

# **Major Work of the Grade**

## **Common Core State Standards Mathematics**

**2012 Summer Institute**

Developed collaboratively with:

- Educators from all North Carolina Regions
- NCDPI
- SBAC Assessment Consortia
- PARCC Assessment Consortia
- Other states' documents

## Math Content Emphases

Content Emphases by Cluster describes content emphases in the standards at the cluster level for each grade or course. These are provided because curriculum, instruction and assessment at each grade must reflect the focus and emphasis of the standards.

Not all of the content in a given grade or course is emphasized equally in the standards. The list of content standards for each grade or course is not a flat, one-dimensional checklist; this is by design. There are sometimes strong differences of emphasis even within a single domain. Some clusters require greater emphasis than others based on the depth of the ideas, the time they take to master, and/or their importance to future mathematics or the demands of college and career readiness. An intense focus on the most critical material at each grade allows depth in learning, which is carried out through the Standards for Mathematical Practice. Without such focus, attention to the practices would be difficult and unrealistic, as would best practices such as formative assessment.

Saying that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting material will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade. Assessments will be designed with a much greater proportion drawn from clusters designated as major and the remainder drawn from clusters designated as additional/supporting, with these items placing emphasis on the major work of the grade or course.

Therefore, to make relative emphases in the standards more transparent and useful, this document designates clusters as Major or Supporting/Additional for the grade or course in question. The following are some recommendations for using the cluster-level emphases:

### Do ...

- Use the identified work to inform instructional decisions regarding time and other resources spent on clusters of varying degrees of emphasis.
- Evaluate instructional materials taking the cluster-level emphases into account. The major work of the grade must be presented with the highest possible quality; the supporting and additional work of the grade should support the major focus, not detract from it.
- Allow the focus on the major work of the grade to open up the time and space to bring the Standards for Mathematical Practice to life in mathematics instruction through sense-making, reasoning, arguing and critiquing, modeling, etc.
- Set priorities for other implementation efforts taking the emphases into account, such as staff development; new curriculum development; or revision of existing district or school level assessments.

### Don't ...

- Neglect any material in the standards. (Instead, connect the Supporting/Additional Clusters to the other work of the grade or course.)
- Sort clusters from Major to Supporting/Additional, and then teach them in that order. To do so would strip the coherence and progressiveness of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting/additional clusters.
- Use the cluster headings as a replacement for the standards or use the standards without the cluster heading. All features of the standards matter because a focus is given at the cluster level as a way to talk about the content with the necessary specificity, without going so far into detail as to compromise the coherence of the standards.

Adapted from: <http://engageny.org/resource/math-content-emphases/>

# Major Work of the Grade

Kindergarten	
Major Clusters	Supporting/Additional Clusters
<p><b>Counting and Cardinality</b></p> <ul style="list-style-type: none"><li>• Know number names and the count sequence.</li><li>• Count to tell the number of objects.</li><li>• Compare numbers.</li></ul> <p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</li></ul> <p><b>Number and Operations in Base Ten</b></p> <ul style="list-style-type: none"><li>• Work with numbers 11–19 to gain foundations for place value.</li></ul>	<p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Describe and compare measurable attributes.</li><li>• Classify objects and count the number of objects in categories.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Identify and describe shapes.</li><li>• Analyze, compare, create, and compose shapes.</li></ul>

# Major Work of the Grade

First Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Represent and solve problems involving addition and subtraction.</li><li>• Understand and apply properties of operations and the relationship between addition and subtraction.</li><li>• Add and subtract within 20.</li><li>• Work with addition and subtraction equations.</li></ul> <p><b>Number and Operations in Base Ten</b></p> <ul style="list-style-type: none"><li>• Extend the counting sequence.</li><li>• Understand place value.</li><li>• Use place value understanding and properties of operations to add and subtract.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Measure lengths indirectly and by iterating length units.</li></ul>	<p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Tell and write time.</li><li>• Represent and interpret data.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Reason with shapes and their attributes.</li></ul>

