

Little Compton Mathematics Curriculum-Grade 6
By Nicole Hawes, Shana McKinnon, Janet Griffith-May 2011

RATIOS & PROPORTIONAL RELATIONSHIPS

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Ratios & Proportional Relationships- Grade 6 :</p> <p>Understand ratio concepts and use ratio reasoning to solve problems.</p> <p>1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>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."</i> <i>"For every vote candidate A received, candidate C received nearly three votes."</i></p> <p>2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. <i>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."</i> <i>"We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."</i></p> <p>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.</p> <p>a. 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.</p> <p>b. Solve unit rate problems including those involving unit pricing and constant speed. <i>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?</i></p> <p>c. 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.</p> <p>d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p>	<p>GLE: M (N&O)–6–1 Demonstrates conceptual understanding of rational numbers with respect to ratios (comparison of two whole numbers by division a/b, $a: b$, and $a \div b$, where $b \neq 0$); and rates (e.g., a out of b, 25%) using models, explanations, or other representations.</p> <p>GLE: M (N&O)–6–4 Accurately solves problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (State) (IMPORTANT: Applies the conventions of order of operations with and without parentheses.) ** (Most of this GLE is addressed below- in Number System: highlighted portion)</p> <p>GLE: M (N&O)–6–6 Uses a variety of mental computation strategies to solve problems (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to determine the reasonableness of answers; and mentally calculates change back from \$5.00, \$10.00, \$20.00, \$50.00, and \$100.00; multiplies a two-digit whole number by a one-digit number whole number (e.g., 45×5), two-digit whole numbers that are multiples of ten (e.g., 50×60), a three-digit whole number that is a multiple of 100 by a two- or three-digit number which is a multiple of 10 or 100, respectively (e.g., 400×50, 400×600); divides 3- and 4-digit multiples of powers of ten by their compatible factors (e.g., $360 \div 6$, $360 \div 60$, $3600 \div 6$, $3600 \div 60$, $3600 \div 600$, $360 \div 12$, $360 \div 120$, $3600 \div 12$, $3600 \div 120$, $3600 \div 1200$); and determines the part of a whole number using benchmark percents (1%, 10%, 25%, 50%, and 75%). (Local) (IMPORTANT: The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.) ** (Most of this GLE is addressed below- in Number System: highlighted portion)</p>	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <hr/> <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> Demonstrate the relationship between two quantities using ratio symbols and language Model and explain the process of writing rates and use them to calculate unit rates, including unit pricing Demonstrate how to construct and compare ratio tables Review briefly the concepts of acceleration, increased acceleration, deceleration, and constant speed to set a knowledge base identifying constant speed in solving unit rate problems Give real-world problems and scenarios with percents and rates to find unknowns Model and provide practice mental math processing to solve problems involving benchmark percents Demonstrate converting measurement units using multiplication and division Demonstrate how to calculate unit rates in a variety of problem-solving situations Facilitate cooperative group work Use math language often and consistently Model questioning and inferencing Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math thinking 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly) Common Tasks <p><u>Performance Indicators:</u></p> <p>The student will:</p> <ul style="list-style-type: none"> Relate number relationships comparing two quantities using ratio language and ratio symbols Write the rate and compute the unit rates of two quantities with different units, using rate language in the relationship Construct and compare equivalent ratio tables, find missing values, and graph the pairs of values on a coordinate plane. Solve unit rate problems involving unit pricing and constant speed Convert percents to fractions with denominators of 100; Solve two types of problems: Find the part when the percent and the whole are known; Find the whole when the percent and part are known Practice mental math computations to solve problems using benchmark percents: 1%, 10%, 25%, 50%, 75% Use ratio reasoning to convert measurement units by multiplying and dividing Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work Demonstrate proficiency with common tasks, such as role playing (i.e., banker); 15% tip; 20% discount 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> <i>Big Ideas Math Learning</i> by Larson Texts Inc. <i>Impact Mathematics</i> Course 1 by Glencoe www.physicsclassroom.com/class/ Computer lab Rulers (metric), protractors Scissors, glue Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Four-quadrant multiplication grid Multiple Intelligences and Brain Dominance Differentiation Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. Questioning and making conjectures <i>Classroom Instruction That Works</i> by Robert Marzano www.glencoe.com www.bigideasmath.com www.ridoe.net www.ride.ri.gov/instruction/curriculum NECAP Release tasks www.NECompact.org <p><u>Professional Resources (partial list):</u></p> <ul style="list-style-type: none"> <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD http://www.exemplars.com/about/ <i>Improving Adolescent Literacy</i> by Fisher & Frey <i>MARS</i> Balanced Assessment series of common tasks

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NUMBER SYSTEM -Template # 1 (NUMBER & OPERATIONS)

