



Alignment Document  
 State of New Hampshire and Aventa Learning Geometry  
**Geometry**  
 2005-2007 Benchmark Blueprint

Strands	Standards	Unit Name	Course Topic Description
Number and Operations	<b>M:N&amp;O:HS:1</b> Demonstrates conceptual understanding of rational numbers by knowing why a real number is rational if and only if the number's decimal expansion eventually repeats or terminates.		
	<b>M:N&amp;O:HS:2</b> Demonstrates understanding of the relative magnitude of real numbers by solving problems that involve ordering or comparing elements of any subset of the real numbers.	Algebra Connections Algebra Connections Reasoning & Intro to Proof	Connections from Algebra Measuring Segments Two Column Proof with Segments and Angles
	<b>M:N&amp;O:10:2</b> Demonstrates understanding of the relative magnitude of real numbers by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., square root of 2 , pi), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.	Connections from Algebra Special Triangles and Special Relationships in Triangles	Measuring Segments Triangle Inequalities
	<b>M:N&amp;O:HS:3</b> No standard at this level		
	<b>M:N&amp;O:HS:4</b> Accurately solves problems.	Covered throughout the course	
	<b>M(N&amp;O)-HS-4.a</b> Interprets and computes with rational exponents and their relation to radicals, by hand in simple cases (e.g., 4 to the 3/2 power), and using a calculator when appropriate.		

	<p><b>M(N&amp;O)-HS-4.b</b> Interprets and computes in scientific notation with and without a calculator.</p>		
	<p><b>M(N&amp;O)-HS-4.c</b> Solves compound interest problems using <math>A = P(1 + r/n)</math> to the <math>nt</math> power, where <math>n</math> is finite.</p>		
	<p><b>M:N&amp;O:10:4</b> Accurately solves problems involving rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).</p>	<p>Similarity Similarity Similarity Right Triangles and Trigonometry Right Triangles and Trigonometry</p>	<p>Ratios and Proportions Similar Triangles Similar Quadrilaterals and Polygons Special Ratios in a Right Triangle Laws of sine and cosine</p>
	<p><b>M:N&amp;O:HS:5</b> No standard at this level</p>		
	<p><b>M:N&amp;O:HS:6</b> Uses a variety of mental computation strategies to solve problems (e.g., using compatible numbers, applying properties of operations, using mental imagery, using patterns) and to determine the reasonableness of answers.</p>	<p>Reasoning and Introduction to Proof</p>	<p>Inductive Reasoning</p>
	<p><b>M:N&amp;O:HS:7</b> Makes estimates in a given situation (e.g., tips, discounts, tax, the value of a non-perfect square root or cube root) by identifying when estimation is appropriate, selecting the appropriate method of estimation; determining the level of accuracy needed given the situation; analyzing the effect of the estimation method on the accuracy of results; evaluating the reasonableness of solutions appropriate to GSEs across content strands.</p>		
	<p><b>M:N&amp;O:HS:8</b> Applies properties of numbers and field properties (including determining whether a given subset of numbers is closed under a given arithmetic operation) to solve problems or to</p>	<p>Connections from Algebra Connections from Algebra</p>	<p>Basic Algebraic Principles The Commutative Properties</p>

	simplify computations; and compares and contrasts the properties of numbers and number systems; adds and multiplies numerical matrices with attention to the arithmetic properties of these operations.	Reasoning and Introduction to Proof	Properties from Algebra and Proof
Geometry and Measurement	<b>M:G&amp;M:HS:1</b> No standard at this level		
	<b>M:G&amp;M:HS:2</b> Creates formal proofs of propositions (e.g., angles, lines, circles, distance, midpoint and polygons including triangle congruence and similarity).	Reasoning and Introduction to Proof  Triangles: Basic Closed Figures in Geometry  Triangles: Basic Closed Figures in Geometry  Triangles: Basic Closed Figures in Geometry  Special Triangles and Special Relationships in Triangles  Special Triangles and Special Relationships in Triangles  Special Triangles and Special Relationships in Triangles  Special Triangles and Special Relationships in Triangles  Quadrilaterals and Polygons	Two-column Proof with Segments and Angles  Structure of Triangles  Congruent Triangles and Congruence Tests  Special Segments in Triangles  Isosceles Triangles  Equilateral Triangles  Right Triangles and Pythagorean Theorem  Triangle Inequalities  Rhombus and Trapezoid

