

CCSU Comprehensive Curriculum for Math

Grade Level 7

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 7, 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: Proportion, Absolute Value, Order of Operations, Square Numbers, Square Roots

Aligns with Vermont Standards	Vermont Grade Cluster Expectations <i>Competency Focus</i>	Focus and Learning Opportunities	CCSU Power Indicators <i>Proficiency Focus</i>
7.6	<p>M7: 1 Demonstrates conceptual understanding of rational numbers with respect to percents as a means of comparing the same or different parts of the whole when the wholes vary in magnitude (e.g., 8 girls in a classroom of 16 students compared to 8 girls in a classroom of 20 students, or 20% of 400 compared to 50% of 100); and percents as a way of expressing multiples of a number (e.g., 200% of 50) using models, explanations, or other representations. M(N&O)–7–1</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Understanding percent <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Comparing and Scaling: Inv. 2</i> • Supplemental materials 	Proportional reasoning including percents and rates (1a)
	<p>M7: 2 Demonstrates understanding of the relative magnitude of numbers by ordering, comparing, or identifying equivalent rational numbers across number formats, numbers with whole-number bases and whole-number exponents (e.g., 3^3, 4^3), integers, absolute values, or numbers represented in scientific notation using number lines or equality and inequality symbols. M(N&O)–7–2</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Identifying equivalent rational #s across # formats • Absolute value • Scientific notation <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>Bits and Pieces I: Inv. 5</i> • Revisit comparison across formats 	Represent numbers in scientific notation (1b)

	<p>M7: 3 Demonstrates <u>conceptual understanding of operations with integers</u>, exponents, and <u>square roots of perfect square numbers and nonperfect square numbers</u> using models, diagrams, or explanations.</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Operations with integers • Square roots 	<p>Multiply and divide integers (1c)</p> <p>Calculate square root of perfect square numbers and estimate square root of non-perfect square numbers (1d)</p>
	<p>M7: 4 Accurately solves problems involving <u>proportional reasoning</u>; percents <u>involving discounts, tax, or tips</u>; and <u>rates</u>.</p> <p>(IMPORTANT: <i>Applies the conventions of order of operations including parentheses, <u>brackets</u>, or <u>exponents</u>.</i>)</p> <p style="text-align: right;">M(N&O)–7–4</p> <p>And accurately solves problems involving integers, <u>raising numbers to whole-number powers</u>, and <u>determining square roots of perfect square numbers and nonperfect square numbers</u>.</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Proportional reasoning • Percents involving discounts, tax, and tip • Rates • Revisit order of operations <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Comparing and Scaling:</i> Inv. 1, 3, and 4 • <i>Bits and Pieces I:</i> Problem 6.2 (Discount) • Supplemental materials • <i>Bits and Pieces II:</i> Inv. 1 and/or supplemental materials 	<p>Proportional reasoning including percents and rates (1a)</p> <p>Apply conventions of order of operations including grouping symbols and exponents (1e)</p> <p>Calculate square root of perfect square numbers and estimate square root of non-perfect square numbers (1d)</p>
	<p>M7: 8 Applies properties of numbers (greatest common factor [GCF], least common multiple [LCM], composition/decomposition, divisibility, <u>prime factorization</u>, <u>inverses</u>, and <u>identities</u>), and commutative, <u>distributive</u>, and associative properties of operations, and exponents using powers of ten and scientific notation to solve problems and to simplify computations.</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Prime factorization • Inverses $\frac{a}{b} \cdot \frac{b}{a} = 1$ • Identity properties $a + -a = 0$ • Distributive property <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Prime Time:</i> Inv. 4, 5, and/or supplemental materials 	<p>Apply understanding of properties of numbers including prime factorization, inverses, identities, and distributive (1f)</p>

Grade Level 7, 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: Similarity, Volume, Surface Area, Scale factor, Symmetry, Parallel, Dimension

