

Northpoint Horizons

Math Elevations Correlated to the **CONNECTICUT MATHEMATICS CURRICULUM STANDARDS**

Grade 8

This document provides a sampling of the extensive math directives offered throughout the *Math Elevations* program that meet the Connecticut Mathematics Curriculum Standards. N/A denotes Not Applicable.

State Framework Grade-Level Expectations	<i>Math Elevations (Level H) Math Grade 8</i> Teacher's Guide Examples/Lessons
ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS	
1.1 Understand and describe patterns and functional relationships.	Unit 3 – Algebra Unit 5 – Advanced Algebra and Functions
<p>1. Generalize the relationships in patterns in a variety of ways including recursive and explicit descriptions; e.g., the pattern 1, 4, 7, 10... is represented as follows:</p> <ul style="list-style-type: none"> <input type="checkbox"/> recursively as “add 3 to the previous number” <input type="checkbox"/> explicitly as $3n + 1$ 	<p>5.3 – Translating and Solving Word Problems, pp. 138 – 140</p> <p>5.4 – Relations and Functions, pp. 141 – 143</p>
<p>2. Determine whether relationships are linear or nonlinear.</p>	<p>3.3 – Substituting Values for Variables in Equations, pp. 81 – 83 <i>See Challenge in lesson 3.3 for a non-linear example.</i></p> <p>5.5 – Two-Variable Equations, pp. 144 – 146</p> <p>5.6 – Graphing Linear Functions, pp. 147 – 150</p> <p>5.7 – Interpreting linear Functions, pp. 151 – 153</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>3. Write and solve problems involving proportional relationships (direct variation) using linear equations ($y = mx$).</p>	<p>5.4 – Relations and Functions, pp. 141 – 143 5.5 – Two-Variable Equations, pp. 144 – 146 5.6 – Graphing Linear Functions, pp. 147 – 150 5.7 – Interpreting Linear Functions, pp. 151 – 153 5.8 – Slope, pp. 154 – 157</p>
<p>4. Examine and make comparisons in writing between linear and non-linear mathematical relationships including $y = mx$, $y = mx^2$ and $y = mx^3$ using a variety of representations.</p>	<p><i>This expectation is not found in Level H. In a teacher directed lesson, the X-Y Pegboard manipulative can be used in conjunction with lessons 3.3 and 5.5 to make comparisons between linear and non-linear relationships.</i></p>
<p>1.2 Represent and analyze quantitative relationships in a variety of ways.</p>	<p>Unit 3 – Algebra Unit 5 – Advanced Algebra and Functions</p>
<p>5. Represent linear and nonlinear mathematical relationships with verbal descriptions, tables, graphs and equations (when possible).</p>	<p>3.3 – Substituting Values for Variables in Formulas, pp. 81 – 83 5.4 – Relations and Functions, pp. 141 – 143 5.5 – Two-Variable Equations, pp. 144 – 146 5.6 – Graphing Linear Functions, pp. 147 – 150 5.7 – Interpreting Linear Functions, pp. 151 – 153</p>
<p>6. Determine the constant rate of change in a linear relationship and recognize this as the slope of a line.</p>	<p>5.8 – Slope, pp. 154 – 157</p>
<p>7. Compare and contrast the slopes and the graphs of lines that have a positive slope, negative slope, zero slope, undefined slope, slopes greater than one and slopes between zero and one.</p>	<p>5.7 – Interpreting Linear Functions, pp. 151 – 153 5.8 – Slope, pp. 154 – 157</p>
<p>8. Compare and contrast the slopes and the graphs of lines to classify lines as parallel, perpendicular or intersecting.</p>	<p>5.7 – Interpreting Linear Functions, pp. 151 – 153 5.8 – Slope, pp. 154 – 157 <i>Perpendicular lines are not specifically addressed at this Level.</i></p>
<p>9. Interpret and describe slope and y-intercepts from contextual situations, graphs and linear equations.</p>	<p>5.7 – Interpreting Linear Functions, pp. 151 – 153 5.8 – Slope, pp. 154 – 157</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>1.3 Use operations, properties and algebraic symbols to determine equivalence and solve problems.</p>	<p>Unit 3 – Algebra Unit 5 – Advanced Algebra and Functions</p>
<p>10. Evaluate and simplify algebraic expressions, equations and formulas including those with powers using algebraic properties and the order of operations.</p>	<p>3.2 – Order of Operations, pp. 78 – 80 3.3 – Substituting Values for Variables in Equations, pp. 81 – 83 5.3 – Translating and Solving Word Problems, pp. 138 – 140 5.4 – Relations and Functions, pp. 141 – 143</p>