<p><b>M:G&amp;M:10:2</b> Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).</p>		<p>Quadrilaterals and Polygons</p>	<p>Polygons</p>
		<p>Reasoning and Introduction to Proof</p>	<p>If-Then, Converses, and Postulates</p>
		<p>Reasoning and Introduction to Proof</p>	<p>Deductive Reasoning</p>
		<p>Reasoning and Introduction to Proof</p>	<p>Properties from Algebra and Proof</p>
		<p>Parallel Lines and Coordinate Plane</p>	<p>Lines and Points in Coordinate Plane</p>
		<p>Parallel Lines and Coordinate Plane</p>	<p>Equations of Lines in the Coordinate Plane</p>
		<p>Special Triangles and Special Relationships in Triangles</p>	<p>Right Triangles and Pythagorean Theorem</p>
		<p>Special Triangles and Special Relationships in Triangles</p>	<p>Triangle Inequalities</p>
		<p>Quadrilaterals and Polygons</p>	<p>Quadrilaterals and Polygons</p>
		<p>Quadrilaterals and Polygons</p>	<p>Square and Rectangle</p>
	<p>Circles</p>	<p>Arcs and Special Segments</p>	
	<p>Circles</p>	<p>Special Angles in Circles</p>	
	<p>Circles</p>	<p>Equations of a Circle</p>	

	Right Triangle and Trigonometry	Review of Pythagorean Theorem
	Right Triangle and Trigonometry	Special Ratios in a Right Triangle
	Right Triangle and Trigonometry	Law of Sines and Cosines
<b>M:G&amp;M:HS.3</b> No standard at this level		
<b>M:G&amp;M:HS.4</b> Applies the concepts of congruency by using matrices to represent reflections, translations, and rotations.		
<b>M:G&amp;M:10.4</b> Applies the concepts of congruency by solving problems on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.	Triangles: Basic Closed Figures in Geometry	Congruent Triangles and Congruence Tests
<b>M:G&amp;M:HS.5</b> Applies concepts of similarity to define the trigonometric functions as ratios of sides of right triangles; uses the ratios of the sides of special right triangles ( $30^\circ - 60^\circ - 90^\circ$ and $45^\circ - 45^\circ - 90^\circ$ ) to determine the sine, cosine and tangent of $30^\circ$ , $45^\circ$ , and $60^\circ$ ; and solves related problems.	Special Triangles and Special Relationships in Triangles	Right Triangles and Pythagorean Theorem
	Right Triangles and Trigonometry	Review of Pythagorean Theorem
	Right Triangles and Trigonometry	Special Ratios in a Right Triangle
<b>M:G&amp;M:10.5</b> Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.	Right Triangles and Trigonometry	Laws of Sines and Cosines
	Similarity	Ratios and Proportions
	Similarity	Similar Triangles
<b>M:G&amp;M:HS.6</b> Applies trigonometric formulas (e.g.,	Similarity	Similar Quadrilaterals and Polygons
	Right Triangles and	Special Ratios in a Right Triangle

	Law of Sines, Law of Cosines, $A = \frac{1}{2} ab \sin C$ to find angles, lengths and areas of polygons.	Trigonometry Right Triangles and Trigonometry	Laws of Sines and Cosines
	<b>M:G&amp;M:10:6</b> Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.	Perimeters and Areas Perimeters and Areas Perimeters and Areas	Perimeters and Area of Triangles and Polygons Perimeters and Areas of Quadrilaterals Circumferences and Areas of Circles
	<b>M:G&amp;M:HS:7</b> Applies informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations (e.g., use successive approximation to find the area of a pond); and uses measurement conversion strategies (e.g., unit/dimensional analysis).		
	<b>M:G&amp;M:10:7</b> Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations involving measurement in other GSEs.		
	<b>M:G&amp;M:HS:8</b> No standard at this level		
	<b>M:G&amp;M:10:9</b> Solves problems on and off the coordinate plane involving distance, midpoint, perpendicular and parallel lines, or slope.	Connections from Algebra Parallel Lines and Coordinate Plane Parallel Lines and Coordinate Plane Parallel Lines and Coordinate Plane	Measuring Segments Lines and Points in a Plane Lines and Points in Coordinate Plane Equations of Lines in the Coordinate Plane
	<b>M:G&amp;M:HS:10</b> Demonstrates conceptual understanding of spatial reasoning and visualization by sketching or using dynamic	Algebra Connections Algebra Connections	Points, Lines, and Planes Rays and Angles