# Major Work of the Grade

Second Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Represent and solve problems involving addition and subtraction.</li><li>• Add and subtract within 20.</li><li>• Work with equal groups of objects to gain foundations for multiplication.</li></ul> <p><b>Number and Operations in Base Ten</b></p> <ul style="list-style-type: none"><li>• Understand place value.</li><li>• Use place value understanding and properties of operations to add and subtract.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Measure and estimate lengths in standard units.</li><li>• Relate addition and subtraction to length.</li></ul>	<p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Work with time and money.</li><li>• Represent and interpret data.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Reason with shapes and their attributes.</li></ul>

# Major Work of the Grade

Third Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Represent and solve problems involving multiplication and division.</li><li>• Understand properties of multiplication and the relationship between multiplication and division.</li><li>• Multiply and divide within 100.</li><li>• Solve problems involving the four operations, and identify and explain patterns in arithmetic.</li></ul> <p><b>Number and Operations—Fractions</b></p> <ul style="list-style-type: none"><li>• Develop understanding of fractions as numbers.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.</li><li>• Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</li></ul>	<p><b>Number and Operations in Base Ten</b></p> <ul style="list-style-type: none"><li>• Use place value understanding and properties of operations to perform multi-digit arithmetic.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Represent and interpret data.</li><li>• Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Reason with shapes and their attributes.</li></ul>

# Major Work of the Grade

Fourth Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Use the four operations with whole numbers to solve problems.</li></ul> <p><b>Number and Operations in Base Ten</b></p> <ul style="list-style-type: none"><li>• Generalize place value understanding for multi-digit whole numbers.</li><li>• Use place value understanding and properties of operations to perform multi-digit arithmetic.</li></ul> <p><b>Number and Operations—Fractions</b></p> <ul style="list-style-type: none"><li>• Extend understanding of fraction equivalence and ordering.</li><li>• Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</li><li>• Understand decimal notation for fractions, and compare decimal fractions.</li></ul>	<p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Gain familiarity with factors and multiples.</li><li>• Generate and analyze patterns.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</li><li>• Represent and interpret data.</li><li>• Geometric measurement: understand concepts of angle and measure angles.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</li></ul>

# Major Work of the Grade

Fifth Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Number and Operations in Base Ten</b></p> <ul style="list-style-type: none"><li>• Understand the place value system.</li><li>• Perform operations with multi-digit whole numbers and with decimals to hundredths.</li></ul> <p><b>Number and Operations—Fractions</b></p> <ul style="list-style-type: none"><li>• Use equivalent fractions as a strategy to add and subtract fractions.</li><li>• Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.</li></ul>	<p><b>Operations and Algebraic Thinking</b></p> <ul style="list-style-type: none"><li>• Write and interpret numerical expressions.</li><li>• Analyze patterns and relationships.</li></ul> <p><b>Measurement and Data</b></p> <ul style="list-style-type: none"><li>• Convert like measurement units within a given measurement system.</li><li>• Represent and interpret data.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Graph points on the coordinate plane to solve real-world and mathematical problems.</li><li>• Classify two-dimensional figures into categories based on their properties.</li></ul>

# Major Work of the Grade

Sixth Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Ratios and Proportional Relationships</b></p> <ul style="list-style-type: none"><li>• Understand ratio concepts and use ratio reasoning to solve problems.</li></ul> <p><b>The Number System</b></p> <ul style="list-style-type: none"><li>• Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</li></ul> <p><b>Expressions and Equations</b></p> <ul style="list-style-type: none"><li>• Apply and extend previous understandings of arithmetic to algebraic expressions.</li><li>• Reason about and solve one-variable equations and inequalities.</li><li>• Represent and analyze quantitative relationships between dependent and independent variables.</li></ul>	<p><b>The Number System</b></p> <ul style="list-style-type: none"><li>• Compute fluently with multi-digit numbers and find common factors and multiples.</li><li>• Apply and extend previous understandings of numbers to the system of rational numbers</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Solve real-world and mathematical problems involving area, surface area, and volume.</li></ul> <p><b>Statistics and Probability</b></p> <ul style="list-style-type: none"><li>• Develop understanding of statistical variability.</li><li>• Summarize and describe distributions.</li></ul>

