

Understanding the Content Standards

Clicking on each of the standards below will provide a brief description of the standard along with a breakdown of the standard through its learning objectives. For more detailed information about how to help students build toward mastery of these standards and background information, review *Explanation of the Mathematics Content Standards*.

Grade 4 Mathematics	
Mathematical Practice <u>4.MP</u>	
Numerical Reasoning <u>4.NR.1</u> <u>4.NR.2</u> <u>4.NR.4</u> <u>4.NR.5</u>	Patterning & Algebraic Reasoning <u>4.PAR.3</u>
Measurement & Data Reasoning <u>4.MDR.6</u>	Geometric & Spatial Reasoning <u>4.GSR.7</u> <u>4.GSR.8</u>

Understanding the Content Standards

MATHEMATICAL PRACTICES STANDARD/KEY COMPETENCY

MATHEMATICAL PRACTICES – reasoning and explaining, modeling and using tools, seeing structure and generalizing

4.MP: Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.

Understanding the Intent and Rigor of the Standard

This standard consists of a breakdown through several learning objectives. These learning objectives are not meant to be taught in isolation, but rather in clusters of related learning objectives. The Grade 4 curriculum map provides suggestions for clustering learning objectives within each unit.

The Mathematical Practices describe the reasoning behaviors students should develop as they build an understanding of mathematics – the “habits of mind” that help students become mathematical thinkers. There are eight standards, which apply to all grade levels and conceptual categories.

These mathematical practices describe how students should engage with the mathematics content for their grade level. Developing these habits of mind builds students’ capacity to become mathematical thinkers. These practices can be applied individually or together in mathematics lessons, and no particular order is required. In well-designed lessons, there are often two or more Mathematical Practices present.

Breakdown of Standard/Key Competency (Expectation/Learning Objective)

4.MP.1 Make sense of problems and persevere in solving them.

4.MP.2 Reason abstractly and quantitatively.

4.MP.3 Construct viable arguments and critique the reasoning of others.

4.MP.4 Model with mathematics.

4.MP.5 Use appropriate tools strategically.

4.MP.6 Attend to precision.

4.MP.7 Look for and make use of structure.

4.MP.8 Look for and express regularity in repeated reasoning.

STANDARD/KEY COMPETENCY 1

NUMERICAL REASONING – place value, rounding, comparisons with multi-digit numbers, addition and subtraction, multiplicative comparisons, multiplication, and division involving whole numbers

4.NR.1: Recognize patterns within the base ten place value system with quantities presented in real-life situations to compare and round multi-digit whole numbers through the hundred-thousands place.

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When learning this standard, students are building on their knowledge of patterns in the base ten place value system and rounding learned in Third Grade. This standard refers to various ways to write numbers. In addition to the traditional standard and expanded forms, students will explore other ideas. Students use place value reasoning to represent, compare, and order multi-digit whole numbers. When rounding, student understanding is extended beyond a procedure for rounding, but relies on a deep understanding of place value, number sense, and reasonableness of answers.

Breakdown of Standard/Key Competency 1 (Expectation/Learning Objective)

4.NR.1.1 Read and write multi-digit whole numbers to the hundred thousands place using base ten numerals and expanded form.

4.NR.1.2 Recognize and show that a digit in one place has a value ten times greater than what it represents in the place to its right and extend this understanding to determine the value of a digit when it is shifted to the left or right, based on the relationship between multiplication and division.

4.NR.1.3 Use place value reasoning to represent, compare, and order multi-digit numbers, using $>$, $=$, and $<$ symbols to record the results of comparisons.

4.NR.1.4 Use place value understanding to round multi-digit whole numbers.

STANDARD/KEY COMPETENCY 2

NUMERICAL REASONING – place value, rounding, comparisons with multi-digit numbers, addition and subtraction, multiplicative comparisons, multiplication, and division involving whole numbers

4.NR.2: Using part-whole strategies, solve problems involving addition and subtraction through the hundred-thousands place, as well as multiplication and division of multi-digit whole numbers presented in real-life, mathematical situations.

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When learning this standard, students will add, subtract, multiply and divide numbers using a variety of strategies based on place value, part-whole, and properties of operations. Multiple strategies enable students to develop fluency and transfer that understanding to related computation problems.

