Milford Public Schools Curriculum

Department: Mathematics
Course Name: Grade 4 Mathematics

UNIT 1

Unit Title: Landmarks and Large Numbers
Unit Description: Students extend their knowledge of the number system by examining the structure of 10,000 and practice and refine strategies for adding and subtracting whole numbers up to 10,000. They continue to study place value by adding and subtracting multiples of 10 and 100 to numbers in the thousands, and they consolidate their understanding of the operation of addition by studying a variety of addition strategies and algorithms, including the U.S. algorithm for addition. Students continue their study of subtraction by solving, representing, and discussing their strategies for a variety of subtraction problems.

LEARNING GOALS

Enduring Understanding(s):
Computation involves taking apart and combining numbers using a variety of approaches.
Place value is based on groups of ten.
Subtraction situations can be represented by finding a missing part, comparing two amounts, or removing some amount.

Essential Question(s):
How does understanding place value help me to round, compare, add, and subtract numbers?
What are efficient methods for finding sums and differences?
What makes notation clear and concise?

Content and Skills:
Read, write, and round numbers to 1,000,000
Write numbers to 1,000,000 in expanded form
Use , and = to compare numbers to 1,000,000
Add and subtract multiples of 10, 100, and 1,000
Find the difference between any 3 digit number and 1,000 using multiples of 10 and 100
Find combinations of 3 digit numbers that add up to 1,000
Add and subtract 3 and 4 digit numbers using clear and concise notation to show addition or subtraction strategy

Standards Addressed:
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.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.
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.

UNIT 2

Unit Title: Measurement, Multiple Towers and Division Stories
Unit Description: This unit concentrates on the meaning of operations with whole numbers, the development of computational fluency, the structure of place value, the base-ten number system and generalizations about numbers and operations.

LEARNING GOALS

Enduring Understanding(s):
Arrays model multiplication situations
Breaking apart numbers by place value makes it easier to multiply [14 x 12 = (10 x 12) + (4 x 12)]
Breaking apart numbers into simpler multiplication problems makes it easier to multiply [8 x 9 = (4 x 9) + (4 x 9) or 8 x 9 = (8 x 4) + (8 x 5)]
Known multiplication combinations can be used to solve division problems
Remainders need to be interpreted in division story problems
Multiples of a number can be used to reason about important number relationships (i.e: The 10th multiple can be divided in half to find the 5th multiple, the 10th multiple can be doubled to find the 20th multiple)
When a factor is doubled or halved, there is an effect on the product

Essential Question(s):
How can I use a model, diagram, picture, or manipulatives to represent multiplication or division?
What are strategies for solving multiplication and division problems?
Why do I need to pay attention to the remainders in a division problem?
What patterns do I notice when I begin to list the multiples of a number in sequence, and how do these pattern help me find other multiples?

Content and Skills:
Break apart numbers to multiply
Use arrays to model multiplication
Represent multiplication and division problems with models, diagrams, pictures, and/or manipulatives
Use known multiplication combinations (groups of the divisor) to solve division problems
Interpret remainders in terms of the problem context
Write and solve story problems to represent division expressions
Describe the effect of multiplying by a multiple of 10 (i.e. the relationship between 3 x 4 and 3 x 40)
Find multiples of 2-digit numbers
Use a sequence of multiples to predict other multiples

Standards Addressed:
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.OA.1-Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 X 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.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.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.

UNIT 3

Unit Title: Size, Shape and Symmetry
Unit Description:
This unit focuses on classifying two-dimensional shapes, comparing the size of angles, and working with linear and area measurement. Students define and categorize polygons by identifying sets of shapes that have a common attribute and use 90 degrees as a reference for finding the measurement of other angles. They continue their measurement work from earlier grades by measuring distance and perimeter, using both U.S. and metric units and finding the area of polygons in square units

LEARNING GOALS

Enduring Understanding(s):	**Essential Question(s):** What different units can we use when measuring the length of an object? How are measurement benchmarks helpful? What is the relationship among units of measure? How do geometric relationships help me solve problems? How do you find perimeter? How do you find area?

Content and Skills:
Knowing when to measure with standard units
Describing and classifying 2-dimensional figures
Describing and measuring angles
Finding and understanding area

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

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.

4.MD.1-Know relative sizes of measurement units within one system of units including km, m, cm; 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.

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.

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.

4.MD.5a-An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a one-degree angle,†€   □ and ca

4.MD.5b-An angle that turns through n one-degree angles is said to have an angle measure of n degrees.

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

UNIT 4

Unit Title: Fraction Cards and Decimal Squares

Unit Description:

Students develop ideas about fractions by identifying fractions of an area (3/4 of a rectangle), fractions of a group of objects (3/4 of 24), and decimal fractions (.75). They compare fractions of different wholes (1/3 of a 6 x 4 rectangle and 1/3 of a 10 x 10 rectangle), and combine fractions using models and reasoning. Students use 10 x 10 grids to represent, compare, and combine common decimals in the tenths and hundredths.