# Major Work of the Grade

Seventh Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Ratios and Proportional Relationships</b></p> <ul style="list-style-type: none"><li>Analyze proportional relationships and use them to solve real-world and mathematical problems.</li></ul> <p><b>The Number System</b></p> <ul style="list-style-type: none"><li>Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</li></ul> <p><b>Expressions and Equations</b></p> <ul style="list-style-type: none"><li>Use properties of operations to generate equivalent expressions.</li><li>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</li></ul>	<p><b>Geometry</b></p> <ul style="list-style-type: none"><li>Draw, construct and describe geometrical figures and describe the relationships between them.</li><li>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</li></ul> <p><b>Statistics and Probability</b></p> <ul style="list-style-type: none"><li>Use random sampling to draw inferences about a population.</li><li>Draw informal comparative inferences about two populations.</li><li>Investigate chance processes and develop, use, and evaluate probability models.</li></ul>

# Major Work of the Grade

Eighth Grade	
Major Clusters	Supporting/Additional Clusters
<p><b>Expressions and Equations</b></p> <ul style="list-style-type: none"><li>• Work with radicals and integer exponents.</li><li>• Understand the connections between proportional relationships, lines, and linear equations.</li><li>• Analyze and solve linear equations and pairs of simultaneous linear equations.</li></ul> <p><b>Functions</b></p> <ul style="list-style-type: none"><li>• Define, evaluate, and compare functions.</li><li>• Use functions to model relationships between quantities.</li></ul> <p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Understand congruence and similarity using physical models, transparencies, or geometry software.</li><li>• Understand and apply the Pythagorean Theorem.</li><li>• Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.</li></ul>	<p><b>The Number System</b></p> <ul style="list-style-type: none"><li>• Know that there are numbers that are not rational, and approximate them by rational numbers.</li></ul> <p><b>Statistics and Probability</b></p> <ul style="list-style-type: none"><li>• Investigate patterns of association in bivariate data.</li></ul>

# Major Work of Math I Standards for Assessment

High School CC Math I Standards for Assessment	
Major Clusters	Supporting/Additional Clusters
<p><b>The Real Number System</b></p> <ul style="list-style-type: none"> <li>Extend the properties of exponents to rational exponents.</li> </ul> <p><b>Quantities</b></p> <ul style="list-style-type: none"> <li>Reason quantitatively and use units to solve problems.</li> </ul> <p><b>Seeing Structure in Expressions</b></p> <ul style="list-style-type: none"> <li>Interpret the structure of expressions</li> <li>Write expressions in equivalent forms to solve problems.</li> </ul> <p><b>Creating Equations</b></p> <ul style="list-style-type: none"> <li>Create equations that describe numbers or relationships.</li> </ul> <p><b>Reasoning with Equations and Inequalities</b></p> <ul style="list-style-type: none"> <li>Understand solving equations as a process of reasoning and explain the reasoning.</li> <li>Represent and solve equations and inequalities graphically</li> </ul> <p><b>Interpreting Functions</b></p> <ul style="list-style-type: none"> <li>Understand the concept of a function and use function notation.</li> <li>Interpret functions that arise in applications in terms of the context.</li> <li>Analyze functions using different representations.</li> </ul> <p><b>Building Functions</b></p> <ul style="list-style-type: none"> <li>Build a function that models a relationship between two quantities.</li> </ul>	<p><b>Arithmetic with Polynomials and Rational Expressions</b></p> <ul style="list-style-type: none"> <li>Perform arithmetic operations on polynomials</li> </ul> <p><b>Reasoning with Equations and Inequalities</b></p> <ul style="list-style-type: none"> <li>Solve equations and inequalities in one variable.</li> <li>Solve systems of equations.</li> </ul> <p><b>Building Functions</b></p> <ul style="list-style-type: none"> <li>Build new functions from existing functions.</li> </ul> <p><b>Congruence</b></p> <ul style="list-style-type: none"> <li>Experiment with transformations in the plane.</li> </ul> <p><b>Geometric Measurement and Dimension</b></p> <ul style="list-style-type: none"> <li>Explain volume formulas and use them to solve problems.</li> </ul> <p><b>Interpreting Categorical and Quantitative Data</b></p> <ul style="list-style-type: none"> <li>Interpret linear models.</li> </ul>

