

Readington Township Public Schools

Grade 2 Math

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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. Throughout the delivery of the K-5 mathematics program, various tools and technology are employed, including manipulatives, calculators, software, apps, videos, websites, and computing devices (computers, tablets, smart phones, interactive whiteboards, etc.). A strong focus of the program is on promoting high levels of mathematical thought through experiences which extend beyond traditional computation.

The second grade Ready Classroom mathematical program is directly correlated to the New Jersey Student Learning Standards, designed to cover the topics of operations and algebraic thinking, number and operations in base ten, measurement and data analysis, and geometry while promoting and instilling the skills of problem solving and strategies, communication in mathematics, and making mathematical connections. Students will use various tools and technology in the process, including manipulatives, websites and calculators to better enhance their understanding of the concepts being taught. A significant part of the collaborative classroom's mathematical culture is the frequent exchange of mathematical ideas and problem-solving strategies through student discourse.

II. STUDENT OUTCOMES (Linked to the New Jersey Student Learning Standards for Mathematics)

OPERATIONS AND ALGEBRAIC THINKING (2.OA)

A. Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.¹

B. Add and subtract within 20.

2. Fluently add and subtract within 20 using mental strategies.² By end of Grade 2, know from memory all sums of two one-digit numbers.

C. Work with equal groups of objects to gain foundations for multiplication.

3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

NUMBER AND OPERATIONS IN BASE TEN (2.NBT)

A. Understand place value.

1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:
 - a. 100 can be thought of as a bundle of ten tens — called a "hundred."
 - b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
2. Count within 1000; skip-count by 5s, 10s, and 100s.
3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$, $=$, and $<$ symbols to record the results of comparisons.

B. Use place value understanding and properties of operations to add and subtract.

5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
6. Add up to four two-digit numbers using strategies based on place value and properties of operations.
7. Add and subtract within 1000, 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. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

9. Explain why addition and subtraction strategies work, using place value and the properties of operations.

MEASUREMENT AND DATA (2.MD)

A. Measure and estimate lengths in standard units.

1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
3. Estimate lengths using units of inches, feet, centimeters, and meters.
4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

B. Relate addition and subtraction to length.

5. Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.

C. Work with time and money.

7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?

D. Represent and interpret data.

9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems⁴ using information presented in a bar graph.

GEOMETRY (2.G)

A. Reason with shapes and their attributes.

1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.⁵ Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves*, *thirds*, *half of*, *a third of*, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

9.1 PERSONAL FINANCIAL LITERACY

Civic Responsibility

9.1.2.CR.1: Recognize ways to volunteer in the classroom, school and community.

9.1.2.CR.2: List ways to give back, including making donations, volunteering, and starting a business.

Financial Institutions

9.1.2.FI.1: Differentiate the various forms of money and how they are used (e.g., coins, bills, checks, debit and credit cards).

Financial Psychology

9.1.2.FP.1: Explain how emotions influence whether a person spends or saves.

9.1.2.FP.2: Differentiate between financial wants and needs.

9.1.2.FP.3: Identify the factors that influence people to spend or save (e.g., commercials, family, culture, society)

Planning and Budgeting

9.1.2.PB.1: Determine various ways to save and places in the local community that help people save and accumulate money over time.

9.1.2.PB.2: Explain why an individual would choose to save money.

Risk Management and Insurance

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

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

III. ESSENTIAL QUESTIONS AND CONTENT

Operations And Algebraic Thinking

Strategies for Addition and Subtraction Within 20

- How do subtraction and addition relate to one another?
- How do we use and understand numbers in our daily lives?

Subtract 2-Digit Numbers

- What are efficient methods for finding differences?
- How does the position of a digit in a number affect subtraction problems?
- How can I use what I know about money, addition, and subtraction to know how much money I have?

Arrays, Equal Shares, and Adding or Subtracting Lengths

- Can I use patterns to help me understand larger numbers?
- Can I use patterns to help me understand equal parts?
- How is measuring like using a number line?

Number And Operations In Base Ten

Addition Within 200

- How do we represent larger numbers?
- What computation tools should I use when adding large numbers?
- How do I know how much money I have or how much something costs?

Three-Digit Addition and Subtraction

- How do strategies assist in more efficient and accurate computation?
- What computation tools are best suited to which circumstances?

Measurement And Data And Geometry

Length and Shapes

- What are tools of measurement and how are they used?
- How do I draw a shape when I'm given certain attributes to use?
- When is an estimate more appropriate than an actual measurement?

Time, Graphs, and Word Problems

- What time is it when certain things happen during one day?
- How can I show information that I have collected?

Personal Financial Literacy

- What actions can an individual take to help make the world a better place?
- What are the different values, forms and uses of money?
- How do an individual's values and emotions affect the way that he/she spends money?
- How does an individual determine the difference between a want and a need?
- How can an individual obtain his/her financial goals?
- How can valuable items be protected?

IV. STRATEGIES

Strategies may include but are not limited to:

- Teacher Presentation

- Daily Routines
- Math Talk (solve, explain, question, and justify)
- Student Pairings
- Scenarios to Act Out
- Small Group Instruction

V. ACCOMMODATIONS

- Accommodations and Modification Addendum

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Ready Classroom Lesson Quizzes
 - Teacher Observations
 - Class Participation
 - Class Discussions
 - Class Assignments
 - Homework Assignments
 - Notebooks
 - Anecdotal Records
- **Summative**
 - Mid-Unit Test
 - Unit Test
- **Alternative**
 - Live Online Assessment Tools (Quizizz, Kahoot, Plickers, Quizlet, Brainpop)
 - Student Projects
 - Student Presentations
 - Self-Assessments
- **Benchmark** (given September, March, and June)
 - I-Ready Diagnostic
 - Performance Assessments
 - Reflex Mathematics

VII. MATERIALS

- **Core**
 - Ready Classroom Mathematics, Curriculum Associates, LLC
 - Teacher Manual Volumes 1 & 2
 - Student Books Volumes 1 & 2
 - Ready Classroom Teacher Toolbox
- **Supplemental Resources**
 - Technology
 - Brain Pop
 - IXL
 - Reflex Math
 - Online Tutorials (Learnzillion, Khan Academy, Math Antics)
 - Online Math Games (Math is Fun, Funbrain, Cool Math Games, Math Playground)

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

Operations And Algebraic Thinking

- **Career Ready Practices**
Utilize critical thinking to make sense of problems and persevere in solving them.
2.OA.B.2 Add and subtract within 20
Activity: Students will use base ten blocks to add and subtract with regrouping. Students will then have to explain to a partner how and when to regroup.
- **9.2 Career Awareness, Exploration, and Preparation**
9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
2.OA.A.1 Represent and solve problems involving addition and subtraction.
Activity: Students will create word problems to match the jobs brainstormed.
- **9.4 Life Literacies and Key Skills**

9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

2.OA.A.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Activity: Students will solve various word problems and discuss why being able to explain their thinking is important.

- **Computer Science**

8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.

2.OA.C.4 Work with equal groups of objects to gain foundations for multiplication.

Activity: Students will be able to solve problems and explain their thinking to their peers using a digital platform. (ex. SmartSuite)

Number And Operations In Base Ten

- **Career Ready Practices**

Act as a responsible and contributing citizen and employee.

2.NBT.A.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones

Activity: Students will expand three-digit numbers into hundred blocks, ten sticks, and ones. Then students will work in a math group to explain their thinking.

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

9.2.2.CAP.2: Explain why employers are willing to pay individuals to work.

2.NBT.A.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens,

and

ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a “hundred.”

Activity: Students will discuss the correlation between place value and money.

- **9.4 Life Literacies and Key Skills**

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives.

2.NBT.B.7. Add and subtract within 1000, 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. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

Activity: Students will share ways they know how to add and subtract. They will discuss the importance of

knowing more than one way.

- **Computer Science**

8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.

2.NBT.B.6 Add up to four two-digit numbers using strategies based on place value and properties of operations

Activity: Students will record their work on a shareable document with another student, they will provide each other feedback digitally.

Measurement And Data

- **Career Ready Practices**

Communicate clearly and effectively and with reason.

2.MD.C.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately.

Activity: Students will work with math partners to answer word problems involving money, they will be able to explain what bills, and coins they used as well identify the amount of each coin.

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

9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.

2.MD.D.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.

Activity: Students will graph the different types of jobs discussed and the skills associated with each job.

- **9.4.2.CT.3:** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

2.MD.D.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems⁴ using information presented in a bar graph.

Activity: Students will analyze data pictures and bar graphs. They will create questions that relate to the graphs. Students will then be paired up and each partner will solve the other questions.

- **Computer Science**

8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.

2.MD.C.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

Activity: Students will play a game on a digital platform that has them identifying as well as writing time on an analog and digit clock.

Geometry

- **Career Ready Practices**

Demonstrate creativity and innovation.

2.G.A.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Activity: Students will use circles and rectangles that have been partitioned into two, three, and four equal shares to create a robot. Students will be able to explain what shapes they used to create their robot and explain using the words halves, thirds, half of, a third of etc.

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

9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.

2.G.A.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Activity: Students will make a list of jobs that would require prior knowledge of fractions and equal parts and how it is used everyday.

- **9.4 Life Literacies and Key Skills**

9.4.2.CI.2: Demonstrate originality and inventiveness in work.

2.G.A.1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

Activity: Students will sort shapes by attributes. Then take a museum walk to see how peers classified their shapes. Students will then go back and try another way to sort their shapes.

- **Computer Science**

8.1.2.DA.3: Identify and describe patterns in data visualizations.

2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.⁵ Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

Activity: Students will create pictures using geometric shapes. Shapes will be totaled as a class and will look for patterns.

IX. PACING

Operations And Algebraic Thinking

Strategies for Addition and Subtraction Within 20

Lessons 1-5 (30 days)

- Mental Math Strategies for Addition and Subtraction
- Solve One and Two-Step Word Problems

Interdisciplinary Connections:

- **Literacy/Math**
2.OA.B.2 Add and subtract within 20.

SL.2.1 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.

L.2.4.A. Use sentence-level context as a clue to the meaning of a word or phrase.

Activity: Working in small groups, students will incorporate new vocabulary in their discussion of strategies for solving the one and two-step word problems then write a response utilizing the new vocabulary.

Number And Operations In Base Ten Addition and Subtraction Within 100

Lessons 6-9 (33 days)

- Addition and Subtraction Strategies with Two-Digit Numbers
- Solve Word Problems with Two-Digit Numbers

Interdisciplinary Connections:

- **Literacy/Math**
2.OA.A.1 Represent and solve problems involving addition and subtraction.
SL.2.2. Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
SL.2.2.B. Build on others' talk in conversations by linking their explicit comments to the remarks of others.
L.2.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 2 reading and content, choosing flexibly from an array of strategies.
Activity: Students work with a small group to share their responses to word problems. They discuss connections among different models and representations, critique approaches and solutions, and draw conclusions based on their observations.

Numbers Within 1,000

Lessons 12-19 (41 days)

- Understand Three-digit Numbers
- Read, Write, and Compare Three-Digit Numbers
- Add and Subtract Three-Digit Numbers
- Add Several Two-Digit Numbers

Interdisciplinary Connections:

- **Literacy/Math**
2.NBT.B.1.7. Add and subtract within 1000, 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. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g. because, and, also) to connect opinion and reasons, and provide a concluding statement or section.
SL.2.3. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
Activity: Students will use a place value chart to draw a representation of the steps used in solving a three digit number problem and to label each step using the sequence words *first*, *next*, and *finally*. When finished, students will share their responses with a new partner using the sequence words *first*, *next*, and *finally*.

Measurement And Data

Length and Line Plots

Lessons 10-11, 20-27(40 days)

- Measuring in Inches and Centimeters
- Measuring in Feet and Meters
- Estimate and Measure Length
- Compare Lengths
- Read and Make Line Plots

Interdisciplinary Connections:

o Science/Math

- **2.MD.A.1.** Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.

W.2.2. Write informative/explanatory texts in which they introduce a topic, use evidence-based facts and definitions to develop points, and provide a conclusion.

2-LS4-1 Make observations (firsthand or from media) to collect data that can be used to make comparisons.

Activity: Students will individually measure and record their seed/plant growth in their science journal over a period of time. On a selected day, individual data results are entered in a class digital Bar Graph for all to analyze. **(Insects and Plants Unit)**

Geometry

Shapes and Arrays

Lessons 28-32 (23 days)

- Recognize and Draw Shapes
- Partition Shapes
- Add Using Arrays

Interdisciplinary Connections:

- **Science/Math**

8.1.2.A.2 Create a document using a word processing application

2.G.A.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves*, *thirds*, *half of*, *a third of*, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Activity: Students will record observations of liquids in various containers on a shared Google Doc using math terms to describe findings, ie; the whole as two halves, three thirds, four fourths **(Solids and Liquids Unit)**

Personal Financial Literacy (10 days)

Civic Responsibility

- There are actions an individual can take to help make this world a better place.

Financial Institutions

- Money comes in different values, forms, and uses.

Financial Psychology

- There is a relationship between an individual's values, emotions, and the ways he/she chooses to spend money.
- External factors can influence the items that an individual wants or needs.

Planning and Budgeting

- A budget is a plan that helps an individual obtain his/her financial goals.
- Saving money is a habit that can be developed.

Risk Management and Insurance

- There are ways to keep the things we value safely at home and other places.

Readington Township Public Schools

Grade 3 Math

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Approval Date: January 18, 2022

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I. OVERVIEW

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In Grade 3, instructional time focuses on four critical areas: (1) developing an understanding of multiplication and division and the strategies for multiplication and division within 100; (2) developing an understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing an understanding of the structure of rectangular arrays and of area; and (4) describing, comparing, and analyzing two-dimensional shapes.

II. STUDENT OUTCOMES (Linked to New Jersey Student Learning Standards for Mathematics)

Operations And Algebraic Thinking (3.OA)

A. Represent and solve problems involving multiplication and division.

1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as 5×7 .
2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.
3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.¹
4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = \div 3$, $6 \times 6 = ?$.

B. Understand properties of multiplication and the relationship between multiplication and division.

5. Apply properties of operations as strategies to multiply and divide.² Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)
6. Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.

C. Multiply and divide within 100.

7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

D. Solve problems involving the four operations, and identify and explain patterns in arithmetic.

8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

- Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

Number And Operations In Base Ten (3.NBT)

A. Use place value understanding and properties of operations to perform multi-digit arithmetic.

- Use place value understanding to round whole numbers to the nearest 10 or 100.
- Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
- Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9×80 , 5×60) using strategies based on place value and properties of operations.

Number And Operations-Fractions (3.NF)

A. Develop understanding of fractions as numbers.

- Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.
- Understand a fraction as a number on the number line; represent fractions on a number line diagram.
 - Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
 - Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
- Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
 - Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
 - Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
 - Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.
 - Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Measurement And Data (3.MD)

A. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

- Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
- Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

B. Represent and interpret data.

- Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.
- Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

C. Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

- Recognize area as an attribute of plane figures and understand concepts of area measurement.