<p>11. Examine systems of two linear equations in context that have a common solution, i.e. point of intersection, using tables, graphs and substitution and interpret the solution.</p>	<p>5.7 – Interpreting Linear Functions, pp. 151 – 153 <i>Graphical examples of direct variation (showing intersections at the origin) can be used to introduce this topic. See 5.7 in the Student Book, pp. 81 – 84. Software such as “Super Slope” can be used to demonstrate these effects.</i></p>
<p>12. Write and solve multistep equations using various algebraic methods including the distributive property, e.g., $3(x + 2) = 10$, combining like terms, e.g., $3x + 2x = 15$, and properties of equality and justify the solutions.</p>	<p>5.1 – Solving Two-Step Equations, pp. 132 – 134 5.2 – Solving Multi-Step Equations, pp. 135 – 137 5.3 – Translating and Solving Word Problems, pp. 138 – 140</p>
<p align="center">NUMERICAL AND PROPORTIONAL REASONING</p>	
<p>2.1 Understand that a variety of numerical representations can be used to describe quantitative relationships.</p>	<p>Unit 1 – Number Sense/Integers Unit 2 – Number Theory/Fractions and Exponents Unit 4 – Ratio, Proportion, and Percent</p>
<p>1. Compare and order rational and common irrational numbers; e.g., -5, $\frac{1}{16}$, $-4\frac{1}{2}$, $\sqrt{2}$, π; and locate them on number lines, scales and coordinate grids.</p>	<p>1.1 – Integers and Absolute Value, pp. 18 – 20 1.8 – Square Roots, pp. 40 – 42</p>
<p>2. Identify perfect squares and their square roots; e.g., squares 1, 4, 9, 16... to corresponding roots 1, 2, 3, 4 ...; and use these relationships to estimate other square roots.</p>	<p>1.7 – Exponents, pp. 37 – 39 1.8 – Square Roots, pp. 40 – 42</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center"><i>Math Elevations (Level H) Math Grade 8</i> Teacher's Guide Examples/Lessons</p>
<p>3. Read and represent whole numbers and those between zero and one in scientific notation (and vice versa) and compare their magnitudes.</p>	<p>2.8 – Scientific Notation, pp. 68 – 71</p>
<p>4. Represent fractions, mixed numbers, decimals and percentages in equivalent forms.</p>	<p>4.4 – Fractions, Decimals, and Percents, pp. 114 – 116</p>
<p>2.2 Use numbers and their properties to compute flexibly and fluently and to reasonably estimate measures and quantities.</p>	<p>Unit 1 – Number Sense/Integers Unit 2 – Number Theory/Fractions and Exponents Unit 3 – Algebra Unit 4 – Ratio, Proportion, and Percent</p>
<p>5. Compute (using addition, subtraction, multiplication and division) and solve problems with positive and negative rational numbers.</p>	<p>1.3 – Adding Integers Using Absolute Value, pp. 24 – 27 1.4 – Subtracting Integers, pp. 28 - 30 1.5 – Multiplying Integers, pp. 31 – 33 1.6 – Dividing Integers, pp. 34 - 36</p>
<p>6. Calculate the square roots of positive rational numbers using technology.</p>	<p>1.8 – Square Roots, pp. 40 – 42</p>
<p>7. Develop and use strategies for multiplying and dividing with numbers expressed in scientific notation using the commutative and associative properties.</p>	<p>2.8 – Scientific Notation, pp. 68 – 71 3.1 – Commutative, Associative, and Distributive Properties, pp. 74 - 77 3.2 – Order of Operations, pp. 78 - 80</p>
<p>8. Estimate reasonable answers and solve problems in context involving rational and common irrational numbers, ratios and percentages (including percentage of increase and decrease) and justify solutions in writing.</p>	<p>4.4 – Fractions, Decimals, and Percents, pp. 114 – 116 4.5 – Solving Percent Problems Using Proportions, pp. 117 – 119 4.7 – Percent of Change, pp. 124 – 126 4.8 – Percent Applications, pp. 127 – 129</p>
<p>9. Use proportional reasoning to write and solve problems in context.</p>	<p>4.1 – Ratios and Rates, pp. 104 – 107 4.2 – Writing and Solving Proportions, pp. 108 – 110 4.3 – Scale Drawings and Models, pp. 111 – 113 4.5 – Solving Percent Problems Using a Proportion, pp. 117 – 119</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>10. Solve a variety of problems in context involving percents, including the following:</p> <ul style="list-style-type: none"> • Percentage of a number, e.g., If 65 percent of the 250 applicants will be accepted to the Arts Magnet School, how many students will be accepted? • The percentage one number is of another number, e.g., Find the percent of students who play soccer if 39 students play soccer out of a total of 387 students. • The percentage of a missing amount, e.g., 5 percent of the money from a fundraiser will be donated to a charity. If \$25 is donated to the charity, how much money was made from the fundraiser? • Percentage increase/decrease, e.g., the number of music downloads have increased from 1,345 per minute to 1,567 per minute. What is the percentage increase? 	<p>4.5 – Solving Percent Problems Using a Proportion, pp. 117 – 119</p> <p>4.6 – Using Proportions to Solve Other Percent Problems, pp. 120 – 123</p> <p>4.7 – Percent of Change, pp. 124 – 126</p> <p>4.8 – Percent Applications, pp. 127 – 129</p>
