Mendham Township School District

Mathematics Curriculum - 2023

Grade 5 General & Advanced

Aligned 2019 Big Ideas Math Modeling Real Life

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

1. Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

2. Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

3. Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Grade 5 Overview (Mad Minute – multiplication / division / fractions – decimal conversions)

- **Operations and Algebraic Thinking**
  - Write and interpret numerical expressions.
  - Analyze patterns and relationships.

- **Number and Operations in Base Ten**
  - Understand the place value system.
  - Perform operations with multi-digit whole numbers and with decimals to hundredths.

- **Number and Operations—Fractions**
  - Use equivalent fractions as a strategy to add and subtract fractions.
  - Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

- **Measurement and Data**
  - Convert like measurement units within a given measurement system.
  - Represent and interpret data.
  - Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

- **Geometry**
  - Graph points on the coordinate plane to solve real-world and mathematical problems.
  - Classify two-dimensional figures into categories based on their properties.

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

NJ	NJ#	Comp & Content	Skills	Concepts
Operations and Algebraic Thinking 5OA				
Write and interpret numerical expressions.				
Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols	5OA1 C2 T1 #6, 7, 11, 12	Math Symbols (parentheses, brackets, and braces)	Evaluating expressions	Using order of operations to simplify expressions
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 X (8 + 7). Recognize that 3 X (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.	5OA2 C2 T1 #6	Double means twice as much Triple means 3X as much	Write simple expressions to represent calculations of numbers Evaluate the value of expression through inspection	
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. 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.	5OA3 C12 T3 #12, 15, 16		Graphing points in coordinate plane Create patterns using two rules Identify the rule associated with a specific pattern	
Number and Operations in Base Ten 5NBT				
Understand the place value system				
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.	5NBT1 C1 T1 #1	Names of each place in a number		Each place is 10x greater than each place to its right + $1/10^{th}$ of each place to its left
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.	5NBT2 C1 T1 #2 T2 #2, 5	Identifying numbers are powers of 10 Definition of exponents		Explain patterns when multiplying or dividing by powers of 10 as: 1) movement of decimal point 2) addition of zeros
Read, write, and compare decimals to thousandths	5NBT3 C1 T1 #3	Reading decimals to thousandths	Writing decimals to thousandths Comparing decimals to thousandths	
Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 X 100 + 4 X10 + 7 X 1 + 3 X (1/10) + 9 X (1/100) + 2 X (1/1000).	5NBT3A C1 T1 #3, 9		Represent numbers in expanded form using base-ten numerals and number names	
Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons	5NBT3B C1	Symbols: >, =, <	Compare 2 decimals to thousandths using symbols	

	T1 #4, 10			
Use place value understanding to round decimals to any place	5NBT4 C1 T1 #5		Rounding decimals to any place	
Perform operations with multi-digit whole numbers and with decimals to hundredths.				
With accuracy and efficiency fluently multiply multi-digit whole numbers using the standard algorithm.	5NBT.B.5 C4 T2 #1		With Multiply multi-digit whole numbers using the standard algorithm	
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.	5NBT6 C6 T2 #3		Divide whole numbers up to 4-digit dividends & 2- digit divisors Illustrate & explain the calculation by using equations, rectangular arrays and/or area models	Illustrate & explain the calculation by using equations, rectangular arrays and/or area models
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.	5NBT7 C3 C5 C7 T1 #8, 13, 14, 15, 16 T2 #2, 4, 5, 6, 15, 16, 17, 18, 19		Add, subtract, multiply and divide decimals using concrete models and standard algorithms Explain reasoning used	
Number and Operations—Fractions 5NF				
Use equivalent fractions as a strategy to add and subtract fractions				
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.)	5NF1 C8 T2 #8, 20	Knowledge of equivalent fractions Common denominator = LCM of denominators	Add and subtract fractions & mixed numbers with unlike denominators by writing equivalent fractions w/a common denominator	
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.	5NF2 C8 T2 #7	Benchmark fractions 0, ½, 1	Solve word problems by addition and subtraction of fractions w/unlike denominators by using models Eestimate sums & differences of fractions by using benchmark fractions	