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>The Number System-Grade 6: Apply and extend previous understandings of multiplication and division to divide fractions by fractions. 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. <i>For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$-cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?</i></p> <p>Compute fluently with multi-digit numbers and find common factors and multiples. 2. Fluently divide multi-digit numbers using the standard algorithm. 3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. 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. 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. <i>For example, express $36 + 8$ as $4(9 + 2)$.</i></p>	<p>GLE: M (N&O)–6–3 Demonstrates conceptual understanding of mathematical operations by adding and subtracting positive fractions and integers; and multiplying and dividing fractions and decimals. (Local)</p> <p>GLE: M (N&O)–6–3 Demonstrates conceptual understanding of mathematical operations by describing or illustrating the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g., 3^3, 4^4); and the effect on the magnitude of a whole number when multiplying or dividing it by a whole number, decimal, or fraction. (State)</p> <p>GLE: M (N&O)–6–4 Accurately solves problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (State) (IMPORTANT: <i>Applies the conventions of order of operations with and without parentheses.</i>)</p> <p>GLE: M (N&O)–6–6 Uses a variety of mental computation strategies to solve problems (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to determine the reasonableness of answers; and mentally calculates change back from \$5.00, \$10.00, \$20.00, \$50.00, and \$100.00; multiplies a two-digit whole number by a one-digit number whole number (e.g., 45×5), two-digit whole numbers that are multiples of ten (e.g., 50×60), a three-digit whole number that is a multiple of 10 or 100, respectively (e.g., 400×50, 400×600); divides 3- and 4-digit multiples of powers of ten by their compatible factors (e.g., $360 \div 6$; $360 \div 60$; $3600 \div 6$; $3600 \div 60$; $360 \div 12$; $360 \div 120$; $3600 \div 12$; $3600 \div 120$; $3600 \div 1200$); and determines the part of a whole number using benchmark percents (1%, 10%, 25%, 50%, and 75%). (Local) (IMPORTANT: <i>The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.</i>)</p> <p>GLE: M (N&O)–6–7 Makes estimates in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, determining the level of accuracy needed given the situation, analyzing the effect of the estimation method on the accuracy of results, and evaluating the reasonableness of solutions appropriate to grade level GLEs across content strands. (Local) (IMPORTANT: <i>The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.</i>)</p> <p>GLE: M(N&O)–6–8 Applies properties of numbers (odd, even, remainders, divisibility, and prime factorization) and field properties (commutative, associative, identity [including the multiplicative property of one, e.g., $1 = 2/2$ and $2/2 \times 3/4 = 6/8$, so $3/4 = 6/8$], distributive, and additive inverses) to solve problems and to simplify computations. (Local) **This part of the GLE is NOT addressed here</p>	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> Review adding, subtracting, multiplying and dividing positive fractions Review strategies for multiplying fractions as it applies to dividing fractions by fractions to create and solve problems Demonstrate the division algorithm with multi-digit whole numbers Model using the algorithms for adding, subtracting, multiplying, and dividing multi-digit decimals Model and demonstrate how to solve problems involving exponents with whole number bases and whole number exponents Review order of operations for solving applicable problems Provide opportunities to explore finding greatest common factors, least common multiples, and factoring (division, divisibility rules, factoring tree, prime factorization, distributive property) Model and provide practice mental math processing to solve problems involving multiplying and dividing whole number multiples of ten and calculating change back. Demonstrate how to use estimation in a variety of ways, including checking calculations Facilitate cooperative group work Use math language often and consistently Model questioning and inferring Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly) Common Tasks <p><u>Performance Indicators:</u> The student will:</p> <ul style="list-style-type: none"> Practice adding, subtracting, multiplying and dividing positive fractions Divide fractions by fractions using prior knowledge of multiplication in creating and solving problems Add and subtract positive fractions and integers Calculate by dividing multi-digit whole numbers using the standard algorithm Calculate by adding, subtracting, multiplying, and dividing multi-digit decimals using the standard algorithm Evaluate problems involving exponents (whole-number bases and exponents) Apply order of operations to all problems when applicable Determine the greatest common factor of two whole numbers less than or equal to 100 Find the least common multiple of two whole numbers less than or equal to 12 Apply the distributive property to factor out the greatest common factor of the sum of two whole numbers from 1 to 100 Practice mental math computations to solve problems calculating change back, and multiplying and dividing whole numbers that are multiples of ten Apply estimation to all number system problems Extend field property principles to solve problems with fractions and to simplify computations Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work Demonstrate proficiency with common tasks: role playing (e.g., banker); chemistry experiment; 15% tip; 20% discount; area and volume 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> <i>Big Ideas Math Learning</i> by Larson Texts Inc. <i>Impact Mathematics</i> Course 1 by Glencoe Computer lab Rulers (metric), protractors Scissors, glue Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Four-quadrant multiplication grid Multiple Intelligences and Brain Dominance Differentiation Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. Questioning and making conjectures <i>Classroom Instruction That Works</i> by Robert Marzano www.glencoe.com www.bigideasmath.com www.ridoe.net www.ride.ri.gov/instruction/curriculum NECAP Release tasks www.NECompact.org <p><u>Professional Resources (partial list):</u></p> <ul style="list-style-type: none"> <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD http://www.exemplars.com/about/ <i>Improving Adolescent Literacy</i> by Fisher & Frey MARS Balanced Assessment series of common tasks