<p>11. Use the rules for exponents to multiply and divide with powers of 10 and extend to other bases.</p> <ul style="list-style-type: none"> • $10^2 \times 10^3 = 10^5$ – Add exponents • $2^5 \div 2^7 = 2^{-2}$ – Subtract exponents 	<p>2.6 – Rules of Exponents, pp. 62 – 64</p> <p>2.7 – Negative and Zero Exponents, pp. 65 – 67</p>
<p>12. Estimate answers to problems in context containing numbers expressed in scientific notation.</p>	<p>2.8 – Scientific Notation, pp. 68 – 70</p>
<p>13. Solve problems in context that involve repetitive multiplication; e.g., compound interest, depreciation; using tables, spreadsheets and calculators to develop an understanding of exponential growth and decay.</p>	<p>3.3 – Substituting Values for Variables in Equations, pp. 81 – 83</p> <p>4.8 – Percent Applications, pp. 127 – 129</p>
<p align="center">GEOMETRY AND MEASUREMENT</p>	
<p>3.1 Use properties and characteristics of two- and three- dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems.</p>	<p>Unit 3 – Algebra Unit 4 – Ratio, Proportion, and Percent Unit 6 – Geometry</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>1. Determine the effect of scale factors (resulting in similar figures) on the perimeters and areas of two-dimensional shapes and the surface areas and volumes of three- dimensional solids.</p>	<p>4.3 – Scale Drawings and Models, pp. 111 – 113 6.6 – Similarity and Dilations, pp. 177 – 179</p>
<p>2. Make and test conjectures about the angle and side relationships to determine that similar figures have congruent angles and corresponding sides proportional and congruent figures have congruent angles and sides.</p>	<p>6.5 – Congruent Triangles, pp. 174 – 176</p>
<p>3. Construct and/or examine right triangles and make and test conjectures about the relationships of the angles and sides and develop the Pythagorean theorem.</p>	<p>3.8 – Pythagorean Theorem, pp. 98 – 101</p>
<p>4. Apply side and angle relationships in geometric figures to solve problems including the Pythagorean theorem and similar figures.</p>	<p>3.8 – Pythagorean Theorem, pp. 98 – 101 6.5 – Congruent Triangles, pp. 174 – 176 6.6 – Similarity and Dilations, pp. 177 – 179</p>
<p>3.2 Use spatial reasoning, location and geometric relationships to solve problems.</p>	<p>Unit 6 – Geometry Unit 7 – Measurement</p>
<p>5. Use a coordinate plane to make and test conjectures about changes in the coordinates of the vertices of polygons as a result of a transformation (translation and/or reflection) and describe the results in writing.</p>	<p>6.7 – Reflections and Translations in the Coordinate Plane, pp. 180 – 183 6.8 – Rotations in the Coordinate Plane, pp. 184 – 186</p>
<p>6. Develop and use formulas to determine the surface areas of rectangular prisms, cylinders and pyramids.</p>	<p>7.4 – Surface Area of a Prism, pp. 199 – 202 7.5 – Surface Area of a Cylinder, pp. 203 – 204 7.6 – Surface Area of a Pyramid and a Cone, pp. 205- 207</p>
<p>7. Develop formulas using measurement strategies and concrete models; and use formulas to determine the volumes of pyramids, cones and spheres.</p>	<p>7.7 – Volume of a Prism and a Cylinder, pp. 208 – 210 7.8 – Volume of a Pyramid and a Cone, pp. 211 – 213</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>3.3 Develop and apply units, systems, formulas and appropriate tools to estimate and measure.</p>	
<p>8. Understand and describe in writing that measurement tools, measurements and estimates of measures are not precise and can affect the results of calculations.</p>	<p>7.2 – Circumference of a Circle, pp. 193 – 195 7.3 – Area of a Circle, pp. 196 – 198</p>
