

Tennessee Mathematics Standards 2009-2010 Implementation

Grade Four Mathematics

Standard 1 – Mathematical Processes

Grade Level Expectations:

- GLE 0406.1.1 Use mathematical language, symbols, and definitions while developing mathematical reasoning.
- GLE 0406.1.2 Apply and adapt a variety of appropriate strategies to problem solving, including estimation, and reasonableness of the solution.
- GLE 0406.1.3 Develop independent reasoning to communicate mathematical ideas and derive algorithms and/or formulas.
- GLE 0406.1.4 Move flexibly between concrete and abstract representations of mathematical ideas in order to solve problems, model mathematical ideas, and communicate solution strategies.
- GLE 0406.1.5 Use mathematical ideas and processes in different settings to formulate patterns, analyze graphs, set up and solve problems and interpret solutions.
- GLE 0406.1.6 Read and interpret the language of mathematics and use written/oral communication to express mathematical ideas precisely.
- GLE 0406.1.7 Recognize the historical development of mathematics, mathematics in context, and the connections between mathematics and the real world.
- GLE 0406.1.8 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):

- ✓ 0406.1.1 Understand the relationship between use of answers and the accuracy of the number.
- ✓ 0406.1.2 Identify the range of appropriate estimates, including over-estimate and under-estimate.
- ✓ 0406.1.3 Connect operations with decimals to money and make estimates.
- ✓ 0406.1.4 Use commutative, associative, and distributive properties of numbers including oral descriptions of mathematical reasoning.
- ✓ 0406.1.5 Measure using ruler, meter stick, clock, thermometer, or other scaled instruments.
- ✓ 0406.1.6 Identify geometric or physical attributes that are appropriate to measure in a given situation.
- ✓ 0406.1.7 Translate the details of a contextual problem into diagrams and/or numerical expressions, and express answers using appropriate units.
- ✓ 0406.1.8 Match the spoken, written, concrete (including base ten blocks), and pictorial representations of decimals.
- ✓ 0406.1.9 Develop a story problem that illustrates a given multiplication or division number sentence.
- ✓ 0406.1.10 Use age-appropriate books, stories, and videos to convey ideas of mathematics.

State Performance Indicators:

- SPI 0406.1.1 Verify a conclusion using the commutative, associative and distributive properties.
- SPI 0406.1.2 Compare decimals using concrete and pictorial representations.
- SPI 0406.1.3 Determine the correct change from a transaction.

SPI 0406.1.4 Compare objects with respect to a given geometric or physical attribute and select appropriate measurement instrument.

Standard 2 - Number and Operations

Grade Level Expectations:

- GLE 0406.2.1 Understand place value of numbers from hundredths to the hundred-thousands place.
- GLE 0406.2.2 Develop fluency with multiplication and single-digit division.
- GLE 0406.2.3 Identify prime and composite numbers.
- GLE 0406.2.4 Understand and use the connections between fractions and decimals.
- GLE 0406.2.5 Add and subtract fractions with like and unlike denominators.
- GLE 0406.2.6 Solve problems involving whole numbers, fractions, and/or decimals using all four arithmetic operations.

Checks for Understanding (Formative/Summative Assessment):

