

CCSU Comprehensive Curriculum for Math

Grade Level 9-12

Power Standard #1 – Numbers and Operations: Students understand value and apply properties and operations of numbers. (Aligns with Vermont Standard 7.6)

Power Standard #2 – Geometric Figures: Students know and apply the attributes of geometric figures. (Aligns with Vermont Standard 7.7)

Power Standard #3 – Units of Measure: Students know and use units of measure. (Aligns with Vermont Standard 7.7)

Power Standard #4 – Patterns, Equations, and Inequalities: Students identify and extend patterns to express relationships between and among variables, and solve equations and inequalities. (Aligns with Vermont Standard 7.8)

Power Standard #5 – Data: Students represent, interpret, and predict using data. (Aligns with Vermont Standard 7.9)

Power Standard #6 – Probability: Students find probability theoretically and experimentally. (Aligns with Vermont Standard 7.9)

Power Standard #7 – Problem Solving: Students use a variety of approaches to solve problems and communicate solutions. (Aligns with Vermont Standard 7.10)

Grade Level 9-12, Power Standard 1

CCSU Power Standard #1: Students understand value and apply properties and operations of numbers. (Aligns with Vermont Standard 7.6)

Concepts to Emphasize: Magnitude of real numbers, Order of operations, Ratio, Rate, Real numbers, Absolute value, Proportion

Aligns with Vermont Standards	Vermont Grade Expectations <i>Competency Focus</i>	Focus and Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.6	<p>MHS: 1 <u>Accurately solves problems involving conceptual understanding and magnitude of real numbers, or simple vectors.</u> State</p> <p>MHS: 4 <u>Accurately solves problems involving proportional reasoning or percents involving the effect of changing the base, rate, or percentage (the three cases of percent), or variations on order of finding percentages (10% off followed by 5% off), and compound interest.</u> State (IMPORTANT: <i>Applies the conventions of order of operations.</i>)</p> <p>MHS: 8 <u>Applies properties of numbers</u> (greatest common factor [GCF], least common multiple [LCM], prime factorization, inverses, and identities), or properties of operations to solve problems and to simplify computations.</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Magnitude of Real numbers • Real number operations • Absolute value • Radicals • Proportional reasoning <p>Learning Opportunities: Pre-Algebra I Pre-Algebra II Algebra I A Algebra I B Geometry A Geometry B Honors Algebra II Algebra II A Algebra II B Pre-Calculus ATPS</p>	<p>Graph, compare, and operate on real numbers (1a)</p> <p>Find and use absolute value(1b)</p> <p>Use proportions to solve algebraic and geometric problems (1c)</p> <p>Use percents to solve problems (1d)</p>

Grade Level 9-12, Power Standard 2

CCSU Power Standard #2: Students know and apply the attributes of geometric figures. (Aligns with Vermont Standard 7.7)

Concepts to Emphasize: Theorems/Postulates/Properties, Congruence, Similarity, Polygons/Polyhedrons, Surface Area, Volume, Pythagorean Theorem, Right Triangle Trigonometry, Circles

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.7	<p>MHS: 9 Models situations geometrically to solve problems connecting to other areas of mathematics or to other disciplines (i.e., diagrams, coordinate systems, transformations). State</p> <p>MHS: 11 Uses the attributes, geometric properties, or theorems involving lines, polygons and circles (e.g., parallel, perpendicular, bisectors, diagonals, radii, diameters, central angles, arc length excluding radians), the Pythagorean Theorem, Triangle Inequality Theorem to solve mathematical situations or problems in context. State</p> <p>MHS: 13 Applies concepts of similarity, congruency or right triangle trigonometry to determine length or angle measures and to solve problems involving scale. State</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Definitions, Postulates and Theorems • Parallel and Perpendicular Lines • Congruency and Similarity • Pythagorean Theorem • Polygons and Circles • Perimeter, Area and Volume • Right Triangle Trigonometry • Midpoint and Distance • Constructions <p>Learning Opportunities: Pre-Algebra I Pre-Algebra II Algebra I A Algebra I B Geometry A Geometry B Honors Algebra II Algebra II A Algebra II B Pre-Calculus Honors Pre-Calculus ATPS</p>	<p>Use the Pythagorean Theorem to solve problem (2a)</p> <p>Write expressions and equations to solve problems involving geometric concepts (complementary, supplementary, triangle sum, etc) (2b)</p> <p>Write algebraic expressions and solves problems involving perimeter, area, and volume of geometric figures (2c)</p> <p>Use theorems and properties involving parallel and perpendicular lines (2d)</p> <p>Use theorems and properties involving polygons and circles (2e)</p>

