Wisconsin Mathematics State Standards
Correlated to Merit Software Mathematics Programs

Standard A: Mathematical Processes
Grades K-4

By the end of **grade four**, students will:

A.4.1 Use reasoning abilities to

- ☒ perceive patterns
- ☒ identify relationships
- ☒ formulate questions for further exploration
- ☒ justify strategies
- ☒ test reasonableness of results

A.4.2 Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models*

A.4.3 Connect mathematical learning with other subjects, personal experiences, current events, and personal interests

- ☒ see relationships between various kinds of problems and actual events
- ☒ use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies)

A.4.4 Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work

A.4.5 Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence

Merit Software: Fraction Shape-up

Standard A: Mathematical Processes
Grades 5-8

By the end of **grade eight,** students will:

A.4.1 Use reasoning abilities to

- ☒ perceive patterns
- ☒ identify relationships
- ☒ formulate questions for further exploration
- ☒ justify strategies

- ☒ test reasonableness of results

A.4.2 Communicate mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models*

A.4.3 Connect mathematical learning with other subjects, personal experiences, current events, and personal interests

- ☒ see relationships between various kinds of problems and actual events
- ☒ use mathematics as a way to understand other areas of the curriculum (e.g., measurement in science, map skills in social studies)

A.4.4 Use appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work

A.4.5 Explain solutions to problems clearly and logically in oral and written work and support solutions with evidence

Merit Software: Word Problem Shape-Up

Standard A: Mathematical Processes
Grades 9-12

By the end of **grade twelve**, students will:

A.12.1 Use reason and logic to

- ☒ evaluate information
- ☒ perceive patterns
- ☒ identify relationships
- ☒ formulate questions, pose problems, and make and test conjectures
- ☒ pursue ideas that lead to further understanding and deeper insight

A.12.2 Communicate logical arguments and clearly show

- ☒ why a result does or does not make sense
- ☒ why the reasoning is or is not valid
- ☒ an understanding of the difference between examples that support a conjecture and a proof of the conjecture

A.12.3 Analyze non-routine* problems and arrive at solutions by various means, including models* and simulations, often starting with provisional conjectures and progressing, directly or indirectly, to a solution, justification, or counter-example

A.12.4 Develop effective oral and written presentations employing correct mathematical terminology, notation, symbols, and conventions for mathematical arguments and display of data

A.12.5 Organize work and present mathematical procedures and results clearly, systematically, succinctly, and correctly

A.12.6 Read and understand

- ☒ mathematical texts and other instructional materials
- ☒ writing about mathematics (e.g., articles in journals)mathematical ideas as they are used in other contexts

Merit Software: Word Problem Shape-Up

Standard B: Number Operations and Relationships
Grades K-4

By the end of **grade four**, students will:

B.4.1 Represent and explain whole numbers*, decimals, and fractions with

- ☒ physical materials
- ☒ number lines and other pictorial models*
- ☒ verbal descriptions
- ☒ place-value concepts and notation
- ☒ symbolic renaming (e.g., 43=40+3=30+13)

B.4.2 Determine the number of things in a set by

grouping and counting (e.g., by threes, fives, hundreds)
combining and arranging (e.g., all possible coin combinations amounting to thirty cents)
estimation, including rounding

B.4.3 Read, write, and order whole numbers*, simple fractions (e.g., halves, fourths, tenths, unit fractions*) and commonly-used decimals (monetary units)

B.4.4 Identify and represent equivalent fractions for halves, fourths, eighths, tenths, six-teenths

B.4.5 In problem-solving situations involving whole numbers, select and efficiently use appropriate computational procedures such as

- ☒ recalling the basic facts of addition, subtraction, multiplication, and division
- ☒ using mental math (e.g., 37+25, 40x7)
- ☒ estimation
- ☒ selecting and applying algorithms* for addition, subtraction, multiplication, and division
- ☒ using a calculator

B.4.6 Add and subtract fractions with like denominators

B.4.7 In problem-solving situations involving money, add and subtract decimals

Merit Software: Fraction Shape-up

Standard B: Number Operations and Relationships
Grades 5-8

By the end of **grade eight**, students will:

B.8.1 Read, represent, and interpret various rational numbers* (whole numbers*, integers*, decimals, fractions, and percents) with verbal descriptions, geometric models*, and mathematical notation (e.g., expanded*, scientific*, exponential*)

B.8.2 Perform and explain operations on rational* numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals, determine absolute value)

B.8.3 Generate and explain equivalencies among fractions, decimals, and percents

B.8.4 Express order relationships among rational numbers using appropriate symbols (>, <, >, <, ≠)

B.8.5 Apply proportional thinking in a variety of problem situations that include, but are not limited to

