

Readington Township Public Schools

Grade 5 Honors & Advanced 6th Math Curriculum

Authored by:

Catherine Way & Carey-Anne Hendershot

Reviewed by:

Sarah Pauch, Supervisor of Math, Science, and Technology

Approval Date:

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Members of the Board of Education:

David Rizza, President

Ellen DePinto

Pamela Cassidy

Elizabeth Fiore

Paulo Lopes

Michele Mencer

Richard Pieros

Linda Rad

Justina Ryan

Superintendent: Dr. Jonathan Hart

Readington Township Public Schools

Whitehouse Station, NJ 08889

www.readington.k12.nj.us

Grade 5 Honors/Grade 6 Advanced Mathematics

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. This course is created with the goal of developing strong, cogent mathematical thinking and independent mathematical problem-solving skills. The course is directly correlated to the sixth and seventh-grade New Jersey Student Learning Standards (NJSLS). All sixth-grade content is covered, and students study approximately half of the seventh-grade content.

STUDENT OUTCOMES

(Linked to [Jersey Student Learning Standards for Mathematics 2023](#))

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

A. 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 $\frac{3}{4}$ -cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger." (Clarification: Expectations for unit rates in this grade are limited to non-complex fractions.)
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.
 - d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

A. 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. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $(\frac{1}{2}) / (\frac{1}{4})$ miles per hour, equivalently 2 miles per hour.
2. Recognize and represent proportional relationships between quantities.
 - a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
 - b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
 - c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t=pn$.
 - d. Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1,r)$ where r is the unit rate.
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)

A. Apply and extend previous understandings of multiplication and division to divide fractions by fractions

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 $(\frac{2}{5}) \div (\frac{3}{4})$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(\frac{2}{5}) \div (\frac{3}{4}) = \frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{5}$. (In general, $(a/b) \div (c/d) = ad/bc$). How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb. of chocolate equally? How many $\frac{3}{4}$ cup servings are in $\frac{2}{5}$ of a cup of yogurt? How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?

B. Compute fluently with multi-digit numbers & find common factors & multiples

- 2 With accuracy and efficiency, divide multi-digit numbers using the standard algorithm.
- 3 With accuracy and efficiency, 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 $4(9+2)$.

C. Apply and extend previous understandings of numbers to the system of rational numbers

- 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.
 - a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3)=3$, and that 0 is its own opposite.
 - b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
 - c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- 7 Understand ordering and absolute value of rational numbers.
 - a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.
 - b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C .
 - c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.
 - d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.
- 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.

A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

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.
 - a. Describe situations in which opposite quantities combine to make 0. For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?
 - b. Understand $p+q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
 - c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
 - d. Apply properties of operations as strategies to add and subtract rational numbers.
2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
 - a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
 - b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts.
 - c. Apply properties of operations as strategies to multiply and divide rational numbers.
 - d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
3. Solve real-world and mathematical problems involving the four operations with rational numbers. (Clarification: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)

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

A. 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.
 - a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as $5 - y$.
 - b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression $2(8+7)$ as a product of two factors; view $(8+7)$ as both a single entity and a sum of two terms.
 - c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = 6s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$.
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.

B. Reason about and solve one-variable equations and inequalities

- 5 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.
- 6 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.
- 7 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.
- 8 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.

C. Represent and analyze quantitative relationships between dependent and independent variables

- 9 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. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.

A. Use properties of operations to generate equivalent expressions

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. For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.”

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

- 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. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
- 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.
 - a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms with accuracy and efficiency. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
 - b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.

GEOMETRY (6.G)

A. Solve real-world and mathematical problems involving area, surface area, and volume.

1. 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 (e.g., pyramid, triangular prism, rectangular prism) 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)

A. Develop understanding of statistical variability

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.

B. Summarize and describe distributions

- 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, such as by:
 - a. Reporting the number of observations.
 - b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
 - c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
 - d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Strategies

- Teacher presentation
- Teacher read-aloud
- Group discussion
- Small Group instruction
- Group presentations
- Interactive Smartboard Lessons

