

West Virginia State Correlations for Mathematics Correlated to Merit Software Mathematics Programs

Third Grade Mathematics Content Standards and Objectives

The third grade objectives extend the students' mathematical skills and concepts through concrete experiences and appropriate technology. These concepts and operations include: whole number operations; comparing and ordering numbers to hundredths and ten thousands; fractions and decimals; multiplication facts through five with corresponding division facts. Additional concepts include gathering and organizing data, estimating and performing measurements. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations (MA.S.1)

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimate

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

- MA.3.1.5 identify fractions as part of a whole/one and as part of a group using models and pictorial representations.
- MA.3.1.6 compare and order fractions with like and unlike denominators using concrete models.
- MA.3.1.7 add and subtract fractions with like denominators using concrete models and pictorial representations.
- MA.3.1.8 recognize and model equivalent fractions using concrete materials.
- MA.3.1.9 recognize and model proper and improper fractions and mixed numbers.

Merit Software: Fraction Shape-Up

Fourth Grade Mathematics Content Standards and Objectives

The fourth grade objectives emphasize critical thinking skills to create independent problem solvers who possess a personalized set of skills and strategies to solve problems in everyday life. Concepts which are stressed include: multiplication and division of two-and three-digit numbers, construction and description of objects from different perspectives, estimation, reading temperatures, description of possible outcomes in a given situation, use of calculators and computers, and describing mathematical relationships and patterns in other content areas and the real world. Additional concepts include adding and subtracting like fractions, and adding and subtracting decimals. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations (MA.S.1)

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

- MA.4.1.5 compare and order fractions with like and unlike denominators using pictorial representations.
- MA.4.1.6 add and subtract fractions with like and unlike denominators using pictorial representations.
- MA.4.1.7 recognize and model equivalent fractions using pictorial representations.

Merit Software: Fraction Shape-Up

Fifth Grade Mathematics Content Standards and Objectives

Building on mastery of the basic facts of addition, subtraction, multiplication, and division, the fifth grade objectives place emphasis on developing proficiency in using whole numbers, fractions, and decimals to solve problems. Students will collect, display and analyze data in a variety of ways and solve probability problems. Students will solve problems involving area and perimeter, will classify polygons, plot points on a coordinate plane, and write a number sentence using a variable to solve problems. Students should be actively engaged, continuing to use concrete materials and appropriate technologies such as calculators and computers. Problem solving should be integrated throughout all the strands. The development of a variety of problem-solving strategies should be a major goal of mathematics at this grade level. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations (MA.S.1)

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

- MA.5.1.6 compare and order fractions, improper fractions and mixed numbers with like and unlike denominators (e.g., greatest common factor, lowest common multiple).
- MA.5.1.7 model and write equivalencies of fractions, decimals, percents, and ratios.
- MA.5.1.8 add and subtract fractions and mixed numbers.
- MA.5.1.9 model multiplication and division of fractions to solve the algorithm.

Standard 2: Algebra (MA.S.2)

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

- MA.5.2.1 explore a variety of patterns with missing elements (e.g., square numbers, powers, triangular numbers, arithmetic sequences).
- MA.5.2.2 use input/output model with grade appropriate functions.
- MA.5.2.3 write an equation using a variable to solve problems.
- MA.5.2.4 evaluate an expression given a value for the variable.

Merit Software: Fraction Shape-Up, Pre-Algebra Shape-Up, Word Problem Shape-Up

Sixth Grade Mathematics Content Standards and Objectives

The sixth grade objectives place continued emphasis on the study of whole numbers, decimals and fractions. However, students need opportunities to apply their skills to real life applications. Calculators and computers may be used to solve problems. Decreased attention should be given to paper and pencil computations. Sixth graders will continue to use manipulatives whenever new material is introduced or whenever it is needed to review previously taught material. The areas of probability, statistics, geometry, and pre-algebra will be stressed. Students will use ratios to compare data sets, make geometric constructions of three-dimensional figures, explore thoroughly the algebra strand, and solve problems involving circles, volume and surface area. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 2: Algebra (MA.S.2)

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

- MA.6.2.1 simplify numerical expressions using order of operations.
- MA.6.2.2 identify missing elements in arithmetic and geometric patterns.
- MA.6.2.3 explore a variety of patterns, including perfect squares, square roots and exponents.
- MA.6.2.4 use input/output models and spreadsheets to evaluate functions.
- MA.6.2.5 solve a proportion using cross multiplication.
- MA.6.2.6 identify like terms and monomials.
- MA.6.2.7 model addition, subtraction, multiplication and division of integers.
- MA.6.2.8 locate and plot points within the four quadrants.
- MA.6.2.9 use variables to represent and solve real world problems appropriate for the 6th grade using multiple strategies.