- ☒ ratios and proportions (e.g., rates, scale drawings*, similarity*)
- ☒ percents, including those greater than 100 and less than one (e.g., discounts, rate of increase or decrease, sales tax)

B.8.6 Model* and solve problems involving number-theory concepts such as

- ☒ prime* and composite numbers
- ☒ divisibility and remainders
- ☒ greatest common factors
- ☒ least common multiples

B.8.7 In problem-solving situations, select and use appropriate computational procedures with rational numbers such as

- ☒ calculating mentally
- ☒ estimating
- ☒ creating, using, and explaining algorithms*
- ☒ using technology (e.g., scientific calculators, spreadsheets)

Merit Software: Pre-Algebra Shape-Up; Basic Algebra Shape-up; Word Problem Shape-Up

Standard B: Number Operations And Relationships

Grades 9-12

By the end of **grade twelve**, students will:

B.12.1 Use complex counting procedures such as union and intersection of sets and arrangements (permutations* and combinations*) to solve problems

B.12.2 Compare real numbers using

- ☒ order relations (>,<) and transitivity*
- ☒ ordinal scales including logarithmic (e.g., Richter, pH rating)
- ☒ arithmetic differences
- ☒ ratios, proportions, percents, rates of change

B.12.3 Perform and explain operations on real numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals, determine absolute value)

B.12.4 In problem-solving situations involving the application of different number systems (natural, integers, rational*, real*) select and use appropriate

- ☒ computational procedures
- ☒ properties (e.g., commutativity*, associativity*, inverses*)
- ☒ modes of representation (e.g., rationals as repeating decimals, indicated roots as fractional exponents)

B.12.5 Create and critically evaluate numerical arguments presented in a variety of classroom and real-world situations (e.g., political, economic, scientific, social)

B.12.6 Routinely assess the acceptable limits of error when

- ☒ evaluating strategies
- ☒ testing the reasonableness of results
- ☒ using technology to carry out computations

Merit Software: Pre-Algebra Shape-Up; Basic Algebra Shape-up; Word Problem Shape-Up

Standard D: Measurement

Grades 3-4

By the end of **grade four**, students will:

D.4.1 Recognize and describe measurable attributes*, such as length, liquid capacity, time, weight (mass), temperature, volume, monetary value, and angle size, and identify the appropriate units to measure them

D.4.2 Demonstrate understanding of basic facts, principles, and techniques of measurement, including

- ☒ appropriate use of arbitrary* and standard units (metric and US Customary)
- ☒ appropriate use and conversion of units within a system (such as yards, feet, and inches; kilograms and grams; gallons, quarts, pints, and cups)
- ☒ judging the reasonableness of an obtained measurement as it relates to prior experience and familiar benchmarks

D.4.3 Read and interpret measuring instruments (e.g., rulers, clocks, thermometers)

D.4.4 Determine measurements directly* by using standard tools to these suggested degrees of accuracy

- ☒ length to the nearest half-inch or nearest cm
- ☒ weight (mass) to the nearest ounce or nearest 5 grams
- ☒ temperature to the nearest 5
- ☒ time to the nearest minute
- ☒ monetary value to dollars and cents
- ☒ liquid capacity to the nearest fluid ounce

D.4.5 Determine measurements by using basic relationships (such as perimeter and area) and approximate measurements by using estimation techniques

Merit Software: Fraction Shape-Up

Standard D: Measurement

Grades 5-8

By the end of **grade eight,** students will:

D.8.1 Identify and describe attributes* in situations where they are not directly* or easily measurable (e.g., distance, area of an irregular figure, likelihood of occurrence)

D.8.2 Demonstrate understanding of basic measurement facts, principles, and techniques including the following

- ☒ approximate comparisons between metric and US Customary units (e.g., a liter and a quart are about the same; a kilometer is about six-tenths of a mile)
- ☒ knowledge that direct measurement* produces approximate, not exact, measures
- ☒ the use of smaller units to produce more precise measures

D.8.3 Determine measurement directly* using standard units (metric and US Customary) with these suggested degrees of accuracy

- ☒ lengths to the nearest mm or 1/16 of an inch
- ☒ weight (mass) to the nearest 0.1 g or 0.5 ounce
- ☒ liquid capacity to the nearest ml
- ☒ angles to the nearest degree
- ☒ temperature to the nearest C or F
- ☒ elapsed time to the nearest second

