New England Common Assessment Program

High School Expectations

Mathematics

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This set of NECAP Grade Expectations (GEs) for high school represents the expectations that will be assessed on the state-level assessment; these expectations are not intended to represent the full high school mathematics curriculum, but are meant to capture concepts and skills related to "big ideas" of mathematics that can be assessed in an on-demand setting. Each partner state has developed a set of local GEs to accompany these NECAP GEs for local assessment purposes. These local GEs include concepts and skills not easily assessable in an on-demand setting.

As you review the NECAP GEs in Mathematics the following are important to understand.

1) The NECAP GEs are organized into four content strands (Number and Operations; Geometry and Measurement; Functions and Algebra; and Data, Statistics, and Probability).
2) Since it is crucial that process standards (problem-solving, reasoning, proof, communication, connections, and representations) are not seen separate from content standards, the process standards have been embedded throughout the content strands (e.g., M(F&A)–HS–1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations). This mirrors classroom instruction in most classes. As students are learning content knowledge, instruction is focusing on improving their abilities in problem solving, reasoning, and communication. Students should be looking for and making appropriate connections, and should be able to understand and use multiple representations of mathematical ideas.
3) Each GE includes a **bolded** statement called the "stem." The stem is meant to communicate the main curricular and instructional focus across grades. Each "stem" is the same or similar across the grades. That is, the high school NECAP stems are the same or similar to the stems found in the NECAP elementary and middle school expectations. Furthermore, the numbering of the stems in this document is consistent with the numbering of the stems in the elementary and middle school expectations. Thus, if a cell indicates "Not assessed on NECAP at this level" one needs to look at the elementary and middle school document to determine the stem at those grade levels or refer to the high school local expectations for one's state to determine if the concept is reserved as a local assessment option in high school.
4) The unbolded text within a GE indicates the specifics at the given grade-span.
5) Each GE is coded for the content strand, grade level, and the GE "stem" number (e.g., M(F&A)–HS–3: The "M" stands for mathematics, the "F&A" stands for the Functions and Algebra strand, the "HS" indicates that the standard is a state assessment standard for High School, and the "3" stands for stem 3 or the 3rd big idea in the Functions and Algebra strand). See the diagram on page 2.
6) The number parameters defined in the Number and Operations strand apply across the other content strands, unless otherwise specified.
7) All the concepts and skills identified in the NECAP GEs are fair game for assessment purposes. However, while all parts of a GE may be assessed each year, it is more likely that all parts of a GE will be assessed over several years.
8) In some places, you will see or^{sc} ("sc" stands for "student choice"). While, in general, students have choices as to the strategies they may use to solve problems, or^{sc} is used to explicitly state to the testing contractor that a particular strategy could not be required. For example, as in M(DSP)–HS–4: "…using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or^{sc} others)."

Reading the Mathematics Grade Expectations

STRAND: In this case, "DSP" stands for Data, Statistics, and Probability

GRADE LEVEL: "HS" indicates a state assessment standard for High School

STEM – Bolded statement communicating main curricular focus and is the same or similar across grades (K-12)

STEM Number: The big ideas in each strand are numbered. In this case, "2" indicates the 2nd big idea in the Data, Statistics, and Probability strand.

CONTENT AREA: "M" stands for mathematics

M(DSP)–HS–2 **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 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.

Number and Operations
M(N&O)–HS–1 Not Assessed on NECAP at this Level
M(N&O)–HS–2 **Demonstrates understanding of the relative magnitude of real numbers** by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.
M(N&O)–HS–3 Not Assessed on NECAP at this Level
M(N&O)–HS–4 **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).
M(N&O)–HS–5 Not Assessed on NECAP at this Level
M(N&O)–HS–6 Not Assessed on NECAP at this Level
M(N&O)–HS–7 Not Assessed on NECAP at this Level
M(N&O)–HS–8 Not Assessed on NECAP at this Level

Geometry and Measurement
M(G&M)–HS–1 Not Assessed on NECAP at this Level
M(G&M)–HS–2 **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).
M(G&M)–HS–3 Not Assessed on NECAP at this Level
M(G&M)–HS–4 **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.
M(G&M)–HS–5 **Applies concepts of similarity by solving problems** within mathematics or across disciplines or contexts.
M(G&M)–HS–6 **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.
M(G&M)–HS–7 **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 GEs.
M(G&M)–HS–8 Not Assessed on NECAP at this Level
M(G&M)–HS–9 **Solves problems on and off the coordinate plane** involving distance, midpoint, perpendicular and parallel lines, or slope.
M(G&M)–HS–10 Not Assessed on NECAP at this Level

Functions and Algebra
M(F&A)–HS–1 **Identifies, extends, and generalizes a variety of patterns** (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations.
M(F&A)–HS–2 **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).
M(F&A)–HS–3 **Demonstrates conceptual understanding of algebraic expressions** by solving 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.
M(F&A)–HS–4 **Demonstrates conceptual 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.

Data, Statistics, and Probability
M(DSP)–HS–1 **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). (IMPORTANT: *Analyzes data consistent with concepts and skills in M(DSP)–HS–2*.)
M(DSP)–HS–2 **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 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.
M(DSP)–HS–3 **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)–HS–1.
M(DSP)–HS–4 **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[sc] others).
M(DSP)–HS–5 **Solves problems involving experimental or theoretical probability.**
M(DSP)–HS–6 Not Assessed on NECAP at this Level

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