LaGrange School District 105
6th Grade Math Curriculum

Statement of Philosophy:
Mathematics is an integrated, balanced program strong in the acquisition of computational skills and the development of mathematical reasoning. To prepare students to be college and career ready, mathematics instruction must build procedural fluency from conceptual understanding. Students should develop the ability to solve problems and reason logically while working with various media and gaining mathematical competency. The mathematics curriculum is viewed as a continuum of introducing, developing, and extending skills. The program is structured yet flexible enough to meet each student's needs.

Mathematical Practices:
The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. There are eight (8) practices outlined through the Common Core Math Standards:

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

For more detailed descriptions of each mathematics practice visit: http://www.corestandards.org/Math/Practice/

6th Grade Mathematics - Overall Emphasis

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

1. Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.
2. Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.
3. Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations,

evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.

4. Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.

5. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected. Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

6th Grade Mathematics - CCSS Math Focus Strands

Ratios and Proportional Relationships
- Understand ratio concepts and use ratio reasoning to solve problems.

The Number System
- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Multiply and divide multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.

Expressions and Equations
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.

Geometry
- Solve real-world and mathematical problems involving area, surface area, and volume.

Statistics and Probability
- Develop understanding of statistical variability.
- Summarize and describe distributions.

Unit 1: Decimals and Fractions
Timing: 7 weeks

Big Ideas in Unit 1:
- Fluently add, subtract, multiply, and divide multi-digit numbers and decimals
- Greatest common factors
- Least common multiples
- Compute quotients of fractions
- Solve word problems involving division of fractions by fractions
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Unit 1 Math Standards and Conceptual Understandings:

6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions
6.NS.B.2 Fluently divide multi-digit numbers using the standard algorithm.
6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
6.NS.B.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.

Unit 2: Ratios, Rates and Proportions
Timing: 5 weeks

Big Ideas in Unit 2:
- Ratio relationships
- Unit Rate
- Equivalent ratios
- Essential vocabulary: unit pricing, constant speed, whole and parts of percents, conversion

Unit 2 Math Standards and Conceptual Understandings:

6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak."*
6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar."*
6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems

Unit 3: Expressions
Timing: 7 weeks

Big Ideas in Unit 3:
- Order of operations
- Exponents
- Expressions in which letters stand for numbers
- Create equivalent expressions
- Use of variables to represent numbers
- Real world problem solving using expressions
- Translate written phrases into algebraic expressions

Unit 3 Math Standards and Conceptual Understandings:

6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents.

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

6.EE.A.3 Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y);*

6.EE.A.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem

Unit 4: Equations and Inequalities
Timing: 5 weeks

Big Ideas in Unit 4:
- Inverse operations
- Inequalities
- Variable equations
- Identify constraint or condition in real world problems
- Represent solutions to inequalities on a number line
- Independent variables
- Dependent variables

Unit 4 Math Standards and Conceptual Understandings:

6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true?

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem.
6.EE.B.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

<table>
<tr><td align="center">Unit 5: Geometry
Timing: 4 weeks</td></tr>
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Big Ideas in Unit 5:
    • Finding area of multiple shapes
    • Finding volume
    • Determining surface area

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6.G.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes
6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\,w\,h$ and $V = b\,h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems
6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures.

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<tr><td align="center">Unit 6: Rational Numbers
Timing: 4 weeks</td></tr>
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Big Ideas in Unit 6:
    • Integers
    • Comparison of integers
    • Absolute value
    • Plotting integers on number line
    • Coordinate planes, ordered pairs

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6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
6.NS.7 Understand ordering and absolute value of rational numbers.

6.NS.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **6.G.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Unit 7: Statistics
Timing: 4 weeks

Big Ideas in Unit 7:
    •   Recognize and write a statistical question
    •   Mean
    •   Mode
    •   Range
    •   Create various graphing formats (dot, histogram, boxplot)
    •   Analyze various graphing formats with precise vocabulary
    •   Make predictions and generalization about a set of data

Unit 7 Math Standards and Conceptual Understandings:

6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages*. **6.SP.2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. **6.SP.3** Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. **6.SP.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots. **6.SP.5** Summarize numerical data sets in relation to their context