- a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.
 - b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).
 7. Relate area to the operations of multiplication and addition.
 - a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.
 - b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
 - c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.
 - d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

D. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Geometry (3.G)

A. Reason with shapes and their attributes.

1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $1/4$ of the area of the shape.

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

III. **ESSENTIAL QUESTIONS**

Number And Operations In Base Ten

- What strategies help add and subtract larger numbers?
- When is rounding numbers useful?
- How can place value models help represent different numbers?
- How do place value models represent the procedures of a standard algorithm?
- How can I use what I know about number relationships to develop efficient strategies for adding/subtracting multi-digit numbers?

Operations And Algebraic Thinking

- What does it mean to multiply and divide?
- How does understanding equal groups help with multiplication and division?
- How can you use patterns to multiply?
- How can you convert words into equations?

Measurement And Data

- How do we measure the world around us?
- How can I use patterns to understand area and perimeter?
- How do I use weight and measurement in my life?
- What tools and units are used to measure?
- How are the units of measure within a standard system related?
- How do I decide which unit of measurement to use?

Number And Operations-Fractions

- What does it mean if I have a fraction of something?
- How do I name a fraction?
- Where do I find fractions in my life?
- What does whole mean?
- What are the parts of a fraction and what do they represent?
- What does it mean to have equivalent fractions?
- How can I know if one fraction has more value than another?

Geometry

- What are the properties of polygons with three and four vertices?
- How can shapes be categorized by their attributes?
- What is the difference between a point, ray, line, line segment?
- How are angles measured?

IV. STRATEGIES

- Teacher presentation
- Daily Routines
- Math Talk (solve, explain, question, and justify)
- Student Pairs
- Scenarios to act out
- Small Group instruction

V. ACCOMMODATIONS

- Accommodations and Modification Addendum

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Exit cards
 - Lesson Quizzes
 - Teacher Observation
 - Class Participation
 - Homework
 - Anecdotal Notes
- **Summative**
 - Mid-Unit Test
 - Unit Test
- **Alternative**
 - Google slide presentations on unit vocabulary/content
 - Math Journal/interactive student notebook
 - Student-Designed Projects
 - Self Assessment

- **Benchmark**
 - I-Ready Diagnostic (given September, March, and June)
 - Reflex Math assessments (Fall, Winter, June)
 - Performance Tasks

VII. MATERIALS

- **Core**
 - Ready Classroom Mathematics, Curriculum Associates, LLC
 - Teacher Manual Volumes 1 & 2
 - Student Books Volumes 1 & 2
 - Ready Classroom Teacher Toolbox
- **Supplemental Resources**
 - **Technology**
 - Brain Pop
 - IXL
 - Learning Farm
 - mathisfun.com
 - mathplayground.com
 - funbrain.com
 - superteacherworksheets.com
 - commoncoresheets.com

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

Number And Operations In Base Ten

- **Career Ready Practices**

Attend to personal health and financial well-being.

3.NBT.A. Use place value understanding and properties of operations to perform multi-digit arithmetic.**1.** Use place value understanding to round whole numbers to the nearest 10 or 100. **2.** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Activity: Students will be given one million dollars to spend on items such as college education/trade school, vacation, home purchase, car purchase, pet, charitable donations, clothing, etc. They are to subtract the researched costs of the items to determine who has the lowest total remaining in the class.
- **9.2 Career Awareness, Exploration, and Preparation**

9.2.5.CAP.2: Identify how you might like to earn an income.

3.NBT.A. Use place value understanding and properties of operations to perform multi-digit arithmetic. **1.** Use place value understanding to round whole numbers to the nearest 10 or 100. **2.** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Activity: Students will be given a monthly budget based on various salary bands. They will use rounding and computation skills to estimate the cost of food, housing, education expenses, and miscellaneous. The challenge will be to stay within the budget and estimate the cost of living. Budgets will be based on several factors, including career choices and their annual salaries.
- **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 (e.g., 6.1.5.CivicsCM.3).

3.NBT.A. Use place value understanding and properties of operations to perform multi-digit arithmetic.**1.** Use place value understanding to round whole numbers to the nearest 10 or 100. **2.** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Activity: Students will be given a weekly allowance. They will also be given a weekly bill. Students will spend money of their choice as well. . Students will discuss the implications of running out of money. What are the consequences?

- **Computer Science**

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

3.NBT.A. Use place value understanding and properties of operations to perform multi-digit arithmetic. 1. Use place value understanding to round whole numbers to the nearest 10 or 100. 2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Activity: Utilize online computational resources to organize and represent the budget calculations based on monthly salaries, as stated in the activity above.

Operations And Algebraic Thinking

- **Career Ready Practices**

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

3.OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Activity: Students will learn and practice multiplication and division facts by using district approved online programs and tools. Activities and games included in iReady and Reflex Math will be practiced daily to develop fact fluency and master memorization of facts.

- **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.

3.OA.A.3 Represent and solve problems involving multiplication and division. 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Activity: Students will brainstorm a list of jobs that require math skills.

- **9.4 Life Literacies and Key Skills**

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

3.OA.A.3 Represent and solve problems involving multiplication and division. 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Activity: Students will digitally create new seating plans for a classroom using methods that show equal groups. Math drawings will be used to illustrate these groupings based on the different totals provided, up to 100. Coordinating equations will be written expressing the number of groups, number in each group, and the total.

- **Computer Science**

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

3.OA.A.1-2 Represent and solve problems involving multiplication and division. 1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as 5×7 . 2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.

Activity: Students will create graphic representations of multiplication and division problems. Students will create a Google Doc or Slide to illustrate a related multiplication and division problem. These visual representations will demonstrate the process of each operation, and the thinking behind it, using either equal groups or an array.

Measurement And Data

- **Career Ready Practices**

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

3.MD.B.3 Represent and interpret data. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Activity: Students will take a survey of their peers. Topics may include “favorite food”, or “best pet”. Based on the information collected, students will create a picture graph and bar graph. Students will then create original, data-based questions to be answered by a classmate. Vocabulary should include, but not be limited to, “how many more” and “how many less”. Questions should be solved based on the graphs created.

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

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

3.MD C.5- Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.

Activity: Have students design a dream home (architect, painter, carpenter, designer, engineer, homeowner, accountant) on graph paper, calculating the areas of each room in the house to find its total area. Calculate the areas of rooms to identify how much carpet, tile, wallpaper, paint is needed to decorate the rooms in the house.

- **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.

3.MD B.3 Represent and interpret data. 3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets

Activity: Have students create various types of graphs (horizontal/vertical bar graphs, pictographs, pie charts, and line plots), using google sheets to represent collection of data (Favorite Dr. Seuss book.)

- **Computer Science**

8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.

3.MD C.5- Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.

Activity: Have students design a dream home (architect, painter, carpenter, designer, engineer, homeowner, accountant) with various materials. , calculating the areas of each room in the house to find its total area. Calculate the areas of rooms to identify how much carpet, tile, wallpaper, paint is needed to decorate the rooms in the house.

Number And Operations-Fractions

- **Career Ready Practices**

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

3.NF.A.3 Develop understanding of fractions as numbers. 3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

Activity: Using pattern blocks, create a visual representation and model of equivalent fractions. Show the equivalencies by stacking the different shapes of blocks that fill the same amount of space. For example, two red trapezoids fill the same amount of space as one yellow hexagon and three blue rhombuses. Write the coordinating fractions. Show and explain to a partner how the pattern blocks show various examples of equivalent fractions.

- **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 (e.g., life guards, child care, medicine, education) and examples of these requirements.

3.NF.A.2. Develop an understanding of fractions as numbers. 2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
Activity: Equate finding fractions on a number line to measuring using a ruler (inches). Practice measuring various line lengths and/or objects and expressing the lengths using the appropriate fractions. Discuss the need to make precise measurements in career fields such as carpentry.

- **9.4 Life Literacies and Key Skills**

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

3.NF.A.3.D. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Activity: Students will solve fraction problems using the symbols $>$, $=$, or $<$, and justify the conclusions.

- **Computer Science**

8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

3.NF.A.2. Develop understanding of fractions as numbers. 1. Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a part of size $1/b$.

Activity: Students will choose a digital tool to create figures and partition them to show equal parts. Then write coordinating fractions. Show both “examples” and “nonexamples”. Explain your reasoning to show understanding of equal parts of a whole.

Geometry

- **Career Ready Practices**

Demonstrate creativity and innovation.

3.G.A.2 Reason with shapes and their attributes. 2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $1/4$ of the area of the shape.

Activity: Using grid paper and a straight edge, draw a rectangle. Decompose the shape, and find the area of each part. Then also find the total area. Next, shade parts of the rectangle and express the value as a fraction. Share findings with peers and explain your reasoning.

- **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 (e.g., life guards, child care, medicine, education) and examples of these requirements.

3.G.A.1 Reason with shapes and their attributes. 1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Activity: Students will choose a career that relies, at least in part, on knowledge of shapes. For example, they may choose to be an architect or a baker. Using learned attributes of shapes, students will create a sketch or 3D project showcasing the importance of the attributes of various shapes. If choosing to be an architect, a student may build a model of a structure using pattern blocks. Afterward, identify what shapes worked well and made the structure stable, as well as what shapes did not and explore why this was the case.

- **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.

3.G.A.12. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $1/4$ of the area of the shape.

Activity: Students will answer word problems that address personal, academic, and global problems that ask them to divide shapes appropriately.

- **Computer Science**

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

3.G.A.1 Reason with shapes and their attributes. 1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Activity: Students will sort shape cards into categories according to their attributes. Possible extensions will include a challenge to explain why several shapes fit into multiple categories. Identify patterns and similarities discovered while sorting. Create a graphic organizer that shows the categories, similarities, and differences.

IX. PACING

Number And Operations In Base Ten

Three-Digit Numbers

Lessons 1-3, 9 (16 days)

- Understand Place Value and Rounding
- Addition and Subtraction with Three-Digit Numbers

Interdisciplinary Connections:

- **RI.3.1.** Ask and answer questions, and make relevant connections to demonstrate understanding of a text, referring explicitly to the text as the basis or the answers.
3.NBT.A.1. Use place value understanding to round whole numbers to the nearest 10 or 100.
Activity: Read, *Sir Cumference and All the King's Tens* by Cindy Neuschwander to introduce the concept of rounding using the understanding of place value. Have the students use dominoes to place on a place value chart. Add the dots on the dominoes to create a digit in each place value on the chart; hundreds, tens and ones. The students will then round the number they created to the nearest hundred and ten.

Operations And Algebraic Thinking

Multiplication and Division

Lessons 4-8, 10-13, 17-18 (42 days)

- Meanings of Multiplication and Division
- Use Place Value to Multiply
- Understand Connection Between Multiplication and Division
- Solve One and Two-Step Word Problems

Interdisciplinary Connections:

- **ELA/Math**
RI.3.1. Ask and answer questions, and make relevant connections to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
3.OA A.1. Interpret products of whole numbers
Activity: Read, *Amanda Bean's Amazing Dream* by Cindy Neuschwander to introduce the concept of multiplication. Have the students begin a multiplication flipbook to model the different ways to visually show multiplication.

Measurement And Data

Area and Scaled Graphs

Lessons 14-16, 19(30 days)

- Understand Area
- Multiply to Find Area
- Read and Create Scaled Graphs
- Measure Length and Plot Data

Interdisciplinary Connections:

- **Science/Math**

3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

3.MD.B.4 Represent and interpret data. 4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Activity: Students will measure force of motion using magnets. They will look for patterns in data to predict how far the magnetic field extends around two magnets. Students collect data for one and three magnets, measuring the distance at which paper clips are attracted. They use those data to predict how far the magnetic field extends around two magnets. Students use and discuss science practices in the context of investigating magnetic fields.

Measurement

Lessons 26-29 (16 days)

- Time
- Liquid Volume
- Mass

Interdisciplinary Connections:

- **Science/Math**

3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

3 MDB4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Activity: Students will design and test carts to see which type of cart rolls farther down a ramp. Students will use tape measures to measure the distance of each roll. Students will make modifications to their carts to improve on the cart's ability to travel.

Number And Operations-Fractions

Explore Fractions

Lessons 20-25 (28 days)

- Fraction Concepts
- Equivalent Fractions
- Comparing Fraction
- Use Symbols to Compare

Interdisciplinary Connections:

Science/Math

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3.NF.A.2. Develop understanding of fractions as numbers.

Activity: Students examine germinated seeds to determine similarities and differences in the way the organisms grow. They set up a hydroponic garden to observe the life cycle of a bean plant. Students go outdoors to investigate the roots and shoots of various plants. They use tools to dig up plants and compare the structures above ground to those below ground. Growth should be measured and recorded in lengths to the nearest quarter inch.

Geometry

Shapes, Perimeter, and Area

Lessons 30-33 (18 days)

- Categories of Shapes
- Classify Quadrilaterals
- Find Area and Perimeter

Interdisciplinary Connections:

ELA/Math

R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

3.G.A.1 Reason with shapes and their attributes. 1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger

category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Activity: Read **The Greedy Triangle** by Marilyn Burns. Create a worksheet that uses the shapes encountered in the story and incorporates perimeter. You may add a bonus section for the area of a quadrilateral. On the back, students will draw their own Greedy Triangle, give it side lengths, and find its perimeter based on the side lengths they decided upon. They will then draw a picture of their triangle doing its favorite activity and write a short description of what they have drawn.

Readington Township Public Schools

Fifth Grade Math Curriculum

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Supervisor of Math, Science, and Technology

Approval Date: January 18, 2022

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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. Throughout the delivery of the K-5 mathematics program, various tools and technology are employed, including manipulatives, calculators, software, apps, videos, websites, and computing devices (computers, tablets, interactive whiteboards, etc.). A strong focus of the program is on promoting high levels of mathematical thought through experiences which extend beyond traditional computation.

The Grade 5 Math course is designed to teach students grade level 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.

II. STUDENT OUTCOMES (Linked to New Jersey Student Learning Standards for Mathematics)

Mathematical Practices

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

Operations And Algebraic Thinking (5.OA)

A. Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
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.*

B. Analyze patterns and relationships.

3. 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.*

Number And Operations In Base Ten (5.NBT)

A. 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.
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.

3. Read, write, and compare decimals to thousandths.
 - a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
 - b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
4. Use place value understanding to round decimals to any place.

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

5. Fluently multiply multi-digit whole numbers using the standard algorithm.
6. 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.
7. 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.

Number And Operations—Fractions (5.NF)

A. 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, $a/b + c/d = (ad + bc)/bd$.)*
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 $3/7 < 1/2$.*

B. Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

3. 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 $3/4$. 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?*
4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
 - a. Interpret the product $(a/b) \times q$ 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 $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)*
 - 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. **Interpret multiplication as scaling (resizing), by:**
 - 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.
 - b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.¹
 - a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use*

the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.

- b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.*
- 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. *For example, how much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $1/3$ -cup servings are in 2 cups of raisins?*

Measurement And Data (5.MD)

A. 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.

B. Represent and interpret data.

2. Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$). 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.*

C. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
 - a. 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.
 - b. 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.
4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.
5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
 - a. 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, e.g., to represent the associative property of multiplication.
 - b. 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.
 - c. 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.

