Correlation: 2016 Alabama Course of Study, Mathematics standards and NAEP Objectives

When teaching Alabama Course of Study content, NAEP objectives and items are useful for identifying a level of rigor which matches proficient student performance nationwide. The NAEP objectives identify content that could be included in lessons building toward master of the correlating standards from the *2016 Alabama Course of Study: Mathematics*.

Grade	Grade 3 Alabama Course of Study Standard	NAEP Objective(s) Grade 4	NAEP Objective(s) Grade 8
3	**1. [3.OA.1]** Interpret products of whole numbers, e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each. - Example: Describe a context in which a total number of objects can be expressed as 5 x 7.	**4NPO3e** Interpret whole-number operations and the relationships between them.	**8NPO3a** Perform computations with rational numbers.
3	**2. [3.OA.2]** Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. Example: Describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	**4NPO3e** Interpret whole-number operations and the relationships between them.	**8NPO3a** Perform computations with rational numbers.
3	**3. [3.OA.3]** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (See Appendix A, Table 2.)	**4NPO3f** Solve application problems involving numbers and operations. **4A3a** Use letters and symbols to represent an unknown quantity in a simple mathematical expression.	**8NPO3a** Perform computations with rational numbers.
3	**4. [3.OA.4]** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. - Example: Determine the unknown number that makes the equation true in each of the equations 8 x ? = 48, 5 = _ ÷ 3, 6 x 6 = ?.	**4NPO5b** Identify factors of whole numbers. **4NPO5e** Apply basic properties of operations. **4A4a** Find the value of the unknown in a whole-number sentence.	**8NPO3a** Perform computations with rational numbers.

3	**5. [3.OA.5]** Apply properties of operations as strategies to multiply and divide. Examples: If 6 x 4 = 24 is known, then 4 x 6 = 24 is also known. (Commutative property of multiplication) 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 = 30, or by 5 x 2 = 10, then 3 x 10 = 30. (Associative property of multiplication) Knowing that 8 x 5 = 40 and 8 x 2 = 16, one can find 8 x 7 as 8 x (5 + 2) = (8 x 5) + (8 x 2) = 40 + 16 = 56. (Distributive property) (Students need not use formal terms for these properties.)		**8NPO3a** Perform computations with rational numbers.
3	**6. [3.OA.6]** Understand division as an unknown-factor problem. - Example: Find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.	**4NPO3e** Interpret whole-number operations and the relationships between them.	**8NPO3a** Perform computations with rational numbers.
3	**7. [3.OA.7]** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	**4NPO3c** Divide whole numbers: • Up to three digits by one digit with paper-and-pencil computation, or • Up to five digits by two digits with use of calculator.	**8NPO3a** Perform computations with rational numbers. **8NPO3d** Describe the effect of multiplying and dividing by numbers, including the effect of multiplying or dividing a rational number by: • Zero, or • A number less than zero, or • A number between zero and one, • One, or • A number greater than one.

3	**8. [3.OA.8]** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).)	**4NPO3f** Solve application problems involving numbers and operations.	**8NPO3a** Perform computations with rational numbers.
3	**9. [3.OA.9]** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. - Example: Observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	**4A1a** Recognize, describe, or extend numerical patterns.	**8NPO3a** Perform computations with rational numbers.
3	**10. [3.NBT.1]** Use place value understanding to round whole numbers to the nearest 10 or 100.		**8NPO3a** Perform computations with rational numbers.
3	**11. [3.NBT.2]** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	**4NPO3a** Add and subtract: • Whole numbers, or • Fractions with like denominators, or • Decimals through hundredths.	**8NPO3a** Perform computations with rational numbers.

3	**12. [3.NBT.3]** Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.	**4NPO3b** Multiply whole numbers: • No larger than two-digit by two-digit with paper-and-pencil computation, or • Larger numbers with use of Calculator	**8NPO3a** Perform computations with rational numbers. **8NPO3d** Describe the effect of multiplying and dividing by numbers, including the effect of multiplying or dividing a rational number by: • Zero, or • A number less than zero, or • A number between zero and one, • One, or • A number greater than one.
3	**13. [3.NF.1]** Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.		**8NPO1h** Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line). **8NPO3a** Perform computations with rational numbers.
3	**14. [3.NF.2]** Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. b. Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.	**4NPO1e** Connect model, number word, or number using various models and representations for whole numbers, fractions, and decimals. **4NPO3d** Describe the effect of operations on size (whole numbers).	**8NPO1b** Model or describe rational numbers or numerical relationships using number lines and diagrams. **8NPO3a** Perform computations with rational numbers. **8NPO1h** Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line).

3	**15. [3.NF.3]** Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. - Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram. d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	**4NPO3d** Describe the effect of operations on size (whole numbers). **4NPO6a** Explain or justify a mathematical concept or relationship (e.g., explain why 15 is an odd number or why 7–3 is not the same as 3–7).	**8NPO1d** Write or rename rational numbers. **8NPO1h** Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line).
3	**16. [3.MD.1]** Tell and write time to the nearest minute, and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.		

3	**17. [3.MD.2]** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Excludes compound units such as cm^3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Excludes multiplicative comparison problems (problems involving notions of "times as much").) (See Appendix A, Table 2.)	**4M1c** Estimate the size of an object with respect to a given measurement attribute (e.g., length, perimeter, or area using a grid).	**8M1c** Estimate the size of an object with respect to a given measurement attribute (e.g., area).
3	**18. [3.MD.3]** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. Example: Draw a bar graph in which each square in the bar graph might represent 5 pets.		
3	**19. [3.MD.4]** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot where the horizontal scale is marked off in appropriate units- whole numbers, halves, or quarters.		

3	**20. [3.MD.5]** Recognize area as an attribute of plane figures, and understand concepts of area measurement. a. A square with side length 1 unit called "a unit square," is said to have "one square unit" of area and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.	**4M1g** Solve problems involving area of squares and rectangles.	**8M1e** Select or use appropriate measurement instrument to determine or create a given length, area, column, angle, weight, or mass.
3	**21. [3.MD.6]** Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	**4M1g** Solve problems involving area of squares and rectangles.	**8M1e** Select or use appropriate measurement instrument to determine or create a given length, area, column, angle, weight, or mass.

3	**22. [3.MD.7]** Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into nonoverlapping rectangles and adding the areas of the nonoverlapping parts, applying this technique to solve real-world problems.	**4NPO3f** Solve application problems involving numbers and operations. **4M1g** Solve problems involving area of squares and rectangles.	
3	**23. [3.MD.8]** Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	**4NPO3f** Solve application problems involving numbers and operations. **4M1f** Solve problems involving perimeter of plane figures.	**8M1f** Solve mathematical or real-world problems involving perimeter or area of plane figures, such as triangles, rectangles, circles, or composite figures.

3	**24. [3.G.1]** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	**4G1f** Describe attributes of two- and three-dimensional shapes. **4G3a** Analyze or describe patterns of geometric figures by increasing number of sides, changing size or orientation (e.g., polygons with more and more sides).	**8G1b** Identify a geometric object given a written description of its properties. **8G3f** Describe or analyze simple properties of, or relationships between, triangles, quadrilaterals, and other polygonal plane figures.
3	**25. [3.G.2]** Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. - Example: Partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.		