Fair Lawn
Public Schools
Fair Lawn, NJ

Grade 4 Math

Adopted August

2017

Revised August 2017
Developed August 2011

Grade 4 Mathematics is aligned to the Student Learning Standards and will expand upon topics learned in Grade 3 as well as prepare students for Grade 5 Mathematics.

Grade 4 Math

Fair Lawn School District

Committee Credits
Grade 4 Math Team

Grace Clune
Caryn Freed

Lauren Gimon, Supervisor
Jennifer Amos, K-5 Math Specialist

Grade 4 Math

I. Course Synopsis
In Grade 4, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) 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.

1. Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

2. Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

3. Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

II. Philosophy & Rationale
The mathematics curriculum is completely aligned to the Student Learning Standards for fourth grade. Fourth grade content required by the Student Learning Standards focuses on following critical areas:

Operations and Algebraic Thinking
- Use the four operations with whole numbers to solve problems.
- Gain familiarity with factors and multiples.
- Generate and analyze 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
- 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 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.

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

As the content is taught, the Common Core's mathematical practices are also woven in, helping to develop the attitudes and habits of mind of those who know and enjoy mathematics and use it effectively. The practices include:
- Problem solving
- Multiple representations
- Reasoning
- Mathematical modeling
- Tool use
- Communication

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report Adding It Up: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

MATH.PRACTICE.MP1 - Make sense of problems and persevere in solving them.
Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

MATH.PRACTICE.MP2 - Reason abstractly and quantitatively.
Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

MATH.PRACTICE.MP3 - Construct viable arguments and critique the reasoning of others.
Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine

domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

MATH.PRACTICE.MP4 - Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MATH.PRACTICE.MP5 - Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

MATH.PRACTICE.MP6 - Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary

grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MATH.PRACTICE.MP7 - Look for and make use of structure.
Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

MATH.PRACTICE.MP8 - Look for and express regularity in repeated reasoning.
Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

III. Scope & Sequence

Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1.1 - 1.11	1.12 – 2.10	2.11 – 3.6	3.7 - 4.3	4.4 - 5.3	5.4 - 5.14	6.1 - 6.14	7.1 - 7.11	7.12 - 8.8	8.9 - 8.14

Grade 4 has 8 instructional units.
Each unit is completed in approximately 3-5 weeks.

Unit	Name	Weeks	Topics
1	Place Value, Multidigit Addition and Subtraction	Weeks 1-5	• Base-10 Value System • Rounding • Student Reference Book • Solving Multi-step Number Stories • Measurement • U.S. Traditional Addition and Subtraction • Beyond Informal Geometry • Playing Games
2	Multiplication and Geometry	Weeks 6-10	• Multiplication and Multiplicative Comparison • Measurement • Geometry • Patterns
3	Fractions and Decimals	Weeks 11-16	• Fraction Equivalence • Comparing and Ordering Fractions • Fractions on Number Lines • Decimals
4	Multidigit Multiplication	Weeks 17-21	• Fact Extensions and Estimating Products • Partitioned Rectangles, Computation, and Multiplication • Real-World Application • Measurement
5	Fraction and Mixed-Number Computation; Measurement	Weeks 22-26	• Fraction concepts • Fraction and Mixed-Number addition and subtraction

			• Measurement and Data: Line plots • Geometry
6	Division; Angles	Weeks 27-31	• Strategies for division and partial quotients • Measuring angles • Expressing and interpreting remainders • Fraction concepts
7	Multiplication of a Fraction by a Whole Number; Measurement	Weeks 32-36	• Multiplication of a fraction by a whole number • Application of fraction concepts and measurement • Division • Patterns
8	Fraction Operations; Applications	Weeks 37-40	• Fractions concepts and operations • Application measurement and geometry • More application: Value and Operations

IV. Unit Descriptions

Unit 1: Place Value; Multidigit Addition and Subtraction   (Weeks 1 - 5)

<u>Enduring Understanding</u>
In this unit, students explore place-value concepts for multi-digit whole numbers. They use U.S. traditional addition and subtraction to add and subtract multi-digit whole numbers.

<u>Essential Question(s)</u>
1. What observations can I make about the different ways numbers can be represented?
2. Can I identify structures or patterns in multidigit numbers and extend the structure through the millions place?