Breakdown of Standard/Key Competency 2 (Expectation/Learning Objective)

4.NR.2.1 Fluently add and subtract multi-digit numbers to solve practical, mathematical problems using place value understanding, properties of operations, and relationships between operations.

4.NR.2.2 Interpret, model, and solve problems involving multiplicative comparison.

4.NR.2.3 Solve relevant problems involving multiplication of a number with up to four digits by a 1-digit whole number or involving multiplication of two two-digit numbers using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NR.2.4 Solve authentic division problems involving up to 4-digit dividends and 1-digit divisors (including whole number quotients with remainders) using strategies based on place-value understanding, properties of operations, and the relationships between operations.

4.NR.2.5 Solve multi-step problems using addition, subtraction, multiplication, and division involving whole numbers. Use mental computation and estimation strategies to justify the reasonableness of solutions.

STANDARD/KEY COMPETENCY 3

PATTERNING & ALGEBRAIC REASONING – patterns, input-output tables, factors, multiples, composite numbers, prime numbers

4.PAR.3: Generate and analyze patterns, including those involving shapes, input/output diagrams, factors, multiples, prime numbers, and composite numbers.

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When learning this standard, students will generate and analyze growing numerical and shape patterns, recognizing this relationship in tables and charts. In addition to growing patterns, students begin understanding factors and multiples of whole numbers as well as prime and composite numbers.

Breakdown of Standard/Key Competency 3 (Expectation/Learning Objective)

4.PAR.3.1 Generate both number and shape patterns that follow a provided rule.

4.PAR.3.2 Use input-output rules, tables, and charts to represent and describe patterns, find relationships, and solve problems.

4.PAR.3.3 Find factor pairs in the range 1–100 and find multiples of single-digit numbers up to 100.

4.PAR.3.4 Identify composite numbers and prime numbers and explain the relationship with the factor pairs.

STANDARD/KEY COMPETENCY 4

NUMERICAL REASONING – fraction equivalence, comparison of fractions, and addition and subtraction of fractions with like denominators

4.NR.4: Solve real-life problems involving addition, subtraction, equivalence, and comparison of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100 using part-whole strategies and visual models.

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When learning this standard, students use visual fraction models to make sense of fractions. These may include area models, number lines or collection/set models. This standard extends the work in third grade with the addition of denominators of 5, 10, 12, and 100. Students also compare fractions with visual fraction models, including number lines, reasoning that comparisons are only valid if the wholes are the same size.

Breakdown of Standard/Key Competency 4 (Expectation/Learning Objective)

4.NR.4.1 Using concrete materials, drawings, and number lines, demonstrate and explain the relationship between equivalent fractions, including fractions greater than one, and explain the identity property of multiplication as it relates to equivalent fractions. Generate equivalent fractions using these relationships.

4.NR.4.2 Compare two fractions with the same numerator or the same denominator by reasoning about their size and recognize that comparisons are valid only when the two fractions refer to the same whole.

4.NR.4.3 Compare two fractions with different numerators and/or different denominators by flexibly using a variety of tools and strategies and recognize that comparisons are valid only when the two fractions refer to the same whole.

4.NR.4.4 Represent whole numbers and fractions as the sum of unit fractions.

4.NR.4.5 Represent a fraction as a sum of fractions with the same denominator in more than one way, recording with an equation.

4.NR.4.6 Add and subtract fractions and mixed numbers with like denominators using a variety of tools.

STANDARD/KEY COMPETENCY 5

NUMERICAL REASONING – fraction equivalence, comparison of fractions, and addition and subtraction of fractions with like denominators

4.NR.5: Solve real-life problems involving addition, equivalence, comparison of fractions with denominators of 10 and 100, and comparison of decimal numbers as tenths and hundredths using part-whole strategies and visual models.

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When learning this standard, students will continue their work with equivalent fractions in third grade. Students will find equivalent fractions with denominators of 10 and 100. Student experiences should focus on working with these ideas conceptually.