Merit Software: Pre-Algebra Shape-Up, Basic Algebra Shape-Up, Word Problem Shape-Up

Seventh Grade Mathematics Content Standards and Objectives

The seventh grade year is an introduction to high school subjects such as algebra, geometry, probability and statistics. With less emphasis on paper/pencil computation, calculators are emphasized in all facets of the mathematics daily work as well as test situations. Students should, by this time, have a mastery of general mathematics topics; however, review of all basic mathematics skills occurs in a relevant context. Problem solving is embedded in the curriculum utilizing a variety of new concepts, while cooperative learning promotes communication skills. Students are routinely permitted to use available technology. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 2: Algebra (MA.S.2)

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

- MA.7.2.1 find missing elements in a variety of arithmetic and geometric patterns including algebraic sequences and series.
- MA.7.2.2 simplify and evaluate numerical and algebraic expressions with whole numbers, integers, absolute value and exponents using the order of operations and exponential rules.
- MA.7.2.3 add, subtract, multiply and divide monomials with no more than two variables and no exponent greater than two.
- MA.7.2.4 find and use the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of a set of monomials or algebraic fractions using prime factorization and exponent rules.
- MA.7.2.5 input data into a spreadsheet to create input/output function tables.
- MA.7.2.6 use ratios and proportions to represent and solve application problems.
- MA.7.2.7 write and evaluate complex algebraic expressions for word phrases.
- MA.7.2.8 use and apply scientific notation containing positive and negative exponents.
- MA.7.2.9 solve one-step linear equations containing whole numbers, fractions, decimals and integers with integer solutions.
- MA.7.2.10 solve basic inequalities using inverse operations and graph solutions.
- MA.7.2.11 plot lines within the Cartesian coordinate plane from a table of values.
- MA.7.2.12 determine the slope of a line from its graphical representation.
- MA.7.2.13 represent and solve real world problems appropriate for 7th grade using multiple strategies.

Merit Software: Pre-Algebra Shape-Up, Basic Algebra Shape-Up, Word Problem Shape-Up

Eighth Grade Mathematics Content Standards and Objectives

Pre-Geometry with Algebra provides an alternative course for students who do not elect to take Algebra I in the eighth grade or who have not successfully mastered the new skills from *Pre-Algebra with Geometry* in the seventh grade. In addition to reinforcing the concepts presented in *Pre-Algebra with Geometry*, this course extends problem solving to a more sophisticated level. Students will continue to apply integer operations, properties, expressions and equations so as to reinforce these concepts in varied applications. Lessons involving cooperative learning,

manipulatives, or technology will strengthen students' understanding of concepts while fostering communication and reasoning skills. Calculator use is emphasized for all mathematical tasks including assessment. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 2: Algebra (MA.S.2)

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

- MA.8.2.1 use order-of-operations and exponents rules to solve problems with numerical and algebraic expressions containing whole numbers, integers, absolute value, fractions and exponents.
- MA.8.2.2 solve one and two step linear equations and inequalities with integers, fractions, and decimal solutions.
- MA.8.2.3 use ratio and proportion to create and solve equations.
- MA.8.2.4 add and subtract polynomials limited to two variables and positive exponents.
- MA.8.2.5 apply algebraic equations and expressions to solve application problems.
- MA.8.2.6 apply inductive and deductive reasoning to write a rule from data in a function table.
- MA.8.2.7 graph linear equations and inequalities within the Cartesian coordinate plane using ordered pairs table of values and appropriate technology.
- MA.8.2.8 formulate and apply a rule to generate an arithmetic, geometric and algebraic pattern.
- MA.8.2.9 determine the slope of a line given two-points or slope/y-intercept equation ($y=mx+b$).
- MA.8.2.10 represent and solve real world problems appropriate for 8th grade using multiple strategies.

