

# Tennessee Mathematics Standards 2009-2010 Implementation

## Grade Eight Mathematics

### Standard 1 – Mathematical Processes

#### Grade Level Expectations:

- GLE 0806.1.1 Use mathematical language, symbols, and definitions while developing mathematical reasoning.
- GLE 0806.1.2 Apply and adapt a variety of appropriate strategies to problem solving, including estimation, and reasonableness of the solution.
- GLE 0806.1.3 Develop independent reasoning to communicate mathematical ideas and derive algorithms and/or formulas.
- GLE 0806.1.4 Move flexibly between concrete and abstract representations of mathematical ideas in order to solve problems, model mathematical ideas, and communicate solution strategies.
- GLE 0806.1.5 Use mathematical ideas and processes in different settings to formulate patterns, analyze graphs, set up and solve problems and interpret solutions.
- GLE 0806.1.6 Read and interpret the language of mathematics and use written/oral communication to express mathematical ideas precisely.
- GLE 0806.1.7 Recognize the historical development of mathematics, mathematics in context, and the connections between mathematics and the real world.
- GLE 0806.1.8 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):

- ✓ 0806.1.1 Relate nonlinear functions to geometric contexts of length, area, and volume.
- ✓ 0806.1.2 Draw qualitative graphs (trend graphs) of functions and describe their general shape/trend.
- ✓ 0806.1.3 Research the contributions of Pythagoras to mathematics.
- ✓ 0806.1.4 Relate data concepts to relevant concepts in the earth and space, life, and physical sciences.
- ✓ 0806.1.5 Use age-appropriate books, stories, and videos to convey ideas of mathematics.
- ✓ 0806.1.6 Use models (such as dynamic geometry software, patty paper and geo boards) to explore relationships among angles (complementary, supplementary, interior, exterior, vertical, and corresponding).
- ✓ 0806.1.7 Use a graphing calculator or spreadsheet to create scatterplots of data and approximate lines of best fit.
- ✓ 0806.1.8 Use a variety of methods to solve real-world problems involving multi-step linear equations (e.g., manipulatives, technology, pencil and paper).

#### State Performance Indicators:

- SPI 0806.1.1 Solve problems involving rate/time/distance (i.e.,  $d = rt$ ).
- SPI 0806.1.2 Interpret a qualitative graph representing a contextual situation.
- SPI 0806.1.3 Calculates rates involving cost per unit to determine the best buy.

### Standard 2 – Number & Operations

**Grade Level Expectations:**

- GLE 0806.2.1 Extend understanding of the real number system to include irrational numbers.
- GLE 0806.2.2 Solve problems involving exponents and scientific notation using technology appropriately.
- GLE 0806.2.3 Solve real-world problems using rational and irrational numbers.
- GLE 0806.2.4 Understand and use the laws of exponents.

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

- ✓ 0806.2.1 Recognize and use exponential, scientific, and calculator notation.
- ✓ 0806.2.2 Square numbers and simplify square roots.
- ✓ 0806.2.3 Solve contextual problems involving powers and roots.
- ✓ 0806.2.4 Use a Venn diagram to represent the subsets of the real number system.
- ✓ 0806.2.5 Identify the subset(s) of the real number system to which a number belongs.
- ✓ 0806.2.6 Simplify expressions using the laws of exponents.
- ✓ 0806.2.7 Add, subtract, multiply, and divide numbers expressed scientific notation.

**State Performance Indicators:**

- SPI 0806.2.1 Order and compare rational and irrational numbers and locate on the number line.
- SPI 0806.2.2 Identify numbers and square roots as rational or irrational.
- SPI 0806.2.3 Use scientific notation to compute products and quotients.
- SPI 0806.2.4 Solve real-world problems requiring scientific notation.

## Standard 3 – Algebra

**Grade Level Expectations:**

- GLE 0806.3.1 Recognize and generate equivalent forms for algebraic expressions.
- GLE 0806.3.2 Represent, analyze, and solve problems involving linear equations and inequalities in one and two variables.
- GLE 0806.3.3 Solve systems of linear equations in two variables.
- GLE 0806.3.4 Translate among verbal, tabular, graphical and algebraic representations of linear functions.
- GLE 0806.3.5 Use slope to analyze situations and solve problems.
- GLE 0806.3.6 Compare and contrast linear and nonlinear functions.

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

- ✓ 0806.3.1 Perform basic operations on algebraic expressions (including grouping, order of operations, exponents, square/cube roots, simplifying and expanding).
- ✓ 0806.3.2 Represent algebraic relationships with equations and inequalities.
- ✓ 0806.3.3 Solve systems of linear equations in two variables and relate the systems to pairs of lines that intersect, are parallel, or are the same line.
- ✓ 0806.3.4 Understand the relationship between the graph of a linear inequality and its solutions.
- ✓ 0806.3.5 Solve linear inequalities in two variables (including those whose solutions require multiplication or division by a negative number).
- ✓ 0806.3.6 Identify x- and y-intercepts and slope of linear equations from an equation, graph or table.
- ✓ 0806.3.7 Analyze situations and solve problems involving constant rate of change.
- ✓ 0806.3.8 Recognize a proportion as a special case of a linear equation and understand that the constant of proportionality is the slope, and the resulting graph is a line through the origin.

