Middle Schools (5-8)

Moss Side Middle School (5-6)
9000 Gateway Campus Blvd.
Monroeville, PA 15146
412-373-5830

Gateway Middle School
4450 Old William Penn Highway
Monroeville, PA 15146
412-373-5780

Gateway School District
Curriculum Map

Curriculum Map: Moss Side Middle School – Gr. 5 Mathematics
Course: MATH FIVE

Grade(s): 5

Unit 1: Whole Number and Decimal Fraction Place Value to the One-Thousandths
Subject: Mathematics

Brief Summary of Unit
Students work with whole number patterns with number disks on the place value table to easily generalize to decimal numbers. As students work word problems with measurements in the metric system, where the same patterns occur, they begin to appreciate the value and the meaning of decimals. They investigate patterns on the place value table using fractions of the form 1/10, 1/100, 1/1000.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Demonstrate an understanding that in a multi-digit number, a digit in one place represents 1/10 of what it represents in the place to its left.
2. Explain patterns in the number of zeroes in the product when multiplying a number by powers of 10.
3. Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.
4. Use whole number exponents to denote powers of 10.
5. Read and write decimals to thousandths using base 10 numerals, word form, and expanded form.
6. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols.
7. Round decimals to ones, tenths, hundredths, or thousandths place.
8. Convert among different sized measurement units within a given measurement system using a provided table of equivalencies.
9. Demonstrate an understanding of rounding as it pertains to whole numbers and decimals.
10. Read, write and compare decimals.
11. Solve problems using simple conversions.

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 relationships 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, compared, 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: Multi-Digit Whole Number and Decimal Fraction Operations

Subject: Mathematics

Brief Summary of Unit
Students sharpen their skills in multiplying and dividing (decimal) numbers by 1-digit whole numbers. They are ready to generalize the 1-digit algorithms to the multi-digit whole number versions (multi-digit decimal multiplication such as 4.1. 3.4 and division such as 4.5 ÷ 1.5 are studied in Module 4). For multiplication, students must grapple with and fully understand the distributive property (one of the key reasons for teaching the multi-digit algorithm). While the multi-digit multiplication algorithm is a straightforward generalization of the one-digit multiplication algorithm, the division algorithm with two-digit divisor requires far more care to teach because students have to also learn estimation strategies, error correction strategies, and the idea of successive approximation (all of which are central concepts in math, science, and engineering).

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Multiply multi-digit whole numbers, not to exceed three digits by three digits.
2. Find whole number quotients of whole numbers with up to four digit dividends and two digit divisors.
3. Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).
4. Use multiple grouping symbols (parentheses, brackets, or braces) in numerical expressions, and evaluate expressions containing these symbols.
5. Write simple expressions that model calculations with numbers.
6. Interpret numerical expressions without evaluating them.
7. Use whole numbers and decimals to compute accurately.
8. Write and interpret numerical expressions.
9. Evaluate expressions using the order of operations.

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: Addition and Subtraction of Fractions

Subject: Mathematics

Brief Summary of Unit
Students focus on the larger set of fractional units for algebra. Like units are added to and subtracted from like units: The new complexity is that if units are not equivalent, they must be changed for smaller equal units so that they can be added or subtracted. Probably the best model for showing this is the rectangular fraction model pictured below. The equivalence is then represented symbolically as students engage in active meaning making rather than obeying the perhaps mysterious command to "multiply the top and bottom by the same number" Relating different fractional units to one another requires extensive work with area and number line diagrams. Tape diagrams are used often in word problems. Tape diagrams, which students began using in the early grades and which become increasingly useful as students applied them to a greater and greater variety of word problems, hit their full strength as a model when applied to fraction word problems. At the heart of a tape diagram is the now-familiar idea of forming units. In fact, forming units to solve word problems is one of the most powerful examples of the unit theme and is particularly helpful for understanding fraction arithmetic.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Add and subtract fractions (including mixed numbers) with unlike denominators.
2. Solve problems using computation of fractions by using information presented in line plots.
3. Add, Subtract, Multiply and Divide fractions to solve problems.
4. Explain operations as they pertain to fractions.
5. Solve problems involving computation with fractions using information obtained from data displays.

