

Little Compton Mathematics Curriculum-Grade 8 Accelerated Algebra
 Designed by Nicole Hawes Gallo and Janet Griffith, August 2011

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ALGEBRAIC RELATIONSHIPS-#2

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

HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
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<p>Arithmetic with Polynomials and Rational Expressions-High School</p> <p>Perform arithmetic operations on polynomials</p> <p>1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.</p> <p>Understand the relationship between zeros and factors of polynomials</p> <p>2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. (Algebra II)</p> <p>3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.</p> <p>Use polynomial identities to solve problems</p> <p>4. Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.</p> <p>5. (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.¹ The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument. (Algebra II)</p>	<p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations function notation). (State) (Addressed elsewhere/HS)</p> <p>M(F&A)–10–3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions. (State) (Addressed elsewhere/HS)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (State) (Addressed elsewhere/HS)</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"> Explain that polynomials are closed under the operations of addition, subtraction, and multiplication; Model and provide practice adding, subtracting, and multiplying polynomials Demonstrate method of determining zeros(intercepts)of polynomial and show to construct a graph using the zeros (intercepts) 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Add, subtract, and multiply polynomials Divide polynomials, accurately representing remainders Identify the zeros(intercepts) of a polynomial and use them to construct a graph of the function 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 2 & 3 by Glencoe <i>Algebra 1 Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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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ALGEBRAIC RELATIONSHIPS #3

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

HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
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<p>Arithmetic with Polynomials and Rational Expressions-High School</p> <p>Rewrite rational expressions</p> <p>6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.</p> <p>7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. (Algebra II)</p> <p>Creating Equations-High School</p> <p>Create equations that describe numbers or relationships</p> <p>1. Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i></p> <p>2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.</p> <p>3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i></p> <p>4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. <i>For example, rearrange Ohm's law $V = IR$ to highlight resistance R.</i></p>	<p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (State) (Addressed elsewhere/HS)</p> <p>M(F&A)–10–3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions. (State)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (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"> Provide numerous examples of relating rational expressions in different forms with ample practice Model and provide practice writing linear, quadratic, rational, and exponential equations and inequalities containing one variable; show how to apply to real world and mathematical problems Demonstrate writing and graphing equations with two or more variables; provide opportunities for practice mathematically and in the real world Facilitate discussion and analysis of constraints on solutions presented in equations or inequalities in the context of real world situations Connect concept of balancing equations to rearrange formulas in isolating a variable; provide practice 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Rewrite simple rational expressions in different forms, with numerators having lower powers (degrees) than the denominators Write linear, quadratic, rational, and exponential equations and inequalities containing one variable and use them to solve problems Write equations with two or more variables and graph on coordinate grid, identifying labels and scales Justify viable or nonviable solutions presented by equations or inequalities in the context of real world situations Rearrange formulas to isolate a variable 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 2 & 3 by Glencoe <i>Algebra 1 Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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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ALGEBRAIC RELATIONSHIPS #4

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

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<p>Reasoning with Equations and Inequalities-High School</p> <p>Understand solving equations as a process of reasoning and explain the reasoning</p> <p>1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.</p> <p>2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.</p> <p>Solve equations and inequalities in one variable</p> <p>3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p> <p>4. Solve quadratic equations in one variable.</p> <p>a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. (Algebra II)</p> <p>b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. (Algebra II)</p>	<p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (State) (Addressed elsewhere/HS)</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"> Show and prove the steps involved in balancing and solving equations; provide ample practice Model and provide practice solving rational and radical equations in one variable, and show how extraneous solutions occur Demonstrate and provide practice solving linear equations and inequalities in one variable, using letters to represent coefficients Introduce the method of completing the square to solve quadratic equations in one variable and provide practice to reinforce the concept Distinguish appropriate times to use various methods of solving quadratic equations, including mental inspection, taking square roots, completing the square, using the quadratic formula, and factoring; model the method and provide 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Solve equations by balancing them, explaining and justifying each step in the process Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise Solve linear equations and inequalities in one variable Solve quadratic equations in one variable using the method of completing the square Solve quadratic equations by inspecting mentally, taking square roots, completing the square, using the quadratic formula and factoring 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 2 & 3 by Glencoe <i>Algebra 1 Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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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ALGEBRAIC RELATIONSHIPS#5

