Grade 4 Overview

Grade 4 content is organized into six Alabama Content Areas outlined in the table below: Operations and Algebraic Thinking; Operations with Numbers: Base Ten; Operations with Numbers: Fractions; Data Analysis; Measurement; and Geometry. Related standards are grouped into clusters, which are listed below each content area. Standards indicate what the student should know or be able to do by the end of the grade.

Alabama Content Areas	Operations and Algebraic Thinking	Operations with Numbers: Base Ten	Operations with Numbers: Fractions	Data Analysis	Measurement	Geometry
Clusters	• Gain familiarity with factors and multiples. • Solve problems with whole numbers using the four operations. • Generate and analyze patterns.	• Generalize place value understanding for multi-digit whole numbers. • Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers.	• Extend understanding of fraction equivalence and ordering. • Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. • Understand decimal notation for fractions, and compare decimal fractions.	• Represent and interpret data.	• Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. • Geometric measurement: understand concepts of angles and measure angles.	• Draw and identify lines and angles, and identify shapes by properties of their lines and angles.

The eight Student Mathematical Practices listed in the chart below represent what students are doing as they learn mathematics. Students should regularly engage in these processes and proficiencies at every level throughout their mathematical studies. Proficiency with these practices is critical in using mathematics, both within the classroom and in life. **The Student Mathematical Practices are as standards which should be incorporated across all grades.**

Student Mathematical Practices	
1. Make sense of problems and persevere in solving them.	5. Use appropriate tools strategically.
2. Reason abstractly and quantitatively.	6. Attend to precision.
3. Construct viable arguments and critique the reasoning of others.	7. Look for and make use of structure.
4. Model with mathematics.	8. Look for and express regularity in repeated reasoning.

Content Priorities

In Grade 4, instructional time should focus on three areas:

1. developing understanding and fluency with multi-digit multiplication, and understanding of division to find quotients involving multi-digit dividends;
2. developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; and
3. understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, or symmetry.

1. Through their learning in the **Operations with Numbers: Base Ten** Alabama Content Area, students
   - generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place;
   - apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operation, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers;
   - select and accurately apply appropriate methods to estimate or mentally calculate products, depending on the numbers and the context;
   - develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems;
   - apply their understanding of models for division, place value, properties of operations, and the relationship between division and multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends; and
   - select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

2. Through their learning in the **Operations with Numbers: Fractions** Alabama Content Area, students
   - develop understanding of fraction equivalence and operations with fractions;
   - recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and develop methods for generating and recognizing equivalent fractions; and
   - extend previous understandings about how fractions are built from unit fractions to compose fractions from unit fractions, decompose fractions into unit fractions, and use the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

3. Through their learning in the **Geometry** Alabama Content Area, students
   - describe, analyze, compare, and identify two-dimensional shapes using formal language based on the definition of the shapes;
   - deepen their understanding of properties of two-dimensional shapes (e.g., angles, parallelism, or symmetry); and
   - use properties of two-dimensional objects to solve problems involving symmetry.

NOTE: Although not all content areas in the grade level have been included in the overview, all standards should be included in instruction.

***NOTE: fluency vs. automaticity.** Fluency involves a mixture of "just knowing" answers, knowing answers from patterns, and knowing answers from the use of strategies. The word *fluently* is used in the standards to mean accurately, efficiently and flexibly. Automaticity of facts becomes evident when a student no longer uses a pattern or mental algorithm to determine the answer.

Grade 4 Content Standards

Each content standard completes the stem *"Students will…"*

Operations and Algebraic Thinking	
Solve problems with whole numbers using the four operations.	1. Interpret and write equations for multiplicative comparisons. 2. Solve word problems involving multiplicative comparison using drawings and write equations to represent the problem, using a symbol for the unknown number. 3. Determine and justify solutions for multi-step word problems, including problems where remainders must be interpreted. a. Write equations to show solutions for multi-step word problems with a letter standing for the unknown quantity. b. Determine reasonableness of answers for multi-step word problems, using mental computation and estimation strategies including rounding.
Gain familiarity with factors and multiples.	4. For whole numbers in the range 1 to 100, find all factor pairs, identifying a number as a multiple of each of its factors. a. Determine whether a whole number in the range 1 to 100 is a multiple of a given one-digit number. b. Determine whether a whole number in the range 1 to 100 is prime or composite.

Generate and analyze patterns.	5. Generate and analyze a number or shape pattern that follows a given rule.