	geometric software to generate three-dimensional objects from two-dimensional perspectives, or to generate two-dimensional perspectives from three-dimensional objects, and by solving related problems; perform and justify constructions with a compass and straightedge or dynamic geometric software.		
Functions and Algebra	<b>M:F&amp;A:HS:1</b> Identifies arithmetic and geometric sequences and finds the $n$ th term; then uses the generalization to find a specific term.	Reasoning and Introductions to Proof	Inductive Reasoning
	<b>M:F&amp;A:10:1</b> Identifies, extends, and generalizes a variety of patterns (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations.	Reasoning and Introduction to Proof	Inductive Reasoning
	<b>M:F&amp;A:HS:2</b> Demonstrates conceptual understanding of linear and nonlinear functions and relations.	Parallel Lines and Coordinate Plane	Equations of Lines in Coordinate Plane
	<b>M(F&amp;A)-HS-2.a</b> Analyzes characteristics of classes of functions (polynomial, rational, and exponential) to include domain, range, intercepts, increasing and decreasing intervals and rates of change.		
	<b>M(F&amp;A)-HS-2.b</b> Understands one-to-one (injective) functions and that a function that is one-to-one has a converse that is also a function; and finds inverses algebraically and graphically.		
	<b>M(F&amp;A)-HS-2.c</b> Graphs polynomial, rational and exponential functions, including vertical and horizontal shifts, stretches, and compressions as well as reflections across vertical and horizontal axes.		
	<b>M(F&amp;A)-HS-2.d</b> Applies knowledge of functions to interpret and understand situations, design mathematical models, and solve problems in mathematics as well as in the natural and social sciences.		

	<p><b>M:F&amp;A:10:2</b> 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).</p>		
	<p><b>M:F&amp;A:HS:3</b> Demonstrates conceptual understanding of algebraic expressions.</p>	<p>Covered throughout the course</p>	
	<p><b>M(F&amp;A)-HS-3.a</b> Manipulates, evaluates, and simplifies algebraic and numerical expressions.</p>	<p>Covered throughout the course</p>	
	<p><b>M(F&amp;A)-HS-3.b</b> Adds, subtracts, multiplies and divides polynomials and rational expressions.</p>		
	<p><b>M(F&amp;A)-HS-3.c</b> Factors quadratic and higher degree polynomials.</p>		
	<p><b>M(F&amp;A)-HS-3.d</b> Understands properties of logarithms and converts between logarithmic and exponential forms.</p>		
	<p><b>M(F&amp;A)-HS-3.e</b> Manipulates, evaluates, and simplifies expressions involving rational exponents and radicals and converts between expressions with rational exponents and expressions with radicals.</p>		
	<p><b>M(F&amp;A)-HS-3.f</b> Understands the effect of simplifying rational expressions on the domain of the related functions (e.g., <math>x^2/x = x</math> for <math>x</math> is not equal to 0).</p>		
	<p><b>M:F&amp;A:10:3</b> Demonstrates conceptual understanding of algebraic expressions by solving</p>	<p>Covered throughout the course</p>	

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.		
<b>M:F&amp;A:HS:4</b> Demonstrates conceptual understanding of equality.	Covered throughout the course	
<b>M(F&amp;A)-HS-4.a</b> Factors, completes the square, uses the quadratic formula, and graphs quadratic functions to solve quadratic equations.	Circles	Equations of Circles
<b>M(F&amp;A)-HS-4.b</b> Solves equations involving polynomial, rational, and radical expressions. Graphs and interprets the solutions.	Circles	Equations of Circles
<b>M(F&amp;A)-HS-4.c</b> Understands extraneous solutions.		
<b>M(F&amp;A)-HS-4.d</b> Finds approximate solutions to equations by graphing each side as a function using technology. Understands that any equation in $x$ can be interpreted as the equation $f(x) = g(x)$ and interpret the solutions of the equation as the $x$ -value(s) of the intersection point(s) of the graphs of $y = f(x)$ and $y = g(x)$ .		
<b>M(F&amp;A)-HS-4.e</b> Solves $2 \times 2$ and $3 \times 3$ systems of linear equations and graphically interprets the solutions.		
<b>M(F&amp;A)-HS-4.f</b> Solves systems of linear and quadratic inequalities.		
<b>M(F&amp;A)-HS-4.g</b> Solves systems of equations involving nonlinear expressions and graphically interprets the solutions.		
<b>M(F&amp;A)-HS-4.h</b> Translates problem situations into inequalities; and solves linear and non-linear inequalities (symbolically and graphically).	Special Triangles and Special Relationships in Triangles	Triangle Inequalities
<b>M:F&amp;A:10:4</b> Demonstrates conceptual	Covered throughout the	

	<p>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.</p>	course	
Data, Statistics, and Probability	<p><b>M:DSP:HS:1</b> Interprets a given representation(s) (e.g., regression function including linear, quadratic, and exponential) to analyze the data to make inferences and to formulate, justify, and critique conclusions.</p>		
	<p><b>M:DSP:10:1</b> Interprets a given representation(s) (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts) to make observations, to answer questions, to analyze the data to formulate or justify conclusions, critique conclusions, make predictions, or to solve problems within mathematics or across disciplines or contexts (e.g., media, workplace, social and environmental situations).</p>		
	<p><b>M:DSP:HS:2</b> Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using measures of dispersion (standard deviation, variance, and percentiles).</p>		
	<p><b>M:DSP:10:2</b> Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or</p>		

