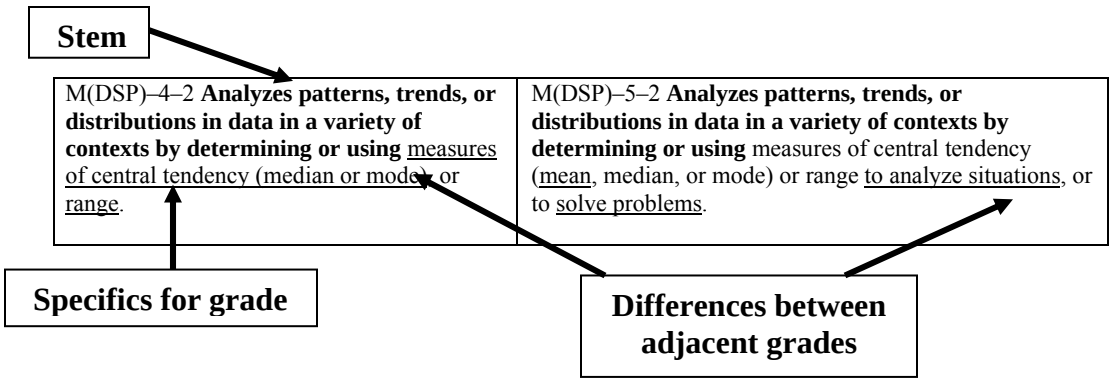
NECAP Mathematics Grade-Level Expectations For Grade 6

The New England Common Assessment Program (NECAP) Mathematics GLEs have been developed as a means to identify the concepts and skills expected of all students for large-scale assessment of mathematics in grades 3–8; they <u>are not intended</u> to represent the full mathematics curriculum at each grade level, but are meant to capture concepts and skills related to "big ideas" of mathematics that can be assessed in an on-demand setting that focus the curriculum, but do not narrow the curriculum. Each partner state intends to develop a set of local GLEs to accompany these GLEs for local assessment purposes that includes the concepts and skills not easily assessable in an on-demand setting, and therefore not included in this set of GLEs.

The NECAP GLEs in this document can be interpreted as describing grade-level expectations for the end of the grade identified, or in the beginning of the next grade.

As you review the NECAP Mathematics Grade-Level Expectations the following are important to understand.

1) The NECAP GLEs are organized into four content strands: Number and Operations; Functions and Algebra; Data, Statistics, and Probability; and Geometry and Measurement.
2) Problem solving, reasoning, connections, and communication are embedded throughout this set of GLEs instead of as separate strands.
3) Each GLE includes a **bolded** statement called the "stem." Each "stem" is the same or similar across the grades for a given GLE, and is meant to communicate the main curriculum and instructional focus of the GLE across the grades.
4) The unbolded text within a GLE indicates how the GLE is specified at a given grade level.
5) At each grade level differences from previous grades are <u>underlined</u>. (Note: Sometimes nothing is underlined within a GLE. In these situations examine other GLEs across the strand to identify the differences.)
6) Each GLE is coded for the content strand, grade level, and the GLE "stem" number (e.g., M(F&A)–6–3: The "M" stands for mathematics, the "F&A" stands for the functions and algebra strand, the "6" stands for grade 6, and the "3" stands for stem 3).
7) An empty cell means that the GLE "stem" will not be assessed at that grade on the state-level on-demand assessment, but is reserved for local curriculum and assessment.
8) Unless otherwise specified the number parameters for a given grade in M(N&O)–X–1 apply to all GLEs at that grade level.
9) Only number concepts identified at a grade level in the NECAP Numbers and Operations strand will be assessed and reported. However, all number concepts acquired up to a grade can be used in other content strands unless otherwise specified.
10) All the concepts and skills identified at a given grade level are "fair game" for assessment purposes. However, conjunctions in this document have specific meaning. The conjunction "and" separates parts of a GLE that will be assessed every year (to the extent possible), while the conjunction "or" separates parts of the GLE that may be assessed each year, but will be more likely to be assessed over several years. In some situations "or[sc]" is used. While students will have choices on strategies they use or methods to communicate their thinking throughout the assessment, there are special cases that the New England partners thought it was necessary to communicate to the test developer that students should not be required to use a specific method (e.g., "…writes in words or[sc] symbols…").



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Number and Operations

Grade 6

M(N&O)–6–1 **Demonstrates conceptual understanding of rational numbers with respect to** ratios (comparison of two whole numbers by division a/b, $a : b$, and $a \div b$, where $b \neq 0$); and rates (e.g., a out of b, 25%) **using models, explanations, or other representations***.