<u>Learning Objectives</u>
Students will be able to:
1. Work with place value in whole numbers through hundred-thousands.
2. Record numbers in expanded form and compare numbers through the hundred-thousands.
3. Learn procedures for rounding numbers through hundred-thousands.
4. Maneuver the student reference book and continue place-value work.
5. Explore different ways to estimate.
6. Practice solving multistep number stories involving addition and subtraction.
7. Practice u.s. traditional addition.
8. Practice u.s. traditional subtraction.
9. Convert between yards, feet, and inches.
10. Explore the properties of points, line segments, lines, and rays.
11. Learn properties of angles, triangles, and quadrilaterals.
12. Develop a formula for finding the perimeter of a rectangle.

<u>New Jersey Student Learning Standards</u>
- **4.OA.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.
- **4.NBT.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 ÷ 70 = 10 by applying concepts of place value and division*.
- **4.NBT.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.

- **4 NBT. 3** Use place value understanding to round multi-digit whole numbers to any place.
- **4.NBT. 4** Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- **4.MD.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), …
- **4. MD. 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.*
- **4.G.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Suggested Activities/Modifications
Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to:
1. Activities
    a. Mental Math
    b. Math Message
    c. Journal pages
    d. Writing/reasoning prompts
    e. Open response and reengagement lesson: cracking the muffin code
    f. Unit 1 progress check and open response assessment
    g. Ongoing assessment through check ins
2. English language learners
    a. When practicing place value, students can use number cards to create 6-digit numbers, and then answer questions about their numbers using comparison symbols.
    b. When encountering new vocabulary, visual representations can be utilized
3. Special education/504 students
    a. For experience comparing numbers in expanded form, students can build numbers with base-10 blocks and then write the numbers in expanded form with a partner.
4. Gifted and talented students
    a. To further explore the base-10 place-value system, students can solve number grid puzzles.
    b. To apply their understanding of place-value concepts, students can start collections of large numbers gathered from real world sources (newspapers, atlas, magazines…)

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
- See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 2: Multiplication and Geometry   (Weeks 6 - 10)

Enduring Understanding
1. Students explore various applications for multiplication.
2. They classify shapes by properties and develop formulas for finding the area of a rectangle.

Essential Question(s)
1. Can I define and label shapes according to their properties, using the terms *parallel, perpendicular, side, angle, acute, obtus*e, and *right*?
2. Can I identify prime and composite numbers?

Learning Objectives
Students will be able to:
1. Review rectangular arrays and explore patters in square numbers.
2. Relate previous work with area to develop a formula for the area of a rectangle.
3. Work with factor pairs, arrays, and corresponding equations.
4. Recognize that a whole number is a multiple of each of its factors.
5. Classify numbers as prime or composite.
6. Convert units of time to smaller units and solve number stories involving time.
7. Create and interpret statements and equations for multiplicative comparisons.
8. Solve number stories involving multiplicative comparisons
9. Classify triangles by angle proportions
10. Classify quadrilaterals by their properties
11. Explore symmetry in nature, objects, and shapes.
12. Review the "what's my rule?" Routine to analyze patterns.

New Jersey Student Learning Standards
- **4.OA.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.
- **4.OA.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.
- **4.OA.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.

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

Suggested Activities/Modifications

Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to:

1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Little and Big
   f. Unit 2 Progress Check and Cumulative Review
   g. Ongoing Assessment through Check Ins
   h. Games
2. English Language Learners
   a. Use everyday objects like egg cartons to illustrate rectangular arrays and practice using the terms *row, column* and *number of objects in rows and columns* in a real-world context.
3. Special education/504 students
   a. Have students describe their arrays using words and phrases like *row, column, objects in each row,* and *total number of objects*.
4. Gifted and talented students
   a. Students use words, pictures, and numbers to explain the patterns they discover.

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
- See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 3: Fractions and Decimals   **(Weeks 11-16)**

Enduring Understanding

1. Students explore fraction equivalence and compare and order fractions using different representations.
2. Students extend their understanding of fractions to decimals, comparing and ordering decimals using the same methods as for comparing fractions.

Essential Question(s)
1. Can I represent fractions and decimals using drawings and number lines?
2. How can I prove that two fractions are equivalent?

Learning Objectives
Students will be able to
   1. Extend their understanding of fraction equivalence by solving number stories involving equally shared quantities.
   2. Use an area model to recognize and generate equivalent fractions.
   3. Use a length or number-line model to recognize and generate equivalent fractions.
   4. Generalize their work with visual fraction models to explain why a fraction a/b is equivalent to a fraction $n*a/n*b$.
   5. Compare fractions in number stories.
   6. Learn strategies to order fractions and place them accurately on number lines.
   7. Explore the relationship between fractions and decimals.
   8. Model decimals with base-10 blocks.
   9. Read and write decimal numbers to hundredths.
   10. Explore decimals in the context of measurement.
   11. Compare decimals using <, >, and =.