	<p>MHS: 14 Demonstrates conceptual understanding of perimeter, circumference, or area of two-dimensional figures or composites of two-dimensional figures or surface area or volume of <u>three-dimensional figures or composites of three-dimensional figures</u> in problem-solving situations and uses appropriate units of measure and <u>expresses formulas for the perimeter, and area of two-dimensional figures or composites of two-dimensional figures or surface area or volume of three-dimensional figures or composites of three-dimensional figures.</u></p> <p style="text-align: right;">State</p> <p>MHS: 17 Constructs¹ or accurately represents <u>congruent angles, perpendicular lines, equilateral or isosceles triangles, triangle given the side segments, or inscribe or circumscribe a figure</u></p>		<p>Prove triangles congruent and solve for unknown sides and angles (2f)</p> <p>Prove triangles similar and solve for unknown sides and angles using proportions (2g)</p> <p>Use right triangle trigonometry to solve for unknown sides and angle measurements (2h)</p> <p>Construct or accurately represent triangle relationships, properties of circles, and linear relationships (2i)</p> <p>Find a midpoint (2j)</p>
--	--	--	---

Grade Level 9-12, Power Standard 3

CCSU Power Standard #3: Students know and use units of measure. (Aligns with Vermont Standard 7.7)

Concepts to Emphasize: Units of measure with Perimeter/Area/Volume, Unit conversions within and between systems

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.7	<p>MHS: 15 Measures and uses units of measures appropriately and consistently when solving problems across the content strands. Makes conversions within or across systems and <u>makes decisions concerning an appropriate degree of accuracy in problem situations involving measurement. Uses measurement conversion strategies, such as unit/dimensional analysis or uses quotient measures, such as speed and density, that give per unit amounts, or uses product measures, such as person hours to solve problems.</u> (See Appendix B for benchmark units and equivalences for each grade.)</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Uses units of measures • Converts units of measures <p>Learning Opportunities:</p> <p>Pre-Algebra I Pre-Algebra II Geometry A Geometry B Honors Algebra II Pre-Calculus Honors Pre-Calculus</p>	<p>Use unit analysis to determine units of measure (3a)</p>

Grade Level 9-12, Power Standard 4

CCSU Power Standard #4: Students identify and extend patterns to express relationships between and among variables and solves equations and inequalities. (Aligns with Vermont Standard 7.8)

Concepts to Emphasize: Domain/range, Polynomial, Simplify, Evaluate, Solve, Slope, Quadratic, Linear, Constants/variables, Rational expressions, Factoring, Functions/Roots

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.8	<p>MHS: 19 <u>Solves and models problems by formulating, extending, or generalizing linear and common nonlinear functions/relations.</u> State</p> <p><u>And makes connections among representations of functions/relations (equations, tables, graphs, symbolic notation, text).</u></p> <p>MHS: 20 <u>Demonstrates conceptual understanding of linear relationships and linear and nonlinear functions (including $f(x) = ax^2$, $f(x) = ax^3$, absolute value function, exponential growth) through analysis of intercepts, domain, range and constant and variable rates of change in mathematical and contextual situations.</u> State</p>	<p>Focus :</p> <ul style="list-style-type: none"> • Solve equations and inequalities • Linear, Absolute Value and Quadratic Functions • Polynomials • Factoring • Systems of Equations and Inequalities <p>Learning Opportunities:</p> <p>Pre-Algebra I Pre-Algebra II Algebra I A Algebra I B Geometry A Geometry B Honors Algebra II Algebra II A Algebra II B Pre-Calculus Honors Pre-Calculus ATPS</p>	<p>Graph linear functions, absolute values, quadratic function and linear inequalities on a coordinate system (4a)</p> <p>Make connections among various representations of functions (linear, quadratic, absolute value, etc.): tables of values, equations, graphs, symbols, and verbal expressions (4b)</p> <p>Find slope, interprets as a rate of change, and use to solve problems (4c)</p> <p>Write equation of a line given slope, intercepts, and points (4d)</p>