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NUMBER SYSTEM Template #2 (NUMBER & OPERATIONS)

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>The Number System-Grade 6: Apply and extend previous understandings of numbers to the system of rational numbers. 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</p> <p>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 coordinate.</p> <p>a. 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., $-(-3) = 3$, and that 0 is its own opposite.</p> <p>b. 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.</p> <p>c. 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 numbers on a coordinate plane.</p> <p>7. Understand ordering and absolute value of rational numbers.</p> <p>a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. <i>For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.</i></p> <p>b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write $-3^\circ C > -7^\circ C$ to express the fact that $-3^\circ C$ is warmer than $-7^\circ C$.</i></p> <p>c. 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. <i>For example, for an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars.</i></p> <p>d. Distinguish comparisons of absolute value from statements about order. <i>For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.</i></p> <p>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.</p>	<p>GLE: M (N&O)-6-2 Demonstrates understanding of the relative magnitude of numbers by ordering or comparing numbers with whole number bases and whole number exponents (e.g., 3^3, 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1-100) using number lines or equality and inequality symbols. (State)</p> <p>**This is NOT addressed here...though it is addressed below see next template</p>	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <hr/> <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> Distinguish the magnitude of numbers based on their relative positions on the number line Model and provide practice identifying the absolute value of rational numbers Model and provide a variety of examples in determining when to use absolute value or to use order when solving problems and/or in real-world examples (games, bank accounts) Provide visuals and examples relating to real-world uses of positive and negative numbers Show the distances from 0 in both positive and negative directions as being equal when numbers have opposite signs using horizontal and vertical number lines Identify locations on a coordinate plane associated with positive and negative numbers in ordered pairs Label coordinates using positive and negative rational numbers to demonstrate the concept of plotting points on a coordinate plane Demonstrate with practice how to find the distance between two points on a four-quadrant coordinate plane to show the concept of absolute value Facilitate cooperative group work Use math language often and consistently Model questioning and inferencing Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math thinking 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly) Common Tasks <p><u>Performance Indicators:</u> The student will:</p> <ul style="list-style-type: none"> Compare the magnitude of positive and negative numbers on the number line Identify the absolute value of a rational number as its distance from 0 on the number line and connect to real-world situations. <i>For example, for an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars.</i> Distinguish between the absolute value of rational numbers to ordering and comparing the value of those rational numbers. <i>For example, -80 represents a greater debt than -50.</i> Connect knowledge of positive and negative numbers to real-world concepts with examples Identify opposite signs of numbers as indicating location on opposite sides of 0 on horizontal and vertical number lines Distinguish locations of positive and negative numbers in a set of ordered pairs on a coordinate plane Plot coordinates in all four quadrants of a Cartesian coordinate plane using positive and negative rational numbers Graph two points with the same x-values (first coordinates) or the same y-values (second coordinates) to find the distance between them as an absolute value Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work Demonstrate proficiency with common tasks 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: 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EXPRESSIONS & EQUATIONS Template # 1 (FUNCTIONS & ALGEBRA)

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Expressions & Equations-Grade 6: Apply and extend previous understandings of arithmetic to algebraic expressions. 1. Write and evaluate numerical expressions involving whole-number exponents. 2. Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation "Subtract y from 5" as $5 - y$.</i> b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. <i>For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.</i> c. 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). <i>For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.</i> 3. Apply the properties of operations to generate equivalent expressions. <i>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 $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.</i> 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). <i>For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.</i></p>	<p>GLE: M (N&O)–6–2 Demonstrates understanding of the relative magnitude of numbers by ordering or comparing numbers with whole number bases and whole number exponents (e.g., 3^3, 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1–100) using number lines or equality and inequality symbols. (State) **This is NOT addressed here... though it is addressed above in previous template</p> <p>GLE: M (F&A)–6–3 Demonstrates conceptual understanding of algebraic expressions by using letters to represent unknown quantities to write linear algebraic expressions involving any of the four operations and consistent with order of operations expected at this grade level; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 3x - 2$). (State)</p> <p>GLE: M (F&A)–6–4 Demonstrates conceptual understanding of equality by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$. (State)</p>	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> Model and provide practice how to write and evaluate numerical expressions involving whole-number exponents Demonstrate the correlation of word clues to write mathematical operations in algebraic expressions Distinguish various parts of an expression in mathematical terms and in relationship to the whole Identify that a variable represents a number and when substituted into an expression, the value of the expression can be determined Provide examples of formulas (e.g., "$l \times w \times h$" = volume) used to solve real-world problems for practice with value substitutions Demonstrate and provide practice on how to apply Order of Operations including whole number exponents to solve expressions Investigate expressions to identify multiple ways to write them using different coefficients Model and provide practice with identifying equivalent expressions Facilitate the use of technology to solve mathematical problems Integrate mathematics with science concepts, e.g., astronomy, microbiology Facilitate cooperative group work Use math language often and consistently Model questioning and inferring Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math thinking 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly, mid-term, final term) Common Tasks <p><u>Performance Indicators:</u> The student will:</p> <ul style="list-style-type: none"> Write and evaluate numerical expressions involving whole-number exponents Translate words into algebraic expressions using letters to represent numbers and operations performed on numbers Identify mathematical terms in various expressions as a part and as part of the whole Find the value of an expression when given a value of the variable Substitute the values of the variables into formulas to find solutions to real-world problems Apply Order of Operations including whole number exponents to solve expressions Construct multiple ways to write equivalent expressions Identify when two expressions are equivalent regardless of what number is substituted for the variable Understand, use, and applies appropriate technology and software programs to solve problems Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work Demonstrate proficiency with common tasks 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> <i>Big Ideas Math Learning</i> by Larson Texts Inc. <i>Impact Mathematics</i> Course 1 by Glencoe Computer lab Rulers (metric), protractors Algebraic tiles/manipulatives Scissors, glue Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Four-quadrant multiplication grid Multiple Intelligences and Brain Dominance Differentiation Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. Questioning and making conjectures <i>Classroom Instruction That Works</i> by Robert Marzano Magazines: <i>Scope; Junior Scholastic; National Geographic; Science World</i> www.glencoe.com www.bigideasmath.com www.ridoe.net www.ridoe.net/instruction/curriculum NECAP Release tasks www.NECompact.org <p><u>Professional Resources (partial list):</u></p> <ul style="list-style-type: none"> <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD http://www.exemplars.com/about/ <i>Improving Adolescent Literacy</i> by Fisher & Frey <i>MARS</i> Balanced Assessment series of common tasks