	<p>correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.</p>		
	<p><b>M:DSP:HS:3</b> Organizes and displays one- and two-variable data using a variety of representations (e.g., box-and-whisker plots, scatter plots, bar graphs, line graphs, circle graphs, histograms, frequency charts, linear, quadratic, and exponential regression functions) to analyze the data to formulate or justify conclusions, make predictions, or to solve problems with or without using technology.</p>		
	<p><b>M:DSP:10:3</b> Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M:DSP:10:1.</p>		
	<p><b>M:DSP:HS:4</b> Uses counting techniques to solve problems in context involving combination or permutations using a variety of strategies (e.g., <math>nCr</math>, <math>nPr</math>, or <math>n!</math>); and finds unions, intersections, and complements of sets.</p>		
	<p><b>M:DSP:10:4</b> Uses counting techniques to solve problems in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).</p>		
	<p><b>M:DSP:HS:5</b> For a probability event in which the sample space may or may not contain equally likely outcomes, predicts the theoretical probability of an event and tests the prediction through experiments and simulations; compares and contrasts theoretical and experimental probabilities; finds the odds of an event and understands the relationship between probability</p>		

	and odds.		
	<b>M:DSP:10:5</b> Solves problems involving experimental or theoretical probability.		
	<b>M:DSP:HS:6</b> In response to a teacher or student generated question or hypothesis decides the most effective method (e.g., survey, observation, research, experimentation) and sampling techniques (e.g., random sample, stratified random sample) to collect the data necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the questions or hypotheses being tested while considering the limitations of the data that could effect interpretations; and when appropriate makes predications, asks new questions, or makes connections to real-world situations.		
Problem Solving, Reasoning, and Proof	<b>M:PRP:HS:1</b> Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content and be able to:		
	<b>M(PRP)-HS-1.a</b> Expand the repertoire of problem-solving strategies and use those strategies in more sophisticated ways.	Covered throughout the course	
	<b>M(PRP)-HS-1.b</b> Use technology whenever appropriate to solve real-world problems (e.g., personal finance, wages, banking and credit, home improvement problems, measurement, taxes, business situations, purchasing, and transportation).		
	<b>M(PRP)-HS-1.c</b> Formulate and redefine problem situations as needed to arrive at appropriate conclusions.	Covered throughout the course	
	<b>M:PRP:HS:2</b> Students will use mathematical reasoning and proof and be able to:		
<b>M(PRP)-HS-2.a</b> Expand the repertoire of proof	Covered throughout the		

	techniques and use those techniques in more sophisticated ways.	course	
	<b>M(PRP)-HS-2.b</b> Use informal and formal reasoning and proof to explain and justify conclusions.	Covered throughout the course	
	<b>M(PRP)-HS-2.c</b> Formalize mathematical arguments through the use of deductive reasoning.	Reasoning and Introduction to Proof	Deductive Reasoning
	<b>M(PRP)-HS-2.d</b> Use the principle of mathematical induction.	Reasoning and Introduction to Proof	Inductive Reasoning
	<b>M(PRP)-HS-2.e</b> Use reasoning and proof throughout classroom discussions independent of the mathematical topic being studied.	Covered throughout the course	
	<b>M(PRP)-HS-2.f</b> Recognize how reasoning and proof influence the structure of mathematics.	Covered throughout the course	
Communication, Connections, and Representations	<b>M(CCR)-HS:1</b> Students will communicate their understanding of mathematics and be able to:		
	<b>M(CCR)-HS-1.a</b> Explain and justify their thinking and develop increasingly sophisticated questions for given problem-situations.	Covered in unit review discussion boards throughout the course	
	<b>M(CCR)-HS-1.b</b> Critique and follow the logic of arguments presented within mathematics and across disciplines.	Covered in unit review discussion boards throughout the course	
	<b>M(CCR)-HS:2</b> Students will create and use representations to communicate mathematical ideas and to solve problems and be able to:		
	<b>M(CCR)-HS-2.a</b> 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.		
	<b>M(CCR)-HS-2.b</b> 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 $f(x) = ax^2$ ).	Perimeters and Areas	Perimeters and Areas of Quadrilaterals



	<b>M(CCR)-HS-2.c</b> Find representations that model essential features of a mathematical situation (e.g., cost of postage can be modeled by a step-function).		
	<b>M(CCR)-HS-2.d</b> Use representations as a primary means for expressing and understanding more abstract mathematical concepts.	Covered throughout the course	
	<b>M:CCR:HS:3</b> Students will recognize, explore, and develop mathematical connections and be able to:		
	<b>M(CCR)-HS-3.a</b> 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).		
	<b>M(CCR)-HS-3.b</b> Explain multiple approaches that lead to equivalent results when solving problems.		