Geometry (5.G)

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

1. 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).
2. 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.

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

3. 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.*
4. Classify two-dimensional figures in a hierarchy based on properties.

III. ESSENTIAL QUESTIONS AND CONTENT

Number And Operations In Base Ten (5.NBT)

- How is place value in decimals related to base-ten?
- 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?
- What does it mean to multiply by 10, 100, or 1,000?
- How is multiplying with decimals related to multiplying whole numbers?
- How is division with decimals related to dividing whole numbers?
- How can I use what I know about estimation and mathematical operations to solve real-world problems?

Measurement And Data (5.MD)

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

Number And Operations—Fractions (5.NF)

- What strategies can be used to compare fractions?
- How can I add or subtract fractions and mixed numbers?
- How are division and fractions related?
- Can I multiply and divide fractions just like whole numbers?
- How can I use multiplication or division of fractions to solve real-world problems?

Geometry (5.G)

- How do I measure two and three-dimensional shapes?
- What is a coordinate plane, and how is one used?

Operations And Algebraic Thinking (5.OA)

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

IV. STRATEGIES

- Group discussions
- Teacher presentation
- Student projects
- Guided groups
- Interactive SMARTBoard lessons
- Tutorials
- Online practice such as Reflex Math and IXL

V. ACCOMMODATIONS

- Accommodations and Modification Addendum

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Ready Classroom Lesson Quizzes
 - Teacher Observations
 - Class Participation
 - Class Discussions
 - Class Assignments
 - Homework Assignments
 - Notebooks
 - Anecdotal Records

- **Summative**
 - Mid-Unit Test
 - Unit Test
- **Alternative**
 - Live Online Assessment Tools (Quizizz, Kahoot, Plickers, Quizlet, Brainpop)
 - Student Projects
 - Student Presentations
 - Self-Assessments
- **Benchmark** (given September, March, and June)
 - I-Ready Diagnostic
 - Performance Assessments
 - Reflex Mathematics

VII. MATERIALS

- **Core**
 - Ready Classroom Mathematics, Curriculum Associates, LLC
 - Teacher Manual Volumes 1 & 2
 - Student Books Volumes 1 & 2
 - Ready Classroom Teacher Toolbox
- **Supplemental Resources**
 - Technology
 - Brain Pop
 - IXL
 - Reflex Math
 - Online Tutorials (Learnzillion, Khan Academy, Math Antics)
 - Online Math Games (Math is Fun, Funbrain, Cool Math Games, Math Playground)

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

Number And Operations In Base Ten

- **Career Ready Practices**
Utilize critical thinking to make sense of problems and persevere in solving them.
5.NBT.B7 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.
Activity: Students will create real world scenarios which would require adding/subtracting decimals to the hundredths. Students will solve classmates' problems providing a model and explanation of their thinking.
- **9.2 Career Awareness, Exploration, and Preparation**
9.2.5.CAP.8: Identify risks that individuals and households face.
5.NBT.7 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.
Activity: Using teacher-created word problems involving typical household finances, students will solve the problems and discuss the risks that households face.
- **9.4 Life Literacies and Key Skills**
9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
5.NBT.7 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.
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.
- **Computer Science**

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

5.NBT.A.4 Use place value understanding to round decimals to any place.

Activity: Students will create a program to modify data to demonstrate how to round decimals.

Measurement And Data

- **Career Ready Practices**

Work productively in teams while using cultural global competence.

5.MD.C Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Activity: Students will work together to find the volume of various prisms.

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

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

5.MD.A: 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.

Activity: Using teacher-created word-problems involving careers that utilize converting measurements, students will discuss careers and solve the problems.

- **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.

5.MD.B. Represent and interpret data. 2. 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.

Activity: Collect data from classmates and create a graph using google sheets or other digital graphing tools.

- **Computer Science**

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

5.MD.B. Represent and interpret data. 2. 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.

Activity: Collect data from classmates and create a graph using google sheets or other digital graphing tools.

Number And Operations—Fractions

- **Career Ready Practices**

Act as a responsible and contributing community member and employee

5.NF.B.5 Interpret multiplication as scaling (resizing), by: 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. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $\frac{a}{b} = \frac{(n \times a)}{(n \times b)}$ to the effect of multiplying $\frac{a}{b}$ by 1.

Activity: Students will explain how multiplying by a fraction less than one creates a smaller product and provide examples.

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

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

5.NF.A.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.

Activity: Using teacher-created word-problems involving careers that utilize fractions, students will discuss the careers and solve the problems.

- **9.4 Life Literacies and Key Skills**

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

5.NF.A.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 $3/7 < 1/2$.*
Activity: Students will discuss how digital tools and technology can aid in solving fraction word problems.

- **Computer Science**

8.1.5.AP.1 Compare and refine multiple algorithms for the same tasks and determine which is the most appropriate.

5.NF.A.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 $3/7 < 1/2$.*

Activity: Using various computer algorithms, students will solve word problems determining which algorithm is the most appropriate.

Geometry

- **Career Ready Practices**

Act as a responsible and contributing community member and employee

5.G.B. Classify two-dimensional figures into categories based on their properties. 3. 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.

Activity: Students will write a description of a 2-dimensional figure using its attributes. Classmates will guess what figure is being described.

- **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.

5.G.A.2 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 a situation.

Activity: The teacher will create word problems that include various careers that use graphing. The teacher will lead a discussion defining each career.

- **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.

5.G.B. Classify two-dimensional figures into categories based on their properties. 3. 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.

Activity: Students will write a description of a 2-dimensional figure using its attributes. Classmates will guess what figure is being described.

- **Computer Science**

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

5.G.A.2 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 a situation.

Activity: Students will roll a ball to determine how many seconds it takes the ball to roll 1 yard. Students will create function tables in a spreadsheet on the computer. Students will use the data to create coordinate grids.

Operations And Algebraic Thinking

- **Career Ready Practices**

Act as a responsible and contributing community member and employee

5.OAA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculator “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.

Activity: Students will discuss various problems (given by the teacher) to explain what they know about the problems without having to solve them.

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

9.2.5.CAP.9: Justify reasons to have insurance.

5.OAA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculator “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.

Activity: Students will work collaboratively to solve problems (given by the teacher) involving insurance (health, car, etc.). Students will discuss reasons to have insurance while determining “how many times” more they would pay if they did not have insurance.

- **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.

5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Activity: Students will work collaboratively to solve problems (given by the teacher) by adding parentheses, brackets, and/or braces to ensure the problem is equivalent to the given answer.

- **Computer Science**

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

5.OA.B.3 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.

Activity: Students will use a Google Spreadsheet to fulfill an in-out table (by creating rules for the spreadsheet to follow) using given rules and then graph them on a coordinate plane.

IX. PACING

Number And Operations In Base Ten

Lessons 6-11, 14-17 (46 days)

- Multiply and Divide Multi-Digit Numbers
- Develop Understanding of Decimal Place Value
- Develop Understanding of Powers of 10
- Read and Write Decimals
- Add and Subtract Decimals
- Apply Knowledge to Solve Word Problems
- Multiply and Divide Decimals

Interdisciplinary Connections:

- ***ELA/Math***

L.5.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.

5.NBT.B. 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.

Activity: Introduce new mathematics vocabulary for division by reading aloud Remainder of One by: Elinor J. Pinczes

- ***Science/Math***

5.NBT.7 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-LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.
Activity: Students will create an experiment where students place celery stalks (some with leaves and some without) in vials (some with and some without water) to demonstrate that plants only need air and water for growth. Students will need to use addition and subtraction to determine the amount of water was used by the celery and how much evaporated.

Measurement And Data

Lessons 1-5, 25-27, 25-27 (22 days)

- Develop Understanding of Volume
- Find Volume Using Unit Cubes
- Find Volume Using Formulas
- Convert Measurement Units
- Make Line Plots and Interpret Data

Interdisciplinary Connections:

- ***ELA/Math***

SL5 Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

5.MD.B.2 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$).

Activity: Students will add a line plot to a piece of nonfiction writing and write a paragraph to be displayed with the line plot explaining what information can be discerned from the line plot.

- ***Science/Math***

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

5.M.D.B2 B. Represent and interpret data. 2. Make a line plot to display a data set of measurements in fractions of a unit.

Activity: Create a line plot showing the daily changes of the lengths of shadows throughout the day.

- ***Science/Math***

5.MD.B.2 Make a line plot to display a set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$).

5-PS1-3 Make observations and measurements to identify materials based on their properties.

Activity: Students will get various materials (salt, diatomaceous earth, gravel, etc.) and will measure it to determine the best method of separation. Students will then create a line plot using the data from the measurements.

Number And Operations—Fractions

Lessons 12-13, 18-24 (32 days)

- Add and Subtract Fractions
- Add and Subtract Fractions in Word Problems
- Fractions as Division
- Develop Understanding of Multiplication by a Fraction
- Division with Unit Fractions
- Multiply and Divide Fractions in Word Problems

Interdisciplinary Connections:

- ***Science/Math***

5.NF.A.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.

LS2.B Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases and water from the environment and release waste matter (gas, liquid, or solid) back into the environment.

Activity: Students will be testing their lung volume capacity using fractions and mixed numbers. Students can find their total lung volume by adding their three tries or find the difference between their highest lung capacity and lowest lung capacity.

ELA/Math

- **5.NF.A.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.

SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

Activity: Math Journal and share. Students will create a math story problem that requires the use of adding or subtracting fractions to solve. Students will share their stories and solve their classmates' word problems.

Geometry

Lessons 28-29 (13 days)

- Categorize and Classify Two-Dimensional Figures
- Develop Understanding

Interdisciplinary Connections:

- ***ELA/Math***

NJSLSA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

5.G.B.4 Classify two-dimensional figures in a hierarchy based on properties.

Activity: Students will discuss in small groups determining the hierarchy of various three and four-sided shapes. In their discussions, students will need to use key vocabulary to explain their reasoning to their group about the hierarchy.

- ***Science/Math***

5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

5.G.A.2. 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.

Activity: Students will plot a constellation on a coordinate plane. They will have a partner find the coordinates of each point of the constellation.

Science/Math

- **5.G.A.2** 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-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Activity: Students will design an experiment to see how the Earth heats soil and water differently. Students will set up containers of water and soil (one in shade and one not). Students will take the temperature at various times of the day. Then, students will graph the results in a coordinate plane and discuss the similarities and differences.

Operations And Algebraic Thinking

Lessons 30-33(8 days)

- Evaluate, Write, and Interpret Expressions
- Analyze Patterns and Relationships

Interdisciplinary Connections:

ELA/Math

- **NJSLSA.SL.1** Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Activity: Students will complete a problem by adding parentheses, brackets, or braces to ensure the answer is accurate. Students will then prepare to present their thinking to their partners, adding to their ideas after others have presented theirs.

ELA/Math

- **SL.5.1.D** Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

5.OA.B.3 Analyze patterns and relationships. 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.

Activity: During the Try-it Activity, students will share their ideas and draw conclusions based on their classmates' shares. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, students will generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence.

Readington Township Public Schools

Grade 6 Math Curriculum

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Approval Date: January 18, 2022

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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. Throughout the delivery of the K-5 mathematics program, various tools and technology are employed, including manipulatives, calculators, software, apps, videos, websites, and computing devices (computers, tablets, interactive whiteboards, etc.). A strong focus of the program is on promoting high levels of mathematical thought through experiences which extend beyond traditional computation.

The Math 6 course is the required, full year course for 6th grade students working on grade level. It is also the course for the Accelerated 5th grade students placed into the course by district criteria. This course is directly aligned with the New Jersey Student Learning Standards ("NJSLS") for grade 6. Through their work in this course, students will understand and apply their knowledge in real world applications. Focus will be on the content as specified in the NJSLS, as well as the NJSLS Practice Standards. The Practice Standards focus on the development of competencies used by mathematicians in all grades and throughout life.

Students in this course will study ratios, rates and proportional reasoning. They will expand their understanding of fractions to include algorithms and uses for dividing fractions. Students will use positive and negative numbers together to describe real world situations. They will order numbers and understand absolute value. Students will begin their work in Algebra as they use variables and expressions and understand the properties of numbers. They will engage in writing equations and inequalities that represent real world situations. Students will also understand area, surface area, and volume.

II. STUDENT OUTCOMES (Linked to New Jersey Student Learning Standards for Mathematics)

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

Ratios and Proportional Reasoning (6.RP)

Understand ratio concepts and use ratio reasoning to solve problems.

1. Understand the ratio concept and use ratio language to describe a relationship between two quantities.
2. Understand the concept of a unit rate and use rate language in the context of a ratio relationship.
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.
 - c. Find a percent of a quantity as a rate per 100. 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.

Number Systems (6.NS)

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

1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions using visual fraction models and equations to represent the problem.

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

2. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
3. 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.
4. 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.

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; 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 to represent points on the line and in the plane with negative number coordinates.
 - a. Recognize opposite signs of numbers as locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself.
 - 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.
 - b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
 - 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.
 - d. Distinguish comparisons of absolute value from statements about order.
8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

Expressions and Equations (6.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.
 - a. Write expressions that record operations with numbers and with letters standing for numbers.
 - 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.
 - c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems.
3. 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).
4. Apply the properties of operations to generate equivalent expressions.

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.

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.

Geometry (6.G)

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.
2. Find the volume of a right rectangular 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 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.
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.

Statistics and Probability (6.SP)

Develop an 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
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.

Summarize and describe distributions.

1. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
2. 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, including how it was measured and 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.
 - 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.

III. ESSENTIAL QUESTIONS AND CONTENT

Number Systems

- 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

- 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

- 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

- 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

- 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?

IV. STRATEGIES

The curriculum will be presented through a variety of strategies, based in research on middle school learning and 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.

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.

V. ACCOMMODATIONS

- **Accommodations and Modification Addendum**

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Ready Classroom Lesson Quizzes
 - Teacher Observations
 - Class Participation
 - Class Discussions
 - Class Assignments
 - Homework Assignments
 - Notebooks
 - Anecdotal Records
- **Summative**
 - Mid-Unit Test
 - Unit Test
- **Alternative**
 - Live Online Assessment Tools (Quizizz, Kahoot, Plickers, Quizlet, Brainpop)
 - Student Projects
 - Student Presentations
 - Self-Assessments
- **Benchmark** (given September, March, and June)
 - I-Ready Diagnostic
 - Performance Assessments
 - Reflex Mathematics

VII. MATERIALS

- **Core**
 - *Big Ideas Math 6* textbook (Ron Larson and Laurie Boswell; published by Big Ideas Learning)
Associated *Big Ideas Record and Practice Journal*
- **Supplemental Resources**
 - Technology
 - Brain Pop
 - IXL
 - Reflex Math
 - Online Tutorials (Learnzillion, Khan Academy, Math Antics)
 - Online Math Games (Math is Fun, Funbrain, Cool Math Games, Math Playground)
 - Illustrative Mathematics (www.illustrativemathematics.org)
 - Explore Learning [Gizmos](#)
 - Estimation 180

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

Number Systems

- **Career Ready Practices**

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

Activity: Students must analyze word problems and interpret phraseology to determine that they are solving for the greatest common factor. They then must pick a problem solving strategy and carry it out completely for a final solution.