Little Compton Mathematics Curriculum-Grade 6
By Nicole Hawes, Shana McKinnon, Janet Griffith-May 2011

EXPRESSIONS & EQUATIONS Template # 2 (FUNCTIONS & ALGEBRA)

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Expressions & Equations-Grade 6: Reason about and solve one-variable equations and inequalities. 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? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p> <p>6. 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.</p> <p>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.</p> <p>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. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.</p> <p>Represent and analyze quantitative relationships between dependent and independent variables. 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. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.</i></p>	<p>GLE: M (F&A)–6–1 Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or symbols for finding specific cases of a nonlinear relationship; and writes an expression or equation using words or symbols to express the generalization of a linear relationship (e.g., twice the term number plus 1 or $2n + 1$). (State) **This is NOT addressed here. See grade 8 templates.</p> <p>GLE: M (F&A)–6–2 Demonstrates conceptual understanding of linear relationships ($y = kx$; $y = mx + b$) as a constant rate of change by constructing or interpreting graphs of real occurrences and describing the slope of linear relationships (faster, slower, greater, or smaller) in a variety of problem situations; and describes how change in the value of one variable relates to change in the value of a second variable in problem situations with constant rates of change. (State) **Most of this is NOT addressed here, being addressed in grade 7.</p> <p>GLE: M (F&A)–6–3 Demonstrates conceptual understanding of algebraic expressions by using letters to represent unknown quantities to write linear algebraic expressions involving any of the four operations and consistent with order of operations expected at this grade level; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 3x - 2$). (State)</p>	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <hr/> <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> Provide examples of determining whether equations or inequalities are true based on different values of a variable Provide examples of expressions used to solve real-world problems for practice with value substitutions Provide practice in solving expressions or equations to determine potential values of a variable Distinguish different results when writing and solving equations using addition and multiplication for real-world and mathematical problems Define inequalities Provide examples in writing and solving real-world and mathematical problems relating to inequalities Demonstrate how to show inequalities on a number line diagram Define independent and dependent variables and provide examples Provide equations to show how one quantity is dependent upon another Provide exemplars of graphs, tables, and equations that represent independent and dependent variables Facilitate the use of technology to solve mathematical problems Integrate mathematics with science concepts, e.g., astronomy, microbiology Facilitate cooperative group work Use math language often and consistently Model questioning and inferring Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math thinking 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly, mid-term, final term) Common Tasks <p><u>Performance Indicators:</u> <u>The student will:</u></p> <ul style="list-style-type: none"> Use substitution to determine whether a given number in a specified set makes an equation or inequality true Substitute the values of the variables into expressions to find solutions to real-world problems Distinguish if a variable represents one number or many numbers when solving expressions or equations Write and solve equations of the form, $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers Write $>, <$ inequalities to represent values with infinite solutions but with constraints in a real-world or mathematical problem Draw the solution of an inequality on a number line diagram Identify the relationship between two quantities that change in relation to each other: independent and dependent variables Write an equation that expresses one quantity in terms of the another quantity Analyze graphs and tables representing independent and dependent variables and associate how it relates to an equation Understand, use, and applies appropriate technology and software programs to solve problems Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work Demonstrate proficiency with common tasks 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> <i>Big Ideas Math Learning</i> by Larson Texts Inc. <i>Impact Mathematics</i> Course 1 by Glencoe Computer lab Rulers (metric), protractors Algebraic tiles/manipulatives Scissors, glue Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Four-quadrant multiplication grid Multiple Intelligences and Brain Dominance Differentiation Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. Questioning and making conjectures <i>Classroom Instruction That Works</i> by Robert Marzano Magazines: <i>Scope; Junior Scholastic; National Geographic; Science World</i> www.glencoe.com www.bigideasmath.com www.ridoe.net www.ridoe.net/instruction/curriculum NECAP Release tasks www.NECompact.org <p><u>Professional Resources (partial list):</u></p> <ul style="list-style-type: none"> <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD http://www.exemplars.com/about/ <i>Improving Adolescent Literacy</i> by Fisher & Frey MARS Balanced Assessment series of common tasks