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

Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ 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?	5NF.B.3 C10 T2 #12, 23	A fraction is same as the quotient of numerator & denominator Interpret a fraction as division	Solve word problems in which division of whole number leads to fraction or mixed number quotients	
Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.	5NF4 C9 T2 #9		Multiply a fraction by a fraction Multiply a fraction by a whole number	
Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to show (2/3) X 4 = 8/3, and create a story context for this equation. Do the same with (2/3) X (4/5) = 8/15. (In general, (a/b) X (c/d) = ac/bd.)	5NF4A C9 T2# 21, 22			Create a story context for multiplication of: 1) fraction with fraction and 2)fraction with a whole number
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.	5NF4B C9 T2 #9	Definition of area of a rectangle	Finding area using fraction files Finding area by multiplying side lengths of sides	Area is equal to number of square units enclosed in a 2-D figure Derive area formula of rectangle A = l x w
Interpret multiplication as scaling (resizing), by:				
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.	5NF5A C9 T2 #11	Definition of: 1) scale factor 2) doubling 3) tripling	Comparing size of product to size of the scale factor used without multiplying	Understanding the impact on product (enlarge/reduce by size of sale factor) i.e.: ● if the number is greater than one it will enlarge the number, (>1 =enlarge) ● if the number is greater than zero and less than 1 it will reduce the number (0<x <1= reduce) based on the scale factor used

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×a)/(n×b) to the effect of multiplying a/b by 1.	5NF5B C9 T2 #11, 14		Explain why the product is greater when scale factor >1 and smaller when scale factor between 0 and 1	Understand that the process of writing equivalent fractions (multiplication & division of numerator & denominators by same numbers) is same as being multiplied or divided by 1
Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	5NF6 T2 #10, 21	Definition of mixed #	Solve real world problems involving multiplication of fractions and mixed numbers by using models or equations	
Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions	5NF7 C10 T2 #13, 23	Definition of 1) unit fractions 2) whole numbers	Divide unit fractions by whole numbers and whole numbers by unit fractions	
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) x 4, and use a visual fraction model to show the quotient Use the relationship between multiplication and division to explain that (1/3) x 4 = 1/12 because (1/12) x 4 = 1/3.	5NF7A C10 T2 #13		Create a story context for division of unit fraction by a non-zero whole number and Calculate division of a non-zero whole number by a unit fraction	
Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 x (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 x (1/5) = 20 because 20 x (1/5) = 4.	5NF7B C10 T2 #13		Create a story context for: division of a whole number by a unit fraction Calculate quotient of whole number by unit fraction	
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?	5NF7C C10 T2 #13, 23		Solve real world problems involving division of unit fractions & whole numbers & whole numbers by unit fractions by using fraction models and equations	

Measurement and Data 5MD

Convert like measurement units within a given measurement system				
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.	5M.A.1 C11 T3 #1, 3, 4, 5, 6, 7, 8, 9	Standard units of measure including metric & customary	Convert from one unit of measure to another within a given measurement system Use conversions to solve multi-step real world problems	
Represent and interpret data				
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.DL.B.5 C11 T3 #2	Line plot	Making a line plot using fractions of a unit Using operations with fractions to solve problems presented in line plots	
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition				
5.M.B.2 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.	5M.B.2 C13 T3 #17	Volume measurement tools		Understand volume as the # of cubic units contained in a 3-D figure
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.	5MD3A C13 T3 #17, 18	1x1x1 cube is a unit cube and is said to have one cubic unit of volume and is used to measure volume		
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.	5MD3B C13 T3 #17, 18	A solid figure which can be packed w/o gaps or overlays using n unit cubes is said to have a vol. of n cubic units		

Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	5M.B.3 C13 T3 #17, 18	Units of volume: Cubic centimeter Cubic inch Cubit feet	Measure volume by counting unit cubes then assigning the appropriate unit of volume (for ex 3 unit cubes = 3 cm cubed)	
Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.	5M.B.4 C13 T3 #19, 20, 21		Solve real world & mathematical problems involving volume	Relate volume to operations of x & / & derive vol. formula for right rect. prism
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	5MD5A C13 T3 #19, 20, 21	Associate property Commutative property	Calculate volume of a right rectangular prism by using unit cubes & then by multiplying edge lengths	Volume is calculated by multiplying the area of the base times the height
Apply the formulas V = l x w x h and V = b x 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.	5MD5B C13 T3 #19, 20, 21		Apply volume formulas l x w x h and B x h for rectangular prisms w/whole # edge lengths in context of real world & mathematical problems	
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.	5MD5C C13 T3 #21			
Understand how different visualizations can be highlight different aspects of data. Ask questions and interpret data visualizations to describe and analyze patterns.	5.DL.A.1			
5.DL.A.2 Develop strategies to collect, organize and represent data of various types and from various sources. Communicate results digitally through a data visual (e.g. chart, storyboard, video presentation).	5.DL.A.2			
5.DL.A.3 Collect and clean data to be analyzable (e.g., make sure each entry is formatted correctly, deal with missing or incomplete data).	5.DL.A.3			
5.DL.A.4 Using appropriate visualizations (i.e. double line plot, double bar graph), analyze data across samples.	5.DL.A.2			

