

	K-2	3-4	5-6	7-8
<p><b>1. Competency Statements for Foundations of Math – Symbolic Expression</b></p> <p><i>“I can statements” are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p>Students will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for different purposes.</p> <ul style="list-style-type: none"> <li>I can represent whole number quantities in multiple ways (words, symbols, expressions, equations, etc.).</li> <li>I can interpret and explain conceptual meanings of mathematical relationships and symbols used for them, such as expressing quantities, equivalence, and greater than-less than.</li> <li>I can represent and interpret addition and subtraction in multiple formats, including expressions and equations.</li> </ul>	<p>Students will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for a variety of purposes, including variables.</p> <ul style="list-style-type: none"> <li>I can represent whole number, decimal, and fractional quantities in multiple ways (with words, symbols, models, expressions, equations, etc.).</li> <li>I can interpret, apply, and explain conceptual meanings of mathematical relationships and symbols used for them, such as expressing or comparing quantities, equivalence, etc.</li> <li>I can represent and interpret the four operations in multiple formats, including expressions and equations.</li> <li>I can represent unknown quantities in mathematical expressions and equations using variables.</li> </ul>	<p>Students will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.</p> <ul style="list-style-type: none"> <li>I can symbolically represent relationships involving non-negative rational numbers, such as equivalent expressions, equations, inequalities, ordered pairs, inverse operations, ratio relationships, and exponents.</li> <li>I can interpret and apply the use of varied symbols in mathematical relationships, formulas, expressions, and operations.</li> <li>I can provide mathematical justification when using or manipulating expressions, equations, or inequalities.</li> </ul>	<p>Students will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.</p> <ul style="list-style-type: none"> <li>I can symbolically represent relationships involving rational and irrational numbers, such as constant rates of change, equivalent expressions, equations, inequalities, ordered pairs, inverse operations, exponents, absolute value.</li> <li>I can interpret and apply the use of varied symbols in mathematical relationships, formulas, expressions, and operations.</li> <li>I can provide mathematical justification when evaluating expressions and modeling linear equations (e.g., slope, rate of change) and inequalities.</li> </ul>
Aligned National standards	KCC5, 1OA1, 2OA1, KCC6, 1NBT3, 2NBT4, KOA1, 1OA2, 2NBT7	3NF2, 4OA2; 3NF3, 4OA1, 3OA8, 4OA3; 3OA3, 4OA2	5OA2, 6EE3; 5OA1, 6EE2; 5NF2, 6EE4	7EE1, 8EE2, 8EE3; 7EE4, 8EE6; 7RP2, 8EE5

\*See GLOSSARY

Competencies statements above are aligned with **Foundations of Math - Symbolic Expression\* (SE)**: The use and manipulation of symbols and expressions provide a variety of representations for solving problems and expressing mathematical concepts, relationships, and reasoning. This definition is from the organizational structure of the *Learning Progressions Framework Designed for Use with the Common Core State Standards in Mathematics* (Hess, et al., 2011).