Operations with Numbers: Base Ten	
Generalize place value understanding for multi-digit whole numbers.	6. Using models and quantitative reasoning, explain that in a multi-digit whole number, a digit in any place represents ten times what it represents in the place to its right. 7. Read and write multi-digit whole numbers using standard form, word form, and expanded form. 8. Use place value understanding to compare two multi-digit numbers using >, =, and < symbols. 9. Round multi-digit whole numbers to any place using place value understanding.
Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers.	10. Use place value strategies to fluently add and subtract multi-digit whole numbers and connect strategies to the standard algorithm. 11. Find the product of two factors (up to four digits by a one-digit number and two two-digit numbers), using strategies based on place value and the properties of operations. a. Illustrate and explain the product of two factors using equations, rectangular arrays, and area models. 12. Use strategies based on place value, properties of operations, and/or the relationship between multiplication and division to find whole-number quotients and remainders with one-digit divisors and up to four-digit dividends. a. Illustrate and/or explain quotients using equations, rectangular arrays, and/or area models.

Operations with Numbers: Fractions	
Extend understanding of fraction equivalence and ordering. *Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.*	13. Using area and length fraction models, explain why one fraction is equivalent to another, taking into account that the number and size of the parts differ even though the two fractions themselves are the same size. a. Apply principles of fraction equivalence to recognize and generate equivalent fractions. *Example:* $\frac{a}{b}$ *is equivalent to* $\frac{n \times a}{n \times b}$.

	14. Compare two fractions with different numerators and different denominators using concrete models, benchmarks (0, ½, 1), common denominators, and/or common numerators, recording the comparisons with symbols >, =, or <, and justifying the conclusions. a. Explain that comparison of two fractions is valid only when the two fractions refer to the same whole.
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	15. Model and justify decompositions of fractions and explain addition and subtraction of fractions as joining or separating parts referring to the same whole. a. Decompose a fraction as a sum of unit fractions and as a sum of fractions with the same denominator in more than one way using area models, length models, and equations. b. Add and subtract fractions and mixed numbers with like denominators using fraction equivalence, properties of operations, and the relationship between addition and subtraction. c. Solve word problems involving addition and subtraction of fractions and mixed numbers having like denominators, using drawings, visual fraction models, and equations to represent the problem. 16. Apply and extend previous understandings of multiplication to multiply a whole number times a fraction. a. Model and explain how a non-unit fraction can be represented by a whole number times the unit fraction. *Example:* $\frac{9}{8} = 9 \times \frac{1}{8}$ b. Extend previous understanding of multiplication to multiply a whole number times any fraction less than one. *Example:* $4 \times \frac{2}{3} = \frac{4 \times 2}{3} = \frac{8}{3}$ c. Solve word problems involving multiplying a whole number times a fraction using visual fraction models and equations to represent the problem. *Examples:* $3 \times \frac{1}{2}$, $6 \times \frac{1}{8}$
Understand decimal notation for fractions, and compare decimal fractions. *Denominators are limited to 10 and 100.*	17. Express, model, and explain the equivalence between fractions with denominators of 10 and 100. a. Use fraction equivalency to add two fractions with denominators of 10 and 100. 18. Use models and decimal notation to represent fractions with denominators of 10 and 100. 19. Use visual models and reasoning to compare two decimals to hundredths (referring to the same whole), recording comparisons using symbols >, =, or <, and justifying the conclusions.

Data Analysis	
Represent and interpret data.	20. Interpret data in graphs (picture, bar, and line plots) to solve problems using numbers and operations. a. Create a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$). b. Solve problems involving addition and subtraction of fractions using information presented in line plots.

Measurement	
Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	21. Select and use an appropriate unit of measurement for a given attribute (length, mass, liquid volume, time) within one system of units: metric - km, m, cm; kg, g, l, ml; customary - lb, oz; time - hr, min, sec. a. Within one system of units, express measurements of a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. 22. Use the four operations to solve measurement word problems with distance, intervals of time, liquid volume, mass of objects, and money. a. Solve measurement problems involving simple fractions or decimals. b. Solve measurement problems that require expressing measurements given in a larger unit in terms of a smaller unit. c. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. 23. Apply area and perimeter formulas for rectangles in real-world and mathematical situations.
Geometric measurement: understand concepts of angle and measure angles.	24. Identify an angle as a geometric shape formed wherever two rays share a common endpoint. 25. Use a protractor to measure angles in whole-number degrees and sketch angles of specified measure. 26. Decompose an angle into non-overlapping parts to demonstrate that the angle measure of the whole is the sum of the angle measures of the parts. a. Solve addition and subtraction problems on a diagram to find unknown angles in real-world or mathematical problems.

Geometry	
Draw and identify lines and angles, and identify shapes by properties of their lines and angles.	27. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines, and identify these in two-dimensional figures. 28. Identify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size. a. Describe right triangles as a category, and identify right triangles. 29. Define a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. a. Identify line-symmetric figures and draw lines of symmetry.