Gateway School District
Curriculum Map

Elementary Schools (K-4)

Cleveland Steward Elementary
5000 Gateway Campus Blvd.
Monroeville, PA 15146
412-373-5874

Ramsey Elementary
2200 Ramsey Road
Monroeville, PA 15146
412-373-5856

Evergreen Elementary
3831 Evergreen Drive
Monroeville, PA 15146
412-373-5842

University Park Elementary
320 Noel Drive
Monroeville, PA 15146
412-327-4113

Curriculum Map: Elementary – Gr. 4 Mathematics

Course: MATH 4

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Unit 1: Place Value, Rounding, Fluency with Addition and Subtraction Algorithms of Whole Numbers

Subject: Mathematics

Brief Summary of Unit
Students begin with a study of large numbers. They are familiar with big units. For example, movies take about a gigabyte (1,000,000,000 bytes) to store on a computer while songs take about a megabyte (1,000,000 bytes). To understand these big numbers, the students rely upon previous mastery of rounding and the addition and subtraction algorithms. In a sense, the algorithms have come full circle: In Grades 2 and 3 the algorithms were the abstract idea students were trying to learn, but by Grade 4 the algorithms have become the concrete knowledge students use to understand new ideas.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

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.
2. Read and write whole numbers in expanded, standard, and word form through 1,000,000.
3. Compare two-digit multi-digit numbers through 1,000,000 based on meanings of the digits in each place.
4. Round multi-digit whole numbers (through 1,000,000) to any place.
5. Add and subtract multi-digit whole numbers (limit sums and subtrahends up to and including 1,000,000).
6. Estimate the answer to addition and subtraction using whole numbers through six digits.
7. Demonstrate an understanding of multi-digit whole numbers.
8. Compare and round multi-digit numbers.
9. Perform multi-digit arithmetic.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of

the unit?

1. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.
2. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.
3. Data can be modeled and used to make inferences.
4. Geometric relation ships can be described, analyzed, and classified based on spatial reasoning and/or visualization.
5. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.
6. Mathematical relationships among numbers can be represented, com pared, and communicated.
7. Measurement attributes can be quantified and estimated using customary and non-customary units of measure.
8. Patterns exhibit relationships that can be extended, described, and generalized.

1. How are relationships represented mathematically?
2. How can expressions, equations, and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
3. What does it mean to estimate or analyze numerical quantities?
4. When is it is appropriate to estimate versus calculate?
5. What makes a tool and/or strategy appropriate for a given task?
6. How does the type of data influence the choice of display?
7. How can probability and data analysis be used to make predictions?
8. How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?
9. How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?
10. How can geometric properties and theorems be used to describe, model, and analyze situations?
11. How can data be organized and represented to provide insight into the relationship between quantities?
12. How is mathematics used to quantify, compare, represent, and model numbers?
13. How can mathematics support effective communication?
14. Why does "what" we measure influence "how" we measure?
15. In what ways are the mathematical attributes of objects or processes measured, calculated, and/or interpreted?
16. How precise do measurements and calculations need to be?
17. How can patterns be used to describe relationships in mathematical situations?
18. How can recognizing repetition or regularity assist in solving problems more efficiently?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards

met?

Other Evidence:(quizzes, tests and so on)

Stage Three - Learning Plan

Unit 2: Unit Conversions: Addition and Subtraction of Length, Weight, and Capacity

Subject: Mathematics

Brief Summary of Unit

Students focus on what it means to measure length, weight, liquid volume, area, perimeter, and intervals of time and the use of standard tools to make these measurements. They develop an understanding of relationships of different units within a system (customary and metric) and the relative sizes of measurement units within one system of units including in., ft., yd., mi.; km, m, cm; kg, g; lb., oz.; l, ml; hr., min., sec; gal., qt., pt., c., and oz. Students apply this knowledge to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals. They further explore the use of area and perimeter in formulas for rectangles used in real world and mathematical problems.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Know relative sizes of measurement units within one system; including standard units (in., ft., yd., mi; oz., lb.; and c., pt., qt., gal.), metric units (cm, m, km, g, kg, and mL, L), and time (sec., min., hr., day, wk., mo., and yr.)
2. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. **A table of equivalencies will be provided.**
3. 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.
4. 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.**
5. Identify time (analog and digital) as the amount of minutes before or after the hour.Generate and analyze patterns that follow a single rule.
6. Solve problems involving measurements.
7. Convert larger unit to smaller unit.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards met?