D.8.4 Determine measurements indirectly* using

- ☒ estimation
- ☒ conversion of units within a system (e.g., quarts to cups, millimeters to centimeters)
- ☒ ratio and proportion (e.g., similarity*, scale drawings*)
- ☒ geometric formulas to derive lengths, areas, volumes of common figures (e.g., perimeter, circumference, surface area)
- ☒ the Pythagorean* relationship
- ☒ geometric relationships and properties for angle size (e.g., parallel lines and transversals; sum of angles of a triangle; vertical angles*)

Merit Software: Word Problem Shape-Up

Standard D: Measurement

Grades 9- 12

By the end of **grade twelve,** students will:

D.12.1 Identify, describe, and use derived attributes* (e.g., density, speed, acceleration, pressure) to represent and solve problem situations

D.12.2 Select and use tools with appropriate degree of precision to determine measurements directly* within specified degrees of accuracy and error (tolerance)

D.12.3 Determine measurements indirectly*, using

- ☒ estimation
- ☒ proportional reasoning, including those involving squaring and cubing (e.g., reasoning that areas of circles are proportional to the squares of their radii)
- ☒ techniques of algebra, geometry, and right triangle trigonometry
- ☒ formulas in applications (e.g., for compound interest, distance formula)

- ☒ geometric formulas to derive lengths, areas, or volumes of shapes and objects (e.g., cones, parallelograms, cylinders, pyramids)
- ☒ geometric relationships and properties of circles and polygons (e.g., size of central angles, area of a sector of a circle)
- ☒ conversion constants to relate measures in one system to another (e.g., meters to feet, dollars to Deutschmarks

Merit Software: Basic Algebra Shape-up; Word Problem Shape-Up

Standard E: Statistics and Probability

Grade 3-4

By the end of **grade four,** students will:

E.4.1 Work with data in the context of real-world situations by

- ☒ formulating questions that lead to data collection and analysis
- ☒ determining what data to collect and when and how to collect them
- ☒ collecting, organizing, and displaying data
- ☒ drawing reasonable conclusions based on data

E.4.2 Describe a set of data using

- ☒ high and low values, and range*
- ☒ most frequent value (mode*)
- ☒ middle value of a set of ordered data (median*)

E.4.3 In problem-solving situations, read, extract, and use information presented in graphs, tables, or charts

E.4.4 Determine if future events are more, less, or equally likely, impossible, or certain to occur

E.4.5 Predict outcomes of future events and test predictions using data from a variety of sources

Standard E: Statistics and Probability

Grades 5-8

By the end of **grade eight,** students will:

E.8.1 Work with data in the context of real-world situations by:

- ☒ formulating questions that lead to data collection and analysis
- ☒ designing and conducting a statistical investigation
- ☒ using technology to generate displays, summary statistics*, and presentations

E.8.2 Organize and display data from statistical investigations using:

- ☒ appropriate tables, graphs, and/or charts (e.g., circle, bar or line for multiple sets of data)
- ☒ appropriate plots (e.g., line*, stem-and-leaf*, box*, scatter*)

E.8.3 Extract, interpret, and analyze information from organized and displayed data by using:

- ☒ frequency and distribution, including mode* and range*
- ☒ central tendencies* of data (mean* and median*)
- ☒ indicators of dispersion (e.g., outliers*)

E.8.4 Use the results of data analysis to:

- ☒ make predictions
- ☒ develop convincing arguments
- ☒ draw conclusions

E.8.5 Compare several sets of data to generate, test, and, as the data dictate, confirm or deny hypotheses

E.8.6 Evaluate presentations and statistical analyses from a variety of sources for:

- ☒ credibility of the source
- ☒ techniques of collection, organization, and presentation of data
- ☒ missing or incorrect data
- ☒ inferences
- ☒ possible sources of bias

E.8.7 Determine the likelihood of occurrence of simple events by:

- ☒ using a variety of strategies to identify possible outcomes (e.g., lists, tables, tree diagrams*)
- ☒ conducting an experiment
- ☒ designing and conducting simulations*

- ☒ applying theoretical notions of probability (e.g., that four equally likely events have a 25% chance of happening)

Merit Software: Word Problem Shape-Up

Mathematics, Standard E: Statistics and Probability

Grades 9- 12

By the end of **grade twelve,** students will:

E.12.1 Work with data in the context of real-world situations by

- ☒ formulating hypotheses that lead to collection and analysis of one- and two-variable data
- ☒ designing a data collection plan that considers random sampling, control groups, the role of assumptions, etc.
- ☒ conducting an investigation based on that plan
- ☒ using technology to generate displays, summary statistics*, and presentations

E.12.2 Organize and display data from statistical investigations using

- ☒ frequency distributions
- ☒ percentiles*, quartiles, deciles
- ☒ line of best fit* (estimated regression line)
- ☒ matrices

E.12.3 Interpret and analyze information from organized and displayed data when given

- ☒ measures of dispersion*, including standard deviation and variance
- ☒ measures of reliability
- ☒ measures of correlation*

E.12.4 Analyze, evaluate, and critique the methods and conclusions of statistical experiments reported in journals, magazines, news media, advertising, etc.

