

Mendham Township

Fourth Grade Math Curriculum

June 2023

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Philosophy

The Mendham Township Elementary School is committed to delivering comprehensive mathematics instruction based on the New Jersey Learning Standards and best practices found in research. Mathematics is a challenging subject that consists of numbers, shapes, and patterns, broken into the following components at the elementary level - counting and cardinality, operations and algebraic thinking, numbers and operations (in base ten and fractions), measurement and data, and geometry. The K - 4 curriculum can be looked at as building blocks of concepts and skills with foundational skills introduced first, then rehearsed, practiced and applied at each grade level. Mathematics instruction consists of hands-on, authentic activities in addition to the use of manipulatives and technology. There is a strong emphasis on problem solving and communication of the process used to achieve an outcome. Through all the strands of math, critical thinking skills are empowering the students to become thoughtful, articulate and active members of our society.

Goals

This curriculum is designed to advance students through grade-specific standards, develop a deeper understanding of skills, and work toward meeting the expectations of mathematics to prepare students for college and careers in order for them to succeed in the future. The goals of this curriculum will develop in our students the ability to:

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.

Mendham Township School District
Math Curriculum
Grade 4

Grade 4, Unit 1 - Number and Operations - Base Ten & Algebraic Thinking (Chapters 1-6)

Stage 1: Desired Results

Unit Goals:

- Understand place value.
- Understand adding and subtracting numbers.
- Understand multiplying one-digit numbers.
- Understand multiplying two-digit numbers.
- Understand dividing one-digit numbers.
- Understand factors, multiples, and patterns.

Essential Questions:

- How can you use place value to compare, add, subtract, and estimate with whole numbers?
- What strategies can you use to multiply by 1-digit numbers?
- What strategies can you use to multiply 2-digit numbers?
- How can you divide 1-digit numbers?
- How can you find factors and multiples?
- How can you generate and describe number patterns?

Skills/Knowledge:

- Compare the value of two identical digits in a number.
- Read and write multi-digit numbers in multiple forms.
- Write a sum or difference.
- Solve addition and subtraction problems.
- Write multiplication problems.
- Solve a problem using an equation.
- Write multiplication problems.
- Solve a problem using an equation.
- Write and solve division problems.
- Compare the different features of different numbers and shapes.
- Apply an appropriate strategy to show relationships in numbers and shapes.

NJSLS:

Number and Operations in Base Ten:

4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents the place to its right. For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.

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.

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

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

4.NBT.B.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.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.

Operations and Algebraic Thinking:

4.OA.A.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.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.

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.

4.OA.B.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.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. 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

Stage 2 - Assessment

Assessments:

- **Formative:**
 - Independent classwork
 - Checkpoint Quizzes
 - Freckle
- **Summative:**
 - Benchmark Assessment Beginning / Middle / End of Year
 - Problem Solving Tasks at the beginning and end of each marking period
 - End of Chapter Assessment
 - Course Benchmark Assessment
 - Performance Task at the end of each chapter
 - Fact Fluency

Evidence:

- Observation of student participation and written work showing an understanding of the following Mathematical Practices: Note - these mathematical practices are proven methods of demonstrating mathematical processes and evidence of student learning. The following practices are incorporated into the updated New Jersey Student Learning Standards (NJSLS) and should be highlighted in lessons as strategies for success.
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 - MP5. Use appropriate tools strategically.

- MP6. Attend to precision.
- MP7. Look for and make use of structure.
- MP8. Look for and express regularity in repeated reasoning.

Stage 3- Learning Plan

Teaching Points:

Chapter 1: Place Value Concepts

1. Understand Place Value
2. Read and Write Multi-Digit numbers
3. Compare Multi-Digit Numbers
4. Round Multi-Digit Numbers

Chapter 2: Add and Subtract Multi-Digit Numbers

1. Estimate Sums and Differences
2. Add Multi-Digit Numbers
3. Subtract Multi-Digit Numbers
4. Use Strategies to Add and Subtract
5. Problem Solving: Addition and Subtraction

Chapter 3: Multiply by One-Digit Numbers

1. Understand Multiplicative Comparisons
2. Multiply Tens, Hundreds, and Thousands
3. Estimate Products by Rounding
4. Use the Distributive Property to Multiply
5. Use Expanded Form to Multiply
6. Use Partial Products to Multiply
7. Multiply Two-Digit Numbers by One-Digit Numbers
8. Multiply Three and Four Digit Numbers by One-Digit Numbers
9. Use Properties to Multiply
10. Problem Solving: Multiplication

Chapter 4: Multiply by Two-Digit Numbers

1. Multiply by Tens
2. Estimate Products
3. Use Area Models to Multiply Two-Digit Numbers
4. Use the Distributive Property to Multiply Two-Digit Numbers
5. Use Partial Products to Multiply Two-Digit Number
6. Multiply Two-Digit Numbers
7. Practice Multiplication Strategies
8. Problem Solving: Multiplication with Two-Digit Numbers