New Jersey Student Learning Standards
   - **4.NBT.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.
   - **4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm.
   - **4.NF.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.
   - **4.NF.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.

- **4.NF.6** Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram*.
- **4.NF.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.
- **4.MD.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), …

Suggested Activities/Modifications
Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:
1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Veggie Pizzas
   f. Unit 3 Progress Check and Cumulative Review
   g. Ongoing Assessment through Check Ins
   h. Games: *Fraction match, Buzz* and *Bizz-Buzz, Spin-and-Round, Fraction Top-It, Rugs and Fences, Polygon Capture, Base-10 Decimal Exchange, Coin Top-It, Decimal Top-It*
2. English Language Learners
   a. Gather pictures of familiar examples of fractions and caption them accordingly, such as one-half of an apple or four-fourths of a divided windowpane.
3. Special education/504 students
   a. To explore the relationships among hundredths, tenths, and ones using a concrete model, students can play *base-10 decimal exchange.*
4. Gifted and talented students
   a. Students explore the concept of the whole using a concrete model.
   b. Students define wholes based on different tenths and hundredths.
   c. They identify the value of base-10 blocks when different combinations are designated as the whole and determine the whole given a fractional part.

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices

- See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 4: Multi-digit Multiplication   (Weeks 17-21)

Enduring Understanding
In this unit, students are introduced to the basic principles of multi-digit multiplication by focusing on extending multiplication skills and exploring the partial-products method. They will use their knowledge of multiplication to find the areas of rectangles and to convert units of measurement.

Essential Question(s)
1. Can I describe the steps I must use to solve this problem?
2. How do I know that my solution is reasonable?

Learning Objectives
Students will be able to:
1. Find a rule for solving multiplication problems involving multiples of 10.
2. Make estimates and evaluate the reasonableness of their answers.
3. Solve multiplication problems by partitioning rectangles.
4. Convert liters to milliliters.
5. Use multiplication or division to decide if one million dollars will fit in a large box.
6. Practice the partial-products multiplication strategy.
7. Explore the metric system and convert kilograms to grams.
8. Solve multistep number stories involving money.
9. Continue their work with partial products and multiply 2-digit numbers by 2-digit numbers.
10. Play a game to practice the basic principles of multiplication with multidigit numbers.
11. Find the area of rectangles and rectilinear figures using multidigit computation.
12. Solve multistep multiplication problems and use estimates to assess the reasonableness of their answers.
13. Explore the lattice method of multiplication.

New Jersey Student Learning Standards
- **4.OA.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.
- **4.OA.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.

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

Suggested Activities/Modifications
Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:
1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Walking Away with a Million Dollars
   f. Unit 4 Progress Check and Open Response Assessment
   g. Ongoing Assessment through Check Ins
   h. Games: *Multiplication Wrestling, Beat The Calculator, Multiplication Top-It, Rugs and Fences*
2. English language learners
   a. When encountering new vocabulary, visual representations can be utilized to support comprehension.
3. Special education/504 students

a. Students can practice decomposing numbers using base-10 blocks to model the decomposed number.
4. Gifted and talented students
    a. To further practice concepts, students can work together to discuss various ways to solve the problem, as well as create new problems for partners to discuss and solve.

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
● See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 5: Fraction and Mixed- Number Computation; Measurement   **(Weeks 22-26)**

Enduring Understanding
1. Students explore the whole in fractions as well as adding and subtracting fractions and mixed numbers. Students use these computation skills to answer questions about line plots.
2. Students are also introduced to adding tenths and hundredths. Students build on their knowledge of rays to explore unit iteration for angles.

Essential Question(s)
1. Can I represent fractions and decimals using drawings and number lines?
2. How can I prove that two fractions are equivalent?

Learning Objectives
Students will be able to:
1. Explore decomposing fractions into sums of fractions with the same denominator.
2. Practice finding the whole when given a fractional part of a region.
3. Add fractions (of the same whole, with like denominators) to solve number stories.
4. Learn multiple strategies to add mixed numbers with like denominators.
5. Add unlike fractions with tenths and hundredths.
6. Subtract fractions (of the same whole, with like denominators) to solve number stories.
7. Subtract mixed numbers by writing equations, drawing diagrams, and solving number stories.
8. Record data on a line plot and answer questions regarding the data.
9. Introduced to the degree as a unit to measure angles.
10. Explore rotation, iteration of measurement units, and angle measures.
11. Review line symmetry and explore properties of symmetric shapes.
12. Solve multistep multiplication number stories and express their solution strategies with appropriate units and number models.

