# Curriculum Map: 4th Grade Mathematics

Course: Math

Grade(s): 4

**Course Description:** In fourth grade the content focuses on procedures, concepts, and applications in eight critical areas:

1. Place Value; Multi-digit Addition and Subtraction

2. Multiplication and Geometry

3. Fractions and Decimals

4. Multi-digit Multiplication

5. Fraction and Mixed Number Computation; Measurement

6. Division; Angles

7. Multiplication of a Fraction By a Whole Number; Measurement

8. Fraction Operations; Applications

These concepts emphasize problem solving, multiple representations, reasoning, mathematical modeling, tool use, communication, and other ways of making sense of mathematics.

**Course Student Learning Outcomes:**

**Place Value; Multi-digit Addition and Subtraction**

**The learner will:**

- use the four operations with whole numbers to solve problems
- generalize place value understanding for multi-digit whole numbers
- use place value understanding and properties of operations to perform multi-digit arithmetic
- solve problems involving measurement and conversion of measurements
- draw and identify lines and angles and classify shapes by properties of their lines and angles
- reason abstractly and quantitatively
- look for and make use structure

**Multiplication and Geometry**

**The learner will:**

- use the four operations with whole numbers to solve problems
- generalize place value understanding for multi-digit whole numbers
- use place value understanding and properties of operations to perform multi-digit arithmetic
- solve problems involving measurement and conversion of measurements
- draw and identify lines and angles and classify shapes by properties of their lines and angles
- attend to precision
- look for and make use of structure


**Fractions and Decimals**

**The learner will:**

- extend understanding of fraction equivalence and ordering
- understand decimal notation for fractions and compare decimal fractions
- construct viable arguments and critique the reasoning of others
- model with mathematics

**Multi-digit Multiplication**

**The learner will:**

- use the four operations with whole numbers to solve problems
- gain familiarity with factors and multiples
- use place value understanding and properties of operations to perform multi-digit arithmetic
- solve problems involving measurement and conversion of measurements
- make sense of problems and persevere in solving them
- look for and make use of structure

**Fractions and Mixed Number Computation; Measurement**

**The learner will:**
- use the four operations with whole numbers to solve problems
- use place value understanding and properties of operations to perform multi-digit arithmetic
- build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers
- solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit
- geometric measurement: understand concepts of angle and measure angles
- draw and identify lines and angles and classify shapes by properties of their lines and angles
- reason abstractly and quantitatively
- use appropriate tools strategically

**Division; Angles**

**The learner will:**
- use the four operations with while numbers to solve problems
- gain familiarity with factors and multiples
- generate and analyze patterns
- use place value understanding and properties of operations to perform multi-digit arithmetic
- build fractions from unit fractions
- geometric measurement: understand concepts of angle and measure angles
- use appropriate tools strategically
- look at and make use of structure


The learner will:
- generate and analyze patterns
- use place value understanding and properties of operations to perform multi-digit arithmetic
- build fractions from unit fractions
- understand decimal notation for fractions and compare decimal fractions
- solve problems involving measurement and conversion of measurements
- represent and interpret data
- reason abstractly and quantitatively
- look for and express regularity in repeated reasoning

The learner will:
- use the four operations with whole numbers to solve problems
- generalize place value understanding for multi-digit whole number
- use place value understanding and properties of operations to perform multi-digit arithmetic
- build fractions from unit fractions
- solve problems involving measurement and conversion of measurements
- represent and interpret data
- draw and identify lines and angles and classify shapes by properties of their lines and angles
- make sense of problems and persevere in solving them
- model with mathematics


**Course Essential Questions:**

1. Mathematical relationships among numbers can be represented, compared, and communicated.

   How is mathematics used to quantify, compare, represent, and model numbers?
   How can mathematics support effective communication?
   How are relationships represented mathematically?
   What does it mean to estimate or analyze numerical quantities?
   What makes a tool and/or strategy appropriate for a given task?
   How can recognizing repetition or regularity assist in solving problems more efficiently?

2. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.

   How is mathematics used to quantify, compare, represent, and model numbers?
   How can mathematics support effective communication?

How are relationships represented mathematically?
What does it mean to estimate or analyze numerical quantities?
What makes a tool and/or strategy appropriate for a given task?
How can recognizing repetition or regularity assist in solving problems more efficiently?

3. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.

How is mathematics used to quantify, compare, represent, and model numbers?
How can mathematics support effective communication?
How are relationships represented mathematically?
What does it mean to estimate or analyze numerical quantities?
What makes a tool and/or strategy appropriate for a given task?
How can recognizing repetition or regularity assist in solving problems more efficiently?

4. Patterns exhibit relationships that can be extended, described, and generalized.

How is mathematics used to quantify, compare, represent, and model numbers?
How can mathematics support effective communication?
How are relationships represented mathematically?
How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
How can recognizing repetition or regularity assist in solving problems more efficiently?
How can patterns be used to describe relationships in mathematical situations?

5. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.

How can recognizing repetition or regularity assist in solving problems more efficiently?
How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?
How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?
How can geometric properties and theories be used to describe, model, and analyze situations?
How can patterns be used to describe relationships in mathematical situations?

6. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.

What does it mean to estimate or analyze numerical quantities?
When is it is appropriate to estimate versus calculate?
What makes a tool and/or strategy appropriate for a given task?
Why does "what" we measure influence "how" we measure?
In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted?
How precise do measurements and calculations need to be?

7. Mathematical concepts and functions can be modeled through multiple representations and analyzed to raise and answer questions.

What does it mean to estimate or analyze numerical quantities?

What makes a tool and/or strategy appropriate for a given task?
Why does "what" we measure influence "how" we measure?
How can data be organized and represented to provide insight into the relationship between quantities?
How does the type of data influence the choice of display?
How can probability and data analysis be used to make predictions?

8.  Data can be modeled and used to make inferences.

What does it mean to estimate or analyze numerical quantities?
What makes a tool and/or strategy appropriate for a given task?
Why does "what" we measure influence "how" we measure?
How can data be organized and represented to provide insight into the relationship between quantities?
How does the type of data influence the choice of display?
How can probability and data analysis be used to make predictions?

**Course Big Ideas:**

1.  Mathematical relationships among numbers can be represented, compared, and communicated.

2.  Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.

3.  Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.

4.  Patterns exhibit relationships that can be extended, described, and generalized.

5.  Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.

6.  Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.

7.  Mathematical concepts and functions can be modeled through multiple representations and analyzed to raise and answer questions.

8. Data can be modeled and used to make inferences.


**Course Academic Vocabulary:**

Academic Vocabulary
•relationship symbol
•acute angles/triangles
•right angles/triangles
•obtuse angles/triangles
•straight angles
•reflex angles
•complementary/supplementary angles
•names of geometric shapes and terms
•rounding/estimation
•digit
•place value
•fact family/sum/difference
•number model
•factor/factor pair/multiple/product
•symmetry/symmetrical
•multiplicative comparison statement
•multiplicative relationship
•prime/composite numbers
•divisibility
•square number
•numerator
•denominator/common denominator
•fractions/equivalent fractions
•unit fractions
•metric units of measurement
•U.S. standard units of measurement
•decimal notation
•pattern
•fraction
•estimate
•equivalent fractions
•graphing terminology
•line plot
•area/perimeter
•measurement/volume
•array
•elapsed time
•quotient/divisor/dividend/remainder
•extended multiplication facts
•commutative/distributive/associative property
•rectilinear
•decompose
•arc/degree
•iterations
•algebraic equations/variables

Course Long Term Transfer Goals:

· Make sense of problems and persevere in solving them.

· Reason abstractly and quantitatively.

· Construct viable arguments and critique the reasoning of others.

· Model with mathematics.

· Use appropriate tools strategically.

· Attend to precision.

· Look for and make use of structure.

· Look for and make sense of regularity in repeated reasoning.

**Academic Standards and Eligible Content**

Standard - CC.2.1.4.B.1: Apply place value concepts to show an understanding of multi-digit whole numbers.

M04.A-T.1.1.1: Demonstrate an understanding that in a multi-digit whole number (through 1,000,000), a digit in one place represents ten times what it represents in the place to its right. Example: Recognize that in the number 770, the 7 in the hundreds place is ten times the 7 in the tens place.

M04.A-T.1.1.2: Read and write whole numbers in expanded, standard, and word form through 1,000,000.