Geometry 5G

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

Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	5G1 C12 T3 #10, 11, 13, 14	Define coordinate plane parts (axes, origin, ordered pair, coordinates, x,y)	Understand the meaning of x,y coordinates as far as movement on the axis	
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	5G2 C12 T3 #11, 14		Graphing points in the first quadrant of the coordinate plane Interpret coordinate values of points of the context of the situation	

Classify two-dimensional figures into categories based on their properties

Understand that attributes belonging to a category of two dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles	5G3 C14 T3 #23, 24, 25			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
Classify two-dimensional figures in a hierarchy based on properties	5G4 C14 T3 #22, 24, 25	Classify two-dimensional figures in a hierarchy based on properties		

Pacing Guide & Materials

Unit 1: September – November – Benchmark Test by 11/30
NJLSL Standards

50A1	50A2	50A3	5NBT1	5NBT1
5NBT2	5NBT3	5NBT3A	5NBT3B	5NBT4
5NBT7				

Unit 2: November – March – Benchmark Test by 3/31
NJLSL Standards

5NBT2	5NBTB5	5NBT6	5NBT7	5NF1
5NF2	5NFB3	5NF4	5NF4A	5NF4B
5NF5A	5NF5B	5NF6	5NF7	5NF7A
5NF7B	5NF7C			

Unit 3: March – May – Benchmark Test by 5/31
NJLSL Standards

5MA1	5MB2	5MB3	5MD3A	5MD3B
5MB4	5MD5A	5MD5B	5MD5C	5DLB5
5DLA1	5DLA2	5DLA3	5G1	5G2
5G3	5G4			

Grade Level	Title	Primary / Supplemental
Fifth	Big Ideas Math: Modeling Real Life Common Core Grade 5 2019	Primary
Fifth through Eighth	Measuring Up: People's Publishing	Supplemental
Fifth through Eighth	Com Core Performance Coach	Supplemental
Fifth through Eighth	IXLMath.Com	Supplemental Software

Differentiation Strategies

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address needs of at risk learners.
- Provide student with open ended questions that stimulate higher order thinking
- Allow student to consider and express personal opinions
- Tiered Assignments
- Afford student with opportunities for independent projects based on the area of study and the student's interests
- Have student share and express their thought process, conclusions and the reasoning that led to their conclusion
- Allow for extended time on homework and assessments as described in the student's plan
- Allow use of calculator
- Check for comprehension and understanding
- Highlight or underline key words
- Permit ample time for student to respond to questions
- Clearly define limits and expectations
- Encourage student to ask for needed assistance
- Preferential seating
- Repeating, clarifying or rewording directions
- Allow for alternate responses
- Provide student with advanced notes
- Allow for extended time on homework and assessments
- Teacher modeling of what is expected and necessary steps to complete task
- Provide simplified written and verbal instructions
- Permit ample time for student to respond to questions
- Repeating, clarifying or rewording directions
- Allow use of dictionary / technology to look up unknown words

Math 5

Interdisciplinary Connections

1. Creation of tables and charts for collection and comparison of scientific data **#3-5-ETS1-3**
2. Calculating volume and mass to determine density **#5-PS1-4**
3. Averaging results for comparison of scientific data
4. Create concrete and picture graphs to organize, display, and communicate data
5. Proportions to create mixtures and solutions
6. Conversions within metrics system for accurate results
7. Graphing of results for analysis to present findings
8. Patterns for identification of crystals
9. Two-coordinate grids for comparison of dependent/independent variables
10. Using a graph as a tool to make predictions
11. Identifying a range of tolerance for organisms
12. Comparing angles for determination of outcomes within controlled experiments
13. Produce/create patterns in tables and graphs to help identify trends
14. Problem solving to carry out plans and verify results
15. Reading and measuring in metric units for tabulation of results

9.2 Career Readiness

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

9.4 Life Literacies & Technology

9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions
9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity
9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process
9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global
9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages and disadvantages of using each.
9.4.5.TL.5: Collaborate digitally to produce an artifact

9.1 Financial Literacy

9.1.5.CP.1: Identify the advantages of maintaining a positive credit history.
9.1.5.EG.3: Explain the impact of the economic system on one's personal financial goals.
9.1.5.FI.1: Identify various types of financial institutions and the services they offer including banks, credit unions, and credit card companies.
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).
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 well- being 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.