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Algebra/Geometry Preparation Objectives

Algebra/Geometry preparation is an elective course designed to be a bridge between the concrete elementary curriculum and the more formal mathematics curriculum ahead. In this course students will explore algebraic concepts in an informal way to build a foundation for subsequent formal study of algebra. Such informal explorations should emphasize physical models, data, graphs, and other mathematical representations rather than facility with formal algebraic manipulations. The study of geometry is to assist students to represent and make sense of the world. Geometric models will provide a perspective from which students are to analyze and solve problems, and geometric interpretations are to help make abstract representations more easily understood. The study of geometry at this level should simply provide increased opportunities for students to engage in more systematic explorations. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Algebra/Geometry Preparation Objectives

Students will:

- AGP.1.1 identify and use properties of numbers (commutative, associative, distributive, etc).
- AGP.1.2 add, subtract, multiply, and divide decimals, integers, fractions and mixed numbers.

AGP.1.3 use order relations to compare, order, or locate whole numbers, integers, fractions, and decimals on a number line.

Standard 2: Algebra (MA.S.2)

Students will:

demonstrate understanding of patterns, relations, and functions;
represent and analyze mathematical situations and structures using algebraic symbols;
use mathematical models to represent and understand quantitative relationships; and
analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

AGP.2.1 substitute values, evaluate expressions involving variables, and calculate formulas to solve application problems.

AGP.2.2 solve equations with at least two operations.

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Algebra I Objectives

Algebra I is a course that provides the gateway to all higher mathematics courses. This course uses a conceptual approach to mathematics and does not focus on algorithmic methods. Algebraic representations will be used to generalize, and the algebraic method will be viewed as a problem-solving tool. In planning for instruction, consideration should be given to the student's readiness for abstract concepts. Manipulatives, such as algeblocks, should be used to bridge the gap from the concrete to the abstract. Available technology such as calculators, computers, and graphing utilities are to be used as tools to enhance learning. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 2: Algebra (MA.S.2)

Students will:

demonstrate understanding of patterns, relations, and functions;
represent and analyze mathematical situations and structures using algebraic symbols;
use mathematical models to represent and understand quantitative relationships; and
analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra I Objectives

Students will:

A1.2.1 simplify and evaluate algebraic expressions using grouping symbols, order of operations and properties of real numbers with justification of steps.

A1.2.2 solve multi-step linear equations in one variable and apply skills toward solving practical problems.

A1.2.3 solve multi-step linear inequalities in one variable, interpret the results on a number line and apply the skills toward solving practical problems.

A1.2.4 solve literal equations for a given variable and apply the skills toward solving practical problems.

A1.2.5 analyze a given set of data for the existence of a pattern numerically, algebraically and graphically; determine the domain and range; and determine if the relation is a function.

A1.2.6 solve absolute value equations in one variable and interpret the results on a number line.

A1.2.7 use the laws of exponents to perform operations on expressions with integral exponents.

- A1.2.8 determine the slope of a line given an equation of a line, the graph of a line and two points to be identified.
- A1.2.9 graph linear equations using slope-intercept, point slope, and x- and y-intercepts.
- A1.2.10 write an equation of a line given a graph of a line, two points on the line, the slope and a point, and the slope and y-intercept.
- A1.2.11 solve systems of linear equations numerically and graphically, by the elimination method and by the substitution method.
- A1.2.12 add and subtract polynomials.
- A1.2.13 multiply and divide binomials by binomials or monomials.
- A1.2.14 factor polynomials by using appropriate methods.
- A1.2.15 estimate and simplify square roots into both exact and approximate forms.
- A1.2.16 solve quadratic equations by graphing, factoring and quadratic formula.
- A1.2.17 add, subtract, multiply and divide simple rational expressions.
- A1.2.18 collect, organize, interpret data and predict outcomes using the mean, mode, median, and range.
- A1.2.19 perform a linear regression and use the results to predict specific values of a variable, and identify the equation for the line of regression.
- A1.2.20 predict the outcomes of simple events using the rules of probability.
- A1.2.21 use process (flow) charts and histograms, scatter diagrams and normal distribution curves.

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