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>M7: 9 Uses properties of angle relationships resulting from two or three intersecting lines (adjacent angles, vertical angles, straight angles, or angle relationships formed by two nonparallel lines cut by a transversal), or two parallel lines cut by a transversal to solve problems.</p> <p>M(G&M)–7–1</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Non- parallel lines cut by a transversal: Adjacent, vertical, straight angles • 2 Parallel lines cut by a transversal: Alternate interior, alternate exterior, corresponding angles <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • Supplemental materials: <ul style="list-style-type: none"> ○ Triangle problems ○ <i>Math with Pizzazz</i>: D 30-33 	Find and measure angles made by intersecting lines (2b)
	<p>M7: 10 Applies theorems or relationships (triangle inequality or sum of the measures of interior angles of regular polygons) to solve problems.</p> <p>M(G&M)–7–2</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Triangle inequality • Interior angles of polygons <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Shapes and Designs</i>: Inv. 2 • <i>Math with Pizzazz</i>: D 34 	Find interior angle sum of polygons (2c) Apply triangle inequality theorem (2d)

	<p>M7: 11 Applies the properties of number of vertices, number of edges, <u>faces</u>, and <u>types of angles, symmetry</u>, to identify and distinguish among three-dimensional shapes (rectangular prisms, triangular prisms, pyramids, <u>cubes</u>) and uses properties to solve problems involving <u>three-dimensional shapes</u>.</p>	<p>Focus:</p> <ul style="list-style-type: none"> • 3-D <i>experiences</i> with faces, types of angles, symmetry and cubes <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Filling and Wrapping</i>: Inv. 1 	
	<p>M7: 12 Applies the concepts of congruency by solving problems on a coordinate plane involving reflections, translations, or rotations. M(G&M)–7–4</p>	<p>Focus:</p> <ul style="list-style-type: none"> • reflections, translations, rotations on a coordinate plane <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • Kaleidoscopes: Inv. 1 and 2 • Supplemental materials: <ul style="list-style-type: none"> ○ Geometry’s Teacher Activities ○ Prentice Hall Intervention Kit: Geometry ○ Annenburg Applet 	<p>e) Solve problems involving reflections, translations, and rotations on a coordinate plane (2e)</p>
	<p>M7: 13 Applies concepts of similarity by solving problems involving scaling up or down and their impact on angle measures, linear dimensions and areas of polygons, and circles when the linear dimensions are multiplied by a constant factor. Describes effects using models or^{sc} explanations. M(G&M)–7–5</p>	<p>Focus:</p> <ul style="list-style-type: none"> • scale factors as they relate to angles, perimeter, and area in polygons and circles <p>Learning Opportunities</p> <ul style="list-style-type: none"> • <i>Stretching and Shrinking</i>: Inv. 1-4 • Note: Inv. 5 is an 8th grade GE but fits well here 	<p>Apply properties of similarity: scale factor’s effect on linear, area, and angle measures (2a)</p>
	<p>M7: 14 Demonstrates conceptual understanding of the area of circles or the area or perimeter of composite figures (quadrilaterals, triangles, or parts of circles), and the surface area of rectangular prisms, or volume of rectangular</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Area of circles • Area and perimeter (not including knowledge of Pythagorean Theorem) of composite figures • SA of rectangular prisms 	<p>Find area of circles; surface area of rectangular prisms; and volume of rectangular prisms, triangular prisms, and</p>

	<p><u>prisms, triangular prisms, or cylinders</u> using models, formulas, or by solving related problems. Expresses all measures using appropriate units. M(G&M)–7–6</p>	<ul style="list-style-type: none"> • Vol. rectangular prism, triangular prism, cylinders <p>Learning Opportunities</p> <ul style="list-style-type: none"> • <i>CMP: Covering and Surrounding</i>: Inv. 7.3, 7.4 • <i>Funky Figures</i> • <i>Filling and Wrapping</i>: Inv. 1-4 • <i>Math w/Pizzazz</i>: D64-70 • Supplemental materials for triangular prisms 	<p>cylinders (1f)</p>
	<p>M7: 17 <u>Sketches three-dimensional solids and the nets of prisms, cylinders, and pyramids.</u></p>	<p>Focus:</p> <ul style="list-style-type: none"> • Nets <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Filling and Wrapping</i>: Inv. 1 and 4 • Supplemental materials for pyramids 	