- ✓ 0806.3.9 Given a function rule, create tables of values for  $x$  and  $y$ , and plot graphs of nonlinear functions.
- ✓ 0806.3.10 Distinguish quadratic and exponential functions as nonlinear using a graph and/or a table of values.
- ✓ 0806.3.11 Distinguish between the equations of linear, quadratic, and exponential functions (e.g. function families such as  $y=x^2$ ,  $y=2^x$ , and  $y=2x$ ).
- ✓ 0806.3.12 Understand how rates of change of nonlinear functions contrast with constant rates of change of linear functions.
- ✓ 0806.3.13 Represent situations and solve real-world problems using symbolic algebra.

**State Performance Indicators:**

- SPI 0806.3.1 Find solutions to systems of two linear equations in two variables.
- SPI 0806.3.2 Solve the linear equation  $f(x) = g(x)$ .
- SPI 0806.3.3 Solve and graph linear inequalities in two variables.
- SPI 0806.3.4 Translate between various representations of a linear function.
- SPI 0806.3.5 Determine the slope of a line from an equation, two given points, a table or a graph.
- SPI 0806.3.6 Analyze the graph of a linear function to find solutions and intercepts.
- SPI 0806.3.7 Identify, compare and contrast functions as linear or nonlinear.

## Standard 4 – Geometry & Measurement

**Grade Level Expectations:**

- GLE 0806.4.1 Derive the Pythagorean theorem and understand its applications.
- GLE 0806.4.2 Understand the relationships among the angles formed by parallel lines cut by transversals.
- GLE 0806.4.3 Understand the necessary levels of accuracy and precision in measurement.
- GLE 0806.4.4 Understand both metric and customary units of measurement.
- GLE 0806.4.5 Use visualization to describe or identify intersections, cross-sections, and various views of geometric figures.

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

- ✓ 0806.4.1 Model the Pythagorean Theorem.
- ✓ 0806.4.2 Use the converse of the Pythagorean Theorem to determine if a triangle is a right triangle.
- ✓ 0806.4.3 Select or use the appropriate measurement instrument to determine or create a given length, area, volume, angle, weight, or mass.
- ✓ 0806.4.4 Understand how the precision of measurement influences accuracy of quantities derived from these measurements.
- ✓ 0806.4.5 Analyze the congruent and supplementary relationships of angles formed by parallel lines and transversals (such as alternate interior, alternate exterior, corresponding, and adjacent).
- ✓ 0806.4.6 Make within-system and between-system conversions of derived quantities including distance, temperature, and money.
- ✓ 0806.4.7 Visualize or describe the cross-section resulting from the intersection of a plane with a 3-dimensional figure.
- ✓ 0806.4.8 Build, draw, and work with 2- and 3-dimensional figures by means of orthogonal views, projective views, and/or nets.

**State Performance Indicators:**

- SPI 0806.4.1 Use the Pythagorean Theorem to solve contextual problems.

- SPI 0806.4.2 Apply the Pythagorean theorem to find distances between points in the coordinate plane to measure lengths and analyze polygons and polyhedra.
- SPI 0806.4.3 Find measures of the angles formed by parallel lines cut by a transversal.
- SPI 0806.4.4 Convert between and within the U.S. Customary System and the metric system.
- SPI 0806.4.5 Identify the intersection of two or more geometric figures in the plane.

## **Standard 5 – Data Analysis, Statistics, & Probability**

### **Grade Level Expectations:**

- GLE 0806.5.1 Explore probabilities for compound, independent and/or dependent events.
- GLE 0806.5.2 Select, create, and use appropriate graphical representations of data (including scatterplots with lines of best fit) to make and test conjectures.
- GLE 0806.5.3 Evaluate the use of statistics in media reports.

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

- ✓ 0806.5.1 Solve simple problems involving probability and relative frequency.
- ✓ 0806.5.2 Compare probabilities of two or more events and recognize when certain events are equally likely.
- ✓ 0806.5.3 Recognize common misconceptions associated with dependent and independent events.
- ✓ 0806.5.4 Explain the benefits and the limitations of various representations (i.e., bar graphs, line graphs, circle graphs, histograms, stem-and-leaf plots, box plots, scatterplots) of data.
- ✓ 0806.5.5 Create and interpret box-and-whisker plots and scatterplots.
- ✓ 0806.5.6 Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken.
- ✓ 0806.5.7 Estimate lines of best fit to make and test conjectures.
- ✓ 0806.5.8 Consider the source, design, analysis, and display of data to evaluate statistics reported in the media.

### **State Performance Indicators:**

- SPI 0806.5.1 Calculate probabilities of events for simple experiments with equally probable outcomes.
- SPI 0806.5.2 Use a variety of methods to compute probabilities for compound events (e.g., multiplication, organized lists, tree diagrams, area models).
- SPI 0806.5.3 Generalize the relationship between two sets of data using scatterplots and lines of best fit.
- SPI 0806.5.4 Recognize misrepresentations of published data in the media.