**High School  
CC Math I Standards for Assessment**

<b>Major Clusters</b>	<b>Supporting/Additional Clusters</b>
<p><b>Linear, Quadratic, and Exponential Models</b></p> <ul style="list-style-type: none"><li>• Construct and compare linear and exponential models and solve problems.</li><li>• Interpret expressions for functions in terms of the situation they model.</li></ul> <p><b>Expressing Geometric Properties with Equations</b></p> <ul style="list-style-type: none"><li>• Use coordinates to prove simple geometric theorems algebraically.</li></ul> <p><b>Interpreting Categorical and Quantitative Data</b></p> <ul style="list-style-type: none"><li>• Summarize, represent, and interpret data on a single count or measurement variable.</li><li>• Summarize, represent, and interpret data on two categorical and quantitative variables.</li></ul>	

# Major Work of the Theme

High School Number and Quantity	
Major Clusters	Supporting/Additional Clusters
<p><b>The Real Number System</b></p> <ul style="list-style-type: none"><li>• Extend the properties of exponents to rational exponents.</li></ul> <p><b>Quantities</b></p> <ul style="list-style-type: none"><li>• Reason quantitatively and use units to solve problems.</li></ul>	<p><b>The Real Number System</b></p> <ul style="list-style-type: none"><li>• Use properties of rational and irrational numbers.</li></ul> <p><b>The Complex Number System</b></p> <ul style="list-style-type: none"><li>• Perform arithmetic operations with complex numbers.</li><li>• Represent complex numbers and their operations on the complex plane.</li><li>• Use complex numbers in polynomial identities and equations.</li></ul> <p><b>Vector and Matrix Quantities</b></p> <ul style="list-style-type: none"><li>• Represent and model with vector quantities.</li><li>• Perform operations on vectors.</li><li>• Perform operations on matrices and use matrices in applications.</li></ul>

# Major Work of the Theme

High School Algebra	
Major Clusters	Supporting/Additional Clusters
<p><b>Seeing the Structure in Expressions</b></p> <ul style="list-style-type: none"><li>• Interpret the structure of expressions.</li><li>• Write expressions in equivalent forms to solve problems.</li></ul> <p><b>Arithmetic with Polynomials and Rational Expressions</b></p> <ul style="list-style-type: none"><li>• Understand the relationship between zeros and factors of polynomials.</li></ul> <p><b>Creating Equations</b></p> <ul style="list-style-type: none"><li>• Create equations that describe numbers or relationships.</li></ul> <p><b>Reasoning with Equations and Inequalities</b></p> <ul style="list-style-type: none"><li>• Understand solving equations as a process of reasoning and explain the reasoning.</li><li>• Represent and solve equations and inequalities graphically.</li></ul>	<p><b>Arithmetic with Polynomials and Rational Expressions</b></p> <ul style="list-style-type: none"><li>• Rewrite rational expressions.</li><li>• Perform arithmetic operations on polynomials.</li><li>• Use polynomial identities to solve problems.</li></ul> <p><b>Reasoning with Equations and Inequalities</b></p> <ul style="list-style-type: none"><li>• Solve equations and inequalities in one variable.</li><li>• Solve systems of equations.</li></ul>