Little Compton Mathematics Curriculum-Grade 6
By Nicole Hawes, Shana McKinnon, Janet Griffith-May 2011

GEOMETRY (GEOMETRY & MEASUREMENT)

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Geometry-Grade 6: Solve real-world and mathematical problems involving area, surface area, and volume.</p> <p>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.</p> <p>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 $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.</p> <p>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.</p> <p>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</p>	<p>GLE: M (G&M)–6–1 Uses properties or attributes of angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity) to identify, describe, classify, or distinguish among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms). (State) **This is NOT addressed here. See Grade 8</p> <p>GLE: M (G&M)–6–3 Uses properties or attributes (shape of bases, number of lateral faces, number of bases, number of edges, or number of vertices) to identify, compare, or describe three-dimensional shapes (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones). (State) **This is NOT addressed here. See Grade 8</p> <p>GLE: M (G&M)–6–4 Demonstrates conceptual understanding of congruency by predicting and describing the transformational steps (reflections, translations, and rotations) needed to show congruence (including the degree of rotation) and as the result of composing and decomposing two- and three-dimensional objects using models or explanations; and using line and rotational symmetry to demonstrate congruent parts within a shape. (Local) **This is NOT addressed here. See Grades 7 & 8</p> <p>GLE: M(G&M)–6–5 Demonstrates conceptual understanding of similarity by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or explanations. (State) **This is NOT addressed here. See Grades 7 & 8</p> <p>GLE: M (G&M)–6–6 Demonstrates conceptual understanding of perimeter of polygons, the area of quadrilaterals or triangles, and the volume of rectangular prisms by using models, formulas, or by solving problems; and demonstrates understanding of the relationships of circle measures (radius to diameter and diameter to circumference) by solving related problems. Expresses all measures using appropriate units. (State) **This is NOT addressed here. See Grade 7</p> <p>GLE: M (G&M)-6-7 Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands. (State)</p> <p>See Benchmarks in Appendix B.</p>	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <hr/> <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> Provide the area formulas for triangles and rectangles and model how to find area of other polygons Classify radius, diameter, and circumference as circle measures to use in real-world problems Provide the volume formula for right rectangular prisms with fractional edge lengths and facilitate discussion about the relationships between the formula and packing a prism with unit cubes Demonstrate with practice how to find the distance between two points on a four-quadrant coordinate plane to show the length of a side Demonstrate how to use nets to find the surface area of three-dimensional figures Provide practice to measure and label with appropriate units across all content areas Provide conversion charts and model making conversions with practice Facilitate cooperative group work Use math language often and consistently Model questioning and inferencing Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math thinking Identify properties relating to specific operations when solving mathematical problems 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly, mid-term, final term) Common Tasks <p><u>Performance Indicators:</u> The student will:</p> <ul style="list-style-type: none"> Find the area of polygons by composing into rectangles or decomposing into triangles and other shapes and apply to real-world and mathematical problems Explain the relationship of circle measures by solving relating problems, identifying radius, diameter, and circumference Find the volume of right rectangular prisms with fractional edge lengths by packing a prism with unit cubes and the formula for volume to show relationships Draw polygons in the coordinate plane using points to represent the vertices Find the distance between two points with the same x-values (first coordinates) or the same y-values (second coordinates) to find the length of a side Use nets to find the surface area of three-dimensional figures, made up of rectangles and triangles Measure and use units of measure consistently and appropriately across all content areas Make conversions within systems when solving problems Understand, use, apply appropriate technology to solve problems Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> <i>Big Ideas Math Learning</i> by Larson Texts Inc. <i>Impact Mathematics</i> Course 1 by Glencoe Computer lab Rulers (metric), protractors Scissors, glue Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Geometric manipulatives Algebra lab gear Four-quadrant multiplication grid Geyer Scientific and Math products Multiple Intelligences and Brain Dominance Differentiation Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. Questioning and making conjectures <i>Classroom Instruction That Works</i> by Robert Marzano www.glencoe.com www.bigideasmath.com www.ridoe.net www.ridoe.net/instruction/curriculum NECAP Release tasks www.NECompact.org <p><u>Professional Resources</u> (partial list):</p> <ul style="list-style-type: none"> <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD http://www.exemplars.com/about/ <i>Improving Adolescent Literacy</i> by Fisher & Frey <i>MARS</i> Balanced Assessment series of common tasks