E.12.5 Determine the likelihood of occurrence of complex events by

- ☒ using a variety of strategies (e.g., combinations*) to identify possible outcomes
- ☒ conducting an experiment
- ☒ designing and conducting simulations*
- ☒ applying theoretical probability

Merit Software: Word Problem Shape-Up

Standard F: Algebraic Relationships

Grades K-4

By the end of **grade four,** students will:

F.4.1 Use letters, boxes, or other symbols to stand for any number, measured quantity, or object in simple situations (e.g., N + 0 = N is true for any number)

F.4.2 Use the vocabulary, symbols, and notation of algebra accurately (e.g., correct use of the symbol "="; effective use of the associative property of multiplication)

F.4.3 Work with simple linear patterns and relationships in a variety of ways, including

- ☒ recognizing and extending number patterns
- ☒ describing them verbally
- ☒ representing them with pictures, tables, charts, graphs
- ☒ recognizing that different models* can represent the same pattern or relationship
- ☒ using them to describe real-world phenomena

F.4.4 Recognize variability in simple functional* relationships by describing how a change in one quantity can produce a change in another (e.g., number of bicycles and the total number of wheels)

F.4.5 Use simple equations and inequalities in a variety of ways, including

- ☒ using them to represent problem situations
- ☒ solving them by different methods (e.g., use of manipulatives, guess and check strategies, recall of number facts)
- ☒ recording and describing solution strategies

F.4.6 Recognize and use generalized properties and relationships of arithmetic (e.g., commutativity* of addition, inverse relationship of multiplication and division)

Merit Software: Fraction Shape-up

Standard F: Algebraic Relationships

Grades 6- 8

By the end of **grade eight,** students will:

F.8.1 Work with algebraic expressions in a variety of ways, including

- ☒ using appropriate symbolism, including exponents* and variables*
- ☒ evaluating expressions through numerical substitution

- ☒ generating equivalent expressions
- ☒ adding and subtracting expressions

F.8.2 Work with linear and nonlinear patterns* and relationships in a variety of ways, including

- ☒ representing them with tables, with graphs, and with algebraic expressions, equations, and inequalities
- ☒ describing and interpreting their graphical representations (e.g., slope*, rate of change, intercepts*)
- ☒ using them as models of real-world phenomena
- ☒ describing a real-world phenomenon that a given graph might represent

F.8.3 Recognize, describe, and analyze functional relationships* by generalizing a rule that characterizes the pattern of change among variables. These functional relationships include exponential growth and decay (e.g., cell division, depreciation)

F.8.4 Use linear equations and inequalities in a variety of ways, including

- ☒ writing them to represent problem situations and to express generalizations
- ☒ solving them by different methods (e.g., informally, graphically, with formal properties, with technology)
- ☒ writing and evaluating formulas (including solving for a specified variable)
- ☒ using them to record and describe solution strategies

F.8.5 Recognize and use generalized properties and relations, including

- ☒ additive and multiplicative property of equations and inequalities
- ☒ commutativity* and associativity* of addition and multiplication
- ☒ distributive* property
- ☒ inverses* and identities* for addition and multiplication
- ☒ transitive * property

Merit Software: Pre-Algebra Shape-up; Basic Algebra; Word Problem Shape-Up

Standard F: Algebraic Relationships

Grades 9-12

By the end of **grade twelve,** students will:

F.12.1 Analyze and generalize patterns of change (e.g., direct and inverse variation) and numerical sequences, and then represent them with algebraic expressions and equations

F.12.2 Use mathematical functions* (e.g., linear*, exponential*, quadratic*, power) in a variety of ways, including

- ☒ recognizing that a variety of mathematical and real-world phenomena can be modeled* by the same type of function
- ☒ translating different forms of representing them (e.g., tables, graphs, functional notation*, formulas)
- ☒ describing the relationships among variable quantities in a problem
- ☒ using appropriate technology to interpret properties of their graphical representations (e.g., intercepts, slopes, rates of change, changes in rates of change, maximum*, minimum*)

F.12.3 Solve linear and quadratic equations, linear inequalities, and systems of linear equations and inequalities

- ☒ numerically
- ☒ graphically, including use of appropriate technology
- ☒ symbolically, including use of the quadratic formula

F.12.4 Model and solve a variety of mathematical and real-world problems by using algebraic expressions, equations, and inequalities

Merit Software: **Basic Algebra; Word Problem Shape-Up**