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

9.2.8.CAP.20- Identify the items to consider when estimating the cost of funding a business.

Activity : Students use positive and negative numbers to examine profit and loss in business.

- **9.4 Life Literacies and Key Skills**

9.4.8.TL.2- Gather data and digitally represent information to communicate a real-world problem.

Activity: Students create Google Slides/ Presentations to display real-world word problems involving fraction and decimal operations.

- **Computer Science**

8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.

Activity: Students collect and organize data using a Google Form, Google Doc table, or Google Sheet and plot the data points on a coordinate plane.

Ratios and Proportional Reasoning

- **Career Ready Practices**

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

Activity: Students utilize an online Desmos Activity “Click Battle” to understand rates and derive the meaning of a unit rate.

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

9.2.8.CAP.13 Compare employee benefits when evaluating employment interests and explain the possible impact on personal finances.

Activity: Students can interpret ratio tables of benefit packages and make comparisons.

- **9.4 Life Literacies and Key Skills**

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option

Activity: Students will use various methods to determine the best, or most cost-effective option, in different scenarios.

- **Computer Science**

8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.

Activity: Students will use a Google Form to collect and analyze data to create part-to-part, part-to-whole, and whole-to-part ratios.

Expressions and Equations

- **Career Ready Practices**

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

Activity: Students evaluate descriptions of relationships between values and variables, and write expressions based on these descriptions. Students explain the distributive property and why it is

mathematically reasonable.

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

9.2.8.CAP.20- Identify the items to consider when estimating the cost of funding a business.

Activity: Students will write expressions to model costs for a particular quantity of a product.

- **9.4 Life Literacies and Key Skills**

9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem

Activity: Students gather data about the costs of real-world products, write expressions modeling the costs, make comparisons, and share their findings digitally.

- **Computer Science**

8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.

Activity: Students collect data and develop a presentation for different real life problems in which variables represent unknown values.

Geometry

- **Career Ready Practices**

Demonstrate creativity and innovation.

Activity: Students can identify more than one way to decompose a composite figure. They then solve for smaller areas and add together.

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

9.2.8.CAP.11: Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics.

Activity: Students explore how different occupations use geometry and apply geometric principles.

- **9.4 Life Literacies and Key Skills**

9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem

Activity: Students will apply area formulas to determine the area of a state, which can then be compared to population for discussion on how one might market to inhabitants of that area

- **Computer Science**

8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options.

Activity: Students make a digital anchor chart displaying knowledge of how the area of polygons (parallelograms, triangles, trapezoids, and composite figures) are used in different careers. Students would include defining features of the polygon, formula for area, and how/if computing technologies have changed how the geometry is used in the career field .

Statistics and Probability

- **Career Ready Practices**

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

Activity: Students can summarize and communicate data displayed in graphs, charts, etc. and describe the contextual meaning of its various mathematical attributes.

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

9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.

Activity: Students use different measures of center to compare education and training requirements, as well as income potential, of two jobs of interest.

- **9.4 Life Literacies and Key Skills**

9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions

Activity: Students will analyze data presented in different forms concerning garbage and recycling weights over time. Students can discuss how this affects their environment, community, etc.

- **Computer Science**

8.1.8.DA.1- Organize and transform data collected using computational tools to make it usable for a specific purpose.

Activity: Students demonstrate understanding of data interpretation by creating a display of student survey responses, and will analyze the quantitative measures of center and variability.

IX. PACING

Sixth Grade

Number Systems

Numerical Expressions and Factors (14 days)

1. Whole Number Operations
2. Powers and Exponents
3. Prime Factorization
4. Greatest Common Factor
5. Least Common Multiples

Fractions and Decimals (20 days)

1. Multiplying Fractions
2. Dividing Fractions
3. Dividing Mixed Numbers
4. Adding and Subtracting Decimals
5. Multiplying Decimals
6. Dividing Decimals

Integers and the Coordinate Plane (20 days)

1. Understanding Integers
2. Comparing and Ordering Integers
3. Fractions and Decimals on the Number Line
4. Absolute Value
5. Graphing on 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.

Ratios and Proportional Reasoning

Ratios & Percents (27 days)

1. Understanding and Writing Ratios

2. Ratio Tables
3. Rates
4. Comparing and Graphing Ratios
5. Percents
6. Solving Percent Problems
7. Converting Measurement

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.

RI.6.4. 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, 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 and to determine weight (and other) conversions for other planets compared to Earth.

Expressions and Equations

Algebraic Expressions and Properties (16 days)

1. Understanding Algebraic Expressions
2. Writing Expressions
3. Order of Operations
4. Properties of Addition and Multiplication
5. Distributive Property

Equations and Inequalities (20 days)

1. Writing Equations in One Variable
2. Solving Equations Using Addition or Subtraction
3. Solving Equations Using Multiplication or Division
4. Writing Equations in Two Variables
5. Writing and Graphing Inequalities
6. Solving Inequalities Using Addition or Subtraction
7. Solving Inequalities Using Multiplication or Division

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 equation solutions to recognize a relationship between the variables (independent versus dependent, how changing one value will affect another).

Geometry

Areas of Polygons (9 days)

1. Areas of Parallelograms
2. Areas of Triangles
3. Areas of Trapezoids
4. Polygons in the Coordinate Plane

Surface Area and Volume (10 days)

1. Three-Dimensional Figures
2. Surface Area of Prisms
3. Surface Area of Pyramids
4. Volumes 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 $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

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

Statistical Measures (6 days)

1. Introduction to Statistics
2. Mean
3. Measures of Center
4. Measures of Variation
5. Mean Absolute Deviation

Data Displays (6 days)

1. Histograms
2. Shapes of Distributions
3. Box and Whisker Plots

Interdisciplinary Connections:

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

RI.6.7. 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.

Readington Township Public Schools

Grade 3 Honors Math

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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. Throughout the delivery of the K-5 mathematics program, various tools and technology are employed, including manipulatives, calculators, software, apps, videos, websites, and computing devices (computers, tablets, smart phones, interactive whiteboards, etc.). A strong focus of the program is on promoting high levels of mathematical thought through experiences which extend beyond traditional computation.

The Third Grade Honors course is a full-year course designed to provide advanced level mathematics instruction to select students who exhibit a demonstrated need to increase content knowledge in mathematics while accelerating the pace of instruction. The course was created with the goal of further developing strong, cogent mathematical thinking, and independent mathematical problem solving skills.

The program is directly correlated to the third and fourth grade New Jersey Student Learning Standards (NJSLS), and is designed to cover such topics as Operations and Algebraic Thinking, Number and Operations in Base Ten and with fractions, Measurement and Data, Geometry, and Mathematical Practices. Instruction fostering critical thinking and multiple strategies to solve complex problems is woven throughout the lessons. As per the NJSLS guidelines, instructional time is focused on developing fluency with multi-digit multiplication and division, developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers, as well as understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

II. STUDENT OUTCOMES (Linked to New Jersey Student Learning Standards for Mathematics)

[NJSLS Grade 3 Mathematics](#)

[NJSLS Grade 4 Mathematics](#)

Operations and Algebraic Thinking

- Represent and solve problems involving multiplication and division.
- Use the four operations with whole numbers to solve problems.
- Understand properties of multiplication and the relationship between multiplication and division.
- Gain familiarity with factors and multiples.
- Generate and analyze (mathematical) patterns.

Number and Operations in Base Ten

- Generalize place value understanding for multi-digit whole numbers.
- Use place value understanding and properties of operations to perform multi-digit arithmetic.

Number and Operations—Fractions

- Develop understanding of fractions as numbers.
- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- Understand decimal notation for fractions, and compare decimal fractions.

Measurement and Data

- Solve problems involving estimation, measurement and conversion of measurements from a larger unit to a smaller unit.
- Represent and interpret data.
- Geometric measurement: understand concepts of angle and measure angles.
- Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
- Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

Geometry

- Reason with shapes and their attributes.
- Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Mathematical Practices

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

III. ESSENTIAL QUESTIONS AND CONTENT OPERATIONS AND ALGEBRAIC THINKING

Foundations in Multiplication

- How are multiplication and addition related?
- How can patterns and models help me to understand and represent basic multiplication?
- How can I relate what I know about skip counting to help me learn the multiples of 2,5,10?

Multi-Digit Multiplication

- What are some strategies for multiplying large numbers and how do they work?
- What makes one strategy or algorithm better than another?
- How does place value affect the accuracy of an estimate?
- What information do I need to know to solve a problem?

Division

- How are multiplication and division related?
- How can I use what I know about repeated subtraction, equal sharing, and forming equal groups to solve division problems?
- How can I use the relationship between multiplication and division to learn my basic facts?
- How can patterns and modelling help me to understand and represent basic division facts?

Equations, Word Problems, Factors and Prime Numbers

- What information and strategies would you use to solve a multi-step word problem?
- When should you use mental computation?
- How do you know if a number is divisible by 2, 3, 5, and 10?
- How can multiples be used to solve problems?
- How can a number be broken down into its smallest factors?
- How do you find the prime factors and multiples of a number?
- How does my knowledge about multiplication facts help me to solve problems?
- What are key words and how do they give me clues to solve a problem?
- What are the different strategies I can use to organize information in a complex, multi-step word problem?
- What is the most appropriate way of communicating a mathematical idea in a particular situation?
- How can I explain my thinking in a clear, concise response?

NUMBERS AND OPERATIONS IN BASE TEN

Using Place Value to solve Multi-Digit Addition and Subtraction Problems

- How can place value models help represent different numbers?
- How do place value models represent the procedures of a standard algorithm?
- How can I use what I know about number relationships to develop efficient strategies for adding/subtracting multi-digit numbers?
- What makes a good estimate?
- Why is rounding used and what are some strategies I can use to round accurately?
- How can I use models, words and expanded formats to order and compare numbers?
- What are variables and when should I use them?

NUMBER AND OPERATIONS - FRACTIONS

Basic Fractions

- Where do I find fractions in my life?
- What does whole mean?
- What are the parts of a fraction and what do they represent?
- What does it mean to have equivalent fractions?
- How can I know if one fraction has more value than another?
- What is a good representation of adding and subtracting fractions with the same denominator?
- How do I identify and record the fraction of a whole or group?
- How do I use concrete materials and drawings to understand and show understanding of fractions?
- How do I explain the meaning of a fraction and its numerator and denominator, and use my understanding to represent values and solve problems?

Advanced Fractions and Decimals

- How are fractions and decimals related?
- How does decimal notation and place value work?
- Why is place value so important in numbers with decimals?
- How can you use models such as a number line to order and compare decimals?
- How do I compare and order whole numbers, fractions and decimals through hundredths?
- How can decimals be rounded to the nearest whole number?
- How do you identify and write equivalent decimals and fractions?
- How can models be used to compute fractions with like and unlike denominators?
- How can models help us understand the addition and subtraction of decimals?
- How many ways can we use models to determine and compare equivalent fractions?
- How are common and decimal fractions alike and different?
- What strategies can be used to solve estimation problems with common and decimal fractions?
- What are some strategies I can use to compare decimals and fractions?
- How can I make and use a line plot to represent data involving fractions?
- What are some methods for carrying out operations with fractions and decimals?

MEASUREMENT AND DATA

Measurement

- What am I measuring when I measure an angle?
- Why doesn't the measure of the angle change as I move along the rays of the angle?
- Why is it helpful to classify things like angles or shapes?
- How do I use weight and measurement in my life?
- What tools and units are used to measure?
- How are the units of measure within a standard system related?
- How do I decide which unit of measurement to use?
- How could estimation help with measurement?
- How do I choose the appropriate tool and unit when measuring?

Perimeter, and Area and Polygons

- How can patterns be used to determine standard formulas for area and perimeter?
- When would do people use perimeter and area in real life?
- How do you find perimeter, area, and volume of geometric figures?
- How are linear units different than square units?
- Why do shapes with the same perimeter have different areas?

Pictographs, bar graphs, and Line Plots

- When solving multi-step word problems using charts, tables, and graphs, how can you tell if the information is sufficient?

- How can you collect, organize, and display data?
- How do you interpret the data you have collected?
- How do charts, tables, and graphs help you interpret data?
- How does the type of data influence the choice of graph?
- What kinds of questions can be answered using different data displays?
- In what ways can sets of data be represented by statistical measures?
- What data display is appropriate for a given set of data?
- Why are graphs helpful?
- What is the purpose of using line plots and how are they constructed?
- How can range, mean, median, and mode be computed and compared?

GEOMETRY

Reason with shapes and their attributes

- How can I identify and construct rays, angles, lines and points?
- What is the difference between a point, ray, line, line segment?
- How are angles measured?
- How are angles and sides used to classify triangles?
- What are some strategies I can use to find unknown angles in triangles?
- How can I demonstrate my understanding of parallel and perpendicular figures?
- How can I put shapes together and take them apart to form other shapes?

IV. STRATEGIES

Students will be actively involved in daily lessons by means of guided and independent practice, cooperative learning activities, as well as group and individual projects. The Third Grade Honors Mathematics curriculum incorporates traditional approaches, real world problem situations, modeling, conceptual language and mathematical discourse in addition to problem-based learning, including hands-on activities, manipulatives, projects, and other approaches determined by the teacher. Students will also utilize the systems and tools of technology in order to solve problems appropriate to each unit of study. Activities that incorporate technology are peppered throughout the course. It is a rigorous program where students are challenged to stretch their thinking and optimize their achievement.

There is an emphasis on solving complex, multi-step problems. Students will understand the mathematical concepts in each problem and choose the appropriate path in order to calculate correct solutions. Students will be prompted either in group or individual problem-solving situations to use a variety of mathematical reasoning strategies to find multiple means to arrive at solutions. They will learn to apply prior knowledge to develop and in-depth understanding of the major mathematical ideas outlined in the curriculum. Additionally, the third graders will be trained to articulate their thought processes in words, drawings, and discussion.

V. ACCOMMODATIONS

- **Accommodations and Modification Addendum**

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Exit cards
 - Lesson Quizzes
 - Teacher Observation
 - Class Participation
 - Homework
 - Anecdotal Notes
- **Summative**
 - Mid-Unit Test
 - Unit Test

- **Alternative**
 - Google slide presentations on unit vocabulary/content
 - Math Journal/interactive student notebook
 - Student Designed Projects
 - Self Assessment
- **Benchmark**
 - I-Ready Diagnostic (given September, March, and June)
 - Reflex Math assessments (Fall, Winter, June)
 - Performance Tasks

VII. MATERIALS

- **Core**
 - Ready Classroom Mathematics, Curriculum Associates, LLC
 - Teacher Manual Volumes 1 & 2
 - Student Books Volumes 1 & 2
 - Ready Classroom Teacher Toolbox
- **Supplemental Resources**
 - **Technology**
 - Brain Pop
 - IXL
 - Learning Farm
 - mathisfun.com
 - mathplayground.com
 - funbrain.com
 - superteacherworksheets.com
 - commoncoresheets.com

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

- **Career Ready Practices**
Attend to financial well-being.
3.NBT A. Use place value understanding and properties of operations to perform multi-digit arithmetic. **1.** Use place value understanding to round whole numbers to the nearest 10 or 100. **2.** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
Activity: Students will be given one million dollars to spend on items such as college education/trade school, vacation, home purchase, car purchase, pet, charitable donations, clothing, etc. They are to subtract the researched costs of the items to determine who has the lowest total remaining in the class.
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Activity: Students will be able to complete page 209-212 in Ready Math Grade 4 book. In this activity students will be solving multi-step word problems that have them using equations and deciding what to do with remainders. Students will also have to show how their answer is reasonable.
- **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 (e.g., life guards, child care, medicine, education) and examples of these requirements.
3.MD C.5- Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used

to measure area. b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.

