

# Tennessee Mathematics Standards 2009-2010 Implementation

## Grade Five Mathematics

### Standard 1 – Mathematical Processes

#### Grade Level Expectations:

- GLE 0506.1.1 Use mathematical language, symbols, and definitions while developing mathematical reasoning.
- GLE 0506.1.2 Apply and adapt a variety of appropriate strategies to problem solving, including estimation, and reasonableness of the solution.
- GLE 0506.1.3 Develop independent reasoning to communicate mathematical ideas and derive algorithms and/or formulas.
- GLE 0506.1.4 Move flexibly between concrete and abstract representations of mathematical ideas in order to solve problems, model mathematical ideas, and communicate solution strategies.
- GLE 0506.1.5 Use mathematical ideas and processes in different settings to formulate patterns, analyze graphs, set up and solve problems and interpret solutions.
- GLE 0506.1.6 Read and interpret the language of mathematics and use written/oral communication to express mathematical ideas precisely.
- GLE 0506.1.7 Recognize the historical development of mathematics, mathematics in context, and the connections between mathematics and the real world.
- GLE 0506.1.8 Use technologies/manipulatives appropriately to develop understanding of mathematical algorithms, to facilitate problem solving, and to create accurate and reliable models of mathematical concepts.

#### Checks for Understanding (Formative/Summative Assessment):

- ✓ 0506.1.1 Make and test conjectures about geometric properties and develop logical arguments to justify conclusions.
- ✓ 0506.1.2 Make reasonable estimates of fraction and decimal sums or differences using models.
- ✓ 0506.1.3 Explore different methods of estimation including rounding and truncating.
- ✓ 0506.1.4 Explore problems in different contexts to interpret the meaning of remainders as discrete values or not.
- ✓ 0506.1.5 Solve problems in more than one way and explain why one process may be more effective than another.
- ✓ 0506.1.6 Communicate answers in correct verbal and numerical form; including use of mixed numbers or fractions and use of units.
- ✓ 0506.1.7 Organize and consolidate verbal statements involving fractions and mixed numbers into diagrams, symbols, and numerical expressions.
- ✓ 0506.1.8 Use patterns, models, and relationships as contexts for writing inequalities and simple equations.
- ✓ 0506.1.9 Use age-appropriate books, stories, and videos to convey ideas of mathematics.

#### State Performance Indicators:

- SPI 0506.1.1 Given a series of geometric statements, draw a conclusion about the figure described.
- SPI 0506.1.2 Estimate fraction and decimal sums or differences.
- SPI 0506.1.3 Recognize the unit associated with the remainder in a division problem or the meaning of the fractional part of a whole given in either decimal or fraction form.

SPI 0506.1.4 Identify missing information and/or too much information in contextual problems.

## Standard 2 - Number and Operations

### Grade Level Expectations:

- GLE 0506.2.1 Extend the understanding of place value through millions and millionths in various contexts and representations.
- GLE 0506.2.2 Write natural numbers (to 50) as a product of prime factors and understand that this is unique (apart from order).
- GLE 0506.2.3 Develop fluency with division of whole numbers. Understand the relationship of divisor, dividend, and quotient in terms of multiplication and division.
- GLE 0506.2.4 Develop fluency with addition and subtraction of proper and improper fractions and mixed numbers; explain and model the algorithm.
- GLE 0506.2.5 Develop fluency in solving multi-step problems using whole numbers, fractions, mixed numbers, and decimals.

### Checks for Understanding (Formative/Summative Assessment):

- ✓ 0506.2.1 Identify prime numbers up to 50.
- ✓ 0506.2.2 Use the prime factorization of two whole numbers to determine the greatest common factor and the least common multiple.
- ✓ 0506.2.3 Use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals.
- ✓ 0506.2.4 Use divisibility rules to factor numbers.
- ✓ 0506.2.5 Make reasonable estimates of fraction and decimal sums and differences.
- ✓ 0506.2.6 Add and subtract mixed numbers.
- ✓ 0506.2.7 Understand the placement of the decimal point in calculations of multiplication and long division, including the placement in the estimation of the answer.
- ✓ 0506.2.8 Understand that division by zero is undefined.
- ✓ 0506.2.9 Explore numbers less than 0 by extending the number line through familiar applications (e.g., temperatures below zero, owing money, measuring elevation below sea level).
- ✓ 0506.2.10 Use exponential notation to represent repeated multiplication of whole numbers.

### State Performance Indicators:

- SPI 0506.2.1 Read and write numbers from millions to millionths in various contexts.
- SPI 0506.2.2 Write the prime factorization of numbers through 50 using both exponential and standard notation.
- SPI 0506.2.3 Select a reasonable solution to a real-world division problem in which the remainder must be considered.
- SPI 0506.2.4 Solve problems involving the division of two- and three-digit whole numbers by one- and two-digit whole numbers.
- SPI 0506.2.5 Solve addition and subtraction problems involving both fractions and decimals.
- SPI 0506.2.6 Add and subtract proper and improper fractions as well as mixed numbers.
- SPI 0506.2.7 Recognize equivalent representations for the same number.
- SPI 0506.2.8 Write terminating decimals in the form of fractions or mixed numbers.
- SPI 0506.2.9 Compare whole numbers, decimals and fractions using the symbols  $<$ ,  $>$ , and  $=$ .