Chapter 5: Divide Multi-Digit Numbers by One-Digit Numbers

1. Divide Tens, Hundreds, and Thousands
2. Estimate Quotients
3. Understand Division and Remainders
4. Divide Two-Digit Numbers by One-Digit Numbers
5. Divide Multi-Digit Numbers by One-Digit Numbers
6. Divide by One-Digit Numbers
7. Problem Solving: Division

Chapter 6: Factors, Multiples, and Patterns

1. Understand Factors
2. Factors and Divisibility

3. Relate Factors and Multiples
4. Identify Prime and Composite Numbers
5. Number Patterns
6. Shape Patterns

Integrated accommodations and modifications for students with IEP/504/ELL/Gifted and Talented:

- Reteach and Enrichment activities from Big Ideas Math
- Small group instruction
- Use of manipulatives, visuals, and other teaching tools
- Flexible grouping centers
- Check for comprehension and understanding
- Repeating, clarifying or rewording directions
- Teacher modeling of what is expected and necessary steps to complete task
- Provide students with open ended questions that stimulate higher order thinking
- Tiered assignments

List of Core Instructional and Supplemental Materials:

Core:

Big Ideas Math Modeling Real Life

Supplemental Materials:

Freckle Math

Star Math

SuperSTEM

MTES Math Tasks

Manipulatives

Smartboard

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Interdisciplinary Connections

NJSLS:

English Language Arts

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RI.4.9. Integrate and reflect on (e.g. practical knowledge, historical/cultural context, and background knowledge) information from two texts on the same topic in order to write or speak about the subject knowledgeably.

W.4.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.

SL.4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Social Studies

- 6.1.5.EconET.1 Identify positive and negative incentives that influence the decisions people make.
- 6.1.5.EconET.2 Use quantitative data to engage in cost benefit analyses of decisions that impact the individual and/or community.
- 6.1.5.EconET.3 Explain how scarcity and choice influence decisions made by individuals, communities, and nations.

**For each lesson, refer to “Cross-Curricular Connections” in TE on the page before each ‘Practice’ page.*

Career Readiness, Life Literacies, and Key Skills

Personal Financial Literacy

- 9.1.5.CR.1 Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
- 9.1.5.FL.1 Identify various types of financial institutions and the services they offer including banks, credit unions, and credit card companies.
- 9.1.5.FP.1 Illustrate the impact of financial traits on financial decisions.
- 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.
- 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).

Career Standards

- 9.2.5.CAP.6 Compare the characteristics of a successful entrepreneur with the traits of successful employees.
- 9.2.5.CAP.7 Identify factors to consider before starting a business.

Integration of the Technology Standard

- 8.1.5.AP.1 Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
- 8.1.5.DA.3 Organize and present collected data visually to communicate insights gained from different views of the data.

Grade 4, Unit 2 - Numbers and Operations - Fractions/Decimals (Chapters 7-10)

Stage 1: Desired Results

Unit Goals:

- Understand fractions.
- Understand adding and subtracting fractions.
- Understand multiplying whole numbers and fractions.
- Understand fractions and decimals.

Essential Questions:

- What strategies can you use to compare fractions and write equivalent fractions?
- How do you add or subtract fractions and mixed numbers that have the same denominator?
- How do you multiply fractions by whole numbers and mixed numbers?
- How can you record decimal notation for fractions, and compare decimal fractions?
- What strategies can you use when problem solving with fractions and decimals?
- How can you relate fractions and decimals to the hundredths place?

Skills/Knowledge:

- Compare the numerators and denominators of two fractions.
- Find the factors of a number.
- Solve a problem using fractions.
- Model different types of fractions.
- Find the product of a whole number and a fraction.
- Compare two decimals.
- Justify the operation used to solve a problem.

NJSLS:

Number and Operations-Fractions:

- 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
- 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 $1/2$. 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.B.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$
- 4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number
- 4.NF.C.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 $3/10$ as $30/100$, and add $3/10 + 4/100 = 34/100$.
- 4.NF.C.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.C.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.

Stage 2 - Assessment

Assessments:

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Stage 3- Learning Plan

Teaching Points:

Chapter 7: Understand Fraction Equivalence and Comparison

1. Model Equivalent Fractions
2. Generate Equivalent Fractions by Multiplying
3. Generate Equivalent Fractions by Dividing
4. Compare Fractions Using Benchmarks
5. Compare Fractions

Chapter 8: Add and Subtract Fractions

1. Use Models to Add Fractions
2. Decompose Fractions
3. Add Fractions with Like Denominators
4. Use Models to Subtract Fractions
5. Subtract Fractions with Like Denominators
6. Model Fractions and Mixed Fractions
7. Add Mixed Numbers

8. Subtract Mixed Numbers
9. Problem Solving: Fractions

Chapter 9: Multiply Whole Numbers and Fractions

1. Understand Multiples of Unit Fractions
2. Understand Multiples of Fractions
3. Multiply Whole Numbers and Fractions
4. Multiply Whole Numbers and Mixed Numbers
5. Problem Solving: Fraction Operations

Chapter 10: Relate Fractions and Decimals

1. Understand Tenths
2. Understand Hundredths
3. Fractions and Decimals
4. Compare Decimals
5. Add Decimal Fractions and Decimals
6. Fractions, Decimals, and Money
7. Operations with Money

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Grade 4, Unit 3 - Geometry, Measurement and Data (Chapters 11-14)

Stage 1: Desired Results

Unit Goals:

- Understand measurement and equivalence.
- Understand perimeter and area formulas.
- Understand lines and angles.
- Understand symmetry and two-dimensional shapes.