<p>9. Use estimation and measurement strategies, including formulas, to solve surface area and volume problems in context.</p>	<p>7.4 – Surface Area of a Prism, pp. 199 – 201 7.5 – Surface Area of a Cylinder, pp. 202 – 204 7.6 – Surface Area of a Pyramid and a Cone, pp. 205 – 207 7.7 – Volume of a Prism and a Cylinder, pp. 208 – 210 7.8 – Volume of a Pyramid and a Cone, pp. 211 – 213</p>
<p>10. Solve customary or metric measurement problems in context using Dimensional Analysis (the Unit Factor Method) and justify the results in writing.</p>	<p><i>N/A</i></p>
<p align="center">WORKING WITH DATA: PROBABILITY AND STATISTICS</p>	
<p>4.1 Collect, organize and display data using appropriate statistical and graphical methods.</p>	<p>Unit 8 – Probability, Statistics, and Data Analysis</p>
<p>1. Collect, organize and display data using an appropriate representation (including box-and-whisker plots, stem and leaf plots, scatter plots, histograms) based on the size and type of data set and purpose for its use.</p>	<p>8.4 – Scatter Plots, pp. 225 – 228 8.5 – Box-And-Whiskers Plots, pp. 229 – 232 8.6 – Line Graphs, pp. 233 – 236 8.8 – Appropriate Graphs, pp. 241 – 243</p>
<p>2. Use appropriate representations to compare and analyze large data sets.</p>	<p>8.4 – Scatter Plots, pp. 227 – 9 8.5 – Box-and-Whiskers Plots, pp. 230 – 233 8.6 – Line Graphs, pp. 234 – 237 8.8 – Appropriate Graphs, pp. 241 – 243</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>3. Identify where measures of central tendency and spread are found in graphical displays including box-and-whisker plots, stem and leaf plots, scatter plots and histograms.</p>	<p>8.3 – Mean, Median, and Mode, pp. 222 – 224 8.4 – Scatter Plots, pp. 225 – 228 8.5 – Box-And-Whiskers Plots, pp. 229 – 232 8.6 – Line Graphs, pp. 233 – 236</p>
<p>4.2 Analyze data sets to form hypotheses and make predictions.</p>	<p>Unit 8 – Probability, Statistics, and Data Analysis</p>
<p>4. Use descriptive statistics, including range, mode, median, mean, quartiles and outliers to describe data and support conclusions in writing.</p>	<p>8.3 – Mean, Median, and Mode, pp. 224 – 226</p>
<p>5. Make predictions from scatter plots by using or estimating a line-of-best-fit.</p>	<p>8.4 – Scatter Plots, pp. 227 – 229</p>
<p>6. Make observations and inferences and evaluate hypotheses based on collected and/or experimental data.</p>	<p>8.1 – Counting Methods, pp. 216 – 219 8.2 – Making Predictions, pp. 220– 223 <i>Additional work with data as it relates to observations and inferences can be found in Level G, Grade 7, Unit 8:</i> 8.1 – Possible Outcomes, pp. 212 – 214</p>
<p>7. Describe in writing the accuracy of statistical claims, e.g., 4 out of 5 dentists prefer Brand X toothpaste, by recognizing when a sample is biased or when data is misrepresented.</p>	<p>8.2 – Making Predictions, pp. 220 – 223 <i>Additional work with data as it relates to this expectation can be found in Level G, Unit 8:</i> 8.1 – Possible Outcomes, pp. 212 – 214</p>
<p>8. Explain the effects of sample size and sampling techniques (convenience sampling, voluntary response sampling, systematic sampling and random sampling) on statistical claims.</p>	<p><i>N/A</i></p>
<p>4.3 Understand and apply basic concepts of probability.</p>	<p>Unit 8 – Probability, Statistics, and Data Analysis</p>

<p align="center">State Framework Grade-Level Expectations</p>	<p align="center">Math Elevations (Level H) Math Grade 8 Teacher’s Guide Examples/Lessons</p>
<p>9. Determine when a situation is a permutation (changing the order results in a different outcome) or a combination (changing the order does not result in a different outcome).</p>	<p><i>This expectation is found in Level G, Unit 8:</i> 8.2 – Permutations, pp. 215 – 217 8.3 – Combinations, pp. 218 – 220</p>
<p>10. Use tree diagrams, lists or the Counting Principle to determine all possible outcomes in permutations and combinations.</p>	<p>8.1 – Counting Methods, pp. 216 – 219 8.2 – Making Predictions, pp. 220 – 223 <i>Additional exploration with this expectation can also be found in Level G, Unit 8:</i> 8.2 – Permutations, pp. 215 – 217 8.3 – Combinations, pp. 218 – 220</p>
<p>11. Apply permutations and combinations to predict possible outcomes and find probabilities to solve problems in a variety of contexts.</p>	<p>8.2 – Making Predictions, pp. 220 – 223 <i>Additional exploration with this expectation can also be found in Level G, Grade 7, Unit 8:</i> 8.1 – Possible Outcomes, pp. 212 – 214 8.2 – Permutations, pp. 215 – 217 8.3 – Combinations, pp. 218 – 220</p>