## Standard 3 – Algebra

### Grade Level Expectations:

- GLE 0506.3.1 Understand and use order of operations.
- GLE 0506.3.2 Develop and apply the concept of variable.
- GLE 0506.3.3 Understand and apply the substitution property.
- GLE 0506.3.4 Solve single-step linear equations and inequalities.

**Checks for Understanding (Formative/Summative Assessment):**

- ✓ 0506.3.1 Evaluate an expression by substituting non-negative rational number values for letter variables in the expression.
- ✓ 0506.3.2 Use variables appropriately to represent numbers whose values are not yet known.
- ✓ 0506.3.3 Solve single-step linear equations using inverse operations.
- ✓ 0506.3.4 Solve single-step linear inequalities and graph solutions on a number line.
- ✓ 0506.3.5 Determine if a given value is a solution to a linear equation/inequality.
- ✓ 0506.3.6 Recognize there are many numbers between any two whole numbers on the number line.

**State Performance Indicators:**

- SPI 0506.3.1 Evaluate algebraic expressions involving decimals and fractions using order of operations.
- SPI 0506.3.2 Evaluate multi-step numerical expressions involving fractions using order of operations.
- SPI 0506.3.3 Find the unknown in single-step equations involving fractions and mixed numbers.
- SPI 0506.3.4 Given a set of values, identify those that make an inequality a true statement.

## **Standard 4 – Geometry and Measurement**

**Grade Level Expectations:**

- GLE 0506.4.1 Use basic formulas and visualization to find the area of geometric figures.
- GLE 0506.4.2 Describe polyhedral solids and analyze their properties, including volume and surface area.
- GLE 0506.4.3 Describe length/distance relationships using the first quadrant of the coordinate system.
- GLE 0506.4.4 Solve problems that require attention to both approximation and precision of measurement.

**Checks for Understanding (Formative/Summative Assessment):**

- ✓ 0506.4.1 Develop the formula for the area of a triangle as it relates to the area of a parallelogram/rectangle.
- ✓ 0506.4.2 Find the area of a convex polygon by decomposing it into triangles/rectangles.
- ✓ 0506.4.3 Build, draw, and work with prisms by means of orthogonal views, projective views, and nets.
- ✓ 0506.4.4 Describe and identify the five regular (Platonic) solids and their properties with respect to faces, shapes of faces, edges, and vertices.
- ✓ 0506.4.5 Quantify total volume as filling space with same-sized units of volume without gaps or overlap.
- ✓ 0506.4.6 Decompose prisms to calculate surface area and volume.
- ✓ 0506.4.7 Understand, select and use units of appropriate size and type to measure angles, lengths/distances, area, surface area and volume.
- ✓ 0506.4.8 Identify characteristics of the set of points that define vertical and horizontal line segments.
- ✓ 0506.4.9 Correctly interpret significant digits in the accuracy of measurements and associated calculations.
- ✓ 0506.4.10 Recognize that measurements are never exact.
- ✓ 0506.4.11 Understand the usefulness of approximations.
- ✓ 0506.4.12 Develop strategies for choosing correct tools of measurement.

- ✓ 0506.4.13 Recognize and use measures of weight and temperature.

**State Performance Indicators:**

- SPI 0506.4.1 Solve contextual problems that require calculating the area of triangles and parallelograms.
- SPI 0506.4.2 Decompose irregular shapes to find perimeter and area.
- SPI 0506.4.3 Identify a three-dimensional object from two-dimensional representations of that object and vice versa.
- SPI 0506.4.4 Solve problems involving surface area and volume of rectangular prisms and polyhedral solids.
- SPI 0506.4.5 Find the length of vertical or horizontal line segments in the first quadrant of the coordinate system, including problems that require the use of fractions and decimals.
- SPI 0506.4.6 Record measurements in context to reasonable degree of accuracy using decimals and/or fractions.

## **Standard 5 – Data, Probability and Statistics**

**Grade Level Expectations:**

- GLE 0506.5.1 Make, record, display and interpret data and graphs that include whole numbers, decimals, and fractions.
- GLE 0506.5.2 Describe the shape and important features of a set of data using the measures of central tendency.

**Checks for Understanding (Formative/Summative Assessment):**

- ✓ 0506.5.1 Construct and analyze double bar and line graphs.
- ✓ 0506.5.2 Represent data using ordered pairs in the first quadrant of the coordinate system.
- ✓ 0506.5.3 Design investigations to address a question and consider how data collection methods affect the nature of the data set.
- ✓ 0506.5.4 Recognize the differences in representing categorical and numerical data.
- ✓ 0506.5.5 Evaluate how different measures of central tendency describe data.
- ✓ 0506.5.6 Identify outliers and determine their effect on mean, median, mode and range.

**State Performance Indicators:**

- SPI 0506.5.1 Depict data using various representations, including decimal and/or fractional data.
- SPI 0506.5.2 Make predictions based on various data representations, including double bar and line graphs.
- SPI 0506.5.3 Calculate measures of central tendency to analyze data.