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

HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
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<p>Reasoning with Equations and Inequalities-High School</p> <p>Solve systems of equations</p> <p>5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.</p> <p>6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</p> <p>7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. <i>For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.</i></p> <p>8. (+) Represent a system of linear equations as a single matrix equation in a vector variable. (Algebra II)</p> <p>9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater). (Algebra II)</p>	<p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (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"> Model, prove, and provide practice solving two equations with two variables by substitution Demonstrate and provide practice solving systems of linear equations approximately by graphing Extend concepts of solving systems of linear equations to solving simple systems of a linear and a quadratic equation with two variables algebraically and graphically 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Solve two equations with two variables by substitution Solve systems of linear equations approximately by graphing Solve a simple system consisting of a linear equation and a quadratic equation with two variables algebraically and graphically 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 2 & 3 by Glencoe <i>Algebra 1 Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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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ALGEBRAIC RELATIONSHIPS #6

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

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<p>Reasoning with Equations and Inequalities-High School Represent and solve equations and inequalities graphically 10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). 11. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. (Algebra II) ★→★□※※●=⊖ 12. Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.</p>	<p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (State)(Addressed previously)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (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"> Discuss the meaning of a curve or line on a coordinate plane as the set of all solutions of an equation Facilitate the exploration of solutions of two functions (linear, polynomial, rational, absolute value, and exponential) as the points of intersection on a graph Model and provide practice graphing solutions to linear inequalities with two variables and graph the solution set to a system of linear inequalities 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Identify solutions of an equation with two variables as the points forming a curve or a line, on a coordinate plane. Explain why the point of intersection of two functions on a graph is the solution of the two functions Graph the solutions to a linear inequality with two variables as a half plane Graph the solution set to a system of linear inequalities with two variables as the intersection of the half-planes 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 2 & 3 by Glencoe <i>Algebra 1 Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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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FUNCTIONS #1

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

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Little Compton Mathematics Curriculum-Grade 8 Accelerated Algebra
 Designed by Nicole Hawes Gallo and Janet Griffith, August 2011

<p>Interpreting Functions-HS Understand the concept of a function and use function notation</p> <p>1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.</p> <p>2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.</p> <p>3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. <i>For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.</i> (Algebra II)</p> <p>Interpret functions that arise in applications in terms of the context</p> <p>4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums & minimums; symmetries; end behavior; and periodicity.</i> ★ (Pre-Calculus)</p> <p>5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.</i> ★ (Pre-Calculus)</p> <p>6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★ (Pre-Cal)</p>	<p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (State) (Addressed previously)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (State) (Addressed previously)</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"> Define function; model and provide practice using function notation Provide practice with using function notation in a variety of contexts and model evaluating functions 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Appropriately use function notation and will explain that each x-value of the domain corresponds to one y-value of the range Apply function notation in real world context evaluating functions for inputs in their domains (x-values) 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 2 & 3 by Glencoe <i>Algebra 1 Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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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FUNCTIONS #2

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

Little Compton Mathematics Curriculum-Grade 8 Accelerated Algebra
Designed by Nicole Hawes Gallo and Janet Griffith, August 2011

HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Interpreting Functions-HS Analyze functions using different representations</p> <p>7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★→★*★❖★☒</p> <p>a. Graph linear and quadratic functions and show intercepts, maxima, and minima.</p> <p>b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.</p> <p>c. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior.</p> <p>d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.</p> <p>e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.</p> <p>Algebra II</p> <p>8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.</p> <p>a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.</p> <p>b. Use the properties of exponents to interpret expressions for exponential functions. <i>For example, identify percent rate of change in functions such as $y = (1.02)^t$; $y = (0.97)^t$; $y = (1.01)^{12t}$; $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.</i></p>	<p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (State) (Addressed previously)</p> <p>M(F&A)–10–3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions. (State)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (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"> Model and provide practice graphing linear, quadratic, square root, cube root, piece-wise, step, and absolute value functions expressed symbolically Extend skills from identifying elements of quadratic equations to quadratic functions and provide practice applying to real world problems Review the properties of exponents and provide practice using them to interpret expressions for exponential functions 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Graph linear, quadratic, square root, cube root, piece-wise, step, and absolute value functions expressed symbolically Identify zeros, extreme value, and symmetry of a quadratic function by factoring or completing the square; apply to a variety of contexts Interpret expressions for exponential functions 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 2 & 3 by Glencoe <i>Algebra I Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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

FUNCTIONS #3

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

Little Compton Mathematics Curriculum-Grade 8 Accelerated Algebra
Designed by Nicole Hawes Gallo and Janet Griffith, August 2011

HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Interpreting Functions-HS Analyze functions using different representations 9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</i></p> <p>Building Functions-HS Build a function that models a relationship between two quantities 1. Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. <i>For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.</i> c. (+) Compose functions. <i>For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time.</i> 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.★ Algebra II</p>	<p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (State) (Addressed previously)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (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"> Present functions in a variety of ways (algebraically, graphically, numerically in tables, and verbally), and identify where properties exist in different parts of each representation 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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 properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions) 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 2 & 3 by Glencoe <i>Algebra I Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.gov/instruction/curriculum NECAP Release tasks www.NECCompact.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

FUNCTIONS #4

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

Little Compton Mathematics Curriculum-Grade 8 Accelerated Algebra
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HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Building Functions-HS Build new functions from existing functions 3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. <i>Include recognizing even and odd functions from their graphs and algebraic expressions for them</i> (Algebra II) 4. Find inverse functions. a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. <i>For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.</i> b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain. 5. (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. Algebra II</p>	<p>M(F&A)-10-2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (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"> Facilitate the exploration of functions by changing aspects of the functions to identify their impact on graphs, with provided practice using technology 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Describe and sketch the impact of changing aspects of a function on the graph of the function, using drawings by hand and with technology 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 2 & 3 by Glencoe <i>Algebra I Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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

FUNCTIONS # 5

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

Little Compton Mathematics Curriculum-Grade 8 Accelerated Algebra
Designed by Nicole Hawes Gallo and Janet Griffith, August 2011

HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Linear, Quadratic, and Exponential Models-HS Construct and compare linear, quadratic, and exponential models and solve problems</p> <p>1. Distinguish between situations that can be modeled with linear functions and with exponential functions.</p> <p>a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.</p> <p>b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.</p> <p>c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</p> <p>2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).</p> <p>3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.</p> <p>4. For exponential models, express as a logarithm the solution to $ab^t = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. Algebra II</p> <p>Interpret expressions for functions in terms of the situation they model</p> <p>5. Interpret the parameters in a linear or exponential function in terms of a context.</p>	<p>M(F&A)–10–1 Identifies, extends, and generalizes a variety of patterns (linear and nonlinear) represented by models, tables, sequences, or graphs to solve problems. (State)</p> <p>M(F&A)–10–2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation). (State)</p> <p>M(F&A)–10–4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations. (State) (Addressed previously)</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"> Identify changes in tables that indicate whether a function is linear or exponential; provide practice recognizing situations where these occur in the real world Model and provide practice writing linear and exponential functions using graphs, descriptions, data, and sequences Demonstrate the impact of exponential increase and compare to linear, quadratic, or polynomial functions; facilitate discussion Facilitate discussion and analysis of parameters in linear or exponential functions presented in the context of real world situations Facilitate cooperative group work Use math language often and consistently involving algebraic reasoning 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 functions of the graphing and scientific calculators Model and/or facilitate common tasks Model and provide 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"> Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals, using tables as evidence; recognize situations where these occur Write linear and exponential functions by looking at graphs, descriptions, data, and sequences Explain why the graph of an exponential function will eventually exceed the graph of a linear, quadratic or other polynomial function Justify viable or nonviable solutions presented by parameters in linear or exponential functions in the context of real world situations 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 2 & 3 by Glencoe <i>Algebra I Concepts & Skills</i> by Holt McDougal Scientific and graphing calculators Interactive TI-Connects graphing software Computer lab Calculators Smart Board <i>Study Island/ALEKS</i> Interventions Rulers (metric), graph paper 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.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