LEARNING GOALS

Enduring Understanding(s):	Essential Question(s):
Fractions are comprised of equal sized pieces.	When and where do I use fractions and decimals in my daily life?
A fraction is a number that always has the same relationship to 1 and to other numbers.	What are the different ways I can use fractions and decimals to represent the whole?
Fractions that name the same amount are equivalent fractions.	How are decimals and fractions related?
Improper fractions are fractions that have a numerator that is greater than or equal to its denominator.	How does finding equivalent fractions help you to compare fractions?
A mixed number has a whole number part and a fraction part.	Why does the numerator change but the denominator stay the same when adding/subtracting fractions with like denominators?
When I add fractions, I am joining parts that refer to the same whole.	How/Why does the whole number become smaller when you multiply a whole number by a fraction?
When I subtract fractions, I am removing parts of a whole.	
I can use what I know about adding, subtracting, and multiplying whole numbers to multiply a fraction and	

a whole number.
Decimal notation is another way to represent a fraction.
Comparing two decimals involves deciding which decimal is less than the other or which decimal is greater than the other.

Content and Skills:
- A fraction represents an equal part of a whole (thing, area, group).
- The denominator of the fraction indicates the number of equal parts into which a whole is divided.
- The numerator indicates how many of those parts are being considered.
- Visualizing fractions helps students make sense of fractions that are larger than 1. For example, $\frac{5}{3}$ – How can there be five equal pieces if the whole is only divided in to three equal parts?
- The number line emphasizes that a fraction is a number.
- The number line and dividing rectangles into fractional pieces are useful representations when multiplying a whole number and a fraction.
- Tenths and hundredths are an extension of the place-value system for whole numbers.
- Representing decimals on 10x10 grids develops visual image of the relationship of these numbers

Standards Addressed:
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.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.
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.NF.1-Explain why a fraction a/b is equivalent to a fraction (n Ã— a)/(n Ã— 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
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.
4.NF.6-Use decimal notation for fractions with denominators 10 or 100.
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
4.NF.3a-Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
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.
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.4a-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 Ã— (1/4), recording the conclusion by the equation 5/4 = 5 Ã— (1/4).
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.
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.

UNIT 5

Unit Title: How Many Packages, How Many Groups?
Unit Description:
Students continue to develop efficient strategies for solving multiplication problems by breaking problems into smaller parts or changing one or both numbers to create an easier problem. Students also focus on recording their work with clear and concise notation. Students develop strategies for solving division problems (three-digit divided by two-digit), which involve making groups of the divisor. These problems are presented both in story contexts and numerically.

LEARNING GOALS

Enduring Understanding(s):
Understanding multiplication problems with 2-digit numbers
Understanding division as making groups of the divisor
Understanding and using the relationship between multiplication and division to solve division problems
Students will gain flexibility in choosing strategies when solving multiplication and division problems

Essential Question(s):
How does I use multiples and factors to find products and quotients?
What strategies can I use to multiply and divide by 2 digits?

Content and Skills:
The major component of students' work centers on reasoning about numbers and their factors and multiples using models, representations, and story context to help them visualize and solve multiplication and division problems; and understand the relationship between multiplication and division.

Standards Addressed:
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.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.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.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.

UNIT 6

Unit Title: Measurement / Conversions

Unit Description:

Students will review standard and metric units of weight, mass, and capacity as well as units of time. Then they will use measurement equivalent to convert units, make tables of equivalent measures, and solve problems involving measurement.

LEARNING GOALS

Enduring Understanding(s):
Measurement describes the attributes of objects and events.
Standard units of measure enable people to interpret results or data.

Essential Question(s):
How do I convert larger units of measure to smaller units?
What measurements are equivalent?
How can I use measurement equivalents to solve problems?
What computation strategies can help me solve problems involving measurements?

Content and Skills:
Measurement equivalents tell how different units are related.
Measurement equivalents help convert from one unit to another and can be used to solve word problems

Standards Addressed:
4.MD.1-Know relative sizes of measurement units within one system of units including km, m, cm; 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.

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.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.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

UNIT 7

Unit Title: Penny Jars and Plant Growth
Unit Description: In this unit, students learn about situations that involve change and ways to mathematically describe and represent this change. They use tables, graphs, and equations to represent how one quantity changes in relation to another quantity.

LEARNING GOALS

Enduring Understanding(s):
Using Tables and Graphs-Using graphs to represent change
Using Tables and Graphs-Using tables to represent change
Linear Change-Describing and representing a constant rate of change

Essential Question(s):
How does a graph help me to show change?

Content and Skills:
Understanding how to use graphs to represent change.
Understanding how to use tables to represent change.
Describing and representing a constant rate of change.

Standards Addressed:
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. *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.*

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.1 Know relative sizes of measurement units within one system of units including km, m, cm; 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. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*