Grade Level 7, Power Standard 3

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

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>M7: 15 Measures and uses units of measures appropriately and consistently when solving problems across the content strands. Makes conversions within systems.</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Length • Time • Capacity • Mass • Weight <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • Embedded in <i>Filling and Wrapping</i> for length • Embedded in <i>Comparing and Scaling</i> for time, capacity, mass and weight 	<p>Label units when finding surface area and volume (3a)</p>

Grade Level 7, 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: Linear, Slope, Simplify, Expression/ Equation, Evaluate

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>M7: 19 Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; and generalizes a linear relationship using words and symbols; generalizes a linear relationship to find a specific case; or <u>writes an expression or^{sc} equation using words or^{sc} symbols to express the generalization of a nonlinear relationship.</u></p> <p style="text-align: right;">M(F&A)–7–1</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Writing rules for very simple non-linear patterns <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>Variables and Patterns:</i> Inv. 5 • <i>Moving Straight Ahead:</i> Inv. 1 • Patterns Menu Activities (non- linear) 	
	<p>M7: 20 Demonstrates conceptual understanding of linear relationships ($y = kx$; $y = mx + b$) as a constant rate of change by <u>solving problems involving the relationship between slope and rate of change</u>, by <u>describing the meaning of slope in concrete situations</u>, or <u>informally determining the slope of a line from a table or graph</u>; and distinguishes between constant and varying rates of change in concrete situations <u>represented in tables or graphs</u>; or describes how change in the value of one variable relates</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Independent and dependent variables • Slope as a constant rate of change • Slope from tables and graphs <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>Variables and Patterns:</i> Inv. 1, 3, and 4 • <i>Moving Straight Ahead:</i> Inv. 1, 2, and 5 	<p>Distinguish between linear and non-linear relationships from tables, graphs, and equations. (4a)</p> <p>Find slope of a line from a table, graph, or equation ($y=mx$) (4b)</p>

	<p>to change in the value of a second variable in problem situations with constant rates of change.</p> <p style="text-align: right;">M(F&A)–7–2</p>		
	<p>M7: 21 Demonstrates conceptual understanding of algebraic expressions by using letters to represent unknown quantities to write algebraic expressions (<u>including those with whole-number exponents or more than one variable</u>); or by evaluating <u>algebraic expressions</u> (including those with <u>whole-number exponents</u> or more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given <u>$y = 5x^3 - 2$</u>).</p> <p style="text-align: right;">M(F&A)–7–3</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Evaluating expressions including exponents • Translating words into algebraic notation <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>Moving Straight Ahead:</i> Inv. 2 (without exponents) • Supplemental materials (with exponents) 	<p>Evaluate expressions using order of operations consistent with this grade level (4c)</p>
	<p>M7: 22 Demonstrates conceptual understanding of equality by showing equivalence between two expressions (<u>expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level</u>) using models or different representations of the expressions, solving multistep linear equations of the form $ax \pm b = c$ with $a \neq 0$, <u>$ax \pm b = cx \pm d$</u> with $a, c \neq 0$, and <u>$(x/a) \pm b = c$</u> with $a \neq 0$, where <u>a, b, c and d are whole numbers</u>; or by <u>translating a problem-solving situation into an equation consistent with the parameters of the type of equations being solved for this grade level</u>.</p> <p style="text-align: right;">M(F&A)–7–4</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Solving equations with variables on both sides with whole number coefficients and constants • Solving word problems consistent with above <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>Moving Straight Ahead:</i> Inv. 4 and 6 • Supplemental materials 	<p>Solve multi-step linear equations with variables on both sides of the equation ($ax \pm b = cx \pm d$, where a, b, c, and d are integers) (4d)</p>