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By Nicole Hawes, Shana McKinnon, Janet Griffith-May 2011

STATISTICS & PROBABILITY (DATA, STATISTICS & PROBABILITY)

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GLEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Statistics and Probability-Grade 6: 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. <i>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.</i></p> <p>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.</p> <p>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.</p> <p>Summarize and describe distributions. 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>5. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. 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. d. 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.</p>	<p>GLE: M (DSP)-6-1 Interprets a given representation (circle graphs, line graphs, or stem-and-leaf plots) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (State) (IMPORTANT: Analyzes data consistent with concepts and skills in M (DSP)-6-2.) **This is NOT addressed here. See Grade 8</p> <p>GLE: M (DSP)-6-2 Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using measures of central tendency (mean, median, or mode) or dispersion (range) to analyze situations, or to solve problems. (State)</p> <p>GLE: M (DSP)-6-3 Organizes and displays data using tables, line graphs, or stem-and-leaf plots to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (Local) (IMPORTANT: Analyzes data consistent with concepts and skills in M (DSP)-6-2.) **This is NOT addressed here. See Grade 8</p> <p>GLE: M(DSP)-6-4 Uses counting techniques to solve problems in context involving combinations or simple permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or so others). (State) **This is NOT addressed here. See Grade 7.</p> <p>GLE: M(DSP)-6-5 For a probability event in which the sample space may or may not contain equally likely outcomes, predicts the theoretical probability of an event and tests the prediction through experiments and simulations, and designs fair games. (Local) **This is NOT addressed here. See Grade 7.</p> <p>GLE: M (DSP)-6-5 For a probability event in which the sample space may or may not contain equally likely outcomes, determines the experimental or theoretical probability of an event in a problem-solving situation. (State) **This is NOT addressed here. See Grade 7.</p> <p>GLE: M(DSP)-6-6 In response to a teacher or student generated question or hypothesis decides the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and asks new questions and makes connections to real world situations. (Local) (IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)-6-2.) **This is NOT addressed here. See Grade 8.</p>	<p>Gradual Release of Responsibility:</p> <ul style="list-style-type: none"> Describe the process standards and proficiencies important to reach mastery level Show an exemplar that models the framework of set tasks; revisit as needed (content & process) Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> Identify developmental skills Reinforcement of skills Drill and practice skills <hr/> <p>The Teacher Will:</p> <ul style="list-style-type: none"> Define a statistical question as one that has variability in data and provide examples Model and provide practice with measures of central tendency (mean, mode, median) Provide data in graphs, tables, charts, and lists to facilitate student understanding and model data analysis Distinguish ways to measure data by identifying a single number that represents measures of central tendency OR measures of variation Display data on a number line using box plots, dot plots, and histograms Facilitate an investigation about numerical data, its collection, measure, and overall patterns Facilitate cooperative group work Use math language often and consistently Model questioning and inferencing Model and justify thinking Facilitate constructing written responses to defend mathematics Integrate content with other core subjects Use appropriate technology Model and/or facilitate common tasks Model and practice mental math thinking Identify properties relating to specific operations when solving mathematical problems 	<p>District Assessment</p> <ul style="list-style-type: none"> Teacher Observations during Classroom Math Activities Formative & Summative Tiered assignments Anecdotal records Exhibits Interviews Journals/notebooks Oral & Visual presentations Portfolios (samples of process & products) Performance/problem-based tasks Exemplars & Rubrics Collaboration/Conferencing Common Local Assessments (quarterly) Common Tasks <p>Performance Indicators: The student will:</p> <ul style="list-style-type: none"> Differentiate between statistical questions and non-statistical questions Calculate measures of central tendency Describe and analyze the data collection by identifying its center (central tendency, e.g., mean, median, mode), spread (range found w/ scatter plot), and by shape (visual display, e.g., histogram) Recognize a single number represents a measure of central tendency OR a measure of variation of numerical data Construct box plots, dot plots, and histograms on a number line Summarize numerical data by: <ul style="list-style-type: none"> reporting the number of observations, describing what is measured and how it is measured, identifying measures of center and variability, describing overall patterns and deviations of the patterns, and describing the shape of the data distribution Justify their thinking when approaching mathematics in general and support their thinking with evidence Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines Construct written responses defending their work Demonstrate proficiency with common tasks 	<p>Programs & Materials:</p> <ul style="list-style-type: none"> <i>Big Ideas Math Learning</i> by Larson Texts Inc. <i>Impact Mathematics</i> Course 1 by Glencoe Computer lab Rulers (metric), protractors Scissors, glue Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Four-quadrant multiplication grid Multiple Intelligences and Brain Dominance Differentiation Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. Questioning and making conjectures <i>Classroom Instruction That Works</i> by Robert Marzano www.glencoe.com www.bigideasmath.com www.ridoe.net www.ridoe.net/instruction/curriculum NECAP Release tasks www.NECcompact.org <p>Professional Resources (partial list):</p> <ul style="list-style-type: none"> <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD http://www.exemplars.com/about/ <i>Improving Adolescent Literacy</i> by Fisher & Frey <i>MARS</i> Balanced Assessment series of common tasks