- ✓ 0406.2.1 Compose and decompose quantities according to place value.
- ✓ 0406.2.2 Understand decimal notation as an extension of the base-ten number system.
- ✓ 0406.2.3 Multiply two- and three-digit whole numbers.
- ✓ 0406.2.4 Understand and use a reliable algorithm for multiplying multi-digit numbers and dividing numbers by a single-digit divisor accurately and efficiently.
- ✓ 0406.2.5 Understand that division by zero is undefined.
- ✓ 0406.2.6 Divide three-digit whole numbers by one-digit divisors fluently with pencil and paper.
- ✓ 0406.2.7 Identify factors of whole numbers and model factors and products beyond basic multiplication facts using arrays and area models.
- ✓ 0406.2.8 Generate equivalent forms of whole numbers, decimals, and common fractions (e.g., $\frac{1}{10}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$).
- ✓ 0406.2.9 Compare equivalent forms whole numbers, fractions, and decimals to each other and to benchmark numbers
- ✓ 0406.2.10 Use models to understand division as the inverse of multiplication, partitioning, and repeated subtraction.
- ✓ 0406.2.11 Use models, benchmarks, and equivalent forms to compare fractions/decimals and locate them on the number line.
- ✓ 0406.2.12 Understand and use decimal numbers up to hundredths and write them as fractions.
- ✓ 0406.2.13 Solve multi-step problems of various types using whole numbers, fractions, and decimals.
- ✓ 0406.2.14 Understand the role of the remainder in division.

State Performance Indicators:

- SPI 0406.2.1 Read and write numbers from hundredths to hundred-thousands in numerals and in words.
- SPI 0406.2.2 Locate and place mixed numbers on the number line.
- SPI 0406.2.3 Identify the place value of a specified digit in a number and the quantity it represents.
- SPI 0406.2.4 Find factors, common factors, multiples, and common multiples of two numbers.
- SPI 0406.2.5 Generate equivalent forms of common fractions and decimals and use them to compare size.
- SPI 0406.2.6 Use the symbols $<$, $>$ and $=$ to compare common fractions and decimals in both increasing and decreasing order.
- SPI 0406.2.7 Convert improper fractions into mixed numbers and/or decimals.
- SPI 0406.2.8 Add and subtract proper fractions with like and unlike denominators and simplify the answer.
- SPI 0406.2.9 Add and subtract decimals through hundredths.
- SPI 0406.2.10 Solve contextual problems using whole numbers, fractions, and decimals.
- SPI 0406.2.11 Solve problems using whole number multi-digit multiplication.

SPI 0406.2.12 Solve problems using whole number division with one- or two-digit divisors.

Standard 3 – Algebra

Grade Level Expectations:

- GLE 0406.3.1 Extend understanding of a variable to equations involving whole numbers, fractions, decimals, and/or mixed numbers.
- GLE 0406.3.2 Use mathematical language and modeling to develop descriptions, rules and extensions of patterns.
- GLE 0406.3.3 Translate between different forms of representations of whole number relationships.

Checks for Understanding (Formative/Summative Assessment):

- ✓ 0406.3.1 Find an unknown quantity in simple equations using whole numbers, fractions, decimals, and mixed numbers.
- ✓ 0406.3.2 Translate between symbols and words to represent quantities in expressions or equations.
- ✓ 0406.3.3 Create, explain and use a rule to generate terms of a pattern or sequence.
- ✓ 0406.3.4 Translate between symbolic, numerical, verbal, or pictorial representations of a whole number pattern or relationship.

State Performance Indicators:

- SPI 0406.3.1 Use letters and symbols to represent an unknown quantity and write a simple mathematical expression.
- SPI 0406.3.2 Make generalizations about geometric and numeric patterns.
- SPI 0406.3.3 Represent and analyze patterns using words, function tables, and graphs.

Standard 4 – Geometry and Measurement

Grade Level Expectations:

- GLE 0406.4.1 Understand and use the properties of lines, segments, angles, polygons, and circles.
- GLE 0406.4.2 Understand and use measures of length, area, capacity, and weight.
- GLE 0406.4.3 Solve problems that involve estimating and measuring length, area, capacity and weight.
- GLE 0406.4.4 Understand the representation of location and movement within the first quadrant of a coordinate system.

