**Big Ideas for Unit 1**

* Order of operations and grouping notations are rules determined by mathematicians to ensure that the value of an expression with defined quantities will always be the same.
* Understanding the order of operations is necessary in order to accurately express numerical expressions in words and to write numerical expressions for calculations given in words.
* Flexible methods for computation require good understanding of the operations and how the properties of operations can be applied. For example, knowledge of the distributive property and the commutative property allows students to compute 2-digit by 2-digit multiplication in different ways of varying efficiency, but still compute the same product.
* There are two concepts of division. First, there is the partition, or fair sharing idea, that applies when the number of groups is known, and asks the question *How many in each group?* Second, there is the measurement, or repeated subtraction concept, that applies when the size of the groups is known, and asks the question *How many groups are there?*
* Division computations that occur in real life often include remainders. A remainder is interpreted differently depending on the context of the division computation.
* The traditional algorithms are clever strategies for computation that have been developed over time. Each is based on performing the operation on one place value at a time with transitions to adjacent place values to allow for regrouping. There are a variety of algorithms that can be applied to each operation, and no single algorithm defines an operation. Traditional algorithms work for all numbers, but they may not always be the most efficient or useful method of computing.

**Gwinnett County Academic Knowledge and Skills**

**Write and interpret numerical expressions.**

* **1.OA.1** use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols
* **2.OA.2** write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them (e.g., express the calculation "add 8 and 7, then

multiply by 2" as 2 x (8 + 7)) and recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product

**Perform operations with multi-digit whole numbers and with decimals to hundredths.**

* **9.NBT.5** multiply multi-digit whole numbers fluently using the standard algorithm
* **10.NBT.6** find whole number quotients of whole numbers with up to four digit dividends and two 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

**Big Ideas for Unit 2**

* Decimal numbers are another way of representing fractions. The decimal point is a convention that has been developed to indicate the unit’s position. The positions to the left of the decimal point are the units that are being counted as whole numbers. The positions to the right of the decimal point are the units that are being counted as fractions.
* The base-ten place-value system extends infinitely in two directions: to tiny values as well as to large values. Between any two consecutive place values, the ten-to-one ratio

remains the same. A digit’s value is dependent upon its place in a number.

* Addition and subtraction with decimals is based on the fundamental concept of adding and subtracting the numbers in like position values---a simple extension from whole numbers.

*In fifth grade students will work with decimal numbers to the thousandths place value.*

**Gwinnett County Academic Knowledge and Skills**

**Understand the place value system.**

* **4.NBT.1** recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its

left

* **6. NBT.3\_a.** read, write, order, and compare place value of decimals to thousandths using base ten numerals, number names, and expanded form (e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) + 2 x (1/1000))
* **7.NBT.3\_b.** compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons
* **8.NBT.4** round decimals to any place using tools such as a number line and/or charts
* **12.NBT.7** add, subtract, multiply, and divide decimals to hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or therelationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used

**Big Ideas for Unit 3**

* Multiplication and division of two numbers will produce the same digits, regardless of the positions of the decimal point.
* Computations using decimal numbers use the same algorithms used in computation of whole numbers.
* Exponents are used to express repeated products of the same number. For example, 102 = 10 x 10 or 100.

**Gwinnett County Academic Knowledge and Skills**

**Understand the place value system.**

* **5.NBT.2** explain patterns in the number of zeros of the product when multiplying a number by powers of 10 and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10; use whole-number exponents to denote powers of 10
* **12.NBT.7** add, subtract, multiply, and divide decimals to hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used

**Big Ideas for Unit 4 Fractions, Part 1**

* For addition and subtraction of fractions, an essential understanding is that the numerator tells the number of parts and the denominator the type of part (what unit is being used).
* For addition and subtraction of fractions, when denominators are different, one or more equivalent fractions with a common denominator must be generated before adding/subtracting.
* Models can be used to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators.
* When two fractions are equivalent that means there are two ways of describing the same amount by using different-sized fractional parts.
* Multiple strategies can be used to find equivalent fractions, using concrete, pictorial, and computational models.
* For multiplication by a fraction, an essential understanding is that the denominator is a divisor. This idea allows us to find parts of the other factor.
* Multiplication by one leaves the amount unchanged, multiplication of a given number by number larger than one produces a larger quantity, and multiplication of a given number by number smaller than one (fractions) produces smaller quantities.
* Multiplication of a whole number by a fraction can be interpreted as repeated addition of the fraction factor.
* Fraction multiplication can be represented with an array model.
* A fraction is a representation of division of two whole numbers and can be explained as equal sharing.
* Benchmark fractions can be used to estimate and examine the reasonableness of a calculation involving fractions.

