

# MATHEMATICS CONTENT STANDARDS

## Grade 4

**Standard 1:** Patterns and Algebraic Reasoning—The student will use a variety of problem-solving approaches to analyze, extend and create patterns.

1. Discover, describe, extend, and create a wide variety of patterns using tables, graphs, rules, and models (e.g., use 1-inch tiles to demonstrate that doubling the length of the side of a square more than doubles the area, explore the characteristics of odd and even numbers, extend patterns of geometric shapes).

2. Elementary Function Concepts

a. Use a variety of techniques to generalize number patterns (e.g., use function machines and “t-tables” to demonstrate “What is the rule?”).

b. Solve simple open sentences involving operations on whole numbers (with a variable, e.g.,  $a + 17 = 23$ ).

**Standard 2:** Number Sense—The student will use numbers and number relationships to acquire basic number facts.

1. Place Value

a. Apply the concept of place value through 6 digits (e.g., write numbers in expanded form, play a trading game involving place value).

b. Read, write and rename whole numbers through 6 digits and decimal numbers to the hundredths (e.g., money, numerals to words).

2. Compare and order whole numbers and decimals to the hundredths place (e.g., pictures of shaded regions of two-dimensional figures, use  $>$ ,  $<$ ,  $=$  symbols).

3. Fractions

a. Use 0,  $\frac{1}{2}$ , and 1 or 0, 0.5, and 1, as benchmarks and place additional fractions and decimals on a number line (e.g.,  $\frac{1}{3}$ ,  $\frac{2}{3}$ , 0.7, 0.4).

b. Create physical and pictorial models of equivalent and nonequivalent fractional parts to be compared, added or subtracted (e.g., egg cartons, fraction strips, circles, and squares).

**Standard 3:** Number Operations and Computation—The student will estimate and compute with whole numbers.

1. Estimate and find the product of 2- and 3-digit numbers to solve application problems.

2. Division Concepts

a. Demonstrate fluency with basic division facts and fact families.

\*b. Develop division algorithms (e.g., use physical materials to show 12 objects arranged in 3 groups, show division as repeated subtraction and as the inverse of multiplication).

c. Estimate and find the quotient (with and without remainders) with a 1-digit divisor and a 2- or 3-digit dividend to solve application problems.

3. Apply a variety of estimation and mental math techniques to simplify computations (e.g., use rounding to estimate  $82 - 58$  is about  $80 - 60$  or 20, use  $30 \cdot 5$  to find the product of  $300 \cdot 5$ ).

\*4. Develop operation sense by applying the associative property of multiplication (e.g.,  $6 \cdot (2 \cdot 3) = (6 \cdot 2) \cdot 3$ ).

**Standard 4:** Geometry and Measurement—The student will use geometric properties and relationships to analyze shapes and use standard units of customary and metric measurements to solve problems.

1. Basic Characteristics of Lines and Angles

a. Identify, draw, and construct models of intersecting, parallel, and perpendicular lines (e.g., use spaghetti, straws, toothpicks).

b. Identify and compare angles equal to, less than, or greater than 90 degrees (e.g., use right angles to determine the approximate size of other angles; make a variety of angles using flexible straws and compare).

\*2. Identify basic characteristics of the rectangular coordinate system and find the distance between horizontal and vertical lines of a rectangular coordinate system (e.g., the x-axis is the horizontal axis).

3. Spatial Reasoning

a. Describe the effects on two- and three-dimensional objects when they slide (translate), flip (reflect), and turn (rotate) (e.g., tessellations).

b. Predict and verify the effects of combining, subdividing, and changing two- and three-dimensional figures (e.g., folding paper, tiling, and rearranging pieces of solids).

4. Measurement

a. Establish benchmarks for customary and metric units and estimate the measures of a variety of objects and compare units (e.g., mass: the mass of a raisin is about 1 gram, length: the width of a finger is about 1 centimeter).

b. Select appropriate customary and metric units of measure to solve application problems involving length, weight, mass, and volume.

c. Solve application problems involving money, time and temperature (e.g., elapsed time).

**Standard 5:** Data Analysis and Probability—The student will demonstrate an understanding of data collection, display and interpretation.

1. Data Analysis

a. Examine data displays such as tallies, tables, charts and graphs and use the observations to pose and answer questions (e.g., choose a table in social studies of population data and write problems).

b. Collect, organize and record data in tables and graphs (e.g., bar, pictograph, line plots).

\*2. Investigate and record probabilities by experimenting with devices that generate random outcomes (e.g., coins, number cubes, spinners).