## 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 |
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| 3 | 1. [3.OA.1] Interpret products of whole numbers, e.g., interpret $5 \times 7$ 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 $5 \times 7$. | 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 $56 \div 8$. | 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. <br> 4A3a Use letters and symbols to represent an unknown quantity in a simple mathematical expression. | 8NPO3a Perform computations with rational numbers. |
| 3 | 4. [3.0A.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 $8 \times ?=48,5=\_\div 3,6 \times 6=$ ? | 4NPO5b Identify factors of whole numbers. <br> 4NPO5e Apply basic properties of operations. <br> 4A4a Find the value of the unknown in a whole-number sentence. | 8NPO3a Perform computations with rational numbers. |


| 3 | 5. [3.0A.5] Apply properties of operations as strategies to multiply and divide. Examples: If $6 \mathrm{x} 4=24$ is known, then 4 x $6=24$ is also known. (Commutative property of multiplication) $3 \times 5 \times 2$ can be found by $3 \times 5=15$, then $15 \times 2=30$, or by $5 \times 2=10$, then $3 \times 10=30$. <br> (Associative property of multiplication) Knowing that $8 \times 5=40$ and $8 \times 2=16$, one can find $8 \times 7$ as $8 \times(5+2)=(8 \times 5)+$ $(8 \times 2)=40+16=56$. (Distributive property) (Students need not use formal terms for these properties.) |  | 8NPO3a Perform computations with rational numbers. |
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| 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 $8 \times 5=40$, one knows 40 \& divide; $5=8$ ) 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-andpencil computation, or • Up to five digits by two digits with use of calculator. | 8NPO3a Perform computations with rational numbers. <br> 8NPO3d Describe the effect of multiplying and dividing by numbers, including the effect of multiplying or dividing a rational number by: $\bullet$ Zero, or $\bullet$ A number less than zero, or $\cdot$ A number between zero and one, •One, or $\cdot \mathrm{A}$ number greater than one. |


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


| 3 | 12. [3.NBT.3] Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., $9 \times 80,5 \times 60$ ) 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 $\bullet$ Larger numbers with use of Calculator | 8NPO3a Perform computations with rational numbers. <br> 8NPO3d Describe the effect of multiplying and dividing by numbers, including the effect of multiplying or dividing a rational number by: $\bullet$ Zero, or $\bullet$ A number less than zero, or $\cdot$ A number between zero and one, •One, or •A number greater than one. |
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| 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). <br> 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. <br> 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. <br> 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. <br> 4NPO3d Describe the effect of operations on size (whole numbers). | 8NPO1b Model or describe rational numbers or numerical relationships using number lines and diagrams. <br> 8NPO3a Perform computations with rational numbers. <br> 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. <br> a. Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line. <br> 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. <br> 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. <br> 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). <br> 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. <br> 8NPO1h Order or compare rational numbers (fractions, decimals, percents, or integers) using various models and representations (e.g., number line). |
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| 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 <br> volumes and masses of objects using <br> standard units of grams (g), kilograms <br> (kg), and liters (l). (Excludes compound <br> units such as cm 3 and finding the <br> geometric volume of a container.) Add, <br> subtract, multiply, or divide to solve one- <br> step word problems involving masses or <br> volumes that are given in the same units, <br> e.g., by using drawings (such as a beaker <br> with a measurement scale) to represent the <br> problem. (Excludes multiplicative <br> comparison problems (problems involving <br> notions of "times as much").) (See <br> Appendix A, Table 2.) | 4M1c Estimate the size of an object with <br> respect to a given measurement attribute <br> (e.g., length, perimeter, or area using a <br> grid). | 8M1c Estimate the size of an object with <br> respect to a given measurement attribute <br> (e.g., area). |
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| 3 | 18. [3.MD.3] Draw a scaled picture graph <br> and a scaled bar graph to represent a data <br> set with several categories. Solve one- and <br> two-step "how many more" and "how <br> many less" problems using information <br> presented in scaled bar graphs. Example: <br> Draw a bar graph in which each square in <br> the bar graph might represent 5 pets. |  |  |
| 3 | 19. [3.MD.4] Generate measurement data <br> by measuring lengths using rulers marked <br> with halves and fourths of an inch. Show <br> the data by making a line plot where the <br> horizontal scale is marked off in <br> appropriate units- whole numbers, halves, <br> or quarters. |  |  |


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


| 3 | 22. [3.MD.7] Relate area to the operations of multiplication and addition. <br> a. Find the area of a rectangle with wholenumber side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. <br> 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. <br> 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. <br> 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. <br> 4M1g Solve problems involving area of squares and rectangles. |  |
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| 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. <br> 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. |

$\left.\begin{array}{|l|l|l|l|}\hline 3 & \begin{array}{l}\text { 24. [3.G.1] Understand that shapes in } \\ \text { different categories (e.g., rhombuses, } \\ \text { rectangles, and others) may share attributes } \\ \text { (e.g., having four sides), and that the } \\ \text { shared attributes can define a larger } \\ \text { category (e.g., quadrilaterals). Recognize } \\ \text { rhombuses, rectangles, and squares as } \\ \text { examples of quadrilaterals, and draw } \\ \text { examples of quadrilaterals that do not } \\ \text { belong to any of these subcategories. }\end{array} & \begin{array}{l}\text { 4G1f Describe attributes of two- and three- } \\ \text { dimensional shapes. }\end{array} & \begin{array}{l}\text { 4GG1b Identify a geometric object given a } \\ \text { geometric figures by increasing number of } \\ \text { sides, changing size or orientation (e.g., } \\ \text { written description of its properties. }\end{array} \\ \text { polygs with more and more sides). }\end{array} \quad \begin{array}{l}\text { 8G3f Describe or analyze simple } \\ \text { properties of, or relationships between, } \\ \text { triangles, quadrilaterals, and other } \\ \text { polygonal plane figures. }\end{array}\right\}$