Activity: Have students design a dream home (architect, painter, carpenter, designer, engineer, homeowner, accountant) on graph paper, calculating the areas of each room in the house to find its total area. Calculate the areas of rooms to identify how much carpet, tile, wallpaper, paint is needed to decorate the rooms in the house.

- **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.

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

Activity: Students will complete Fourth Grade Ready Math Math In Action Unit 3 lesson on page 350-353. In this activity students will pretend they work for a zoo and need to develop birdcages according to different criteria based on perimeter.

- **Computer Science**

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

3MD. B.3 Represent and interpret data. 3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets

Activity: Have students create various types of graphs (horizontal/vertical bar graphs, pictographs, pie charts, and line plots), using google sheets to represent a collection of data (Favorite Dr. Seuss book.)

V. PACING

Number And Operations In Base Ten

Three-Digit Numbers (25 days)

- Understand Place Value and Rounding
- Addition and Subtraction with Whole Numbers

Interdisciplinary Connections:

- **ELA/Math**

RI.3.1. Ask and answer questions, and make relevant connections to demonstrate understanding of a text, referring explicitly to the text as the basis or the answers.

3.NBT.A.1. Use place value understanding to round whole numbers to the nearest 10 or 100.

Activity: Read, *Sir Cumference and All the King's Tens* by Cindy Neuschwander to introduce the concept of rounding using the understanding of place value. Have the students use dominoes to place on a place value chart. Add the dots on the dominoes to create a digit in each place value on the chart; hundreds, tens and ones. The students will then round the number they created to the nearest hundred and ten.

- **Math/Science**

4-ESS2-1 Analyze and interpret data from maps to describe patterns of Earth's features.

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Activity: Students will be learning about topographical maps. Students will learn how to read and draw one. Students will understand what the interval measurements mean and be able to calculate the distance between two intervals by using subtraction.

Operations And Algebraic Thinking

Multiplication and Division (40 days)

- Meanings of Multiplication and Division
- Use Place Value to Multiply
- Understand Connection Between Multiplication and Division
- Multiply and Solve Multi-Digit Numbers
- Solve One and Two-Step Word Problems

Interdisciplinary Connections:

- **ELA/Math**
RI.3.1. Ask and answer questions, and make relevant connections to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
3.OA A.1. Interpret products of whole numbers
Activity: Read, [Amanda Bean's Amazing Dream](#) by Cindy Neuschwander to introduce the concept of multiplication. Have the students begin a multiplication flip book to model the different ways to visually show multiplication.
- **Math/ELA**
RI.4.1. Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Activity: Students will be able to learn how to interpret remainders in division problems. Students will complete division problems in lesson 15 session 2 of the Ready Classroom Grade 4 math program. As they are doing these problems they will have to interpret what the remainder means and how to use it in the final answer.
- **ELA/Math**
RI.3.1. Ask and answer questions, and make relevant connections to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
3.OA A.1. Interpret products of whole numbers
Activity: Read, [Amanda Bean's Amazing Dream](#) by Cindy Neuschwander to introduce the concept of multiplication. Have the students begin a multiplication flipbook to model the different ways to visually show multiplication.

Measurement And Data

Area and Scaled Graphs (20 days)

- Understand Area
- Multiply to Find Area
- Read and Create Scaled Graphs
- Measure Length and Plot Data

Interdisciplinary Connections:

- **Science/Math**
3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
3.MD.B.4 Represent and interpret data. 4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
Activity: Students will measure force of motion using magnets. They will look for patterns in data to predict how far the magnetic field extends around two magnets. Students collect data for one and three magnets, measuring the distance at which paper clips are attracted. They use those data to predict how far the magnetic field extends around two magnets. Students use and discuss science practices in the context of investigating magnetic fields.
- **Math/Social Studies**
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or

decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

6.1.5.EconEM.3: Describe how supply and demand influence price and output of products.

Activity: Students will be able to learn about the role of money in their lives and discuss how budgeting and saving money can help them. Students will be able to solve problems using money that demonstrates their understanding of budgeting.

Measurement (20 days)

- Solve Problems with Time and Money
- Solve Problems about Length, Liquid Volume, Mass, and Weight
- Identify and Measure Angles
- Add and Subtract with Angles

Interdisciplinary Connections:

- **Science/Math**
3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
3 MDB4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
Activity: Students will design and test carts to see which type of cart rolls farther down a ramp. Students will use tape measures to measure the distance of each roll. Students will make modifications to their carts to improve on the cart's ability to travel.
- **Math/ELA**
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
Activity: Students will solve mathematical word problems. During this activity students will have to use the vocabulary in the problems to determine what operation and unit to use.

Number And Operations-Fractions

Explore Fractions (50 days)

- Fraction Concepts
- Equivalent Fractions
- Comparing Fraction
- Add and Subtract Fractions
- Add and Subtract Mixed Numbers
- Multiply Fractions
- Relate Decimals and Fractions
- Compare Decimals

Interdisciplinary Connections:

- **Science/Math**
3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
3.NFA.2. Develop understanding of fractions as numbers.
Activity: Students examine germinated seeds to determine similarities and differences in the way the organisms grow. They set up a hydroponic garden to observe the life cycle of a bean plant. Students go outdoors to investigate the roots and shoots of various plants. They use tools to dig up plants and compare the structures above ground to those below ground. Growth should be measured and recorded in lengths to the nearest quarter inch.

- **Math/ELA**

W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Activity: On P. 380 in the Ready Classroom Grade 4 book students will be able to reflect on the question that if 2 fractions of a granola bar are equivalent to each other will they also be equivalent if the 2 pieces come from different size granola bars.

Geometry

Shapes, Perimeter, and Area (28 days)

- Categories of Shapes
- Classify two-dimensional figures
- Find Area and Perimeter
- Identify points, line segments, rays, and perpendicular and parallel lines
- Draw and identify lines of symmetry

Interdisciplinary Connections:

- **ELA/Math**

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

3.G.A.1 Reason with shapes and their attributes. 1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Activity: Read **The Greedy Triangle** by Marilyn Burns. Create a worksheet that uses the shapes encountered in the story and incorporates perimeter. You may add a bonus section for the area of a quadrilateral. On the back, students will draw their own Greedy Triangle, give it side lengths, and find its perimeter based on the side lengths they decided upon. They will then draw a picture of their triangle doing its favorite activity and write a short description of what they have drawn.

- **Math/ELA**

RL.4.7. Make connections between specific descriptions and directions in a text and a visual or oral representation of the text.

4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Activity: In lesson 33 of the Ready Classroom Grade 4 math program students will be asked to classify shapes according to specific attributes they have. These attributes include types of lines and types of shapes. Students will have to make the connection between the written description and the visual representation.

Readington Township Public Schools

Grade 4 Honors Math

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Approval Date: January 18, 2022

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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)
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)
4. 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)
5. 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. (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. (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 $(a/b) \times q$ 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 $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.) (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 $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$. (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 $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$. (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 ($1/2, 1/4, 1/8$). 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)
6. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. (5.MD.C.5)
7. 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)
8. 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)
9. 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.

1. 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)

2. 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.

1. 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)
2. Classify two-dimensional figures in a hierarchy based on properties. (5.G.B.4)

Geometry (6.G)

1. Students will solve real-world and mathematical problems involving area of rectangles, parallelograms, triangles, and trapezoids.
2. Students will solve real-world and mathematical problems involving area of organic shapes.
3. Students will solve real-world and mathematical problems involving perimeter of two-dimensional shapes.
4. Students will solve problems involving the surface area of right rectangular prisms. 5. 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.

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

PERSONAL FINANCIAL LITERACY (9.1)

Civic Responsibility

9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.

Credit Profile

9.1.5.CP.1: Identify the advantages of maintaining a positive credit history.

Economic and Government Influences

9.1.5.EG.1: Explain and give examples of what is meant by the term "tax."

9.1.5.EG.2: Describe how tax monies are spent

9.1.5.EG.3: Explain the impact of the economic system on one's personal financial goals.

9.1.5. EG.4: Describe how an individual's financial decisions affect society and contribute to the overall economy.

9.1.5. EG.5: Identify sources of consumer protection and assistance.

Financial Institutions

9.1.5.FI.1: Identify various types of financial institutions and the services they offer including banks, credit unions, and credit card companies.

Financial Psychology

9.1.5.FP.1: Illustrate the impact of financial traits on financial decisions.

9.1.5.FP.2: Identify the elements of being a good steward of money.

9.1.5.FP.3: Analyze how spending choices and decision-making can result in positive or negative consequences.

9.1.5.FP.4: Explain the role of spending money and how it affects wellbeing and happiness (e.g., "happy money," experiences over things, donating to causes, anticipation, etc.).

9.1.5.FP.5: Illustrate how inaccurate information is disseminated through various external influencers including the media, advertisers/marketers, friends, educators, and family members.

Planning and Budgeting

9.1.5.PB.1: Develop a personal budget and explain how it reflects spending, saving, and charitable contributions.

9.1.5.PB.2: Describe choices consumers have with money (e.g., save, spend, donate).

Risk Management and Insurance

9.1.5.RMI.1: Identify risks that individuals and households face.

9.1.5.RMI.2: Justify reasons to have insurance.

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. ACCOMMODATIONS

- [Accommodations and Modification Addendum](#)

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Ready Classroom Lesson Quizzes
 - Teacher Observations
 - Class Participation
 - Class Discussions
 - Class Assignments
 - Homework Assignments
 - Notebooks
 - Anecdotal Records
- **Summative**
 - Mid-Unit Test
 - Unit Test
- **Alternative**
 - Live Online Assessment Tools (Quizizz, Kahoot, Plickers, Quizlet, Brainpop)
 - Student Projects
 - Student Presentations
 - Self-Assessments
- **Benchmark** (given September, March, and June)
 - I-Ready Diagnostic
 - Performance Assessments
 - Reflex Mathematics

VI. MATERIALS

- **Core**
 - Ready Classroom Mathematics, Curriculum Associates, LLC
 - Teacher Manual Volumes 1 & 2
 - Student Books Volumes 1 & 2
 - Ready Classroom Teacher Toolbox
 - *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)

- o Student Edition Record and Practice Journal (Green) Students will be required to maintain a notebook for class and use a pencil for all work.
- **Supplemental Resources**
 - o Technology
 - Brain Pop
 - IXL
 - Estimation180
 - Freckle
 - Gizmos
 - Google Classroom
 - Illustrative Mathematics
 - Padlet
 - o Lappan, G. (2009). *Connected Mathematics 2*. Boston, MA: Pearson.

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

The Number System (6.NS), Numbers and Operations in Base Ten (5.NBT)

- **Career Ready Practices**

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 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 collaboration, clear communication, and leadership abilities - to both lead, and follow, successfully.

- **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.

Activity: Students have a problem solving board from which they select a new problem, at least weekly. These problems require logical thinking and 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.

- **Computer Science**

8.1.5.IC.2: Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

Activity: Students will compare mental math strategies to using a calculator to experience the impact of selecting the correct tool for the task. They will understand that while a calculator can be used for this purpose, when using properties of whole numbers, sometimes it is not a more effective tool. When adding long lists of numbers, they will be introduced to a spreadsheet formula and compare how this option is less error prone than a calculator.

Operations & Algebraic Thinking

- **Career Ready Practices**

Act as a responsible and contributing community members and employee.

Attend to financial well-being.

Activity: Students will utilize numerical expressions to determine how much they will spend on vacation, given scenarios. 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 expressions, and the life situations that are represented. They will choose a vacation destination, and determine under different circumstances, how much they would have to spend. Students will identify minimum wage and use it to calculate total hours needed to work, to pay for vacation.

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

9.2.5.CAP.5: Identify various employee benefits, including income, medical, vacation time, and lifestyle benefits provided by different types of jobs and careers.

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

Activity: The activity above will have students gathering the data for their vacation and the job they have chosen.

- **Computer Science**

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

Activity: The activity above will provide an opportunity to use digital tools to collect, organize and display their data of how much they will spend. Students will decide which vacation will be worth the cost.

Number and Operations-Fractions

- **Career Ready Practices**

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

5.NF.B.5 Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, [...]. b. Explaining why multiplying [...] a given number by a fraction less than 1 results in a product smaller than the given number; [...].

Activity: Students will explain how multiplying by a fraction less than one creates a smaller product and provide examples using valid mathematical language and written expression.

- **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 (e.g., life guards, child care, medicine, education) and examples of these requirements.

Activity: Students will brainstorm, whole class, skills that we use regularly in school. They will discuss with parents how/if their parents use these skills in their workplace. Students will write a paragraph summarizing their learning.

- **9.4 Life Literacies and Key Skills**

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

Activity: Students will look at the list they came up with of skills that are needed in their parents' workplace. They will then discuss which skills would use digital tools and technology.

- **Computer Science**

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

Activity: Students will use a graphic organizer (Venn diagram) to chart the skills used in school vs. the workplace (parent) in activity above.

Measurement and Data

- **Career Ready Practices**

Demonstrate creativity and innovation.

Activity: Students will use creativity and innovation to find different prisms with a given volume.

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

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

5.MD.C. Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Activity: Students will complete self-reflection form after a group activity where they find the volume of various objects around the classroom. Students will brainstorm different careers that work with measuring volume.

- **9.4 Life Literacies and Key Skills**

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

Activity: Collect data from classmates and decide what technology resources would be best to use to display the information collected.

- **Computer Science**

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

5.MD.B. Represent and interpret data. 2. Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$). Use operations on fractions for this grade to solve problems involving information presented in line plots.

Activity: Collect data from classmates and create a graph using google sheets or other digital graphing tools.

Geometry

- **Career Ready Practices**

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 bumper car track, For each, students will analyze the impacts various designs have on cost, land usage and societal enjoyment of the resulting product. They will select the best product design based on their analysis and present it to the company design selection committee.

- **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: During the course of the project above, students will collaborate with each other and the “selection committee”. They will identify different skills one may need to do different non-traditional careers such as this. They will also be able to work with their families as they finalize their design and presentation.

- **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.

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

- **Computer Science**

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Activity: During the project above, students will develop a presentation to use as they describe and present their project.