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 3: Multiplication and Division of Fractions and Decimal Fractions

Subject: Mathematics

Brief Summary of Unit
Students know enough about fractions and whole number operations to begin to explore multi-digit decimal multiplication and division. In multiplying 2.1 x 3.8, for example, students now have multiple skills and strategies that they can use to locate the decimal point in the final answer. Students' understanding of division is enriched through strategies that help them to see multi-digit decimal division as whole number division in a different unit. For example, we divide to find, "How many groups of 3 apples are there in 45 apples?" and write 45 apples ÷ 3 apples = 15. Similarly, 4.5 ÷ 0.3 can be written as "45 tenths ÷ 3 tenths" with the same answer: There are 15 groups of 0.3 in 4.5. This idea was used to introduce fraction division earlier in the module, thus gluing division to whole numbers, fractions and decimals together through an understanding of units.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Solve word problems, including division of whole numbers, leading to answers in the form of fractions.
2. Multiply a fraction and mixed numbers by a fraction.
3. Demonstrate an understanding of multiplication as scaling/resizing.
4. Divide unit fractions by whole numbers and whole numbers by unit fractions.
5. Convert among different sized measurement units within a given measurement system using a provided table of equivalencies.
6. Solve problems involving computation of fractions by using information presented in line plots.
7. Display and interpret data shown in tallies, tables, charts, pictographs, bar graphs, and line graphs.
8. Display and interpret data using the title, appropriate scale, and labels.
9. Add, Subtract, Multiply and Divide fractions to solve problems.
10. Explain operations as they pertain to fractions.
11. Organize and display data in order to answer questions.
12. Represent and interpret data using appropriate scale.
13. Solve problems involving computation with fractions using information obtained from data displays.

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 Multiplication with Volume and Area

Subject: Mathematics

Brief Summary of Unit
Through the daily use of area models, students are prepared for an in-depth discussion of area and volume. Students may ask questions about how the area changes when a rectangle is scaled by a whole or fractional scale factor. Measuring volume once again highlights the unit theme, as a unit cube is chosen to represent a volume unit and used to measure the volume of simple shapes composed out of rectangular prisms.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Classify two dimensional figures in a hierarchy based on properties.
2. 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 *given the appropriate formula*.
3. Find volumes of solid figures composed of two non-overlapping right rectangular prisms.
4. Relate volume to multiplication and to addition.
5. Classify two-dimensional figures based on their properties.

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: Graph Points on the Coordinate Plane to Solve Problems

Subject: Mathematics

Brief Summary of Unit
Students have been using bar graphs to display data and patterns since Kindergarten. Extensive bar-graph work has set the stage for line plots, which are both the natural extension of bar graphs and the precursor to linear functions. Students use a simple line plot of a straight line on a coordinate plane and they are asked about the scaling relationship between the increases in the units of the vertical axis for 1 unit of increase in the horizontal axis. This is the first hint of slope and marks the beginning of the major theme of middle school: ratios and proportions.

Stage One - Desired Results

Established Goals:(Standards of Learning, content standards)

1. Generate two numerical patterns using two given rules.
2. Identify apparent relationships between corresponding terms of two patterns with the same starting numbers that follow different rules.
3. Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I.
4. Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane, and interpret coordinate values of points in the context of a situation.
5. Solve problems involving computation of fractions by using information presented in line plots.
6. Display and interpret data shown in tallies, tables, charts, pictographs, bar graphs, and line graphs.
7. Display and interpret data using a title, appropriate scale, and labels.
8. Generate, analyze and compare patterns.
9. Plot points in quadrant I.
10. Describe and interpret points given an ordered pair.
11. Identify parts of a coordinate grid.
12. Organize and display data in order to answer questions.
13. Represent and interpret data using appropriate scale.
14. Solve problems involving computation with fractions using information obtained from data displays.

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)

G.r 5 - Standards for Mathematical Practice

Subject: Mathematics

Brief Summary of Unit

Standards for Mathematical Practice

Mathematical Practices resource page on SAS

Unit 1, 2, 3, 4, 5, 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)
MP# 8. Look for and express regularity in repeated 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