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MATHEMATICAL PRACTICES/PROBLEM SOLVING, REASONING & PROOF

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GSEs (6-8)	Instructional Strategies	Assessment Opportunities	Resources
<p>Mathematical Practices-K-12 :</p> <ol style="list-style-type: none"> 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. 	<p>GSE: M (PRP)-8-1 Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content and be able to:</p> <ul style="list-style-type: none"> • Use problem-solving strategies appropriately and effectively for a given situation. • Determine, collect and organize the relevant information needed to solve real-world problems. • Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics. • Use technology when appropriate to solve problems. • Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed. <p>GSE: M (PRP)-8-2 Students will use mathematical reasoning and proof and be able to:</p> <ul style="list-style-type: none"> • Draw logical conclusions and make generalizations using deductive and inductive reasoning. • Formulate, test, and justify mathematical conjectures and arguments. • Construct and determine the validity of a mathematical argument or a solution. • Apply mathematical reasoning skills in other disciplines. 	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> • Describe the process standards and proficiencies important to reach mastery level • Show an exemplar that models the framework of set tasks; revisit as needed (content & process) • Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> • Identify developmental skills • Reinforcement of skills • Drill and practice skills <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> • Model dissecting problems in determining what steps to take to solve them • Scaffold instruction to help students move from concrete thinking to abstract numerical thinking • Model and practice how to write using evidence to support mathematical thinking • Facilitate group conversations where students practice giving and receiving constructive feedback of others • Stress the importance of accuracy and precision of solutions • Provide frameworks to demonstrate the structure in mathematics • Identify commonalities that repeatedly occur • Direct students through problem-solving processes in a variety of scenarios • Model and justify thinking • Model and show how to make logical conclusions and generalizations by using inductive and deductive reasoning • Demonstrate how to look at solutions in the problem-solving process to determine if revisions are needed • Model and/or facilitate common tasks • Show exemplars that demonstrate proficiency in common tasks • Facilitate cooperative group work • Use math language often and consistently • Model questioning and inferencing • Integrate content with other core subjects • Use appropriate technology • Model and practice mental math thinking • Identify properties relating to specific operations when solving mathematical problems 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> • Teacher Observations during Classroom Math Activities • Formative & Summative • Tiered assignments • Anecdotal records • Exhibits • Interviews • Journals/notebooks • Oral & Visual presentations • Portfolios (samples of process & products) • Performance/problem-based tasks • Exemplars & Rubrics • Collaboration/Conferencing • Common Local Assessments (quarterly) • Common Tasks <p><u>Performance Indicators:</u> The student will:</p> <ul style="list-style-type: none"> • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct written responses defending their work • Construct viable arguments and critique the reasoning of others • Model with mathematics • Use appropriate technology and tools strategically to solve problems • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning • Use problem-solving strategies appropriately and effectively for a given situation • Determine, collect and organize the relevant information needed to solve real-world problems • Question, analyze and solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines • Justify their thinking when approaching mathematics in general and support their thinking with evidence • Use inductive and deductive reasoning and proof to form logical conclusions and make generalizations • Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed • Demonstrate proficiency with common tasks 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> • <i>Big Ideas Math Learning</i> by Larson Texts Inc. • <i>Impact Mathematics</i> Course 1 by Glencoe • Computer lab • Rulers (metric), protractors • Scissors, glue • Calculators • Smart Board • <i>Study Island/ALEKS</i> Interventions • Four-quadrant multiplication grid • Multiple Intelligences and Brain Dominance • Differentiation • Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. • Questioning and making conjectures • <i>Classroom Instruction That Works</i> by Robert Marzano • www.glencoe.com • www.bigideasmath.com • www.ri.ri.gov/instruction/curriculum • www.ridoe.net • www.ridoe.net • www.ridoe.net • NECAP Release tasks • www.NECCompact.org <p><u>Professional Resources</u> (partial list):</p> <ul style="list-style-type: none"> • <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD • <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD • http://www.exemplars.com/about/ • <i>Improving Adolescent Literacy</i> by Fisher & Frey • <i>MARS</i> Balanced Assessment series of common tasks

Little Compton Mathematics Curriculum-Grade 6
By Nicole Hawes, Shana McKinnon, Janet Griffith-May 2011

MATHEMATICAL PRACTICES/COMMUNICATION, CONNECTIONS & REPRESENTATIONS

Applied Learning Standards: (SCANS)-Critical Thinking, Problem Solving, Research, Communication, Reflection and Evaluation; Principles of Learning; Disciplinary Literacy