NEW HAMPSHIRE College and Career Ready  
K-8 Mathematics MODEL COMPETENCIES

	K-2	3-4	5-6	7-8
<p><b>2. Competency Statements for Numbers and Number Systems</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p><b>Students will demonstrate an understanding of the nature of numbers, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers.</b></p> <ul style="list-style-type: none"> <li>I can count, compare, order, estimate, and represent quantities using my understanding of place value to explain my answer or strategy.</li> <li>I can model and explain why decomposition of whole numbers will help me understand a number or answer a question or solve a problem.</li> </ul>	<p><b>Students will demonstrate an understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers, fractions, and decimals.</b></p> <ul style="list-style-type: none"> <li>I can model, compare, order, estimate and represent quantities using my understanding of place value to explain my solution or strategy.</li> <li>I can distinguish among and represent whole and fractional numbers (e.g., using set, area, and linear models).</li> <li>I can model and explain why decomposition or composition of numbers will help me solve a problem.</li> </ul>	<p><b>Students will expand their understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using rational numbers.</b></p> <ul style="list-style-type: none"> <li>I can justify how place value and multiple representations can be used to estimate and compare fractions, decimals, percent, ratios, and integers in real-world/applied contexts.</li> <li>I can use exponents to express quantities and relationships in problem solving.</li> </ul>	<p><b>Students will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.</b></p> <ul style="list-style-type: none"> <li>I can justify how place value and multiple representations can be used to estimate and compare fractions, decimals, percent, ratios, proportions, and integers in real-world/applied contexts.</li> <li>I can use positive and negative exponents to express quantities and relationships in problem solving.</li> </ul>
Aligned national standards	KCC4, 1NBT4, 2NBT5; KOA3, 1OA6, 2NBT1	3NBT1,4NBT2; 3NF1, 4NF1; 4OA4	5NF7, 6NS6, 6NS7; 6EE1	7RP3, 8NS1; 8EE1, 8EE4
<p><b>3. Competency Statements for Reasoning and Computational Strategies</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the</i></p>	<p><b>Students will apply additive reasoning using multiple strategies (algorithms, models, manipulatives) to solve authentic applied problems.</b></p> <ul style="list-style-type: none"> <li>I can fluently add, subtract and estimate using whole numbers.</li> <li>I can perform operations with whole numbers using models, representations, and math language.</li> <li>I can apply properties and inverse relationships between addition and</li> </ul>	<p><b>Students will apply additive, multiplicative, and fractional reasoning using multiple strategies (algorithms, models, manipulatives) to solve authentic applied problems.</b></p> <ul style="list-style-type: none"> <li>I can fluently add, subtract, multiply, divide and estimate using whole numbers, fractions, mixed numbers and decimals.</li> <li>I can perform operations with whole numbers, fractions, mixed numbers, and decimals using models, representations, and math language.</li> <li>I can apply properties and inverse</li> </ul>	<p><b>Students will expand the use of computational strategies, algorithms, and proportional reasoning to rational numbers.</b></p> <ul style="list-style-type: none"> <li>I can perform operations fluently with non-negative rational numbers.</li> <li>I can identify and generate equivalence of indicated division and fractional parts.</li> <li>I can apply properties and inverse operations to solve and justify solutions.</li> <li>I can generate and evaluate possible approaches for a given</li> </ul>	<p><b>Students will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.</b></p> <ul style="list-style-type: none"> <li>I can perform operations fluently with rational numbers</li> <li>I can generate equivalence of indicated division and fractional parts.</li> <li>I can apply properties and inverse operations to solve and justify solutions.</li> <li>I can generate and evaluate the appropriateness or efficiency of</li> </ul>

<i>competencies.</i>	<p>subtraction to solve and justify solutions.</p> <ul style="list-style-type: none"> <li>I can determine and explain my reasoning for an appropriate approach for a given situation.</li> </ul>	<p>operations between multiplication and division to solve and justify solutions.</p> <ul style="list-style-type: none"> <li>I can determine and explain my reasoning for more than one appropriate approach for a given situation.</li> </ul>	<p>authentic situation.</p>	<p>possible approaches for a given situation and conditions, such as application in authentic applied contexts*.</p>
Aligned national standards	KOA5,1OA6,2OA2; KOA2, 1OA3, 2NBT9; KOA4,1OA8, 2NBT9; MP8, 1NBT6	3NBT2,4NBT4; 4NBT5, 4NF3; 3OA5, 4NBT6; MP8	5NBT5, 6NS2, 6NS3; 5NF3; 5NF4; 5NBT7; MP8	7NS1, 7NS3; 7RP1; 7NS2; MP8
<p><b>4. Competency Statements for Metacognitive Skills and Communication</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p><b>Students will use reasoning and self-monitoring to analyze and explain a solution pathway.</b></p> <ul style="list-style-type: none"> <li>I can check the reasonableness of solutions (e.g., with estimation, diagrams, tables).</li> <li>I can critique and explain the strategy and mathematical reasoning used in a problem.</li> </ul>	<p><b>Students will use reasoning and self-monitoring to analyze and justify one or more solution pathways.</b></p> <ul style="list-style-type: none"> <li>I can check the reasonableness of solutions (e.g., with estimation and rounding, diagrams, data tables, models).</li> <li>I can critique, explain, and defend the strategy and mathematical reasoning used in a problem.</li> </ul>	<p><b>Students will use reasoning and metacognitive skills* through making conjectures, justifying, and communicating mathematical solutions and arguments.</b></p> <ul style="list-style-type: none"> <li>I can use informal (concrete referents: objects, drawings, etc.,) and rule-based (formulas) arguments to support the reasonableness of a solution.</li> <li>I can make, test and justify conjectures using mathematical concepts and models.</li> </ul>	<p><b>Students will use reasoning and metacognitive skills through making conjectures, justifying, and effectively* communicating mathematical solutions and arguments.</b></p> <ul style="list-style-type: none"> <li>I can use stated assumptions, definitions, patterns, or previously established results to support the reasonableness of arguments/justifications.</li> <li>I can make, test, evaluate, and justify conjectures using mathematical concepts and models.</li> </ul>
Aligned national standards	MP2, MP4; MP3, MP8	MP2, MP4; MP3, MP8	MP2, MP4; MP3, MP8	MP2, MP4; MP3, MP8