Checks for Understanding (Formative/Summative Assessment):

- ✓ 0406.4.1 Identify the basic parts of circles.
- ✓ 0406.4.2 Understand the definition of degree as it relates to the circle.
- ✓ 0406.4.3 Classify angles and triangles as obtuse, acute, or right.
- ✓ 0406.4.4 Measure and draw angles.
- ✓ 0406.4.5 Determine if a figure is a polygon.
- ✓ 0406.4.6 Recognize the use of decimals in metric measures.
- ✓ 0406.4.7 Measure liquids using both standard units and metric units.
- ✓ 0406.4.8 Recognize that a measure of area represents the total number of same-sized units /that cover the shape without gaps or overlaps.
- ✓ 0406.4.9 Recognize that area does not change when 2-dimensional figures are cut apart and rearranged.
- ✓ 0406.4.10 Connect area measure to multiplication using a rectangular area model.
- ✓ 0406.4.11 Estimate areas of rectangles in square inches and square centimeters.
- ✓ 0406.4.12 Estimate the size of an object with respect to a given measurement attribute (length, perimeter, area, or capacity).

- ✓ 0406.4.13 Compare objects with respect to a given attribute such as length, area, and capacity.
- ✓ 0406.4.14 Explain how the components of a coordinate system are used to determine location.
- ✓ 0406.4.15 Explore properties of paths between points.
- ✓ 0406.4.16 Examine transformations in the coordinate plane.
- ✓ 0406.4.17 Predict the results of a transformation of a geometric shape.
- ✓ 0406.4.18 Determine whether a geometric shape has line and/or rotational symmetry.
- ✓ 0406.4.19 Design and analyze simple tilings and tessellations.
- ✓ 0406.4.20 Draw lines of symmetry in 2-dimensional figures.
- ✓ 0406.4.21 Recognize two-dimensional faces of three-dimensional shapes.

State Performance Indicators:

- SPI 0406.4.1 Classify lines and line segments as parallel, perpendicular, or intersecting.
- SPI 0406.4.2 Graph and interpret points with whole number or letter coordinates on grids or in the first quadrant of the coordinate plane.
- SPI 0406.4.3 Construct geometric figures with vertices at points on a coordinate grid.
- SPI 0406.4.4 Identify acute, obtuse, and right angles in 2-dimensional shapes.
- SPI 0406.4.5 Identify attributes of simple and compound figures composed of 2- and 3- dimensional shapes.
- SPI 0406.4.6 Determine situations in which a highly accurate measurement is important.
- SPI 0406.4.7 Determine appropriate size of unit of measurement in problem situations involving length, capacity or weight.
- SPI 0406.4.8 Convert measurements within a single system that are common in daily life (e.g., hours and minutes, inches and feet, centimeters and meters, quarts and gallons, liters and milliliters).
- SPI 0406.4.9 Solve problems involving area and/or perimeter of rectangular figures.
- SPI 0406.4.10 Identify images resulting from reflections, translations, or rotations.

Standard 5 – Data, Probability and Statistics

Grade Level Expectations:

- GLE 0406.5.1 Collect, record, arrange, present, and interpret data using tables and various representations.
- GLE 0406.5.2 Use probability to describe chance events.

Checks for Understanding (Formative/Summative Assessment):

- ✓ 0406.5.1 Create and label appropriate scales for graphs.
- ✓ 0406.5.2 Evaluate how well various representations show the collected data.
- ✓ 0406.5.3 Interpret and prepare pie charts using appropriate measurements of angles.
- ✓ 0406.5.4 Develop and use stem-and-leaf plots.
- ✓ 0406.5.5 Use measures of central tendency to compare two sets of related data.
- ✓ 0406.5.6 Determine a simple probability.
- ✓ 0406.5.7 Express a probability pictorially.

State Performance Indicators:

- SPI 0406.5.1 Depict data using various representations (e.g., tables, pictographs, line graphs, bar graphs).
- SPI 0406.5.2 Solve problems using estimation and comparison within a single set of data.
- SPI 0406.5.3 Given a set of data or a graph, describe the distribution of the data using median, range, or mode.
- SPI 0406.5.4 List all possible outcomes of a given situation or event.