New Jersey Student Learning Standards
● **4.NF.3a** Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

- **4.NF.3b** 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 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*
- **4.NF.3c** 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.
- **4.NF.3d** 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.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.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
- **4.MD.4** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 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.*
- **4.MD.5a** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.
- **4.MD.5b** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

Suggested Activities/Modifications
Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:
1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Queens Arlene's Dilemma
   f. Unit 5 Progress Check and Cumulative Review
   g. Ongoing Assessment through Check Ins
   h. Games: *Decimal Top-It, Fraction Match, Fishing for Fractions (Addition)*
2. English Language Learners
   a. Scaffold students' understanding of the problem contexts of number stories by accompanying spoken and written presentations.
3. Special education/504 students
   a. To explore mixed-number addition concepts, students use fraction circles to compose mixed numbers.

4. Gifted and talented students
    a. To explore adding fractions with unlike denominators, students solve number stories by adding lengths of hiking trails. (*math masters,* p. 198)

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
● See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 6: Division; Angles   **(Weeks 27-31)**

Enduring Understanding
In this unit, students explore the relationship between multiplication and division by developing a method for dividing whole numbers and solving division number stories. They are introduced to protractors and explore using them to measure and construct angles.

Essential Question(s)
1. Can I identify and use the appropriate tools to measure and create angles?
2. How can I tell if my solution is reasonable?

Learning Objectives
Students will be able to:
1. Find a rule for solving extended division facts.
2. Find missing side lengths of rectangles.
3. Solve division number stories using familiar multiples.
4. Explore dividing multidigit numbers into parts as a method for division.
5. Interpret remainders to decide how to package fruit for a fundraiser and explain their solutions.
6. Discuss solutions and explanations of the problem and revise their work.
7. Explore U.S. customary units of weight and convert tons to pounds and pounds to ounces.
8. Explore different ways to express and interpret remainders.
9. Make an angle measurer and use it to measure angles.
10. Measure angles with a half-circle protractor.
11. Add and subtract to find unknown angle measures.
12. Add and subtract fractions and mixed numbers with like denominators to solve number stories.
13. Use their understanding of whole-number multiplication to multiply fractions by whole numbers.

New Jersey Student Learning Standards
● **4.OA.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.

- **4.NBT.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.
- **4.NBT. 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.
- **4.NF.3c** Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$. 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.
- **4.NF.3d** 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.MD.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
- **4.MD.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.

Suggested Activities/Modifications

Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to:

1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Fruit Baskets
   f. Unit 6 Progress Check and Open Response Assessment
   g. Ongoing Assessment through Check Ins
   h. Games: Divide and Conquer, Rugs and Fences, Fishing for Fractions, Division Dash
2. English Language Learners.
   a. When encountering new vocabulary, students will use concrete objects to understand concepts being taught. (for example, use an extension cord to show 'extending')

3. Special education/504 students
    a. Students can practice naming multiples by practicing with games like buzz, buzz.
4. Gifted and talented students
    a. To further practice concepts, students can work together to create additional examples of problems and challenge each other to solve.

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
● See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 7: Multiplication of a Fraction by a Whole Number; Measurement   (Weeks 32-36)

Enduring Understanding
Students formalize their understanding of multiplying a fraction by a whole number and use this knowledge to solve problems in real-world scenarios.

Essential Question(s)
1. Can I identify a method for multiplying a fraction by a whole number?
2. Can I solve multistep number stories using drawings, tables, graphs, and concrete objects?

Learning Objectives
Students will be able to:
1. Convert between cups, pints, quarts, and gallons.
2. Multiply unit and non-unit fractions by whole numbers.
3. Learn to represent fractions as multiples of a unit fraction.
4. Explore multiplying fractions by whole numbers.
5. Multiply mixed numbers by whole numbers.
6. Estimate, find, and assess the reasonableness of answers to multistep division number stories.
7. Use division strategies to solve various measurement problems.
8. Generate and analyze patterns in rectangular numbers.
9. Solve multistep number stories involving fractions.
10. Multiply and add fractional weights to solve problems about state birds.
11. Practice converting between fractions and decimals to solve number stories.
12. Record data on a line plot and answer questions regarding the data.

New Jersey Student Learning Standards
● **4.OA.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.
● **4.NBT.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.

- **4.NBT.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.
- **4.NF.4a** Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.
- **4.NF.4b** 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 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*
- **4.NF.4c** 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.
- **4.MD.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), …
- **4.MD.4** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.