Common Core	GSEs (6-8)	Instructional Strategies	Assessment Opportunities	Resources
<p>Mathematical Practices-K-12 :</p> <ol style="list-style-type: none"> 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. 	<p>GSE: M (CCR)-8-1 Students will communicate their understanding of mathematics and be able to:</p> <ul style="list-style-type: none"> • Articulate ideas clearly and logically in both written and oral form. • Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems. • Use mathematical symbols and notation. • Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations. <p>GSE: M (CCR)-8-2 Students will create and use representations to communicate mathematical ideas and to solve problems and to be able to:</p> <ul style="list-style-type: none"> • Use models and technology to develop equivalent representations of the same mathematical concept. • Use and create representations to solve problems and organize their thoughts and ideas. • Convert between representations (e.g., a table of values, an equation, and a graph may all be representations of the same function.) <p>GSE: M (CCR)-8-3 Students will recognize, explore, and develop mathematical connections and be able to:</p> <ul style="list-style-type: none"> • Connect new mathematical ideas to those already studied and build upon them. • Understand that many real-world applications require an understanding of mathematical concepts (e.g., personal finance, running a business, building a house, following a recipe, or sending a rocket to the moon). • Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model. • Explain in oral and written form the relationships among various mathematical concepts (e.g., the relationship between exponentiation and multiplication). 	<p><u>Gradual Release of Responsibility:</u></p> <ul style="list-style-type: none"> • Describe the process standards and proficiencies important to reach mastery level • Show an exemplar that models the framework of set tasks; revisit as needed (content & process) • Provide an understanding of key ideas/concepts; define what should be done (contextual framework) <hr/> <ul style="list-style-type: none"> • Identify developmental skills • Reinforcement of skills • Drill and practice skills <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> • Use math language often and consistently • Facilitate constructing written responses to defend mathematics • Model and justify thinking • Identify properties, notations, and symbols relating to specific operations when solving mathematical problems • Model questioning and inferencing • Integrate content with other core subjects • Use appropriate technology and models to represent and compare the relationships between mathematical concepts • Present students with mathematical scenarios that relate to prior mathematical concepts, building knowledge to formulate new ideas • Use exemplars to show proficiency in constructing viable arguments in defending their work and identifying relationships between real world problems and mathematical models • Facilitate cooperative group work • Model and/or facilitate common tasks • Model and practice mental math thinking 	<p><u>District Assessment</u></p> <ul style="list-style-type: none"> • Teacher Observations during Classroom Math Activities • Formative & Summative • Tiered assignments • Anecdotal records • Exhibits • Interviews • Journals/notebooks • Oral & Visual presentations • Portfolios (samples of process & products) • Performance/problem-based tasks • Exemplars & Rubrics • Collaboration/Conferencing • Common Local Assessments (quarterly) • Common Tasks <p><u>Performance Indicators:</u> The student will:</p> <ul style="list-style-type: none"> • Articulate mathematical ideas clearly and logically in both written and oral forms • Justify their thinking when approaching mathematics in general and support their thinking with evidence, building upon the ideas of others to solve problems • Correctly use mathematical symbols and notation • Formulate questions, conjectures, definitions, and generalizations; analyze data and information; and, solve real world problems from contexts outside of and within mathematics including those that cut across content strands or disciplines • Use multiple models and technology that directly represent the same mathematical concepts, converting between them for regularity in the reasoning • Create representations to solve problems and organize their thoughts and ideas • Solve problems building upon prior knowledge to connect new ideas • Connect real world applications to mathematical concepts in solving problems and explain the relationships among mathematical concepts • Construct oral and written responses defending their work and identifying relationships between real world problems and mathematical models • Demonstrate proficiency with common tasks 	<p><u>Programs & Materials:</u></p> <ul style="list-style-type: none"> • <i>Big Ideas Math Learning</i> by Larson Texts Inc. • <i>Impact Mathematics</i> Course 1 by Glencoe • Computer lab • Rulers (metric), protractors • Scissors, glue • Calculators • Smart Board • <i>Study Island/ALEKS</i> Interventions • Four-quadrant multiplication grid • Multiple Intelligences and Brain Dominance • Differentiation • Jigsaw, Anchoring, Think-Pair-Share, Cubing, etc. • Questioning and making conjectures • <i>Classroom Instruction That Works</i> by Robert Marzano • www.glencoe.com • www.bigideasmath.com • www.ridoe.net • www.ride.ri.gov/instruction/curriculum • NECAP Release tasks • www.NECompact.org <p><u>Professional Resources</u> (partial list):</p> <ul style="list-style-type: none"> • <i>A Collection of Performance Tasks and Rubrics High School Mathematics</i> by Charlotte Danielson, ASCD • <i>A Collection of Performance Tasks and Rubrics Middle School Mathematics</i> by Charlotte Danielson, ASCD • http://www.exemplars.com/about/ • <i>Improving Adolescent Literacy</i> by Fisher & Frey • <i>MARS</i> Balanced Assessment series of common tasks