# Major Work of the Theme

<b>High School Functions</b>	
<b>Major Clusters</b>	<b>Supporting/Additional Clusters</b>
<p><b>Interpreting Functions</b></p> <ul style="list-style-type: none"> <li>• Understand the concept of a function and understand function notation.</li> <li>• Interpret functions that arise in applications in terms of the context.</li> <li>• Analyze functions using different representations.</li> </ul> <p><b>Building Functions</b></p> <ul style="list-style-type: none"> <li>• Build a function that models a relationship between two quantities.</li> </ul> <p><b>Linear, Quadratic and Exponential Models</b></p> <ul style="list-style-type: none"> <li>• Construct and compare linear, quadratic, and exponential models and solve problems.</li> <li>• Interpret expressions for functions in terms of the situation they model.</li> </ul>	<p><b>Building Functions</b></p> <ul style="list-style-type: none"> <li>• Build new functions from existing functions.</li> </ul> <p><b>Trigonometric Functions</b></p> <ul style="list-style-type: none"> <li>• Extend the domain of trigonometric functions using the unit circle.</li> <li>• Model periodic phenomena with trigonometric functions.</li> <li>• Prove and apply trigonometric identities.</li> </ul>

# Major Work of the Theme

<b>High School Geometry</b>	
<b>Major Clusters</b>	<b>Supporting/Additional Clusters</b>
<p><b>Congruence</b></p> <ul style="list-style-type: none"> <li>• Prove geometric theorems.</li> </ul> <p><b>Expressing Geometric Properties with Equations</b></p> <ul style="list-style-type: none"> <li>• Use coordinates to prove simple theorems algebraically.</li> </ul> <p><b>Similarity, Right Triangles, and Trigonometry</b></p> <ul style="list-style-type: none"> <li>• Understand similarity in terms of similarity transformations.</li> <li>• Define trigonometric ratios and solve problems involving right triangles.</li> </ul> <p><b>Modeling with Geometry</b></p> <ul style="list-style-type: none"> <li>• Apply geometric concepts in modeling situations.</li> </ul>	<p><b>Congruence</b></p> <ul style="list-style-type: none"> <li>• Experiment with transformations in the plane.</li> <li>• Understand congruence in terms of rigid motions.</li> <li>• Make geometric constructions.</li> </ul> <p><b>Circles</b></p> <ul style="list-style-type: none"> <li>• Understand and apply theorems about circles.</li> <li>• Find arc lengths and areas of sectors of circles.</li> </ul> <p><b>Similarity, Right Triangles, and Trigonometry</b></p> <ul style="list-style-type: none"> <li>• Prove theorems involving similarity.</li> <li>• Apply trigonometry to general triangles.</li> </ul> <p><b>Geometric Measurement and Dimension</b></p> <ul style="list-style-type: none"> <li>• Explain volume formulas and use them to solve problems.</li> <li>• Visualize relationships between two-dimensional and three-dimensional objects.</li> </ul> <p><b>Expressing Geometric Properties with Equations</b></p> <ul style="list-style-type: none"> <li>• Translate between the geometric description and the equation for a conic section. (Here because of circles.)</li> </ul>

# Major Work of the Theme

<b>High School Statistics and Probability</b>	
<b>Major Clusters</b>	<b>Supporting/Additional Clusters</b>
<p><b>Interpreting Categorical and Quantitative Data</b></p> <ul style="list-style-type: none"> <li>• Summarize, represent, and interpret data on a single count or measurement variable.</li> <li>• Summarize, represent, and interpret data on two categorical and quantitative variables.</li> </ul> <p><b>Making Inferences and Justifying Conclusions</b></p> <ul style="list-style-type: none"> <li>• Make inferences and justify conclusions from sample surveys, experiments, and observational studies.</li> </ul>	<p><b>Making Inferences and Justifying Conclusions</b></p> <ul style="list-style-type: none"> <li>• Understand and evaluate random processes underlying statistical experiments.</li> </ul> <p><b>Interpreting Categorical and Quantitative Data Conditional</b></p> <ul style="list-style-type: none"> <li>• Interpret linear models.</li> </ul> <p><b>Conditional Probability and the Rules of Probability</b></p> <ul style="list-style-type: none"> <li>• Understand independence and conditional probability and use them to interpret data.</li> <li>• Use the rules of probability to compute probabilities of compound events in a uniform probability model.</li> </ul> <p><b>Using Probability to Make Decisions</b></p> <ul style="list-style-type: none"> <li>• Calculate expected values and use them to solve problems.</li> <li>• Use probability to evaluate outcomes of decisions.</li> </ul>