Suggested Activities/Modifications
Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to:

1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Three-Fruit Salad
   f. Unit 7 Progress Check and Cumulative Review
   g. Ongoing Assessment through Check Ins
   h. Games: *Fishing for Fractions, Multiplication Wrestling, Angle Tangle*
2. English Language Learners.
   a. Use visual aids to build students' familiarity with U.S. customary units. Preview the terms *cup, pint, quart,* and *gallon* by displaying common items with those capacities.
3. Special Education/504 Students.
   a. To review multiplication concepts, students solve 6*92 using the partial-product method. Guide students, as they work, emphasizing the Distributive Property
4. Gifted and Talented Students

  a. To extend work multiplying mixed numbers by whole numbers, students change multiplication equations to increase or decrease the product. (Activity Card 80)

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
- See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

Unit 8: Fraction Operations; Applications   **(Weeks 37-40)**

Enduring Understanding
In this unit, students apply their knowledge of fractions, number concepts, patterns, and geometry to different real-world scenarios.

Essential Question(s)
1. Can I monitor and evaluate my own progress as I work to fulfill each step in my strategy?
2. Can I apply the mathematics I know to solve problems I encounter in everyday life?

Learning Objectives
Students will be able to:
  1. Solve challenging multistep number stories.
  2. Apply their understanding of the additive nature of angle measures to real-life situations.
  3. Find measures of pattern-block angles and use known angle measures to find measures of other angles.
  4. Discuss others' work and then revise their own work to include written generalizations.
  5. Apply knowledge of line symmetry to create symmetric shapes and quilting patterns.
  6. Make line plots and add and subtract mixed numbers to answer questions regarding the data.
  7. Compute with fractions and mixed numbers as they apply a perimeter formula for rectangles in real-world and mathematical problems.
  8. Solve number stories by converting decimals to fractions.
  9. Find the area of rectangles using fractions and mixed numbers.
  10. Multiply fractions by whole numbers to solve number stories.
  11. Convert liquid measurements and solve problems involving fractions.
  12. Solve problems with fractions and conversion of units of measure.
  13. Use understanding of place value and properties of operations to solve puzzles.
  14. Find equivalent names for numbers.

New Jersey Student Learning Standards
- **4.NF.3c** 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.

- **4.NF.3d** 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.NF.4b** 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 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*
- **4.NF.4c** 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 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?*
- **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 100.2 *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
- **4.NF.6** Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*
- **4.MD.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.
- **4.MD.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.

Suggested Activities/Modifications
Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to:
1. Activities
   a. Mental Math
   b. Math Message
   c. Journal pages
   d. Writing/Reasoning Prompts
   e. Open Response and Reengagement Lesson: Pattern-Block Angles
   f. Unit 8 Progress Check and Open Response Assessment
   g. Ongoing Assessment through Check Ins
   h. Games: Fraction Multiplication Top-It, Name That Number

2. English Language Learners
   a. When encountering new vocabulary, students will use concrete objects to understand concepts being taught. (for example, use an extension cord to show 'extending')
3. Special education/504 students
   a. Students can practice applying concepts by drawing shapes and portioning them, or by building wholes using internal shapes.
4. Gifted and talented students
   a. To further practice concepts, students can work together to create additional examples of problems and challenge each other to solve.

New Jersey Student Learning Standards– Standards 8, 9 and Career Readiness Practices
- See Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix

V. Course Materials (included, but not limited to)
- Textbook: Everyday Mathematics, McGraw Hill Education Copyright 2015
- Materials: Math Masters, Classroom Posters, Assessment Handbook, *Home Connection Handbook*, Student Math Journal: Volumes 1 and 2, Homelinks, *My Reference Book*, Activity Cards
- Manipulatives: base-10 blocks, beakers, clock faces, connectors, dice, Everything Math Decks, fraction circle pieces, geoboards, marker boards, measuring cups: cup, pint, quart, gallon, medicine dropper, meter sticks, number line, pattern blocks, money, protractor, rocker (pan) balance, rubber bands, ruler, tape measure
- Computer Programs: Exam View
- Internet Resources: ConnectED, eToolkit, ePresentations, Smart Notebook, Virtual Learning Community, iXL

VI. Assessments (included, but not limited to)
- Sept: Baseline Fact Mastery +,-, x,/
- Jan: Mid Year Fact Mastery +,-, x,/
- May: End of Year Fact Mastery +,-, x,/
- Unit 1-8 Progress Checks
- Odd Units- Open Response Assessment
- Even Units- Cumulative Assessments
- Ongoing Assessment Check Ins
- Writing/Reasoning Prompts
- District online trimeseter benchmarks

VII. Cross Curricular Aspects
- When the opportunity arises, teachers can use literature links during daily math lessons. This will help incorporate the study of literature into the curriculum.