

**Massachusetts State Standards  
correlated to  
Merit Software Math Programs**

The 2000 Mathematics Curriculum Framework is one of seven sets of standards created to advance educational reform in Massachusetts. It is the work of teachers and administrators in pre-kindergarten through grade 12, mathematics education professors, university mathematicians, and community members working with staff from the Department of Education. The ten **Guiding Principles** articulate a set of beliefs about the teaching, learning, and assessing of speaking, viewing, listening, reading, and writing. Five **strands** organize the mathematical content: Number Sense and Operations; Patterns, Relations, and Algebra; Geometry; Measurement; and Data Analysis, Statistics, and Probability. At the beginning of each strand are the **broad concepts** from *NCTM Standards 2000*; they guide the clustering of the **Learning Standards** for PreK–2, 3–4, 5–6, 7–8, 9–10, and 11–12 and the courses Algebra I, Geometry, Algebra II, and Precalculus.

Merit’s Math programs address the following Massachusetts State Standards:

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Grades 3-4

Strand	Broad Concept	Learning Standard	Merit Software
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.1 Exhibit an understanding of the base ten number system by reading, modeling, writing, and interpreting whole numbers to at least 100,000; demonstrating an understanding of the values of the digits; and comparing and ordering the numbers. +	Word Problem Shape-Up Set 1, 2, 3
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.2 Represent, order, and compare large numbers (to at least 100,000) using various forms, including expanded notation, e.g., $853 = 8 \times 100 + 5 \times 10 + 3$ . +	Word Problem Shape-Up Set 1, 2, 3

Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.3 Demonstrate an understanding of fractions as parts of unit wholes, as parts of a collection, and as locations on the number line. +	Word Problem Shape-Up Set 1, 2, 3; Fraction Shape-Up
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.4 Select, use, and explain models to relate common fractions and mixed numbers ( $\frac{1}{2}$ , $\frac{1}{3}$ , $\frac{1}{4}$ , $\frac{1}{5}$ , $\frac{1}{6}$ , $\frac{1}{8}$ , $\frac{1}{10}$ , $\frac{1}{12}$ , and $1\frac{1}{2}$ ), find equivalent fractions, mixed numbers, and decimals, and order fractions. +	Word Problem Shape-Up Set 1, 2, 3; Fraction Shape-Up
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.5 Identify and generate equivalent forms of common decimals and fractions less than one whole (halves, quarters, fifths, and tenths). +	Word Problem Shape-Up Set 1, 2, 3; Fraction Shape-Up
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.8 Select, use, and explain various meanings and models of multiplication and division of whole numbers. Understand and use the inverse relationship between the two operations. ●	Word Problem Shape-Up Set 1, 2, 3
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.N.9 Select, use, and explain the commutative, associative, and identity properties of operations on whole numbers in problem situations, e.g., $37 \times 46 = 46 \times 37$ , $(5 \times 7) \times 2 = 5 \times (7 \times 2)$ . ●	Word Problem Shape-Up Set 1, 2, 3
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.P.1 Create, describe, extend, and explain symbolic (geometric) and numeric patterns, including multiplication patterns like 3, 30, 300, 3000, ... +	Word Problem Shape-Up Set 1, 2, 3
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.P.4 Use pictures, models, tables, charts, graphs, words, number sentences, and mathematical notations to interpret mathematical relationships. ▲	Word Problem Shape-Up Set 1, 2, 3

Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.P.5 Solve problems involving proportional relationships, including unit pricing (e.g., four apples cost 80¢, so one apple costs 20¢) and map interpretation (e.g., one inch represents five miles, so two inches represent ten miles). ▲	Word Problem Shape-Up Set 1, 2, 3
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.M.1 Demonstrate an understanding of such attributes as length, area, weight, and volume, and select the appropriate type of unit for measuring each attribute. +	Word Problem Shape-Up Set 1, 2, 3
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.M.1 Demonstrate an understanding of such attributes as length, area, weight, and volume, and select the appropriate type of unit for measuring each attribute. +	Word Problem Shape-Up Set 1, 2, 3
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.M.3 Identify time to the minute on analog and digital clocks using a.m. and p.m. Compute elapsed time using a clock (e.g., hours and minutes since...) and using a calendar (e.g., days since...). ●	Word Problem Shape-Up Set 1, 2, 3
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.M.4 Estimate and find area and perimeter of a rectangle, triangle, or irregular shape using diagrams, models, and grids or by measuring. ●	Word Problem Shape-Up Set 1, 2, 3
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.D.1 Collect and organize data using observations, measurements, surveys, or experiments, and identify appropriate ways to display the data. +	Word Problem Shape-Up Set 1, 2, 3
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.D.2 Match a representation of a data set such as lists, tables, or graphs (including circle graphs) with the actual set of data. ●	Word Problem Shape-Up Set 1, 2, 3

Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.D.3 Construct, draw conclusions, and make predictions from various representations of data sets, including tables, bar graphs, pictographs, line graphs, line plots, and tallies. ▲	Word Problem Shape-Up Set 1, 2, 3
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.D.4 Represent the possible outcomes for a simple probability situation, e.g., the probability of drawing a red marble from a bag containing three red marbles and four green marbles. ■	Word Problem Shape-Up Set 1, 2, 3
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.D.5 List and count the number of possible combinations of objects from three sets, e.g., how many different outfits can one make from a set of three shirts, a set of two skirts, and a set of two hats? ■	Word Problem Shape-Up Set 1, 2, 3
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	4.D.6 Classify outcomes as certain, likely, unlikely, or impossible by designing and conducting experiments using concrete objects such as counters, number cubes, spinners, or coins. ■	Word Problem Shape-Up Set 1, 2, 3