*\* In 5th grade students aren’t expected to find the least common denominator using a standard algorithm but rather to find a common denominator by making equivalent fractions. Using the least common denominator is a 6th grade expectation.*

*\*Limiting the* u*se of denominators to 2, 3, 4, 5, 6, 8, 10, 12, and 100 is recommended.*

**Gwinnett County Academic Knowledge and Skills**

**Use equivalent fractions as a strategy to add and subtract fractions.**

* **13.NF.1** add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators (e.g., 2/3 + 5/4 = 8/12 + 15/12 = 23/12)
* **14. NF.2** solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g., recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2)
* **15.NF.2** solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators

**Big Ideas for Unit 4, Fractions Part 2**

* The concepts of whole number division are the same as fractional division; concepts should be connected and applied.
* For division by a fraction, the two ways of thinking about the operation – partition and measurement- are very important. The partition or fair-sharing concept of division will lead to very different division procedure than will the measurement or repeat subtraction concept.
	+ Partition problems ask how much each part is if the dividend is partitioned (divided) into a number of equal parts equal to the divisor. Example: If 3 friends share ¾ of a pizza how much of the whole pizza will each friend receive?
	+ Measurement reasoning problems ask how many copies of the divisor are in the dividend. Example: How many ½ servings are in 3 cups?
* Division of a whole number by a fraction can be interpreted as repeated subtraction of the fraction factor.
* Fraction division can be represented with an area model.
* Estimation of fractional computations is tied almost entirely to concepts of the operations and of fractions. A computation algorithm is not required for making estimations. Estimations should be an integral part of computation development to keep the students attention on the meaning of the operation and the expected size of the result.
* Benchmark fractions can be used to estimate and examine the reasonableness of a calculation involving fractions.
* When solving division problems where the divisor is a whole number or fraction the fundamental question to keep in mind is “How much is one?” or
“How much is the whole?”
* Division by one leaves the amount unchanged, division of a given number by number larger than one produces a smaller quantity, and division of a given number by number smaller than one (fractions) produces larger quantities.

**Gwinnett County Academic Knowledge and Skills**

**Apply and extend previous understandings of multiplication and division to multiply and divide fractions.**

* **25. NF.7\_a**. interpret division of a unit fraction by a non-zero whole number and compute such quotients (e.g., create a story context for (1/3) ÷ 4 and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3) *Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.*
* **26. NF.7\_b.** interpret division of a whole number by a unit fraction and compute such quotients (e.g., create a story context for 4 ÷ (1/5) and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 x (1/5) = 4)
* **27. NF.7\_c.** solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions e.g., by using visual fraction models and equations to represent the problem. (For example, how much chocolate will each person get if 3 people share 1/2 lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?)

**Big Ideas for Unit 5**

* A coordinate grid is formed by the intersection of two perpendicular number lines called axes.
* Shapes and points can be described in terms of their location in a plane or in space. Coordinate systems can be used to describe these locations precisely.
* The first number in an ordered pair tells how far you move to the right, or horizontally, along the x-axis.
* The second number tells how far your move up, or vertically, along the y-axis.
* On the coordinate plane, a point represents the two facets of information associated with an ordered pair.
* Graphs are a visual representation of information called data.
* The graph of both sequences of numbers is a visual representation that will show the relationship between the two sequences of numbers.
* Graphical representations can be used to make predictions and interpretations about real world situations.

**Gwinnett County Academic Knowledge and Skills**

**Graph points on the coordinate plane to solve real-world and mathematical problems.**

* **37.G.1** create, label, and use a coordinate grid system
* **38.G.2** represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation

**Big Ideas Unit 6**

* Shapes exist in great variety. There are many different ways to describe properties/attributes of shapes. The more ways one can classify and discriminate shapes, the better one understands them.
* Two dimensional figures are classified by their properties/attributes because properties/attributes are what determines how the shapes are alike and different. For example, shapes have sides that are parallel, perpendicular, or neither; they have line symmetry, rotational symmetry, or neither; they are similar, congruent, or neither.
* A collection of objects with various properties/attributes can be classified or sorted in different ways. A single object can belong to more than one class. Classification is the first step in organizing shapes/figures.
* Shapes have properties/attributes that can be used when describing and analyzing them. Awareness of these properties/attributes helps us appreciate shapes in our world. Properties/attributes can be explored and analyzed in a variety of ways.
* An analysis of geometric properties/attributes leads to deductive reasoning in a geometric environment.

**Gwinnett County Academic Knowledge and Skills**

**Classify two-dimensional figures into categories based on their properties.**

* **39.G.3** demonstrate that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category (e.g., all rectangles have four right angles and squares are rectangles so all squares have four right angles)
* **40.G.4** classify two-dimensional figures in a hierarchy based on properties

**Big Ideas for Unit 7**

* To measure something, one must first determine the attribute to be measured (such as length, area, volume, weight). Then the units that measure that attribute should be used.
* To estimate measurements, personal benchmarks should be developed. For example, a benchmark for a gram could be a paper clip.
* Instruments and tools, such as rulers and scales, can be used to measure attributes.
* When converting from a smaller unit of measure to a larger unit, the number of units will be divided by the conversion factor because there will be fewer of the larger size units.
* When converting from a larger unit of measure to a smaller unit, the number of units will be multiplied by the conversion factor because there will be more of the smaller size units.
* Volume is an attribute of a three-dimensional object, and it refers to the amount of space that an object takes up.
* Volume can be measured by finding the total number of same size units required to fill the space without gaps or overlaps.
* The standard unit used to measure volume is a cube that is 1-unit by 1-unit by 1-unit.
* The volume of a rectangular prism can be decomposed into layers of arrays of cubes.
* A formula can be used to find the volume of a three-dimensional object by using only measures of length in three directions.
* Data can be measured and represented on line plots in units of whole numbers or fractions. Line plots are useful in showing the distribution of data.

**Gwinnett County Academic Knowledge and Skills**

**Convert like measurement units within a given measurement system.**

* **28.MD.1** convert among different-sized measurement units within a given measurement system and use these conversions in solving multi-step, real world problems (e.g., convert 5 cm to 0.05 m, 3 ft to 36 in, 120 minutes to 2 hours)