**HCPSS Grade 5 GT Essential Curriculum**

**2014-2015**

**The Mathematical Practices**

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

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

**The Mathematical Content Standards**

The Mathematical Content Standards (Essential Curriculum) that follow are designed to promote a balanced combination of procedure and understanding. Expectations that begin with the word “understand” are often especially good opportunities to connect the mathematical practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. *In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices.* In this respect, those content standards that set an expectation of understanding are potential “points of intersection” between the Mathematical Content Standards and the Mathematical Practices.

**Ratios and Proportional Relationships 6.RP**

**A. Understand ratio concepts and use ratio reasoning to solve problems.**

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.” “For every vote candidate A received, candidate C received nearly three votes.”*
2. Understand the concept of a unit rate a/b associated with a ratio *a:b* with , 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 a 3/4 cup of flour for each cup of sugar.” “We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.”*
3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
   1. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
   2. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
   3. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
   4. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

**Number Systems 6.NS/7.NS**

**Note: Standards 6.NS.1-6.NS.4 will be taught in 4GT this year. Beginning with the 2015-2016 school year, these standards will no longer be taught in 5GT.**

**A. Apply and extend previous understandings of multiplication and division to divide fractions by fractions. (6.NS)**

1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

**B. Compute fluently with multi-digit numbers and find common factors and multiples. (6.NS)**

1. Fluently divide multi-digit numbers using the standard algorithm.
2. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
3. 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. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

**C. Apply and extend previous understandings of numbers to the system of rational numbers. (6.NS)**

1. 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 numbers to represent quantities in real-world context, explaining the meaning of 0 in each situation.
2. 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.
   1. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,  and that 0 is its own opposite.
   2. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
   3. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational number on a coordinate plane.
3. Understand ordering and absolute value of rational numbers.
   1. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret*  *as a statement that*  *is located to the right of*  *on a number line oriented from left to right.*
   2. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write*  *to express the fact that*  *is warmer than* .
   3. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write* *to describe the size of the debt in dollars.*
   4. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
4. 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.

**A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. (7.NS)**

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
   1. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
   2. Understand *p* + *q* as the number located a distance  from *p*, in the positive or negative direction depending on whether *q* is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
   3. Understand subtraction of rational numbers as adding the additive inverse, . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
   4. Apply properties of operations as strategies to add and subtract rational numbers.
2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
   1. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
   2. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If *p* and *q* are integers, then . Interpret quotients of rational numbers by describing real-world contexts.
   3. Apply properties of operations as strategies to multiply and divide rational numbers.
   4. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
3. Solve real-world and mathematical problems involving the four operations with rational numbers.

**Expressions and Equations 6.EE/7.EE**

**A. Apply and extend previous understandings of arithmetic to algebraic expressions. (6.EE)**

1. Write and evaluate numerical expressions involving whole-number exponents.
2. Write, read, and evaluate expressions in which letters stand for numbers.
   1. Write expressions that record operations with numbers and with letters standing for numbers.
   2. Identify parts of an expression, using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression  as a product of two factors;  as both a single entity and a sum of two terms.
   3. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
3. Apply the properties of operations to generate equivalent expressions.
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).

**B. Reason about and solve one-variable equations and inequalities. (6.EE)**

1. 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? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
2. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
3. Solve real-world and mathematical problems by writing and solving equations of the form  and  for cases in which *p*, *q* and *x* are all nonnegative rational numbers.
4. Write an inequality of the form  or  to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form  or  have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

**C. Represent and analyze quantitative relationships between dependent and independent variables. (6.EE)**

1. 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.

**A. Use properties of operations to generate equivalent expressions. (7.EE)**

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem of how the quantities in it are related. *For example, a + 0.05a = 1.05a means that “increase by 5%” is the same as “multiply by 1.05.”*

**B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (7.EE)**

1. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*
2. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
   1. Solve word problems leading to equations of the form *px* + *q* = *r* and *p*(*x* + *q*) = *r*, where *p*, *q*, and *r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*
   2. Solve word problems leading to inequalities of the form *px* + *q* > *r* or *px* + *q* < *r*, where *p*, *q*, and *r* are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*

**Geometry 6.G/7.G**

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

1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
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  and  to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. **Note: Check prior understanding of Standard 5.MD.3-5.**
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.
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. Apply these techniques in the context of solving real-world and mathematical problems.

**A. Draw, construct, and describe geometrical figures and describe the relationships between them. (7.G)**

1. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine an unique triangle, more than one triangle, or no triangle.
2. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

**B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (7.G)**

1. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
2. Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
3. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

**Statistics and Probability 6.SP**

**Note: Standards 6.SP.1-6.SP.5 will be taught in 4GT this year. Beginning with the 2015-2016 school year, these standards will no longer be taught in 5GT.**

**A. Develop understanding of statistical variability.**

1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
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.
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.

**B. Summarize and describe distribution.**

1. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
2. Summarize numerical data sets in relation to their context, such as by:
   1. Reporting the number of observations.
   2. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
   3. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
   4. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.