Grades 5-6

Strand	Broad Concept	Learning Standard	Merit Software
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.4 Demonstrate an understanding of fractions as a ratio of whole numbers, as parts of unit wholes, as parts of a collection, and as locations on the number line. +	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.5 Identify and determine common equivalent fractions, mixed numbers, decimals, and percents. +	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2

Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.6 Find and position integers, fractions, mixed numbers, and decimals (both positive and negative) on the number line. +	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.7 Compare and order integers (including negative integers), and positive fractions, mixed numbers, decimals, and percents. +	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.9 Select and use appropriate operations to solve problems involving addition, subtraction, multiplication, division, and positive integer exponents with whole numbers, and with positive fractions, mixed numbers, decimals, and percents. ●	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.11 Apply the Order of Operations for expressions involving addition, subtraction, multiplication, and division with grouping symbols (+, -, x, ÷). ●	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.13 Accurately and efficiently add, subtract, multiply, and divide (with double-digit divisors) whole numbers and positive decimals. ▲	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.N.14 Accurately and efficiently add, subtract, multiply, and divide positive fractions and mixed numbers. Simplify fractions. ▲	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.P.3 Use the properties of equality to solve problems, e.g., if $\square + 7 = 13$ , then $\square = 13 - 7$ , therefore $\square = 6$ ; if $3 \times \square = 15$ , then $\frac{1}{3} \times 3 \times \square = \frac{1}{3} \times 15$ , therefore $\square = 5$ . ●	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.P.5 Solve linear equations using concrete models, tables, graphs, and paper-pencil methods. ▲	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1

Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.P.6 Produce and interpret graphs that represent the relationship between two variables in everyday situations. ▲	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.M.3 Solve problems involving proportional relationships and units of measurement, e.g., same system unit conversions, scale models, maps, and speed. ●	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.D.1 Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range. ●	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	6.D.4 Predict the probability of outcomes of simple experiments (e.g., tossing a coin, rolling a die) and test the predictions. Use appropriate ratios between 0 and 1 to represent the probability of the outcome and associate the probability with the likelihood of the event. ■	Word Problem Shape-Up Set 1, 2, 3; Basic Algebra Shape-Up Set 1

Grades 7-8

Strand	Broad Concept	Learning Standard	Merit Software
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.N.1 Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.N.3 Use ratios and proportions in the solution of problems, in particular, problems involving unit rates, scale factors, and rate of change.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2

Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.N.8 Demonstrate an understanding of the properties of arithmetic operations on rational numbers. Use the associative, commutative, and distributive properties; properties of the identity and inverse elements (e.g., $-7 + 7 = 0$ ; $\frac{3}{4} \times \frac{4}{3} = 1$ ); and the notion of closure of a subset of the rational numbers under an operation (e.g., the set of odd integers is closed under multiplication but not under addition).	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.N.9 Use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems, e.g. multiplying by $\frac{1}{2}$ or 0.5 is the same as dividing by 2.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.N.10 Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1).	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.N.12 Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.P.1 Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions, e.g., compounding.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1

Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.P.2 Evaluate simple algebraic expressions for given variable values, e.g., $3a^2 - b$ for $a = 3$ and $b = 7$ .	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.M.1 Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.M.2 Given the formulas, convert from one system of measurement to another. Use technology as appropriate.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.M.4 Use ratio and proportion (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Data Analysis, Statistics, and Probability	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	8.D.1 Describe the characteristics and limitations of a data sample. Identify different ways of selecting a sample, e.g., convenience sampling, responses to a survey, random sampling.	Word Problem Shape-Up Set 1, 2, 3; Basic Algebra Shape-Up Set 1

Grades 9-10

Strand	Broad Concept	Learning Standard	Merit Software
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	10.N.1 Identify and use the properties of operations on real numbers, including the associative, commutative, and distributive properties; the existence of the identity and inverse elements for addition and multiplication; the existence of $n^{\text{th}}$ roots of positive real numbers for any positive integer $n$ ; and the inverse relationship between taking the $n^{\text{th}}$ root of and the $n^{\text{th}}$ power of a positive real number.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	10.N.4 Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers.	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	A1.P.1 Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative, recursive (e.g., Fibonacci Numbers), linear, quadratic, and exponential functional relationships. (10.P.1)	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Measurement	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	10.M.3 Relate changes in the measurement of one attribute of an object to changes in other attributes, e.g., how changing the radius or height of a cylinder affects its surface area or volume.	Word Problem Shape-Up Set 1, 2, 3; Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2

Algebra I

Strand	Broad Concept	Learning Standard	Merit Software
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	AI.N.1 Identify and use the properties of operations on real numbers, including the associative, commutative, and distributive properties; the existence of the identity and inverse elements for addition and multiplication; the existence of $n^{\text{th}}$ roots of positive real numbers for any positive integer $n$ ; and the inverse relationship between taking the $n^{\text{th}}$ root of and the $n^{\text{th}}$ power of a positive real number. (10.N.1)	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Number Sense and Operations	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	AI.N.4 Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers. (10.N.4)	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	AI.P.1 Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative, recursive (e.g., Fibonacci Numbers), linear, quadratic, and exponential functional relationships. (10.P.1)	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	AI.P.2 Use properties of the real number system to judge the validity of equations and inequalities, to prove or disprove statements, and to justify every step in a sequential argument.	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2
Patterns, Relations, and Algebra	Students engage in problem solving, communicating, reasoning, connecting, and representing as they:	AI.P.4 Translate between different representations of functions and relations: graphs, equations, point sets, and tabular.	Pre-Algebra Shape-Up; Basic Algebra Shape-Up Set 1 & 2