M04.A-T.1.1.3: Compare two multi-digit numbers through 1,000,000 based on meanings of the digits in each place, using >, =, and < symbols.

M04.A-T.1.1.4: Round multi-digit whole numbers (through 1,000,000) to any place.

Standard - CC.2.1.4.B.2: Use place value understanding and properties of operations to perform multi-digit arithmetic.

M04.A-T.2.1.1: Add and subtract multi-digit whole numbers (limit sums and subtrahends up to and including 1,000,000).

M04.A-T.2.1.2: Multiply a whole number of up to four digits by a one-digit whole number and multiply 2 two-digit numbers.

M04.A-T.2.1.3: Divide up to four-digit dividends by one-digit divisors with answers written as whole-number quotients and remainders.

M04.A-T.2.1.4: Estimate the answer to addition, subtraction, and multiplication problems using whole numbers through six digits (for multiplication, no more than 2 digits × 1 digit, excluding powers of 10).

Standard - CC.2.1.4.C.1: Extend the understanding of fractions to show equivalence and ordering.

M04.A-F.1.1.1: Recognize and generate equivalent fractions.

M04.A-F.1.1.2: Compare two fractions with different numerators and different denominators (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100) using the symbols >, =, or < and justify the conclusions.

Standard - CC.2.1.4.C.2: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

M04.A-F.2.1.1: Add and subtract fractions with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; answers do not need to be simplified; and no improper fractions as the final answer).

M04.A-F.2.1.2: Decompose a fraction or a mixed number into a sum of fractions with the same denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100), recording the decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model). Example 1: 3/8 = 1/8 + 1/8 + 1/8 OR 3/8 = 1/8 + 2/8 Example 2: 2 1/12 = 1 + 1 + 1/12 = 12/12 + 12/12 + 1/12

M04.A-F.2.1.3: Add and subtract mixed numbers with a common denominator (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100; no regrouping with subtraction; fractions do not need to be simplified; and no improper fractions as the final answers).

M04.A-F.2.1.4: Solve word problems involving addition and subtraction of fractions referring to the same whole or set and having like denominators (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100).

M04.A-F.2.1.5: Multiply a whole number by a unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). Example: $5 \times (1/4) = 5/4$

M04.A-F.2.1.6: Multiply a whole number by a non-unit fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 and final answers do not need to be simplified or written as a mixed number). Example: $3 \times (5/6) = 15/6$

M04.A-F.2.1.7: Solve word problems involving multiplication of a whole number by a fraction (denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100).

Standard - CC.2.1.4.C.3: Connect decimal notation to fractions, and compare decimal fractions (base 10 denominator, e.g., 19/100).

M04.A-F.3.1.1: Add two fractions with respective denominators 10 and 100. Example: Express 3/10 as 30/100, and add 3/10 + 4/100 = 30/100 + 4/100 = 34/100.

M04.A-F.3.1.2: Use decimal notation for fractions with denominators 10 or 100. Example: Rewrite 0.62 as 62/100 and vice versa.

M04.A-F.3.1.3: Compare two decimals to hundredths using the symbols >, =, or <, and justify the conclusions.

Standard - CC.2.2.4.A.1: Represent and solve problems involving the four operations.

M04.B-O.1.1.1: Interpret a multiplication equation as a comparison. Represent verbal statements of multiplicative comparisons as multiplication equations. Example 1: Interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Example 2: Know that the statement 24 is 3 times as many as 8 can be represented by the equation $24 = 3 \times 8$ or $24 = 8 \times 3$.

M04.B-O.1.1.2: Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison. Example: Know that $3 \times 4$ can be used to represent that Student A has 4 objects and Student B has 3 times as many objects not just 3 more objects.

M04.B-O.1.1.3: Solve multi-step word problems posed with whole numbers using the four operations. Answers will be either whole numbers or have remainders that must be interpreted yielding a final answer that is a whole number. Represent these problems using equations with a symbol or letter standing for the unknown quantity.

M04.B-O.1.1.4: Identify the missing symbol (+, −, ×, ÷, =, <, and >) that makes a number sentence true (single-digit divisor only).

Standard - CC.2.2.4.A.2: Develop and/or apply number theory concepts to find factors and multiples.