	<p>MHS: 21 Demonstrates conceptual understanding of algebraic expressions by evaluating, simplifying, or <u>writing algebraic expressions</u>; and <u>writes equivalent forms of algebraic expressions or formulas</u> ($d = rt \rightarrow r = d/t$ or solves a multivariable equation or formula for one variable in terms of the others).</p> <p style="text-align: right;">State</p> <p>MHS: 22 Demonstrates conceptual understanding of equality by solving linear equations, systems of <u>two</u> linear equations, or problems using tables, graphs, algebraic manipulation, or technology.</p> <p style="text-align: right;">State</p> <p><u>Demonstrates conceptual understanding of inequality by solving linear inequalities, comparing values of systems of linear functions, using tables, graphs, algebraic manipulation, or technology.</u></p>		<p>Write, simplify, and evaluate algebraic expressions (4e)</p> <p>Use formulas and solve literal equations (4f)</p> <p>Use properties of exponents in algebraic expressions (4g)</p> <p>Perform operations on polynomials including factoring (4h)</p> <p>Solve linear, quadratic and absolute value equations and linear inequalities (4i)</p> <p>Solve and graph a system of linear equations and identifies number of solutions (4j)</p> <p>Solve and graph a system of linear inequalities (4k)</p>
--	--	--	--

Grade Level 9-12, Power Standard 5

CCSU Power Standard #5: Students represent, interpret, and predict using data. (Aligns with Vermont Standard 7.9)

Concepts to Emphasize: Interpret & create Data displays, Central tendency, Scatter plot, Regression line, Correlation,

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.9	<p>MHS: 23 Interprets a given representation(s) (box-and-whisker or scatter plots, histograms, frequency charts) to make observations, to answer questions or justify conclusions, to make predictions, or to solve problems. State</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in MHS: 24.</i>)</p> <p>MHS: 24 Analyzes patterns, trends, or distributions in <u>single variable and two variable data in a variety of contexts by determining or using</u> measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, or <u>regression line or correlation (high, low/positive, negative)</u> to analyze situations, or to solve problems; and evaluates the sample from which the statistics were developed (bias, random, or nonrandom). State</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Displays of Data • Correlation and Regression • Measures of Central Tendency • Modeling Data <p>Learning Opportunities: Pre-Algebra I Pre-Algebra II Algebra I A Algebra I B Geometry A Geometry B Honors Algebra II Algebra II A Algebra II B ATPS</p>	<p>Interpret a given representation (e.g. scatter plots, bar graphs, line graphs, circle graphs, etc.) (5a)</p> <p>Determine correlation between two variables from a scatter plot and determine linear regression lines (5b)</p> <p>Use and analyze measures of central tendency with one and two variable data (5c)</p> <p>Choose an appropriate model (linear, absolute value, exponential or quadratic) to fit data (5d)</p>

	<p>MHS: 25 Organizes and displays data using scatter plots, <u>histograms</u>, or <u>frequency distributions</u> to answer questions related to the data, to analyze the data to formulate or justify conclusions, make predictions, or to solve problems; or identifies representations or elements of representations that best display a given set of data or situation, consistent with the representations required in <u>MHS: 23</u>.</p> <p><i>(IMPORTANT: Analyzes data consistent with concepts and skills in MHS: 24.)</i></p>		
--	---	--	--

Grade Level 9-12, Power Standard 6

CCSU Power Standard #6: Students find probability theoretically and experimentally. (Aligns with Vermont Standard 7.9)

Concepts to Emphasize: Probability

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.9	<p>MHS: 26 <u>Uses combinations, arrangements or permutations</u> to solve problems or to determine theoretical probability and experimental probability.</p> <p style="text-align: right;">State</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Probability <p>Learning Opportunities:</p> <p>Pre-Algebra I Pre-Algebra II Geometry A Geometry B Honors Algebra II ATPS</p>	<p>Find permutations and combinations to determine theoretical and experimental probability (6a)</p>

Grade Level 9-12, Power Standard 7

CCSU Power Standard #7: Students use a variety of approaches to solve problems and communicate solutions. (Aligns with Vermont Standard 7.9)

Concepts to Emphasize: Reasonableness

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
2.5 7.10	<p>MHS: 30 Demonstrate understanding of mathematical problem solving and communication by:</p> <ul style="list-style-type: none"> • Approach and Reasoning—The strategies and skills used to solve the problem, and the reasoning that supports the approach; • Execution—The answer and the mathematical work that supports it; • Observations and Extensions— Demonstration of observation, connections, application, extensions, and generalizations; • Mathematical Communication—The use of mathematical vocabulary and representation to communicate the solution; and • Presentation—Effective communication of how the problem was solved, and of the reasoning used. 	<p>Focus:</p> <ul style="list-style-type: none"> • Problem Solving • Portfolio Problems <p>Learning Opportunities:</p> <p>Pre-Algebra I Pre-Algebra II Algebra I A Algebra I B Geometry A Geometry B Honors Algebra II Algebra II A</p>	<p>Approach a problem correctly (7a)</p> <p>Provide solution with evidence (7b)</p> <p>Communicate mathematically (7c)</p>