Breakdown of Standard/Key Competency 5 (Expectation/Learning Objective)

4.NR.5.1 Demonstrate and explain the concept of equivalent fractions with denominators of 10 and 100, using concrete materials and visual models. Add two fractions with denominators of 10 and 100.

4.NR.5.2 Represent, read, and write fractions with denominators of 10 or 100 using decimal notation, and decimal numbers to the hundredths place as fractions, using concrete materials and drawings.

4.NR.5.3 Compare two decimal numbers to the hundredths place by reasoning about their size. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions.

STANDARD/KEY COMPETENCY 6

MEASUREMENT AND DATA REASONING: time, metric measurements, distance, elapsed time, liquid volume, mass, and length

4.MDR.6: Measure time and objects that exist in the world to solve real-life, mathematical problems and analyze graphical displays of data to answer relevant questions.

Understanding the Intent and Rigor of the Standard

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When learning this standard, students will solve multi-step word problems related to expressing measurements from a larger unit in terms of a smaller unit and smaller unit in terms of a larger unit (e.g., feet - inches, meters - centimeter, dollars - cents, hours - minutes). In addition to measurement, students work with fractions by measuring objects to an eighth of an inch, and conducting statistical investigations. Students will also learn to ask statistical questions, and collect, display and analyze data to answer these questions.

Breakdown of Standard/Key Competency 6 (Expectation/Learning Objective)

4.MDR.6.1 Use the four operations to solve problems involving elapsed time to the nearest minute, intervals of time, metric measurements of liquid volumes, lengths, distances, and masses of objects, including problems involving fractions with like denominators, and also problems that require expressing measurements given in a larger unit in terms of a smaller unit, and expressing a smaller unit in terms of a larger unit based on the idea of equivalence.

4.MDR.6.2 Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life.

4.MDR.6.3 Create dot plots to display a distribution of numerical (quantitative) measurement data.

STANDARD/KEY COMPETENCY 7

GEOMETRIC AND SPATIAL REASONING: polygons, points, lines, line segments, rays, angles, perpendicular lines, area, perimeter

4.GSR.7: Investigate the concepts of angles and angle measurement to estimate and measure angles.

Understanding the Intent and Rigor of the Standard

This standard consists of a breakdown through several learning objectives. These learning objectives are not meant to be taught in isolation, but rather in clusters of related learning objectives. The Grade 4 curriculum map provides suggestions for clustering learning objectives within each unit.

When learning this standard, students build an understanding of angles and a connection between angles and circular measurement (360 degrees), exploring these ideas in one degree turns. Students will transfer their understanding that a 360° rotation about a point makes a complete circle.

Breakdown of Standard/Key Competency 7 (Expectation/Learning Objective)

4.GSR.7.1 Recognize angles as geometric shapes formed when two rays share a common endpoint. Draw right, acute, and obtuse angles based on the relationship of the angle measure to 90 degrees.

4.GSR.7.2 Measure angles in reference to a circle with the center at the common endpoint of two rays. Determine an angle's measure in relation to the 360 degrees in a circle through division or as a missing factor problem.

STANDARD/KEY COMPETENCY 8

GEOMETRIC AND SPATIAL REASONING: polygons, points, lines, line segments, rays, angles, perpendicular lines, area, perimeter

4.GSR.8: Identify and draw geometric objects, classify polygons based on properties, and solve problems involving area and perimeter of rectangular figures.

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When learning this standard, students draw geometric objects, understanding that they may be classified using different characteristics such as, parallel or perpendicular lines or by angle measurement. In addition, students calculate area and perimeter of rectangles, building off of the understanding developed in 3rd grade and applying it to composite rectangles.

Breakdown of Standard/Key Competency 8 (Expectation/Learning Objective)

4.GSR.8.1 Explore, investigate, and draw points, lines, line segments, rays, angles (right, acute, obtuse), perpendicular lines, parallel lines, and lines of symmetry. Identify these in two dimensional figures.

4.GSR.8.2 Classify, compare, and contrast polygons based on lines of symmetry, the presence or absence of parallel or perpendicular line segments, or the presence or absence of angles of a specified size and based on side lengths.

4.GSR.8.3 Solve problems involving area and perimeter of composite rectangles involving whole numbers with known side lengths.