VII. PACING

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**

Lessons 12-13 (20 days)

- Equivalent Fractions
- Addition and Subtraction with Fractions

Interdisciplinary Connections:

ELA NJSLA.W10. Write routinely [...] for a range of tasks, purposes, and audiences

Activity: During the course of the unit, students engage in a variety of writing and editing as they explain their reasoning, show their work, and present their findings to others. They will contribute to a class newsletter which will be sent to parents.

- **Addition and Subtraction with Decimals**

Lessons 6-11 (17 days)

- Read and Write Whole Numbers and Decimals
- Addition and subtraction of Whole and Decimal Numbers
- Round and Estimate with Decimals

Interdisciplinary Connections:

2.1.5.PGD.1: Identify effective personal health strategies and behaviors that reduce illness, prevent injuries, and maintain or enhance one’s wellness (e.g., adequate sleep, balanced nutrition, ergonomics, regular physical activity).

Activity: Students will use nutritional information found on food labels to make a full day’s meal plan, meeting the nutritional guidelines for a child. They will use operations with decimals and whole numbers to determine the best combination of food to meet the guidelines, and their budget.

- **Multiplication and Division with Fractions & Mixed Numbers**

- Lessons 15, 18-24 (23 days)**

- Multiplication with Fractions & Mixed Numbers
- Multiplication Links
- Division with Fractions & Mixed Numbers

- Interdisciplinary Connections:***

- ELA. RI.4.4.*** Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

- W.4.2.*** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- Activity:*** Students will read Multiplying Menace by Pam Calvert, to get an understanding of multiplying whole numbers by fractions. Students will write a short story (1-3 paragraphs) using fraction multiplication.

- **Multiplication with Whole Numbers and Decimals**

- Lessons 4, 16 (18 days)**

- Multiplication with Whole Numbers and Decimals
- Multiplication with Decimal Numbers

- Interdisciplinary Connections:***

- Social Studies. 6.1.4.C.10*** Explain the role of money, savings, debt and investment in individuals' lives.

- Activity:*** Students will use decimals to determine total earnings spending and saving over time. Demonstrate understanding of debt vs investment and the benefits of each.

- **Division with Whole Numbers and Decimals**

- Lessons 5, 17(16 days)**

- Division with Whole Numbers
- Division with Decimal Numbers

- Interdisciplinary Connections:***

- 5th Grade ELA/Math L.5.4.*** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.

- 5.NBT B.*** 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.

- Activity:*** Introduce new mathematics vocabulary for division by reading aloud Remainder of One by: Elinor J. Pinczes

- **Operations and Word Problems**

- Lesson 14, 26, (18 days)**

- Equations and Problem Solving
- Comparison Problems
- Problems with More Than One Step

- Interdisciplinary Connections:***

ELA NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

Activity: Students will read multi-step word problems and accompanying diagrams, pictures to identify key information needed to solve each problem.

- **Algebra, Patterns and Coordinate Graphs**

- **Lessons 30-33 (12 days)**

- Algebraic Reasoning and Expressions
- Patterns and graphs

- ***Interdisciplinary Connections:***

- *5th Grade Science/Math*

- **5-ESS2-2.** Describe and graph the amounts of saltwater and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

- **MP.4** Model with mathematics. (5-ESS3-1)

- **Activity:** Students will research the amount of salt water vs.fresh water in various reservoirs in New Jersey and graph their findings.

- **Measurement and Geometry**

- **Lessons 1-3, 25-29 (26 days)**

- Measurement and Data
- Area and Volume
- Surface Area
- Classify Geometric Figures

- ***Interdisciplinary Connections:***

- **Science ETS1.A** Defining and Delimiting Engineering Problems; ETS1.B, Developing possible solutions; ETS1.C Optimizing the Design Solution.

- **Activity:** The designing a bumper car track activity for this unit (described above) involves three Disciplinary Core Ideas from 4th Grade Science: ETS1.A, ETS1.B, ETS1.C, as students need to consider multiple variations and design successes and failures.

- **Personal Financial Literacy 9.1 (10 days)**

- **Civic Responsibility**

- You can give back in areas that matter to you.

- **Credit Profile**

- There are benefits to having a positive credit history.

- **Economic and Government Influences**

- Taxes are collected on a variety of goods and services at the local, state, and federal levels.
- There is a broader economic system that influences your financial goals.
- There are agencies, laws, and resources to protect individuals as consumers.

- **Financial Institutions**

- People can choose to save money in many places such as home in a piggy bank, bank, or credit union.

- **Financial Psychology**

- An individual's financial traits and habits affect his/her finances.

- Spending choices and their intended and unintended consequences impact financial outcomes and personal well-being.
- Not all financial information is accurate or truthful.

Planning and Budgeting

- There are specific steps associated with creating a budget.
- Saving money can impact an individual's ability to address emergencies and accomplish their short-and long-term goals.

Risk Management and Insurance

- Individuals can choose to accept inevitable risk or take steps to protect themselves by avoiding or reducing risk.

Readington Township Public Schools

Grade 5 Honors Math Curriculum

Authored by: Colleen DiGregorio and Colleen Ogden

Reviewed by: Sarah Pauch, Supervisor of Math, Science, and Technology

Approval Date: January 18, 2022

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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 6th grade content is covered and students study approximately half of the 7th grade content. A typical progression for students successful in Honors Math 5 would be to move into 6th grade Pre-Algebra to gain the remaining 7th grade standards and all of the 8th grade standards.

II. STUDENT OUTCOMES (Linked to [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.
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.
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.
 - c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the
 - d. 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.
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).

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 $V = l w h$ 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.
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.

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

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 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.

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- 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. ACCOMMODATIONS

- [Accommodations and Modification Addendum](#)

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Homework assignments
 - Notebooks
 - Teacher observations
- **Summative**
 - End of Year Test
 - Unit Test
 - Unit Quizzes
- **Alternative**
 - Student projects

- **Benchmark**
 - o Performance-based assessments
 - o I-Ready Diagnostic (given September, March, and June)

VII. MATERIALS

- **Core**
 - o *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
- **Supplemental Resources**
 - o **Technology**
 - Brain Pop
 - IXL
 - Estimation180
 - Freckle
 - Gizmos
 - Google Classroom
 - Illustrative Mathematics
 - Padlet
 - Reflex Math
 - o Lappan, G. (2009). *Connected Mathematics 2*. Boston, MA: Pearson.

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

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 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.
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.

- **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.

Activity: Students will utilize equations to determine how long to reach a savings goal.

- **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 complete Chapter 5, Alternate Assessment as an in class activity. This involves the above standards, and can be extended to include a self-created survey of families and community members to further enhance its applicability to career standards. Survey question to include topics related to 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.

Activity: Students will complete Chapter 5, Alternate Assessment as an in class activity. This involves the above standards.

- **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.

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.

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

IX. PACING

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)

Interdisciplinary Connections:

Science 5-ESS-1-2 Represent data in graphical displays to reveal patterns.

Activity: During the Big Ideas activities described in this unit, students will create tables and graphs to record patterns in multiplying and dividing integers, using the pattern visible to generate an algorithm. They will also read graphs to determine how negative and positive numbers are used to represent real world altitude above and below sea level.

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)

Interdisciplinary Connections:

ELA RI.5.1. Quote accurately from a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.

Activity: During the Big Ideas activities described in this unit, students will learn to carefully attend to the words in context and relate key phrases to different mathematical operation symbols and inequality symbols. Students will also tend carefully to text to write numerical and algebraic expressions to represent the word problem.

Ratios and Proportional Relationships

Ratios and Rates (10 days, Ch 5)

Ratios and Proportions (10 days, Ch 14) Percent (10 days, Ch 15)

Interdisciplinary Connections:

Science: 5-PS1-2 Measure and graph quantities such as weight to address scientific and engineering questions and problems.

Activity: During the Big Ideas activities described in this unit, students will measure the amount of food coloring added to an icing to make different shades. They will compare the resulting colors. The students will

graph the relationships between food coloring drops and icing amount, to determine how the graph shows which ratio is greater.

Geometry

Areas of Polygons (10 days, Ch 4)

Surface Area and Volume (10 days, Ch 8)

Interdisciplinary Connections:

Science 5-PS1-3 Make observations and measurements to identify materials based on their properties.

Activity: During the Big Ideas activities described in this unit, students will categorize and find the area of polygons based on their properties. They will demonstrate understanding of which properties apply to ALL shapes or SOME shapes in each category. They will use these properties to determine shape type and then apply the correct formula to find its area/surface area/volume.

Statistics and Probability

Statistical Measures (10 days, Ch 9)

Data Displays (8 days, Ch 10)

Interdisciplinary Connections:

ELA NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

Activity: During the Big Ideas activities described in this unit, and a survey students create to describe what is typical of a 5th grader, students will analyze data using measures of center and spread. They will decide on a pictorial representation for this data and make posters for each characteristic measured. The class, as a whole, will create a book or bulletin board display with what is typical (e.g., height, age, eye color, favorites, etc).

Readington Township Public Schools

Algebra 2

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Supervisor of Math, Science, and Technology

Approval Date: January 18, 2022

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OVERVIEW

This full-year Algebra 2 course is designed to provide advanced 8th grade students with the opportunity to strengthen their skills in the areas of linear, quadratic, and exponential functions, while extending their content base and knowledge to include higher-degree polynomial functions (including now solving these over the set of complex numbers), rational exponents and radical functions, solving exponential and logarithmic equations, rational functions, arithmetic and geometric sequences and series, trigonometric ratios and functions, probability, data analysis and statistics.

In addition to these topics, and in keeping with the New Jersey Student Learning Standards, students will experience the course content as an integrated, useful, and coherent whole, continually refining their abilities to model with mathematics, reason abstractly and quantitatively while attending to precision both in calculations and vocabulary, and to make sense of problem situations as an essential part of the solution process.

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

N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.

N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

N.CN.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.

N.CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

N.CN.7 Solve quadratic equations with real coefficients that have complex solutions.

N.CN.8 (+) Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.

N.CN.9 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

A.SSE.1 Interpret expressions that represent a quantity in terms of its context. (Linear, exponential, quadratic for Alg.1; Polynomial and rational for Alg. 2)

a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P .

A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

a. Factor a quadratic expression to reveal the zeros of the function it defines.

b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

A.SSE.4 Derive and/or explain the derivation the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.

A.APR.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

A.APR.2 Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.

A.APR.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

A.APR.4 Prove Polynomial identities and use them to describe numerical relationships and solve problems. For example, the difference of two squares; the sum and difference of two cubes; the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.

A.APR.5 (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

A.APR.6 Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.

A.APR.7 (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

A.CED.1, 2, 3, 4 Create equations that describe numbers or relationships. (This is an Alg. 1 cluster that limits discussion to linear, quadratic, and exponential functions with integer inputs only. Algebra 2 extends this to equations using all types of expressions, including simple root functions).

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .

A.REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

A.REI.4 Solve quadratic equations in one variable.

*a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

*b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

A-REI.6 Solve algebraically a system of *three* linear equations in three unknowns.

A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

A.REI.11 Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.

F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and

trigonometric functions, showing period, midline, and amplitude.

F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

F.BF.1 Write a function that describes a relationship between two quantities.

- b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.

F.BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

F.BF.3 Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F.BF.4 Find inverse functions.

- a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.

F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

F.LE.4 Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology.

F.TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

F.TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

F.TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

F.TF.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$, given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$, and the quadrant of the angle.

S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).

S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

S.ID.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

- a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.

S-ID.6a-1 Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID.6a, excluding normal distributions and limiting function fitting to exponential functions

S-ID.6a-2 Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course level knowledge and skills articulated in S-ID.6a limiting function fitting to

trigonometric functions.

S.IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

S.IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. E.g., a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?

S.IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

S.IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

S.IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

S.IC.6 Evaluate reports based on data.

S.CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).

S.CP.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

S.CP.3 Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

S.CP.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

****S.CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

S.CP.6 Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.

S.CP.7 Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.

S.CP.8 (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

S.CP.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

S-CP.Int.1 Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-CP.

S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

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

ESSENTIAL SKILLS AND CONTENT

Polynomial, Rational, and Radical Relationships

- Perform arithmetic operations with complex numbers.
- Use complex numbers in polynomial identities and equations.
- Interpret the structure of expressions.
- Write expressions in equivalent forms to solve problems.
- Perform arithmetic operations on polynomials.
- Understand the relationship between zeros and factors of polynomials.
- Use polynomial identities to solve problems.
- Rewrite rational expressions.
- Understand solving equations as a process of reasoning and explain the reasoning.
- Represent and solve equations and inequalities graphically.
- Analyze functions using different representations.

Trigonometric Functions

- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric function.
- Prove and apply trigonometric identities.

Modeling with Functions

- Create equations that describe numbers or relationships.
- Interpret functions that arise in applications in terms of a context.
- Analyze functions using different representations.
- Build a function that models a relationship between two quantities.
- Build new functions from existing functions.
- Construct and compare linear, quadratic, and exponential models and solve problems.

Inferences and Conclusions from Data

- Summarize, represent, and interpret data on single count or measurement variable.
- Understand and evaluate random processes underlying statistical experiments.
- Make inferences and justify conclusions from sample surveys, experiments and observational studies.
- Use probability to evaluate outcomes of decisions.

STRATEGIES

Intellectual engagement and active involvement of students in daily lessons will be achieved by a variety of teaching strategies, including:

Comprehensive direct instruction utilizing Interactive SmartBoard technology
2. Guided practice using worked-out study examples, followed immediately by
3. Independent Practice using 'Now You Try' examples
4. Student presentation of work and solutions, with explanation and justification of solutions
5. High-level questioning and encouragement of student participation
6. Student group discussion and mutual help as part of point 3 above
7. Regular written 'check for understanding' assessments.
8. End of unit formative assessments.

ACCOMMODATIONS

- [Accommodations and Modification Addendum](#)

ASSESSMENTS

- **Formative**
 - Independent student work
 - Homework assignments
 - Notebooks
 - Teacher observations
 -
- **Summative**
 - End of Year Test
 - Unit Test
 - Unit Quizzes
- **Alternative**
 - Student projects
 -
- **Benchmark**
 - Performance-based assessments

REQUIRED RESOURCES

- **Core**
 - **Textbook for course:** *Big Ideas MATH Algebra 2*, Larson, R., Boswell, L. Copyright 2015 by Big Ideas Learning, LLC.
- **Supplemental resources for course:**
 - Chapter Resource Books. Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. Copyright 2001 by McDougal Littell, a Houghton Mifflin Company, Evanston, IL.
 - Standardized Test Practice Workbook. Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. Copyright 2001 by McDougal Littell, a Houghton Mifflin Company, Evanston, IL.
 - *McDougal Littell Algebra 2*. Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. Copyright 2004 by McDougal Littell, a Houghton Mifflin Company, Evanston, IL.
- **Suggested supplemental Technology**
 - www.classzone.com
 - www.shmoop.com/common-core-standards/
 - www.illustrativemathematics.org
 - Gizmos

CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

Number and Quantity

- **Career Ready Practices**
 - Utilize critical thinking to make sense of problems and persevere in solving them.
Activity: Collect data on handedness and Male / Female population and enter into two-way tables to compute joint relative, marginal relative, and conditional relative frequencies
- **9.2 Career Awareness, Exploration, and Preparation**
 - **9.2.8.CAP.18:** Explain how personal behavior, appearance, attitudes, and other choices may impact the job application process.
Activity: Students will perform peer- and self-evaluations on their work effort and behavior during the above activity. Students will self-assess their work and the overall functioning of their work group during this project.

