The MAP Project](#)
- [Think Central](#)
- Other publically available online resources and problems at the teacher's discretion

## **VII. SCOPE AND SEQUENCE**

The approximate duration of each segment of the units is provided, along with the chapter of the Big Ideas textbook in which those topics are covered. As noted, other resources may also be utilized to best meet the students' needs for these topics.

### **The Number System**

Numerical Expressions and Factors (15 days, Ch 1)

Fractions and Decimals (15 days, Ch 2)

Integers and the Coordinate Plane (10 days, Ch 6)

Integers (10 days, Ch 11)

Rational Numbers (10 days, Ch 12)

### **Expressions and Equations**

Algebraic Expressions and Properties (10 days, Ch 3)

Equations and Inequalities (15 days, Ch 7)

Expressions and Equations (10 days, Ch 13)

### **Ratios and Proportional Relationships**

Ratios and Rates (10 days, Ch 5)

Ratios and Proportions (10 days, Ch 14)

Percent (10 days, Ch 15)

### **Geometry**

Areas of Polygons (10 days, Ch 4)

Surface Area and Volume (10 days, Ch 8)

### **Statistics and Probability**

Statistical Measures (10 days, Ch 9)

Data Displays (8 days, Ch 10)