• Partner work • Museum walks • Math talk (students explain their thinking) • Small Group Work • Centers/ stations	
Accommodations	
<u>Accommodations and Modification Addendum</u>	
Assessments	
Formative	Summative
• Independent student work • Ready Classroom Lesson Quizzes • Teacher Observations • Class Participation • Class Discussions • Class Assignments • Homework Assignments • Notebooks • Anecdotal Records	• Mid-Unit Test • Unit Test
Benchmark	Alternative
• I-Ready Diagnostic • Performance Assessments	• Live Online Assessment Tools (Kahoot, Brainpop) • Student Projects • Student Presentations • Self-Assessments
Resources	
Required/Primary	Supplemental
• <i>EdGems Math Courses 1 and 2</i> (Shannon McCaw; published by EdGems Math LLC)	• IXL • <i>Big Ideas Math Advanced 1 textbook</i> (Ron Larson and Laurie Boswell; published by Big Ideas Learning) • Online Tutorials (Learnzillion, Khan Academy, Math Antics) • Online Math Games (Math is Fun, Funbrain, Cool Math Games, Math Playground) • Illustrative Mathematics (www.illustrativemathematics.org) • Estimation 180
Essential Questions And Content	
Number Systems (6.NS) • How do you know which operation to choose when solving a real-life problem? • How can you use repeated factors in real-life situations? • What does it mean to multiply and divide fractions & mixed numbers? • How is a coordinate plane used to graph and locate points that contain negative numbers? Ratios and Proportional Reasoning (6.RP) • How is a relationship between two quantities represented? • How are rates used to describe changes in real-life problems? • What is the connection between ratios, fractions, and percents? • How are lengths between the customary and metric system compared? Expressions and Equations (6.EE)	

- How are expressions that represent a real-life problem written and evaluated?
- Does the order in which operations are performed matter?
- How are mathematical operations used to solve an equation?
- What happens to one variable when another changes?
- How are mathematical operations used to solve an inequality?

Geometry (6.G)

- How is a formula for the area of a polygon derived?
- How are the lengths of line segments in a coordinate plane found?
- How are three-dimensional figures drawn in two dimensions?
- How do you measure the surface area or volume of certain shapes?

Statistics and Probability (6.SP)

- How is a statistical question identified?
- What are the different ways to describe an average of a data set?
- How can intervals, tables, and graphs be used to organize data?

The Number System (7.NS)

- How can I represent addition and subtraction on a horizontal or vertical number line?
- How can I interpret sums of rational numbers in real-world situations?
- How can I show that the distance between two rational numbers on the number line is the absolute value of their difference?
- How do I multiply and divide signed numbers?
- How do I use division to convert a rational number to a decimal?
- How do I add and subtract rational numbers?
- How do I multiply and divide rational numbers using the properties of operations?
- How can I apply the convention of order of operations to add, subtract, multiply, and divide rational numbers?
- How do I solve real-world problems involving the four operations with rational numbers?

Ratios and Proportional Relationships (7.NS)

- How can I compute unit rates with ratios of fractions?
- How can I compute unit rates with ratios of fractions representing measurement quantities in both like and different units of measure?
- How can I use tables and graphs to determine if two quantities are in a proportional relationship?
- How do I identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships?
- How do I write equations representing proportional relationships?
- How do I interpret the origin and (1,r) on the graph of a proportional relationship in context?
- How do I interpret a point on the graph of a proportional relationship in context?
- How can I use proportions to solve multi-step percent problems including simple interest, tax, markups, discounts, gratuities, commissions, fees, percent increase, percent decrease, and percent error?
- How can I use proportions to solve multi-step ratio problems?
- How can I use ratios and proportions to create scale drawings?
- How can I reproduce a scale drawing at a different scale?
- How can I compute actual lengths and areas from a scale drawing?
- How do I solve problems involving scale drawings using populations?

Pacing and Interdisciplinary Connections

Number Systems (6.NS)

Multi-Digit Operations (15 days)

1. Adding and Subtracting Decimals
2. Multiplying Decimals
3. Dividing by 1-Digit Numbers
4. Dividing by Multi-Digit Numbers
5. Dividing Decimals

6. Common Factors and Multiples

Fraction Operations (10 days)

1. Multiplying Fractions
2. Understanding Fraction Division
3. Dividing Fractions
4. Multiplying and Dividing Mixed Numbers

Rational Numbers and the Coordinate Plane (10 days)

1. Understanding Integers
2. Comparing Rational Numbers
3. Inequalities
4. The Coordinate Plane
5. Quadrilaterals and the Coordinate Plane

Interdisciplinary Connections:

- **6.NS.A.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.
 - 6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
 - 6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
 - MS-PS3-1.** Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
 - MS-PS3-2.** Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
- Activity:** Students run a controlled, multi-step experiment to collect data. Students will apply data to evaluate the equation for kinetic versus stored energy. Students may use these equation solutions to recognize a relationship between the variables.