***Specifications for area, set, and linear models for grades 5 – 8**: **Fractions:** The number of parts in the whole are equal to the denominator, a multiple of the denominator, or a factor of the denominator. **Percents:** The number of parts in the whole is equal to 100, a multiple of 100, or a factor of 100 (for grade 5); the number of parts in the whole is a multiple or a factor of the numeric value representing the whole (for grades 6-8). **Decimals (including powers of ten)**: The number of parts in the whole is equal to the denominator of the fractional equivalent of the decimal, a multiple of the denominator of the fractional equivalent of the decimal, or a factor of the denominator of the fractional equivalent of the decimal.

M(N&O)–6–2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing numbers with whole number bases and whole number exponents (e.g.,3^3, 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1- 100) using number lines or equality and inequality symbols.

M(N&O)–6–3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g.,3^3, 4^3); and the effect on the magnitude of a whole number when multiplying or dividing it by a whole number, decimal, or fraction.

M(N&O)–6–4 **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple.

(IMPORTANT*: Applies the conventions of order of operations with and without parentheses.*)

Geometry and Measurement

M(G&M)–6–1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish** among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

M(G&M)–6–3 **Uses properties or attributes** (shape of bases, number of lateral faces, number of bases, number of edges, or number of vertices) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

M(G&M)–6–5 **Demonstrates conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.

M(G&M)–6–6 **Demonstrates conceptual understanding of perimeter** of polygons, **the area of** quadrilaterals or triangles, and **the volume of** rectangular prisms by using models, formulas, or by solving problems; and **demonstrates understanding of the relationships of circle measures** (radius to diameter and diameter to circumference) by solving related problems. Expresses all measures using appropriate units.

M(G&M)–6–7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands.

Benchmarks in Appendix B.

Functions and Algebra

M(F&A)–6–1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or[sc] symbols for finding specific cases of a nonlinear relationship; and writes an expression or[sc] equation using words or[sc] symbols to express the **generalization** of a linear relationship (e.g., twice the term number plus 1 or[sc] $2n + 1$).

M(F&A)–6–2 **Demonstrates conceptual understanding of linear relationships** ($y = kx$; $y = mx + b$) **as a constant rate of change** by constructing or interpreting graphs of real occurrences and describing the slope of linear relationships (faster, slower, greater, or smaller) in a variety of problem situations; **and describes how change in the value of one variable relates to change in the value of a second variable** in problem situations with constant rates of change.

M(F&A)–6–3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent

unknown quantities to write linear algebraic expressions involving two or more of the four operations; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 3x - 2$).
M(F&A)–6–4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.
Data, Statistics, and Probability
M(DSP)–6–1 **Interprets a given representation** (circle graphs, line graphs, or stem-and-leaf plots) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M(DSP)–6–2.*)
M(DSP)–6–2 **Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or dispersion (range) to analyze situations, or to solve problems.
M(DSP)–6–4 **Uses counting techniques to solve problems** in context involving combinations or simple permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or[sc] others).
M(DSP)–6–5 **For a probability event in which the sample space may or may not contain equally likely outcomes, determines** the experimental or theoretical probability of an event in a problem-solving situation.

Appendix B: Measurement Benchmarks

The following is a list of the measurement benchmarks and equivalences that ***can be used*** in problems across the content strands at each grade level to address the expectations in M(G&M)–X–7 for the NECAP Assessment.

M(G&M)–X–7 **Uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands.

The type of measure (e.g., length, time, etc.), the unit (e.g., inches, feet, etc.), the degree of accuracy where appropriate (e.g., ½ inch); and equivalences (e.g., 12 inches in a foot) are identified for grades 2 – 8. In addition to measurement benchmarks identified below students will be expected to use the appropriate units when solving problems involving area, volume, surface area, conversions, and rates (e.g., miles per hour, price per pound, pounds per square inch) on the NECAP Assessment.

Measures	**Grade 6**
Length	**Units (accuracy):** Inch (to 1/16 inch); Foot; Centimeter (to 1/10 centimeter); Meter (to 1/100 meter); Yard; Mile (use in scale and rate questions); Kilometer (use in scale and rate questions) **Equivalencies:** 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter; 1000 millimeters in 1 meter
Time	**Unit (accuracy):** Hour (to 1 minute); Day; Year **Equivalencies:** 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	**Unit (accuracy):**

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	Cº and Fº (to 1 degree)
Capacity	**Unit (accuracy):** Quarts (to 1 ounce); Gallon; Pint; Liter **Equivalencies:** 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart; 1000 milliliters in 1 liter
Mass	**Unit (accuracy):** Kilogram; Gram (to 1/10 gram)
Weight	**Unit (accuracy):** Pound (to 1 ounce) **Equivalencies:** 16 ounces in 1 pound
Angles and Rotation	**Unit (accuracy):** Degree (to 2 degrees) **Equivalencies:** 360º in 1 circle; 90º in 1 right angle