Other Evidence:(quizzes, tests and so on)

Unit 3: Multiplication and Division of up to a 4-Digit Number by up to a 1-Digit Number Using Place Value

Subject: Mathematics

Brief Summary of Unit

Students learn that measurements provide the concrete foundation behind the distributive property in the multiplication algorithm: 4. (1 m 2 cm) can be made physical using ribbon, where it is easy to see the 4 copies of 1 m and the 4 copies of 2 cm. Likewise, 4. (1 ten 2 ones) = 4 tens 8 ones. Students then turn to the place value table with number disks to develop efficient procedures for multiplying and dividing one-digit whole numbers and use the table with number disks to understand and explain why the procedures work. Students also solve word problems throughout the module where they select and accurately apply appropriate methods to estimate, mentally calculate, or use the procedures they are learning to compute products and quotients.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

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.
2. Multiply a whole number of up to four digits by a one-digit whole number and multiply 2 two-digit numbers.
3. Divide up to four-digit dividends by one-digit divisors with answers written as whole-number quotients and remainders.
4. Estimate the answer to multiplication problems using whole numbers through six digits (for multiplication, no more than 2 digits x 1 digit, excluding powers of 10).
5. Interpret a multiplication equation as a comparison Represent verbal statements of multiplicative comparisons as multiplication equations.
6. Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.
7. 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.
8. Demonstrate an understanding of multi-digit whole numbers.
9. Perform multi-digit arithmetic.
10. Represent and solve problems verbally as equations.
11. Use factors to represent numbers in various ways.
12. Recognize that a whole number is a multiple of each of its factors.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the

understandings have been developed, the knowledge and skill attained, and the state standards met?

Other Evidence:(quizzes, tests and so on)

Stage Three - Learning Plan

Unit 4: Addition and Subtraction of Angle Measurement of Planar Figures

Subject: Mathematics

Brief Summary of Unit
Students focus on solving unknown angle problems using letters and equations as it does on building, drawing, and analyzing two-dimensional shapes in geometry. They continue to use letters and equations to solve word problems, and now they also learn to solve unknown angle problems: work that challenges students to build and solve equations to find unknown angle measures. First, students learn the definition of degree and learn how to measure angles in degrees using a protractor. From the definition of degree and the fact that angle measures are additive, the following rudimentary facts about angles naturally follow: 1. Vertical angles are equal. 2. The sum of angle measurements on a line is 180 degrees. 3. The sum of angle measurements around a point is 360 degrees. Armed only with these three facts (and the two facts used to justify them), students are able to generate and solve equations that make sense, as in the following problem: Unknown angle problems help to unlock algebraic concepts for students because such problems are visual. The x clearly stands for a specific number: If a student wished, he could place a protractor down on that angle and measure it to find x. But doing so destroys the joy of deducing the answer and solving the puzzle on his own.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
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.
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).
4. Measure angles in whole-number degrees using a protractor. With the aid of a protractor, sketch angles of specified measure.
5. 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.)
6. Draw and identify lines and angles.
7. Classify shapes by properties of their lines and angles.
8. Recognize symmetric shapes and draw lines of symmetry.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards met?

Other Evidence: (quizzes, tests and so on)

Stage Three - Learning Plan

Unit 5: Order and Operations with Fractions

Subject: Mathematics

Brief Summary of Unit
Students explore the understanding of a fraction a/b as a multiple of 1/b. (for example: model the product of ¾ as 3 x ¼). It will teach representations of simple equivalent fractions understanding a multiple of a/b as a multiple of 1/b, and will use this understanding to multiply a fraction by a whole number, including solving word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

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).
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).
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).
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).
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).
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).
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).
8. 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).
9. 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).
10. Translate information from one type of display to another (table, chart, bar graph, or pictograph).
11. Recognize and generate equivalent fractions.
12. 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.
13. Demonstrate an understanding of multi-digit whole numbers.
14. Recognize that a whole number is a multiple of each of its factors.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of

	the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards met?