The Number System (7.NS)

Sums and Differences of Rational Numbers (14 days)

1. Adding Integers
2. Adding Rational Numbers
3. Subtracting Integers
4. Subtracting Rational Numbers

Products and Quotients of Rational Numbers (8 days)

1. Multiplying and Dividing Integers
2. Multiplying Rational Numbers
3. Dividing Rational Numbers

Interdisciplinary Connections

- **W.NW.7.3** Write narratives to develop real or imagined experiences or events using effective techniques, relevant descriptive details, and well-structured event sequences.
- Activity:** Students will write a story using all for operations of rational numbers.

Ratios and Proportional Reasoning (6.RP)

Ratios and Rates (10 days)

1. Ratios
2. Ratio Tables and Graphs
3. Rates and Unit Rates
4. Comparing Rates
5. Measurement Conversion

Percents (14 days)

1. Introducing Percents
2. Percents, Decimals, and Fractions

3. Percent of a Number
4. Percent Application

Interdisciplinary Connections:

6.RP.A.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.

L.VL.6.3.B Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

Activity: Jigsaw activity in which students take charge of one particular word problem involving ratios and/or percentages, analyze the problem for relevant mathematical information, and then teach other students the process for dissecting the text and solving the problem.

6.RP.A.3.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.

MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.

Activity: Utilize ratio tables to determine weight (and other) conversions for other planets compared to Earth.

Ratios and Proportional Relationships (7.RP)

Ratios and Rates (8 days)

1. Ratios
2. Unit Rates
3. Rates and Ratios with Complex Fractions
4. Scale Drawings

Proportional Relationships (10 days)

1. Proportional Relationships
2. Problem Solving with Proportions
3. Tables and Graphs of Proportional Relationships
4. Proportional Relationship Equations

Percents (8 days)

1. Fractions, Decimals, and Percents
2. Percent of a Number
3. Percent of Change
4. Percent Application

Interdisciplinary Connections:

- **L.VL.7.3** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, including technical meanings, choosing flexibly from a range of strategies.
Activity: Students will read an excerpt from *Gulliver's Travels* and use information from the story to create a graph between two quantities that vary directly.
- **MS-PS4-2**-Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Activity: Students will compare the amount of UV rays reflected by various surfaces.

Expressions and Equations (6.EE)

Expressions(10 days)

1. Powers and Exponents
2. Order of Operations
3. Variables and Expressions
4. Evaluating Expressions
5. Equivalent Expressions
6. Distributive Property

Equations (10 days)

1. Equations and Solutions
2. Solving Addition and Subtraction Equations
3. Solving Multiplication and Division Equations
4. Solving Percent Equations

Tables, Equations, and Graphs (10 days)

1. Input-Output Tables
2. Writing Two-Variable Equations
3. Graphing Two-Variable Equations

Interdisciplinary Connections:

6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents.

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

6.EE.C.9 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.

MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Activity: Students run a controlled, multi-step experiment to collect force, mass, and acceleration data of the balloon rocket. Students will apply data to evaluate the equation $f=m*a$. Students may use these equations solutions to recognize a relationship between the variables (independent versus dependent, how changing one value will affect another).

Geometry (6.G)

Area and Volume (10 days)

1. Area and Perimeter
2. Area of Composite Figures
3. Nets and Surface Area
4. Volume of Rectangular Prisms

Interdisciplinary Connections:

6.G.A.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 $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Activity: Students will solve for and compare volumes of various solids, liquids, or gases.

Statistics and Probability (6.SP)

Statistics (15 days)

1. Introduction to Statistics
2. Measures of Center and Spread
3. Dot Plots
4. Histograms
5. Box Plots
6. Analyzing Statistics
7. Mean Absolute Deviation

Interdisciplinary Connections:

6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

RI.MF.6.6 Integrate information presented in different media or formats (e.g. visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

Activity: Students will display survey information in different formats (histograms, dot plots, box plots, etc.) and summarize/ explain the results of the survey.

6.SP.B.5.C Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Activity: Upon measuring and recording temperature over time, students will analyze for and find the mean, median, and mode of their data set.

Career, Computer Science, and Key Skills

The Number System

- **Career Ready Practices**

Act as a responsible and contributing community member and employee

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

Activity: Students have a problem-solving board from which they select a new problem at least weekly. These problems require logical thinking and the utilization of multiple strategies in order to reach a solution successfully. Students must describe their solution, in writing or video, to convince the reader they are correct.

- **9.2 Career Awareness, Exploration, and Preparation**

9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.

Activity: Students, in small groups, will create a newsletter to be sent to families. They will include a short description of a career that frequently involves arithmetic. This will require students to identify the qualifications for the career they chose.