M04.B-O.2.1.1: Find all factor pairs for a whole number in the interval 1 through 100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the interval 1 through 100 is a multiple of a given one digit number. Determine whether a given whole number in the interval 1 through 100 is prime or composite.

Standard - CC.2.2.4.A.4: Generate and analyze patterns using one rule.

M04.B-O.3.1.1: 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. Example 1: Given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms alternate between odd and even numbers. Example 2: Given the rule "increase the number of sides by 1" and starting with a triangle, observe that the tops of the shapes alternate between a side and a vertex.

M04.B-O.3.1.2: Determine the missing elements in a function table (limit to +, −, or × and to whole numbers or money).

M04.B-O.3.1.3: Determine the rule for a function given a table (limit to +, −, or × and to whole numbers).

Standard - CC.2.3.4.A.1: Draw lines and angles and identify these in two-dimensional figures.

M04.C-G.1.1.1: Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

M04.C-G.1.1.2: 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.

M04.C-G.1.1.3: 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 mirroring parts. Identify line-symmetric figures and draw lines of symmetry (up to two lines of symmetry).

Standard - CC.2.3.4.A.2: Classify two-dimensional figures by properties of their lines and angles.

M04.C-G.1.1.1: Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

M04.C-G.1.1.2: 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.

M04.C-G.1.1.3: 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 mirroring parts. Identify line-symmetric figures and draw lines of symmetry (up to two lines of symmetry).

Standard - CC.2.3.4.A.3: Recognize symmetric shapes and draw lines of symmetry.

M04.C-G.1.1.1: Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

M04.C-G.1.1.2: 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.

M04.C-G.1.1.3: 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 mirroring parts. Identify line-symmetric figures and draw lines of symmetry (up to two lines of symmetry).

Standard - CC.2.4.4.A.1: Solve problems involving measurement and conversions from a larger unit to a smaller unit.

M04.D-M.1.1.1: Know relative sizes of measurement units within one system of units including standard units (in., ft., yd., mi; oz., lb.; and c, pt., qtr., gal), metric units (cm, m, km; g, kg; and mL, L), and time (sec, min, hr., day, wk., mo., and yr.). Within a single system of measurement, express measurements in a larger unit in terms of smaller unit. A table of equivalencies will be provided. Example 1: Know that 1 kg is 1,000 times as heavy as 1 g. Example 2: Express the length of a 4-foot snake as 48 in.

M04.D-M.1.1.2: Use the four operations to solve word problems involving distances, intervals of time

(such as elapsed time), liquid volumes, masses of objects; 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.

M04.D-M.1.1.3: Apply the area and perimeter formulas for rectangles in real-world and mathematical problems (may include finding a missing side length). Whole numbers only. The formulas will be provided.

M04.D-M.1.1.4: Identify time (analog or digital) as the amount of minutes before or after the hour. Example 1: 2:50 is the same as 10 minutes before 3:00. Example 2: Quarter past six is the same as 6:15.

Standard - CC.2.4.4.A.2: Translate information from one type of data display to another.

M04.D-M.2.1.1: Make a line plot to display a data set of measurements in fractions of a unit (e.g., intervals of 1/2, 1/4, or 1/8).

M04.D-M.2.1.2: Solve problems involving addition and subtraction of fractions by using information presented in line plots (line plots must be labeled with common denominators, such as 1/4, 2/4, 3/4).

M04.D-M.2.1.3: Translate information from one type of display to another (table, chart, bar graph, or pictograph).

Standard - CC.2.4.4.A.4: Represent and interpret data involving fractions using information provided in a line plot.

M04.D-M.2.1.1: Make a line plot to display a data set of measurements in fractions of a unit (e.g., intervals of 1/2, 1/4, or 1/8).

M04.D-M.2.1.2: Solve problems involving addition and subtraction of fractions by using information presented in line plots (line plots must be labeled with common denominators, such as 1/4, 2/4, 3/4).

M04.D-M.2.1.3: Translate information from one type of display to another (table, chart, bar graph, or pictograph).

Standard - CC.2.4.4.A.6: Measure angles and use properties of adjacent angles to solve problems.

M04.D-M.3.1.1: Measure angles in whole-number degrees using a protractor. With the aid of a protractor, sketch angles of specified measure.

M04.D-M.3.1.2: Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems. (Angles must be adjacent and non-overlapping.)