Essential Questions:

- How can you draw and identify lines and angles?
- How can you classify shapes?
- How can you measure angles and solve problems involving angle measures?
- How can you use relative sizes of measurements to solve problems and to generate measurement tables that show a relationship?
- How can you use formulas for perimeter and area to solve problems?

Skills/Knowledge:

- Compare sizes of units of length.
- Solve a problem using measurements.
- Compare perimeter and area.
- Model perimeter and area.
- Compare sizes of angles to create different patterns.
- Measure and draw angles.
- Compare angles and shapes.
- Draw different angles and shapes.

NJSLS:

Measurement and Data:

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. 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.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.

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.

4.MD.B.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.

4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement

4.MD.C.6 . Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.C.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.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

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.

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.

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Stage 3- Learning Plan

Teaching Points:

Chapter 11: Understand Measurement Equivalence

1. Length in Metric Units
2. Mass and Capacity in Metric Units
3. Length in Customary Units
4. Weight in Customary Units
5. Capacity in Customary Units
6. Make and Interpret Line Plots
7. Units of Time
8. Problem Solving: Elapsed Time
9. Mixed Measures

Chapter 12: Use Perimeter and Area Formulas

1. Perimeter Formula for a Rectangle
2. Area Formula for a Rectangle
3. Find Unknown Measures
4. Problem Solving: Perimeter and Area

Chapter 13: Identify and Draw Lines and Angles

1. Points, Lines, and Rays
2. Identify and Draw Angles
3. Identify Parallel and Perpendicular Lines
4. Understand Degrees
5. Find Angle Measures
6. Measure and Draw Angles
7. Add Angle Measures
8. Find Unknown Angle Measures

Chapter 14: Identify Symmetry and Two-Dimensional Shapes

1. Line Symmetry
2. Draw Symmetric Shapes
3. Classify Triangles by Sides
4. Classify Triangles by Angles
5. Classify Quadrilaterals

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Pacing Guide

Chapter	NJSLS	Marking Period	Days	Assessments
Chapters 1-14		1	1 day	Pre-Course Test
1 - Place Value Concepts	4.NBT.A.1-3	1	8 days	Ch. 1 Test
2 - Add and Subtract Multi-Digit Numbers	4.NBT.A.3 4.NBT.B.4 4.OA.A.3	1	9 days	Ch. 2 Test
3 - Multiply by One-Digit Numbers	4.OA.A.1-2 4.NBT.A.1,3 4.NBT.B.5 4.OA.A.3	1	15 days	Ch. 3 Test
Chapters 1-3 Course Benchmark		1	1 day	Course Benchmark 1
4 - Multiply by Two-Digit Numbers	4.NBT.B.5 4.NBT.A.3 4.OA.A.3	1	12 days	Ch. 4 Test
5 - Divide Multi-Digit Numbers by One-Digit Numbers	4.NBT.A.1 4.NBT.B.6 4.OA.A.3	2	13 days	Ch 5 Test
6 - Factors, Multiples, and Patterns	4.OA.B.4 4.OA.C.5	2	9 days	Ch. 6 Test
7 - Understand Fraction Equivalence and Comparison	4.NF.A.1,2	2	10 days	Ch. 7 Test
Chapters 4-7 Course Benchmark		1	1 day	Course Benchmark 2
8 - Add and Subtract Fractions	4.NF.B.3a, 3b, 3c, 3d	2	13 days	Ch. 8 Test
9 - Multiply Whole Numbers and Fractions	4.NF.B.4a, 4b, 4c	3	9 days	Ch. 9 Test
10 - Relate Fractions and Decimals	4.NF.C.5-7 4.MD.A.2	3	11 days	Ch. 10 Test
11 - Understand Measurement Equivalence	4.MD.A.1, 2 4.MD.B.4	3	14 days	Ch. 11 Test
Chapters 8-11 Course Benchmark		1	1 day	Course Benchmark 3

12 - Use Perimeter and Area Formulas	4.MD.A.3 4.OA.A.3	4	8 days	Ch 12 Test
13 - Identify and Draw Lines and Angles	4.G.A.1 4.MD.C.5-7	4	12 days	Ch. 13 Test
14- Identify Symmetry and Two-Dimensional Shapes	4.G.A.2,3	4	9 days	Ch. 14 Test
Chapters 1-14		1	1 day	Post-Course Test