- **9.4 Life Literacies and Key Skills**

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology

9.4.5.IML.2: Create a visual representation to organize information about a problem or issue.

9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.

Activity: Using the teacher-created word problems involving typical household finances, students will discuss what tools/technology could be used to help solve household financial problems. Students will then use a digital tool to help them solve problems.

- **Computer Science**

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Activity: Students will use a spreadsheet to analyze the impact of exponents on numbers. They will understand that while a calculator can be used for this purpose when repeatedly making the same computation, a spreadsheet is a more effective tool.

Expressions and Equations

- **Career Ready Practices**

Act as a responsible and contributing community member and employee.

Attend to financial well-being.

Activity: Students will utilize equations to determine how long to reach a savings goal. When working together in class and online, students will show respect for each other, provide each other with necessary information and assistance through this challenging unit, and work together cooperatively to develop and describe their equations, and the life situations that are represented. They will choose a savings goal, and

determine under different circumstances, how much they would have to save to reach it in different time periods. Also, consider how they would earn the money necessary to save.

- **9.2 Career Awareness, Exploration, and Preparation**

9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.

Activity: The activity above will include communication, collaboration and leadership skills required in a career. It will also require students to research the minimum wage in NJ and other jobs to determine pay scale.

- **9.4 Life Literacies and Key Skills**

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community, and global.

9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology.

9.4.5.IML.5: Distinguish how media are used by individuals, groups, and organizations for varying purposes.

Activity: Students will utilize equations to determine how long to reach a savings goal. Students will discuss what programs or online platforms can be used to help maintain savings goals.

- **Computer Science**

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships and support a claim.

Activity: The activity above will provide an opportunity to use digital tools to create line graphs in a coordinate plane. Students will then print that image, and add it to a document, with text, to demonstrate to their readers the importance of saving money over time to reach their goal.

Ratios & Proportions

- **Career Ready Practices**

Act as a responsible and contributing community member and employee.

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

Activity: Students will complete Chapter 5, Alternate Assessment as an in class activity.

- **9.2 Career Awareness, Exploration, and Preparation**

9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification and examples of these requirements.

Activity: Students will include a self-created survey of families and community members to further enhance its applicability to career standards. Survey questions to include topics related to the position of employment and education achieved.

- **9.4 Life Literacies and Key Skills**

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.

9.4.5.DC.3: Distinguish between digital images that can be reused freely and those that have copyright restrictions.

Activity: Students will include a self-created survey of families and community members to further enhance its applicability to career standards. Survey questions to include topics related to the position of employment and education achieved.

- **Computer Science**

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

Activity: In the activity above, students will use calculators, spreadsheets and graphing tools to graph their results and explain their findings.

Geometry

- **Career Ready Practices**

Act as a responsible and contributing community member and employee.

Consider the environmental, social and economic impacts of decisions.

Demonstrate creativity and innovation

Use technology to enhance productivity, increase collaboration and communicate effectively.

Work productively in teams while using cultural/global competence.

Activity: Students will make several models of a juice box package. For each, students will analyze the impacts various designs have on cost, material usage and societal enjoyment of the resulting product. They will select the best product packaging based on their analysis and present to the company design selection committee.

- **9.2 Career Awareness, Exploration, and Preparation**

9.2.5.CAP.7: Identify factors to consider before starting a business.

Activity: During the course of the project above, students will discuss the factors involved in starting a juice box business.

- **9.4 Life Literacies and Key Skills**

9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process.

9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics, or symbols.

9.4.5.IML.4: Determine the impact of implicit and explicit media messages on individuals, groups, and society as a whole.

Activity: During the course of the project above, students will research and discuss the process of developing a product.

- **Computer Science**

8.1.5.AP.2: Create programs that use clearly named variables to store and modify the data.

Activity: Students will create a program to compute the volume of their juice box that will modify their data as they change their juice box dimensions.

Statistics and Probability

- **Career Ready Practices**

Act as a responsible and contributing community member and employee

Demonstrate creativity and innovation.

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

Activity: Students will create and send surveys to students and/or parents to analyze and create a “What’s Typical about a 5th grader” product at the conclusion of this unit.

- **9.2 Career Awareness, Exploration, and Preparation**

9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.

Activity: This will be incorporated into the project as described above.

- **9.4 Life Literacies and Key Skills**

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one’s thinking about a topic of curiosity.

9.4.5.TL.5: Collaborate digitally to produce an artifact.

9.4.8.DC.7: Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.

Activity: This will be incorporated into the project as described above.

- **Computer Science**

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

Activity: This will be incorporated into the project as described above