

Readington Township Public Schools

Grade 4 Honors Math Curriculum

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I. OVERVIEW

Readington Township Public Schools' K-8 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. Throughout the delivery of the K-8 mathematics program, various tools and technology are employed, including manipulatives, calculators, software, apps, videos, websites, and computing devices (computers, tablets, smartphones, interactive whiteboards, etc.). A strong focus of the program is promoting high levels of mathematical thought through experiences which extend beyond traditional computation. The program is directly correlated to the New Jersey Student Learning Standards for Mathematics, which the State of New Jersey has adopted, and it is designed to prepare students for the New Jersey state assessments.

The Mathematics 4 Honors course is designed to teach students fifth grade & some 6th-grade mathematics while promoting higher order thinking skills. The course is directly correlated to the New Jersey Student Learning Standards and covers such topics as number sense, geometry, measurement, number operations in base ten and fractions, and algebraic thinking. The course also promotes and instills the skills of problem-solving, communication in mathematics, and making mathematical connections. Students will utilize various tools and technology in the process, including manipulatives, calculators, websites, and computers to better enhance a well-rounded understanding of course topics. A strong focus of the program is on promoting high levels of mathematical thought through experiences which extend beyond traditional computation. Students will use websites such as Reflex Math and IXL.

II. STUDENT OUTCOMES

[Linked to New Jersey Student Learning Standards for Mathematics](#)

Operations & Algebraic Thinking (5.OA)

All students will write and interpret numerical expressions and analyze patterns and relationships.

Number and Operations in Base Ten (5.NBT)

All students will understand the place value system and perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations-Fractions (5.NF)

All students will use equivalent fractions as a strategy to add and subtract fractions and apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data (5.MD)

All students will convert like measurement units within a given measurement system, represent and interpret data and understand concepts of volume and relate volume to multiplication and to addition.

Geometry (5.G and 6.G)

All students will graph points on the coordinate plane to solve real-world and mathematical problems and classify two-dimensional figures. Students will solve real-world and mathematical problems involving area of polygons and surface area and volume of three-dimensional shapes.

The Number System (6.NS)

Students will interpret and compute quotients and solve problems involving division of fractions and mixed numbers. Students will fluently add, subtract, multiply, and divide with multi-digit whole numbers and decimals. Students will solve problems using the greatest common factor and the least common multiple.

Students will:

Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. (5.OA.A.1)
2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product. (5.OA.A.2)

Analyze patterns and relationships.

1. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so. (5.OA.B.3)

Understand the place value system.

1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $1/10$ of what it represents in the place to its left. (5.NBT.A.1)
2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5.NBT.A.2)
3. Read, write, and compare decimals to thousandths. (5.NBT.A.3)
4. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$. (5.NBT.A.3.A)
5. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. (5.NBT.A.3.B)
6. Use place value understanding to round decimals to any place. (5.NBT.A.4)

Perform operations with multi-digit whole numbers and with decimals to hundredths.

1. Fluently multiply multi-digit whole numbers using the standard algorithm. (5.NBT.B.5)
2. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (5.NBT.B.6)
3. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (5.NBT.B.7)
4. 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?. (6.NS)*
5. Fluently divide multi-digit numbers using the standard algorithm. (6.NS)
6. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (6.NS)

Use equivalent fractions as a strategy to add and subtract fractions.

1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$. (In general, $a/b + c/d = (ad + bc)/bd$.) (5.NF.A.1)
2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$. (5.NF.A.2)

Use GCF and LCM to solve problems (6.NS)

1. 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 $4(9 + 2)$.*

Apply and extend previous understandings of multiplication and division.

1. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared

equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie? (5.NF.B.3)

2. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. (5.NF.B.4)
 - a. Interpret the product $(\frac{a}{b}) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $(\frac{2}{3}) \times 4 = \frac{8}{3}$, and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general, $(\frac{a}{b}) \times (\frac{c}{d}) = \frac{ac}{bd}$.) (5.NF.B.4.A)
 - b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. (5.NF.B.4.B)
3. Interpret multiplication as scaling (resizing), by: (5.NF.B.5)
 - a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. (5.NF.B.5.A)
 - b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number. (5.NF.B.5.B)
4. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. (5.NF.B.6)
5. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.1 (5.NF.B.7)
 - a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. Use the relationship between multiplication and division to explain that $(\frac{1}{3}) \div 4 = \frac{1}{12}$ because $(\frac{1}{12}) \times 4 = \frac{1}{3}$. (5.NF.B.7.A)
 - b. Interpret division of a whole number by a unit fraction, and compute such quotients. Use the relationship between multiplication and division to explain that $4 \div (\frac{1}{5}) = 20$ because $20 \times (\frac{1}{5}) = 4$. (5.NF.B.7.B)
 - c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. (5.NF.B.7.C)

Convert like measurement units within a given measurement system.

1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (5.MD.A.1)

Represent and interpret data.

1. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally. (5.MD.B.2)

Geometric measurement: understand concepts of volume.

1. Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5.MD.C.3)
2. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. (5.MD.C.3.A)
3. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. (5.MD.C.3.B)
4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units. (5.MD.C.4)
5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (5.MD.C.5)
6. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes. (5.MD.C.5.A)

- Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. (5.MD.C.5.B)
- Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems. (5.MD.C.5.C)

Graph points on the coordinate plane to solve real-world and mathematical problems.

- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate). (5.G.A.1)
- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5.G.A.2)

Classify two-dimensional figures into categories based on their properties.

- Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles. (5.G.B.3)
- Classify two-dimensional figures in a hierarchy based on properties. (5.G.B.4)

Geometry (6.G)

- Students will solve real-world and mathematical problems involving area of rectangles, parallelograms, triangles, and trapezoids.
- Students will solve real-world and mathematical problems involving area of organic shapes.
- Students will solve real-world and mathematical problems involving perimeter of two-dimensional shapes.
- Students will solve problems involving the surface area of right rectangular prisms.
- Students will find the volume of a right rectangular prism including applying the formulas $V = lwh$ and $V = Bh$ in the context of solving real-world and mathematical problems.

Personal Financial Literacy (9.1)

Income and Careers

- Explain the difference between a career and a job, and identify various jobs in the community and the related earnings.
- Identify potential sources of income.
- Explain how income affects spending and take-home pay.

Money Management

- Differentiate between financial wants and needs.
- Identify age-appropriate financial goals.
- Explain what a budget is and why it is important.
- Identify common household expense categories and sources of income.
- Identify ways to earn and save.

Credit and Debt Management

- Explain why people borrow money and the relationship between credit and debt.
- Identify common sources of credit (e.g., banks, credit card companies) and types of credit (e.g., loans, credit cards, mortgages).
- Compare and contrast credit cards and debit cards and the advantages and disadvantages of using each.
- Determine the relationships among income, expenses, and interest.
- Determine personal responsibility related to borrowing and lending.
- Summarize ways to avoid credit problems.

Planning, Saving, and Investing

- Determine various ways to save.
- Explain what it means to "invest."
- Distinguish between saving and investing.

Becoming A Critical Consumer

E.1 Determine factors that influence consumer decisions related to money.

E.2 Apply comparison shopping skills to purchasing decisions.

Civic Financial Responsibility

F.1 Demonstrate an understanding of individual financial obligations and community financial obligations.

F.2 Explain the roles of philanthropy, volunteer service, and charitable contributions, and analyze their impact on community development and quality of living.

Insuring and Protecting

G.1 Describe how valuable items might be damaged or lost and ways to protect them.

III. ESSENTIAL QUESTIONS AND CONTENT

Addition and Subtraction with Fractions & Decimals

What strategies can be used to compare fractions?

How can I add or subtract fractions and mixed numbers?

What is the correct way to read and write decimals and fractions?

What is the procedure for adding and subtracting decimals?

How do I use what I know about fractions and decimals to solve problems?

Multiplication and Division with Fractions

Can I multiply and divide fractions just like whole numbers?

How can I use multiplication or division of fractions to solve real-world problems?

Multiplication and Division with Whole Numbers and Decimals

How is multiplying with decimals related to multiplying whole numbers?

How is division with decimals related to dividing whole numbers?

Operations and Word Problems

How can I use what I know about estimation and mathematical operations to solve real-world problems?

Algebra, Patterns and Coordinate Graphs

How can expressions be written, read, and used in the real world?

What is a coordinate plane, and how is one used?

Measurement and Geometry

What are the different types of measurement units, and when do I use them?

How do I measure two and three-dimensional shapes?

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' grades 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

The required student resources for this course are:

Math Expressions Common Core Grade 5 Houghton Mifflin Harcourt

Big Ideas Math: Advanced 1 Common Core Curriculum. Larson, R. and Boswell, L. (2013)
Teaching Edition (Green) features Chapters 1-10

Student Edition textbook (Green)

Student Edition Record and Practice Journal (Green)

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

Additional 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 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. This pacing will be modified to best meet the students' needs for these topics on an as-needed basis.

- **Addition and Subtraction with Fractions (20 days)**
 - Equivalent Fractions
 - Addition and Subtraction with Fractions

- **Addition and Subtraction with Decimals (17 days)**
 - Read and Write Whole Numbers and Decimals
 - Addition and subtraction of Whole and Decimal Numbers
 - Round and Estimate with Decimals
- **Multiplication and Division with Fractions & Mixed Numbers (23 days)**
 - Multiplication with Fractions & Mixed Numbers
 - Multiplication Links
 - Division with Fractions & Mixed Numbers
- **Multiplication with Whole Numbers and Decimals (18 days)**
 - Multiplication with Whole Numbers and Decimals
 - Multiplication with Decimal Numbers
- **Division with Whole Numbers and Decimals (16 days)**
 - Division with Whole Numbers
 - Division with Decimal Numbers
- **Operations and Word Problems (18 days)**
 - Equations and Problem Solving
 - Comparison Problems
 - Problems with More Than One Step
- **Algebra, Patterns and Coordinate Graphs (12 days)**
 - Algebraic Reasoning and Expressions
 - Patterns and graphs
- **Measurement and Geometry (26 days)**
 - Measurement and Data
 - Area and Volume
 - Surface Area
 - Classify Geometric Figures

Personal Financial Literacy 9.1 (10 days)

- **Income and Careers**
 - Define careers and jobs
 - Identify potential sources of income
 - Explore the relationship between income, spending, and take-home pay
- **Money Management**
 - Financial wants and needs
 - Age-appropriate financial goals
 - Budgets
 - Expenses and sources of income
 - Earning and saving
- **Credit and Debt Management**
 - Relationship between credit and debt
 - Sources of credit (e.g., banks, credit card companies) and types of credit (e.g., loans, credit cards, mortgages)
 - Credit cards and debit cards
 - Relationships among income, expenses, and interest
 - Personal responsibility related to borrowing and lending.
- **Planning, Saving, And Investing**
 - Distinguish between saving and investing
- **Becoming A Critical Consumer**
 - Apply comparison shopping skills to purchasing decisions
- **Civic Financial Responsibility**
 - Individual financial obligations and community financial obligations
 - Roles of philanthropy, volunteer service, and charitable contributions
- **Insuring and Protecting**
 - Describe how valuable items might be damaged or lost and ways to protect them