- **9.4 Life Literacies and Key Skills**
 - **9.4.8.TL.1:** Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
Activity: Collect data on handedness and Male / Female population and enter into two-way tables to compute joint relative, marginal relative, and conditional relative frequencies using Excel.
- **Computer Science**
 - **8.1.8.DA.1:** Organize and transform data collected using computational tools to make it usable for a specific purpose.
Activity: Collect data on handedness and Male / Female population and enter into two-way tables to compute joint relative, marginal relative, and conditional relative frequencies using Excel.

Algebra

- **Career Ready Practices**
 - Utilize critical thinking to make sense of problems and persevere in solving them.
Activity: Students will be asked to calculate height of a dropped object t seconds after release given gravity constant for earth vs. gravity constant for moon. (Ch. 3 of BI Algebra 2).
- **9.2 Career Awareness, Exploration, and Preparation**
 - **9.2.8.CAP.14:** Evaluate sources of income and alternative resources to accurately compare employment options.
Activity: Students will calculate how to maximize possible income.
- **9.4 Life Literacies and Key Skills**
 - **9.4.8.TL.2:** Gather data and digitally represent information to communicate a real-world problem
Activity: Students will persevere in solving real world problems involving functions - solving, graphing and interpreting. (Big Ideas Section 2.1, pgs 53-54).
- **Computer Science**
 - **8.1.8.DA.1:** Organize and transform data collected using computational tools to make it usable for a specific purpose.
Activity: Enter data pairs into TI graphing calculator using time, height data and use quadratic regression.

Functions

- **Career Ready Practices**
 - Use technology to enhance productivity, increase collaboration and communicate effectively.
Activity: Students will persevere in solving real world problems involving functions - solving, graphing and interpreting. (Big Ideas Section 2.1, pgs 53-54).
- **9.2 Career Awareness, Exploration, and Preparation**

- o **9.2.8.CAP.8:** Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.
Activity: Students will persevere in solving real world problems involving functions - solving, graphing and interpreting. (Big Ideas Section 2.1, pgs 53-54).
- **9.4 Life Literacies and Key Skills**
 - o **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.
Activity: Students will use a graphing calculator to model transformations of quadratic functions. They will solve real world problems, e.g., modeling the path of water coming from a fire truck (Big Ideas. Section 2.1).
- **Computer Science**
 - o **8.1.8.DA.1:** Organize and transform data collected using computational tools to make it usable for a specific purpose.
Activity: Students will use a graphing calculator to model transformations of quadratic functions. They will solve real world problems, e.g., modeling the path of water coming from a fire truck (Big Ideas. Section 2.1).

Statistics and Probability

- **Career Ready Practices**
 - o Use technology to enhance productivity, increase collaboration and communicate effectively.
Activity: Students will design and execute a valid research survey, analyze its results on an issue pertaining to education and income . (Big Ideas Sections 11.1 - 11.3)
- **9.2 Career Awareness, Exploration, and Preparation**
 - o **9.2.8.CAP.6:** Compare the costs of postsecondary education with the potential increase in income from a career of choice.
Activity: Through the group survey project above, students will participate fairly and effectively with their group members, to produce a coherent survey, analysis and presentation of its findings. (Big Ideas, Chapter 11).
- **9.4 Life Literacies and Key Skills**
 - o **9.4.8.TL.2:** Gather data and digitally represent information to communicate a real-world problem
Activity: Through the group survey project above, students will participate fairly and effectively with their group members, to produce a coherent survey, analysis and presentation of its findings. (Big Ideas, Chapter 11).
- **Computer Science**
 - o **8.1.8.DA.5:** Test, analyze, and refine computational models.
Activity: Students will analyze school-wide data on left-handedness, enter into a spreadsheet and program to calculate one-variable statistics on measures of central tendency and variability. Alternatively, they may use the research topic of their choice (see above).

IX. PACING

A. Polynomials (Quadratics) (34 days)

- a. Rewrite equations and formulas
- b. Solve systems of two nonlinear equations algebraically using elimination and substitution methods
- c. Graph quadratic functions from standard, vertex, and intercept (factored) form.
- d. Solve quadratic functions by factoring
- e. Solve quadratic functions by finding square roots
- f. Perform operations with complex numbers
- g. Solve quadratic functions by completing the square
- h. Use the quadratic formula to solve equations. and the discriminant
- i. Use the discriminant to determine the number and type of solutions to a quadratic equation.
- j. Model with quadratic functions
- k. Solve quadratic systems (i.e. a linear – quadratic system)
- l. Parabolas as conic sections (derive equation of a parabola given a focus and directrix)

Interdisciplinary Connections:

- NJSLSA.R7 Integrate and evaluate content presented in Diverse media and formats, including visually and quantitatively, as well as in word.

Activity: Students will watch Dirt Bike Trajectory video and read its associated written performance task and complete problems relating to calculating the trajectory of a dirt bike launching from a ramp. (Big Ideas. Section 1.1).

B. Polynomials (Higher Order Polynomials) (20 days)

1. Evaluate and graph polynomial functions
2. Understand and apply properties of exponents
3. Add, subtract, and multiply polynomials
4. Factor and solve polynomial equations
5. Understand the Remainder and Factor Theorems and dividing polynomials
6. Apply the Rational Zero Theorem
7. Evaluate using the Fundamental Theorem of Algebra
8. Analyze graphs of polynomial functions
9. Evaluate and solve polynomial functions of degree 3 or higher.
10. Graph polynomial functions of degree 3 and above.

Interdisciplinary Connections:

- NJSLSA.R7 Integrate and evaluate content presented in Diverse media nad formats, including visually and quantitatively, as well as in word.

Activity: Students will watch the Parabolic Mirror video and read associated written

performance task and complete problems relating to building their own parabolic mirror that uses sunlight to generate electricity.. (Big Ideas. Section 2.3).

C. Radical and Rational Functions (19 days)

1. Understand Nth roots and rational exponents
2. Apply properties of rational exponents
3. Evaluate power functions and function operations (limited to arithmetic operations)
4. Evaluate inverse functions
5. Understand how to graph square root and cube root functions
6. Solve radical equations
7. Understand inverse and joint variation
8. Graph simple rational functions
9. Graph general rational functions
10. Multiply and divide rational expressions 1
11. Add and subtract rational expressions and simplify complex fractions
12. Solve rational equations

Interdisciplinary Connections:

- ETS1.B: Developing Possible Solutions A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3) Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) Models of all kinds are important for testing solutions. (MS-ETS1-4)

Activity: Through this unit, students will find equivalent expressions, solutions to functions and model their solutions.

D. Exponential and Logarithmic Functions (20 days)

1. Analyze and graph exponential growth
2. Analyze and graph exponential decay
3. Evaluate and apply the number e
4. Solve and graph logarithmic functions
5. Understand properties of Logarithms (cover only those needed to solve exp. and log. Equations, i.e. Power Property and Change-of-Base Formula. Cover others if time.)
6. Solve exponential and logarithmic equations (Suppl. same as C.8 above for solving *systems* of exponential and logarithmic equations)
7. Model exponential functions (and power functions – time allowing)

Interdisciplinary Connections:

- ETS1.A: Defining and Delimiting Engineering Problems The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)

Activity: Throughout the unit, students will analyze limits and constraints in functions.

E. Arithmetic and Geometric Sequences and Series (12 days)

1. Introduce sequences and series
2. Write rules for arithmetic sequences and series
3. Write rules for geometric sequences and series
4. Find the sum of an infinite geometric series (Time-allowing. Not in PARCC PBA or EOY) 5.
5. Use recursive rules for sequences (8.5)

Interdisciplinary Connections:

- Patterns Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2) Cause and Effect Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)

Activity: Throughout this unit, students will analyze sequences and series to determine the relationship between its terms. They will use these relationships to make predictions.

F. Probability (13 days)

1. Introduction to probability (Suppl. vocab.: outcomes, event, sample space, with Big Ideas Algebra 2, BI- 10.1)
2. Calculate the probability of compound events
3. Calculate the probability of independent and dependent events (Suppl. with Big Ideas Algebra 2 for ‘Two-Way Tables and Probability’)
4. Apply the Fundamental Counting Principle and permutations (Time-allowing)
5. Use Combinations and the Binomial Theorem to expand a binomial. (Time-allowing)
6. Construct and interpret binomial distributions (Time-allowing).

Interdisciplinary Connections:

- Science: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (MS-ETS1-4)

Activity: Students will meet this standard through their creation, execution and evaluation of their surveys.

G. Data Analysis and Statistics (24 days)

1. Interpret statistics and statistical graphs
2. Understand normal distributions (Optional - Suppl. with shmoop.com/precalculus-statistics-probability/z-scores.html)

3. Calculate populations, samples, and hypotheses
4. Collect data
5. Validate experimental design
6. Make inferences from sample surveys
7. Make inferences from experiments

Interdisciplinary Connections:

- Science: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (MS-ETS1-4)

Activity: Throughout this unit and through the survey project, students will calculate and compare probabilities, noting similarities and differences.

H. Trigonometry (18 days)

1. Calculate right triangle trigonometry
2. Apply the unit circle (BI-Chpt.9 Mathematical Practices, p.460)
3. Understand general angles and radian measure
4. Calculate trigonometric functions of any angle
5. Graph sine, cosine, and tangent functions
6. Translate and reflect trigonometric graphs (Suppl. with BI-9.4 for 'midline' as vocab., and other points as needed)
7. Verify trigonometric identities (Suppl. with BI-9.7 unit circle discussion of why $\sin^2 + \cos^2 = 1$, p.514)
8. Solve trigonometric equations
9. Model trigonometric functions
10. Apply sum and difference formulas (time-allowing)

Interdisciplinary Connections:

- NJSLSA.R7 Integrate and evaluate content presented in Diverse media nad formats, including visually and quantitatively, as well as in word.
NJSLSA.W1 Write arguments to support claims ina n analysis of substantive topics or text, using valid reasoning and relevant and sufficient evidence.

Activity: Students will watch the Parasailing to Great Heights video and read associated written performance task and complete problems relating to calculating just how high a parasailer can fly. (Big Ideas. Section 9.1).

I. Introduction to Geometry, Logical Reasoning and Proofs (20 days)

1. Find patterns and use inductive reasoning (MLG-1.1) 1 (McDougal Littell Geometry 2004)
2. Understand points, lines, and planes (MLG-1.2) 1
3. Understand segments and calculate their measure (MLG-1.3) 1
4. Correlate angles and their measure (MLG-1.4) 1
5. Calculate segment and angle bisectors (MLG-1.5) 1

6. Associate angle pair relationships (MLG-1.6) 1
7. Introduce perimeter, circumference, and area (MLG-1.7) 1
8. Understand and apply conditional statements (MLG-2.1) 2
9. Interpret definitions and biconditional statements (MLG-2.2) 2
10. Deductive reasoning (MLG-2.3) 2
11. Reasoning with properties from algebra (MLG-2.4) 2
12. Prove statements about segments (MLG-2.5) 1
13. Prove statements about angles (MLG-2.6) 1
14. Argue indirect proofs (MLG-5.6) 2
15. Demonstrate logical reasoning (McDougal Littell Alg. 2 'Skills Review Handbook' pp. 924-929)

Interdisciplinary Connections:

- RI.8.8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
RI.8.1 Cite the textual evidence and make relevant connections that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
Activity: Throughout this unit, students will analyze and create arguments and proofs based on provided evidence.

Readington Township Public Schools

Grade 4 Math Curriculum

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Supervisor of Math, Science, and Technology

Approval Date: January 18, 2022

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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. Throughout the delivery of the K-5 mathematics program, various tools and technology are employed, including manipulatives, calculators, software, apps, videos, websites, and computing devices (computers, tablets, interactive whiteboards, etc.). A strong focus of the program is on promoting high levels of mathematical thought through experiences which extend beyond traditional computation.

The Mathematics 4 course is designed to teach students grade level 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 i-Ready.

II. STUDENT OUTCOMES ([Linked to New Jersey Student Learning Standards for Mathematics](#))

Grade 4 Math

MATHEMATICAL PRACTICES

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

OPERATIONS AND ALGEBRAIC THINKING (4.OA)

A. Use the four operations with whole numbers to solve problems.

1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.¹
3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

B. Gain familiarity with factors and multiples.

4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

C. Generate and analyze patterns.

5. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1,*

generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

NUMBER AND OPERATIONS IN BASE TEN (4.NBT)

A. Generalize place value understanding for multi-digit whole numbers.

1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.*
2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
3. Use place value understanding to round multi-digit whole numbers to any place.

B. Use place value understanding and properties of operations to perform multi-digit arithmetic.

4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.
5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
6. Find whole-number quotients and remainders with up to four-digit dividends and one-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.

NUMBER AND OPERATIONS—FRACTIONS (4.NF)

A. Extend understanding of fraction equivalence and ordering.

1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

3. Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.
 - a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
 - b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.*
 - c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
 - d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
 - a. Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.*
 - b. Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)*

- c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat $\frac{3}{8}$ of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

C. Understand decimal notation for fractions, and compare decimal fractions.

5. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.⁴ *For example, express $\frac{3}{10}$ as $\frac{30}{100}$, and add $\frac{3}{10} + \frac{4}{100} = \frac{34}{100}$.*
6. Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as $\frac{62}{100}$; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*
7. Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model.

MEASUREMENT AND DATA (4.MD)

A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

1. Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*
2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

B. Represent and interpret data.

4. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

C. Geometric measurement: understand concepts of angle and measure angles.

5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
 - a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a “one-degree angle,” and can be used to measure angles.
 - b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.
6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

GEOMETRY (4.G)

A. Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

PERSONAL FINANCIAL LITERACY (9.1)

Civic Responsibility

9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.

Credit Profile

9.1.5.CP.1: Identify the advantages of maintaining a positive credit history.

Economic and Government Influences

9.1.5.EG.1: Explain and give examples of what is meant by the term "tax."

9.1.5.EG.2: Describe how tax monies are spent

9.1.5.EG.3: Explain the impact of the economic system on one's personal financial goals.

9.1.5.EG.4: Describe how an individual's financial decisions affect society and contribute to the overall economy.

9.1.5.EG.5: Identify sources of consumer protection and assistance.

Financial Institutions

9.1.5.FI.1: Identify various types of financial institutions and the services they offer including banks, credit unions, and credit card companies.

Financial Psychology

9.1.5.FP.1: Illustrate the impact of financial traits on financial decisions.

9.1.5.FP.2: Identify the elements of being a good steward of money.

9.1.5.FP.3: Analyze how spending choices and decision-making can result in positive or negative consequences.

9.1.5.FP.4: Explain the role of spending money and how it affects wellbeing and happiness (e.g., "happy money," experiences over things, donating to causes, anticipation, etc.).