\*See GLOSSARY

Competencies statements above are aligned with **Numbers and Operations (NO)**: Understandings of number ("how many" or "how much") and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. This definition is from the organizational structure of the *Learning Progressions Framework Designed for Use with the Common Core State Standards in Mathematics* (Hess, et al., 2011).

	K-2	3-4	5-6	7-8
<p><b>5. Competency Statements for Measurement</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p>Students will use standard and nonstandard measurement tools, units, and attributes to describe and compare objects, authentic applied situations, or events, and to solve measurement problems.</p> <ul style="list-style-type: none"> <li>I can apply appropriate tools and techniques while attending to precision to solve problems involving measurement (time, money, length, height, weight).</li> <li>I can estimate and explain measurements using appropriate units.</li> <li>I can describe and compare relative sizes of objects using terms such as: short-long, short-tall, heavy-light, more-less, large-small, thick-thin.</li> </ul>	<p>Students will use measurement tools, units, and attributes to describe and compare objects, situations, or events, and to solve authentic applied measurement problems.</p> <ul style="list-style-type: none"> <li>I can apply appropriate tools, techniques and formulas while attending to precision to solve problems involving measurement (liquid volume, mass, perimeter, area, time, angles, money, distances).</li> <li>I can estimate and justify measurements using appropriate units and relative sizes.</li> <li>I can explain and use relationships among units within a measurement system (e.g., minutes/hour, inches/ft. or yd.).</li> </ul>	<p>Students will use tools and apply precision and reasoning to solve measurement problems authentic applied contexts.</p> <ul style="list-style-type: none"> <li>I can make and justify estimates and conversions within measurement systems.</li> <li>I can compare measurement attributes, measures, and models, and select the appropriate customary or metric units of measure and formula for the given task (e.g., volume, surface area).</li> </ul>	<p>Students will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/theoretical and authentic applied contexts.</p> <ul style="list-style-type: none"> <li>I can make and justify estimates and conversions within measurement systems.</li> <li>I can compare measurement attributes, measures, and models, and select the appropriate customary or metric units of measure and formula for the given task (e.g., scale drawings, similar figures, distance between two points).</li> </ul>
Aligned national standards	MP5,MP6,1MD3, 2MD7; KMD1, 1MD1, 2MD3; KMD2, 1MD2, 2MD2	3MD1, 4MD2; 3MD2, 4NF2; 3MD4, 4MD1	5MD1; 5MD3, 5MD5, 6G2	8G8

Competencies statements above are aligned with **Measurement (ME)**: Measurement attributes, processes, and tools help us quantify, compare, and solve problems involving objects, situations, and events. This definition is from the organizational structure of the *Learning Progressions Framework Designed for Use with the Common Core State Standards in Mathematics* (Hess, et al., 2011).