Grade Level 7, Power Standard 5

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

Concepts to Emphasize: Outlier, Scatter Plot, Variability

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>M7: 23 Interprets a given representation (circle graphs, <u>scatter plots that represent discrete linear relationships</u>, or histograms) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems.</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in M7: 24.</i>)</p> <p style="text-align: right;">M(DSP)–7–1</p> <p>And (Frequency charts, <u>tables</u>, <u>bar graphs</u>, pictographs, Venn diagrams, line plots).</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Scatter plots <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>Variable and Patterns</i>: Inv. 1,2, and 3 (Insert during Moving Straight Ahead) • <i>CMP6: Data About Us</i>: Inv 1,2, and 4 and Pumpkin Seed Problem • Microsoft Excel 	Interpret and analyze scatter plots (5b)
	<p>M7: 24 Analyzes patterns, trends, or distributions in data in a variety of contexts by <u>solving problems using</u> measures of central tendency (mean, median, or mode), dispersion (range or <u>variation</u>), or <u>outliers</u> to analyze situations to <u>determine their effect on mean, median, or mode</u>; and <u>evaluates the sample from which the statistics were developed (bias)</u>.</p> <p style="text-align: right;">M(DSP)–7–2</p>	<p>Focus:</p> <ul style="list-style-type: none"> • Range = variation and Outliers • Effects on Central Tendencies • Bias <p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: Data About Us</i>: Inv. 1, 3, and 5 (outlier in 3.2 follow-up) • Supplemental material for bias (samples and populations) 	Analyze measures of central tendency including outlier effect and variability (5a)

	<p>M7: 25 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in <u>M7: 23</u>. M(DSP)–7–3</p> <p>Organizes and displays data using line graphs or histograms, bar graphs, tables, frequency tables, line plots, and stem-and-leaf plots to answer question related to the data, to analyze the data to formulate or justify conclusions, or to make predictions.</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in M7: 24.</i>)</p>	<p>Learning Opportunities:</p> <ul style="list-style-type: none"> • Embedded in <i>Variables and Patterns</i> and <i>Data About Us</i> 	
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Grade Level 7, Power Standard 6

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

Concepts to Emphasize: Area Model

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>M7: 26 Uses counting techniques to solve problems in context involving combinations using a variety of strategies (e.g., organized lists, tables, tree diagrams, <u>area models</u>, Fundamental Counting Principle, or^{sc} others); <u>or determines the possible outcomes for a sample space that may or may not contain equally likely outcomes.</u></p>	<p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: What Do You Expect?</i> – Inv 1, 2, 3 • Supplemental materials 	Use area models to represent and find probability (6a)
	<p>M7: 27 For a probability event in which the sample space may or may not contain equally likely outcomes, determines the experimental or theoretical probability of a simple event or an event in a problem-solving situation.</p> <p style="text-align: right;">M(DSP)–7–5</p>	<p>Learning Opportunities:</p> <ul style="list-style-type: none"> • <i>CMP: What Do You Expect?</i> – Inv 1, 2 	Compare theoretical and experimental probability (6b)
	<p>M7: 28 In response to a teacher - or student-generated question, makes a hypothesis, collects appropriate data, organizes the data, appropriately displays/represents numerical and/or categorical data, analyzes the data to draw conclusions about the questions or hypothesis being tested, and when appropriate makes predictions, asks new questions, or makes</p>	<p>Learning Opportunities:</p> <ul style="list-style-type: none"> • Embedded in Data About Us, Variables and Patterns, Moving Straight Ahead • Samples and Populations 	

	<p>connection to real-world situations.</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in M7: 24.</i>)</p>		
	<p><u>M7: 29 Compares and contrasts theoretical and experimental probabilities of events; and uses theoretical or experimental probabilities to determine the fairness of a game.</u> Represents probabilities using fractions, decimals, or percents.</p>	<p><i>Learning Opportunities:</i></p> <ul style="list-style-type: none"> • <i>CMP: What Do You Expect?</i> – Inv. 1, 2 • <i>How Likely Is It?</i> – Inv. 1, 2, 3, 4, 5 and 6 	<p>Compare theoretical and experimental probability (6b)</p>

Grade Level 7, 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>
7.10	<p>M7: 30 Demonstrate understanding of mathematical problem solving and communication through:</p> <ul style="list-style-type: none"> • Approach & Reasoning—The reasoning, strategies, and skills used to solve the problem; • Connections—Demonstration of observations, applications, extensions, and generalizations; • Solution—All of the work that was done to solve the problem, including the answer; • Mathematical Language—The use of mathematical language in communicating the solution; • Mathematical Representation—The use of mathematical representation to communicate the solution; and • Documentation—Presentation of the solution. 	<p>Learning Opportunities: Problem solving pieces</p>	<p>Approach a problem correctly (7a)</p> <p>Provide solution with evidence (7b)</p> <p>Communicate mathematically (7c)</p>