9.1.5.FP.5: Illustrate how inaccurate information is disseminated through various external influencers including the media, advertisers/marketers, friends, educators, and family members.

Planning and Budgeting

9.1.5.PB.1: Develop a personal budget and explain how it reflects spending, saving, and charitable contributions.

9.1.5.PB.2: Describe choices consumers have with money (e.g., save, spend, donate).

Risk Management and Insurance

9.1.5.RMI.1: Identify risks that individuals and households face.

9.1.5.RMI.2: Justify reasons to have insurance.

III. ESSENTIAL QUESTIONS

Operations and Algebraic Thinking

- What is multiplication?
- How do you use multiplication and division to solve comparison problems?
- How can you identify multiples of a number?
- How can numbers be broken down into its smallest factors?
- How do you figure out and describe patterns?
- How can you model and solve multi-step word problems

Number and Operations in Base Ten

- How can you use place value to understand and compare very large numbers?

- What strategies and understandings allow you to successfully add, subtract, multiply and divide multi-digit whole numbers?
- How can multi-digit whole numbers be rounded?

Number and Operations in Fractions

- How does finding equivalent fractions help you to compare them?
- What is the process of adding and subtracting fractions and mixed numbers with like denominators?
- How can understanding repeated addition of fractions help you to multiply fractions by whole numbers?
- How can you express a fraction as a decimal?
- How can you compare decimals through hundredths?

Measurement and Data

- How can you convert measurements of the U.S. customary system and the metric system?
- What strategies can you use to solve measurement word problems?
- How can you use an understanding of money and time to complete real world problems?
- How can you determine what situations you would use area and perimeter in and how do you solve them?
- How are you able to use a line plot to organize data and answer questions about the data?
- What are angles and how do you measure and draw them?
- How can you use addition and subtraction to solve problems involving angles?

Geometry

- How can you identify a point, line, line segment, ray, and angle?
- How can you use parallel and perpendicular lines to classify two dimensional shapes?
- What is a line of symmetry and how do you find it?
- What is the process of multiplying multi-digit whole numbers using the standard algorithm?

IV. STRATEGIES

- Group discussions
- Teacher presentation
- Student projects
- Guided groups
- One to one instruction
- Interactive SMARTBoard lessons
- Tutorials
- Online practice such as Reflex Math and IXL

V. ACCOMMODATIONS

- [Accommodations and Modification Addendum](#)

VI. ASSESSMENTS

- **Formative**
 - Independent student work
 - Ready Classroom Lesson Quizzes
 - Teacher Observations
 - Class Participation
 - Class Discussions
 - Class Assignments
 - Homework Assignments
 - Notebooks
 - Anecdotal Records
- **Summative**
 - Mid-Unit Test
 - Unit Test
- **Alternative**
 - Live Online Assessment Tools (Quizizz, Kahoot, Plickers, Quizlet, Brainpop)
 - Student Projects

- o Student Presentations
- o Self-Assessments
- **Benchmark** (given September, March, and June)
 - o I-Ready Diagnostic
 - o Performance Assessments
 - o Reflex Mathematics

VII. MATERIALS

- **Core**
 - o Ready Classroom Mathematics, Curriculum Associates, LLC
 - o Teacher Manual Volumes 1 & 2
 - o Student Books Volumes 1 & 2
 - o Ready Classroom Teacher Toolbox
- **Supplemental Resources**
 - o Technology
 - Brain Pop
 - IXL
 - Reflex Math
 - Online Tutorials (Learnzillion, Khan Academy, Math Antics)
 - Online Math Games (Math is Fun, Funbrain, Cool Math Games, Math Playground)

VIII. CAREER READINESS, LIFE LITERACIES, AND KEY SKILLS AND COMPUTER SCIENCE

Number and Operations in Base Ten

- **Career Ready Practices**
Utilize critical thinking to make sense of problems and persevere in solving them.
4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
Activity: Students will be able to work on and complete the Mystery Number enrichment problem that is in lesson 1 of the Ready Classroom Math Grade 4 program. Students will have to use clues that are provided to try and figure out the 4 digit mystery number. Students will be allowed to work with partners.
- **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 (e.g., life guards, child care, medicine, education) and examples of these requirements.
4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-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.
Activity: While learning about division in whole numbers students will complete a T-chart. The first column of the chart will list a real-life activity that uses division. The second corresponding column will list a profession that uses this activity. For example, you would need to divide if you were taking a large recipe and splitting it in half for less people. A chef would use division in this manor.
- **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
4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.*
Activity: Students will be able to explore large numbers and place value in Lesson 1 of Ready Classroom Math. Students will be able to discuss and brainstorm how numbers are related. Students

will be able to figure out on their own that places to the left of a place are 10 times greater than the one to the right. They will also learn that places to the right are one tenth the value than the place to the left.

- **Computer Science**

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

4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.

Activity: Students will be able to use a digital number line to visualize how to round numbers. The teacher will be able to model using this digital tool and then the students can use it via the SMART Board. Students will be able to complete lesson 3 in the Ready Math Classroom Grade 4 book.

Operations and Algebraic Thinking

- **Career Ready Practices**

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

4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Activity: Students will be able to complete page 209-212 in Ready Math Grade 4 book. In this activity students will be solving multi-step word problems that have them using equations and deciding what to do with remainders. Students will also have to show how their answer is reasonable.

- **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.

4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Activity: Students will be able to complete the Unit 2 Math in Action lesson from the Ready Classroom Math program. In this activity students will learn about a job where a worker has to set up a display for a wildlife museum. Students will be able to see how math relates to his job. Students will also be able to discuss other different traditional and nontraditional jobs based on their likes and dislikes.

- **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.

4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Activity: In Lesson 7 of Ready Classroom math students will be able to brainstorm how to use multiplication and division to solve different multiplicative word problems. Students will be able to discuss this with partners and groups.

- **Computer Science**

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

Activity: Students will be able to find patterns in the school and make some of their own. They will then display the patterns on a shared Google Jamboard. Students will then explain the properties of the patterns and how they are the same and different.

Number and Operations in Fractions

- **Career Ready Practices**

Work productively in teams while using cultural/global competence.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Activity: All throughout Lesson 18 in the Ready Classroom Math Grade 4 program students will compare fractions. Students will have to use prior knowledge that they have learned to do this. This skill builds upon their whole number number sense, fraction number sense, and understanding of fractions. Students will be able to work in a group part of the time to solve these problems.

- **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 (e.g., life guards, child care, medicine, education) and examples of these requirements.

4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.

Activity: Students will learn how to convert fractions with denominators of 10 and 100 into decimals. Students will be able to relate this to money. Students will be able to understand that the way we write money is in decimal form. As students are learning this in lesson 25 session 2 of the Ready Classroom Grade 4 math program the teacher will discuss with them why it is so important to learn the skill of understanding money and what careers deal with money every day. Students will be able to complete P. 523-526 using this knowledge.

- **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.

4.NF.B.3 Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$.

Activity: Students will be able to understand how fractions are important in all parts of everyday life. Students will see in Lesson 20 of the Ready Classroom grade 4 math program how fractions are used in recipes everyday. Students will be able to understand what could happen to their food if they use the wrong amounts. The class will discuss how failure is part of the learning process.

- **Computer Science**

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

4.NF.A.1 Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

Activity: Students will learn how to make equivalent fractions. Students will be able to use a digital tool to help them visualize these equivalent fractions. Students will use this tool to complete Lesson 17 in the Ready Classroom Grade 4 book.

Measurement and Data

- **Career Ready Practices**

Act as a responsible and contributing community members and employee.

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Activity: Students will be able to use Math Talk to discuss area and perimeter problems with their classmates and their teacher. Students will use prompts such as, "How did you get started?", "Why did you choose that strategy?", and "Do you agree with me? Why?". Students will be able to use this Math Talk all throughout Lesson 16 in the Ready Classroom Grade 4 program.

- 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.

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

Activity: Students will complete Fourth Grade Ready Math Math In Action Unit 3 lesson on page 350-353. In this activity students will pretend they work for a zoo and need to develop birdcages according to different criteria based on perimeter.
- 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

4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Activity: During Lesson 29 in the grade 4 Ready Classroom math program students will be learning how to solve word problems involving length, mass, weight and volume. They will also be converting measurements to larger and smaller units. During this time the teacher will lead a discussion on how important it is to pay attention to the unit. The class will discuss how in history using the wrong unit has caused major problems in the area of space exploration. [LA Times article](#)
- Computer Science**

8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.

4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.

Activity: Students will be able to make a graphic organizer using a site like Google Slides. On this graphic organizer they will be able to record what they know about converting measurements. They will explain what it is in their own words, they will be able to illustrate what it is, and then they will show examples and non-examples. This activity will be done during session 1 of lesson 13 in the Ready Math Classroom Grade 4 program. While students are doing this the teacher will discuss how computers and software like Google Slides has changed the way people live and work.

Geometry

- Career Ready Practice**

Demonstrate creativity and innovation.

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Activity: Students will be able to create pictures that have lines of symmetry. For this activity students will be able to use any mathematical tools that they wish. These tools can include pattern blocks, rulers, protractors or compasses.
- 9.2 Career Awareness, Exploration, and Preparation**

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

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles

as a category, and identify right triangles.

Activity: During the Unit 5 Math In Action activity in the Ready Classroom Math Grade 4 program students will be able to classify shapes that an artist cut to use in one of her mosaic designs. As students complete this activity the teacher will discuss with them where we can find math in different careers. An artist cutting shapes may not immediately seem like math to many students.

- **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 (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Activity: Students will be able to learn how to classify 2 dimensional shapes. Students will be able to work in groups to brainstorm based on attributes of shapes what a given shape is.

- **Computer Science**

8.1.5.IC.1: Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Activity: Students will be able to use i-Ready to practice classifying two-dimensional figures and triangles. The teacher will discuss with the students how using the I-Ready software is like having another teacher and that having this technology gives students 2 ways to learn information.

IX. PACING

Fourth Grade

Number and Operations in Base Ten

Lessons 1-5, 11-15 (34 days)

- Develop Understanding of Place Value
- Compare and Round Whole Numbers
- Add and Subtract Whole Numbers

Interdisciplinary Connections:

Math/ELA

- **SL.4.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.*

Activity: Students will be able to solve place value problems by comparing whole numbers. Students will be given small scenarios where it is describing a situation. They will then have to decide which whole number in the scenario is larger. Before they decide, students will complete the routine of Try-it, Discuss-it, Connect-it. In this routine students will give the problem a go on their own. Once they think they have solved it they will then discuss with peers and the teacher how they solved the problem. Once that is done, the teacher will then connect their learning to their background knowledge.

Math/Science

- **4-ESS2-1** Analyze and interpret data from maps to describe patterns of Earth's features.

4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Activity: Students will be learning about topographical maps. Students will learn how to read and draw one. Students will understand what the interval measurements mean and be able to calculate the distance between two intervals by using subtraction.

Operations and Algebraic Thinking

Lessons 6-10(24 days)

- Multiplication as a Comparison
- Multiplication and Division in Word Problems
- Patterns
- Model and Solve Multi-Step Problems
- Multiply and Divide Multi-Digit Numbers

Interdisciplinary Connections:

Math/Science

- **4-ESS1-1** Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
Activity: Students will be able to look at patterns in different landforms and layers of rock. Students will be able to decide from these patterns how the land has changed over time and what type of life had lived there previously.

Math/ELA

- **RI.4.1.** Refer to details and examples in a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Activity: Students will be able to learn how to interpret remainders in division problems. Students will complete division problems in lesson 15 session 2 of the Ready Classroom Grade 4 math program. As they are doing these problems they will have to interpret what the remainder means and how to use it in the final answer.

Number and Operations in Fractions

Lessons 17-21, 23-27 (50 days)

- Develop Understanding of Equivalent Fractions
- Compare Fractions
- Add and Subtract Fractions
- Add and Subtract Mixed Numbers
- Multiply Fractions and Fractions by Whole Numbers
- Relate Decimals and Fractions
- Compare Decimals

Interdisciplinary Connections

- **Math/Social Studies**

6.1.5.CivicsPI.8: Describe how the United States Constitution defines and limits the power of government.

4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

Activity: Students will learn how our government has a series of checks and balances so that one of the three branches doesn't have too much power. The teacher will discuss with the students how another branch's decisions can be overturned. We will look specifically how a President's veto of a bill can be overturned if congress gets a two-thirds vote in each chamber. Students will learn how they can figure out how many senators' and representatives' votes specifically will be needed by using equivalent fractions.

- **Math/ELA**

W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $\frac{1}{2}$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Activity: On P. 380 in the Ready Classroom Grade 4 book students will be able to reflect on the question that if 2 fractions of a granola bar are equivalent to each other will they also be equivalent if the 2 pieces come from different size granola bars.

Measurement and Data

Lessons 16, 22, 28-29, 31-32 (22 days)

- Use Multiplication to Convert Measurements
- Solve Problems with Time and Money
- Solve Problems about Length, Liquid Volume, Mass, and Weight
- Identify and Measure Angles
- Add and Subtract with Angles

Interdisciplinary Connections:

- **Math/ELA**
4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

RI.4.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

Activity: Students will solve mathematical word problems. During this activity students will have to use the vocabulary in the problems to determine what operation and unit to use.

Geometry

Lessons 30, 33-34 (16 days)

- Identify points, line segments, rays and perpendicular and parallel lines
- Classify two-dimensional figures
- Draw and identify lines of symmetry

Interdisciplinary Connections:

- **Math/ELA**
RL.4.7. Make connections between specific descriptions and directions in a text and a visual or oral representation of the text.
4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
Activity: In lesson 33 of the Ready Classroom Grade 4 math program students will be asked to classify shapes according to specific attributes they have. These attributes include types of lines and types of shapes. Students will have to make the connection between the written description and the visual representation.
- **Math/Science**
4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Activity: Students will be able to observe mealworms. As students are observing them they will be able to take notes and make detailed drawings. As they are drawing the teacher will remind them to think about lines of symmetry and how they can be used when drawing the organism. Students will then be able to label their drawing pointing out specific body parts and uses.

Personal Financial Literacy 9.1 (10 days)

Civic Responsibility

- You can give back in areas that matter to you.

Credit Profile

- There are benefits to having a positive credit history.

Economic and Government Influences

- Taxes are collected on a variety of goods and services at the local, state, and federal levels.
- There is a broader economic system that influences your financial goals.
- There are agencies, laws, and resources to protect individuals as consumers.

Financial Institutions

- People can choose to save money in many places such as home in a piggy bank, bank, or credit union.

Financial Psychology

- An individual's financial traits and habits affect his/her finances.
- Spending choices and their intended and unintended consequences impact financial outcomes and personal well-being.
- Not all financial information is accurate or truthful.

Planning and Budgeting

- There are specific steps associated with creating a budget.
- Saving money can impact an individual's ability to address emergencies and accomplish their short-and long-term goals.

Risk Management and Insurance

- Individuals can choose to accept inevitable risk or take steps to protect themselves by avoiding or reducing risk.

Additional time will be spent on reviewing concepts that may need to be revisited and looking ahead to next year's curriculum.