COMMUNICATION, CONNECTIONS, AND REPRESENTATIONS

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

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HS Common Core	GSEs	Instructional Strategies	Assessment Opportunities	Resources
<p>Mathematical Practices</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>M(CCR)–HS–1 Students will communicate their understanding of mathematics and be able to:</p> <ul style="list-style-type: none"> • Explain and justify their thinking and develop increasingly sophisticated questions for given problem-situations. • Critique and follow the logic of arguments presented within mathematics and across disciplines <p>M(CCR)–HS–2 Students will create and use representations to communicate mathematical ideas and to solve problems and be able to:</p> <ul style="list-style-type: none"> • Choose appropriate representations and mathematical language (e.g., spreadsheets, geometric models, algebraic symbols, tables, graphs, matrices) to present ideas clearly and logically for a given situation. • See a common structure in mathematical phenomena that come from very different contexts (e.g., the sum of the first n odd natural numbers, the areas of square gardens, and the distance traveled by a vehicle that starts at rest and accelerates at a constant rate can be represented by functions of the form $f(x) = ax^2$). • Find representations that model essential features of a mathematical situation (e.g., cost of postage can be modeled by a step-function). • Use representations as a primary means for expressing and understanding more abstract mathematical concepts. <p>M(CCR)–HS–3 Students will recognize, explore, and develop mathematical connections and be able to:</p> <ul style="list-style-type: none"> • Explain in oral or written form how mathematics connects to other disciplines, to daily life, careers, and society (e.g., geometry in art and literature, data analysis in social studies, and exponential growth in finance). • Explain multiple approaches that lead to equivalent results when solving problems. 	<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) <p>-----</p> <ul style="list-style-type: none"> • Identify developmental skills • Reinforcement of skills • Drill and practice skills <p>-----</p> <p><u>The Teacher Will:</u></p> <ul style="list-style-type: none"> • Challenge critical thinking skills by developing increasingly sophisticated questions and explanations • Facilitate opportunities to debate mathematical reasoning and processes within and across disciplines • Provide multiple strategies to clearly and logically communicate basic and abstract mathematical ideas with a variety of tools and representations • Present multiple examples of real world phenomena that relate to the structure of mathematics • Model identifying real world representations that model mathematical situations with provided practice • Provide opportunities to connect mathematics to everyday life and to other disciplines • Facilitate discussions and provide multiple opportunities in solving problems in a variety of ways to reach the same conclusion, attending to precision and using math reasoning • Model approaches to making sense of problems and persevere in reaching a conclusion with provided practice • 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 functions of the graphing and scientific calculators • Model and/or facilitate common tasks • Model and provide 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"> • Develop increasingly sophisticated questions and explanations to justify or challenge mathematical thinking • Critique mathematical reasoning and processes to provide understanding of mathematical logic within and across disciplines • Communicate basic and abstract ideas clearly and logically using appropriate tools, representations and mathematical language • Use the structure of mathematics to understand real world phenomena in a variety of contexts • Find real world representations that model mathematical situations • Explain in oral or written form how mathematics connects to other disciplines, to daily life, careers, and society • Reason quantitatively, attending to precision, to explain multiple approaches that lead to equivalent results when solving problems • Make sense of problems and persevere in solving them • 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 relaying (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 2 & 3 by Glencoe • <i>Algebra I Concepts & Skills</i> by Holt McDougal • Scientific and graphing calculators • Interactive TI-Connects graphing software • Computer lab • Calculators • Smart Board • <i>Study Island/ALEKS</i> Interventions • Rulers (metric), graph paper • 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.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