	K-2	3-4	5-6	7-8
<p><b>6. Competency Statements for Algebraic Functions Patterns, And Relations</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p><b>Students will make use of structure to represent, interpret, and analyze change or patterns in various contexts using models, rules, and explanations.</b></p> <ul style="list-style-type: none"> <li>I can use concrete, pictorial, and symbolic representations to identify, describe, compare, and model situations that involve change.</li> <li>I can identify, interpret, and analyze patterns (repeating and growing) using rules involving addition and subtraction.</li> </ul>	<p><b>Students will make use of structure to represent, analyze, and generalize change or patterns in various contexts using models and justification.</b></p> <ul style="list-style-type: none"> <li>I can use concrete, pictorial, and symbolic representations to identify, describe, compare, and model situations that involve change.</li> <li>I can interpret, analyze, and extend patterns (repeating and growing) using functions involving the four basic operations.</li> </ul>	<p><b>Students will make use of structure to describe and compare situations that involve change or patterns and use the information to make conjectures and justify conclusions/solutions.</b></p> <ul style="list-style-type: none"> <li>I can model contextual situations using multiple representations.</li> <li>I can calculate constant rates of change for authentic situations.</li> <li>I can interpret, analyze, and generalize a variety of mathematical patterns and arithmetic relations.</li> </ul>	<p><b>Students will make use of structure to describe and compare situations that involve proportionality, change, or patterns and use the information to make conjectures and justify conclusions/solutions.</b></p> <ul style="list-style-type: none"> <li>I can model contextual situations using multiple representations (e.g., interpreting slope).</li> <li>I can calculate constant rates of change for authentic situations.</li> <li>I can interpret, analyze, and generalize a variety of mathematical patterns, relations, or explicit and recursive functions.</li> </ul>
Aligned national standards	MP4, 2MD10; 1MD4, 2MD9	3OA9, 4OA5	5NF6, 6NS1; 5NBT2, 6RP3; 5OA3, 6EE9	8EE7, 8EE8; 8F4; 7RP3, 8F5

\*See GLOSSARY

Competencies statements above are aligned with **Algebraic Functions, Patterns, and Relations\* (AFPR)**: Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world phenomena. This definition is from the organizational structure of the *Learning Progressions Framework Designed for Use with the Common Core State Standards in Mathematics* (Hess, et al., 2011).

	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8
<p><b>7. Competency Statements for Geometry</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p><b>Students will recognize and use attributes of two- and three-dimensional figures to solve problems.</b></p> <ul style="list-style-type: none"> <li>I can describe, compare, and explain possible classifications of objects and figures based on geometric attributes.</li> <li>I can compose, decompose, and draw figures applying spatial reasoning.</li> </ul>	<p><b>Students will use attributes of two-dimensional shapes and complex figures to solve authentic applied problems.</b></p> <ul style="list-style-type: none"> <li>I can describe, compare, and justify how to classify objects and figures based on shared geometric attributes (e.g., angles, sides, points).</li> <li>I can compose, decompose, and draw complex figures applying spatial reasoning.</li> <li>I can apply and explain concepts of symmetry in a variety of figures or for different authentic situations</li> </ul>	<p><b>Students will solve problems involving reasoning using properties of 2- and 3-dimensional shapes to analyze, represent, and model geometric relationships in authentic applied contexts.</b></p> <ul style="list-style-type: none"> <li>I can solve problems and justify solutions using geometric relationships, properties, and formulas (e.g., volume, surface area).</li> <li>I can decompose figures into new figures and construct figures with given conditions.</li> <li>I can represent authentic situations using coordinate graphing and diagrams.</li> </ul>	<p><b>Students will solve problems involving reasoning using properties of 2- and 3-dimensional shapes to analyze, represent, and model geometric relationships in pure/theoretical and authentic applied contexts.</b></p> <ul style="list-style-type: none"> <li>I can solve problems and justify solutions using geometric relationships, properties (e.g., parallel/perpendicular lines, angles), and formulas.</li> <li>I can decompose figures into new figures and construct geometric figures with given conditions.</li> <li>I can demonstrate transformations* using multiple contexts (e.g., coordinate grid, models, technology).</li> </ul>
Aligned national standards	KG1, 1G1, 2G1; KG6, 1G2, 1G3, 2G3	3G1, 4G1, 4MD5; 3G2, 4G2, 4MD7; 4G3	5G3, 6G1; 5G4, 6G4; 5G2, 6G3	7G1, 7G4, 7G5, 8G6; 7G2, 8G4; 7G6, 8G2

Competencies statements above are aligned with **Geometry (GM)**: Visualizations, spatial reasoning, and properties of 2- and 3-dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. This definition is from the organizational structure of the *Learning Progressions Framework Designed for Use with the Common Core State Standards in Mathematics* (Hess, et al., 2011).