Other Evidence:(quizzes, tests and so on)

Stage Three - Learning Plan

Unit 6: Decimal Fractions

Subject: Mathematics

Brief Summary of Unit
Student start with the realization that decimal place value units are simply special fractional units: 1 tenth = 1/10, 1 hundredth = 1/100, etc. Fluency plays an important role in this topic as students learn to relate 3/10 = 0.3 = 3 tenths.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Recognize and generate equivalent fractions.
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.
3. Solve problems involving fractions and whole numbers (straight computation or word problems).
4. Use operations to solve problems involving decimals, including converting between fractions and decimals (may include word problems).
5. Use numbers and symbols to model the concepts of expressions and equations.
6. Demonstrate an understanding of multi-digit whole numbers.
7. Demonstrate an understanding of fraction equivalence.
8. Compare and order fractions.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards met?

Other Evidence:(quizzes, tests and so on)

Stage Three - Learning Plan

Unit 7: Exploring Multiplication

Subject: Mathematics

Brief Summary of Unit
Students end the year with an exploratory module on multiplication. They have been practicing the algorithm for multiplying by a one-digit number since Module 3. The goal of Module 7 is to structure opportunities for them to discover ways to multiply two-digit × two-digit numbers with their tools (such as place value tables, area models, bar diagrams, number disks, the distributive property and equations). Students also solve fraction and area problems that involve customary measurements (inches and feet, etc.).

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Multiply a whole number of up to four digits by a one-digit whole number and multiply 2 two-digit numbers.
2. Estimate the answer to addition, subtraction, and multiplication problems using whole numbers through six digits (for multiplication, no more than 2 digits X 1 digit, excluding powers of 10).
3. Multiply a whole number by a unit fraction (denominators limited to 2,3,4,5,6,8,10,12, and 100).
4. 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).
5. 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).
6. Multiply or divide to solve word problems involving multiplicative comparison, distinguishing multiplicative comparison from additive comparison.
7. Apply the area and perimeter formulas for rectangles in real-world and mathematical problems(may include finding a missing side length).
8. Demonstrate an understanding of multi-digit whole numbers.
9. Compare and round multi-digit numbers.
10. Perform multi-digit arithmetic.
11. Solve problems involving fractions and mixed numbers.

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards met?

Other Evidence:(quizzes, tests and so on)

Unit Summary: Gr 4 - Standards for Mathematical Practice

Subject: Mathematics

Brief Summary of Unit

Standards for Mathematical Practice
[Mathematical Practices](#) resource page on SAS

Unit 1, Unit 3, Unit 5, Unit 6:
MP# 1. Make sense of problems and persevere in solving them
MP# 2. Reason abstractly and quantitatively
MP# 4. Model with mathematics
MP# 5. Use appropriate tools strategically
MP# 6. Attend to precision
MP# 7. Look for and make use of structure (Deductive Reasoning)

Unit 2:
MP# 1. Make sense of problems and persevere in solving them
MP# 2. Reason abstractly and quantitatively
MP# 4. Model with mathematics
MP# 5. Use appropriate tools strategically
MP# 6. Attend to precision
MP# 7. Look for and make use of structure (Deductive Reasoning)
MP# 8. Look for and express regularity in repeated reasoning

Unit 4:
MP# 5. Use appropriate tools strategically
MP# 6. Attend to precision
MP# 7. Look for and make use of structure (Deductive Reasoning)

Unit 7:
MP# 2. Reason abstractly and quantitatively
MP# 4. Model with mathematics
MP# 5. Use appropriate tools strategically
MP# 7. Look for and make use of structure (Deductive Reasoning)

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

Understandings: What will students understand (about what big ideas) as a result of the unit? "Students will understand that..."	**Essential Questions:**What arguable, recurring, and thought-provoking questions will guide inquiry and point toward the big ideas of the unit?

Stage Two - Assessment Evidence

Performance Tasks: What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skill attained, and the state standards

met?

Other Evidence:(quizzes, tests and so on)

Stage Three - Learning Plan