	Grades K-2	Grades 3-4	Grades 5-6	Grades 7-8
<p><b>8. Competency Statements for Data Analysis, Probability, And Statistics</b></p> <p><i>"I can statements" are models of what educators may see in performance tasks when students demonstrate their increasing understanding and use of the competencies.</i></p>	<p><b>Students will gather, represent, and interpret data related to a particular/single unit scale, including authentic applications.</b></p> <ul style="list-style-type: none"> <li>I can formulate questions and gather, record, and organize data to answer them.</li> <li>I can construct and interpret data (e.g., using pictograph, bar graph, tally) to answer questions or identify patterns.</li> </ul>	<p><b>Students will gather, represent, and interpret data related to a particular/single context, including authentic applications.</b></p> <ul style="list-style-type: none"> <li>I can formulate questions and gather, record, and organize data to support my answers.</li> <li>I can represent a data set with multiple categories (e.g., using a key to show relationships: 1 circle = 5 dogs; 1 inch = 1 mile).</li> <li>I can identify and describe variations in data, and describe and compare shapes of distribution (e.g., using line plot, scaled pictograph).</li> </ul>	<p><b>Students will design investigations and gather data involving populations* (data sets).</b></p> <ul style="list-style-type: none"> <li>I can formulate questions, gather data, and build representations (e.g., box plots, dot and line plots, histograms) to support my conclusions</li> <li>I can compare populations by analyzing distributions in terms of variability and measures of central tendency (e.g., interpreting mean as a fair share and center of balance).</li> </ul>	<p><b>Students will design investigations and conduct probability experiments involving populations.</b></p> <ul style="list-style-type: none"> <li>I can formulate questions, gather data, and build representations (e.g., box plots, scatter plots, circle graphs, histograms) to justify or refute my conjectures and conclusions.</li> <li>I can compare populations by analyzing distributions in terms of variability and measures of central tendency, interquartile ranges, and outliers.</li> <li>I can generate random samples to characterize variability in estimates and predictions about a population.</li> <li>I can build and analyze models representing the association between two variables.</li> </ul>
Aligned national standards	KMD3; 1 MD4, 2MD9, 2MD10	3MD3, 4MD4	5MD2, 6SP4; 6SP5	7SP3, 8SP2; 7SP4, 8SP4; 7SP1, 8SP1; 7SP2, 8SP3

\*See GLOSSARY

Competencies statements above are aligned with **Data Analysis, Probability, and Statistics (DPS)**: Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions. This definition is from the organizational structure of the *Learning Progressions Framework Designed for Use with the Common Core State Standards in Mathematics* (Hess, et al., 2011).

GLOSSARY:

**Symbolic Expression:** Symbolic Expression is foundational to all areas of mathematics and includes the use and manipulation of symbols and representations. Foundations of math also include the math practices, such as reasoning, representation, and communication.

**Metacognitive skills** are evidenced when students reflect on their own learning and frame and monitor their own learning and goals. They seek out and use evidence of their own progress from one or more sources to improve their performance. They act on feedback from formative assessments.

**Communicate “Effectively”:** Students will communicate consistently, to a purpose, and with results.

**Authentic Applied Contexts:** an instructional approach that allows students to explore, discuss, and meaningfully construct concepts and relationships in contexts that involve real-world problems and projects that are relevant to the learner.

**Relations (Geometric and Arithmetic):** A *relation* "maps" elements of one set to another set.

**Transformations:** Includes rotations, reflections, translations, and dilations

**Populations:** The entire group of objects or individuals considered for a survey.