A Side-by-Side Comparison of the Kindergarten Standards
in the
2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Count forward orally from 0 to 100 by ones and by tens. Count backward orally from 10 to 0 by ones.	K.CC.1	Count to 100 by ones and by tens.
2	Count to 100 by ones beginning with any given number between 0 and 99.	K.CC.2	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
3	Write numerals from 0 to 20. a. Represent 0 to 20 using concrete objects when given a written numeral from 0 to 20 (with 0 representing a count of no objects).	K.CC.3	Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).
4	4. Connect counting to cardinality using a variety of concrete objects. a. Say the number names in consecutive order when counting objects. b. Indicate that the last number name said tells the number of objects counted in a set. c. Indicate that the number of objects in a set is the same regardless of their arrangement or the order in which they were counted. d. Explain at each successive number name refers to a quantity that is one larger.	K.CC.4	Understand the relationship between numbers and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. c. Understand that each successive number name refers to a quantity that is one larger.
5	Count to answer "how many?" questions. a. Count using no more than 20 concrete objects arranged in a line, a rectangular array, or a circle. b. Count using no more than 10 concrete objects in a scattered configuration. c. Draw the number of objects that matches a given numeral from 0 to 20.	K.CC.5	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.
6	Orally identify whether the number of objects in one group is greater/more than, less/fewer than, or equal/the same as the number of objects in another group, in groups containing up to 10 objects, by using matching, counting, and other strategies.	K.CC.6	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.
7	Compare two numbers between 0 and 10 presented as written numerals (without using inequality symbols).	K.CC.7	Compare two numbers between 1 and 10 presented as written numerals.
8	Represent addition and subtraction up to 10 with concrete objects, fingers, pennies, mental images, drawings, claps or other sounds, acting out situations, verbal explanations, expressions, or equations.	K.OA .1	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

9	Solve addition and subtraction word problems, and add and subtract within 10, by using concrete objects or drawings to represent the problem.	K.OA .2	Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
10	Decompose numbers less than or equal to 10 into pairs of smaller numbers in more than one way, by using concrete objects or drawings, and record each decomposition by a drawing or equation. Example: 5 = 2 + 3 and 5 = 4 + 1	K.OA .3	Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).
11	For any number from 0 to 10, find the number that makes 10 when added to the given number, by using concrete objects or drawings, and record the answer with a drawing or equation.	K.OA .4	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
12	Fluently add and subtract within 5.	K.OA .5	Fluently add and subtract within 5.
13	Duplicate and extend simple patterns using concrete objects.		
14	Compose and decompose numbers from 11 to 19 by using concrete objects or drawings to demonstrate understanding that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	K.NBT .1	Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.
15	Classify objects into given categories of 10 or fewer; count the number of objects in each category and sort the categories by count.	K.MD.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
16	Identify and describe measurable attributes (length, weight, height) of a single object using vocabulary such as long/short, heavy/light, or tall/short.	K.MD.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
17	Directly compare two objects with a measurable attribute in common to see which object has "more of " or "less of" the attribute and describe the difference. Example: Directly compare the heights of two children and describe one child as "taller " or "shorter. "	K.MD.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/ "less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*
18	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, be/ow, beside, in front of, behind, and next to.	K.G.1	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.
19	Correctly name shapes regardless of their orientations or overall sizes.	K.G.2	Correctly name shapes regardless of their orientations or overall size.
20	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid').	K.G.3	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
21	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (number of sides and vertices or "comers"), and other attributes. Example: having sides of equal length	K.G.4	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).
22	Model shapes in the world by building them from sticks, clay balls, or other components and by drawing them.	K.G.5	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
23	Use simple shapes to compose larger shapes. Example: Join two triangles with full sides touching to make a rectangle.	K.G.6	Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

A Side-by-Side Comparison of the First Grade Standards
in the
2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Use addition and subtraction to solve word problems within 20 by using concrete objects, drawings, and equations with a symbol for the unknown number to represent the problem. a. Add to with change unknown to solve word problems within 20. b. Take from with change unknown to solve word problems within 20. c. Put together/take apart with addend unknown to solve word problems within 20. d. Compare quantities, with difference unknown, bigger unknown, and smaller unknown while solving word problems within 20.	1.OA.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 by using concrete objects, drawings, or equations with a symbol for the unknown number to represent the problem.	1.OA.2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
3	Apply properties of operations as strategies to add and subtract. Examples: If *8 + 3 = 11 is known, then 3 + 8 = 11 is also known* (commutative property of addition). To add 2 + 6 + 4, the second and third numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12 (associative property of addition). When adding 0 to a number, the result is the same number (identity property of zero for addition).	1.OA.3	Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*
4	Explain subtraction as an unknown-addend problem. Example: subtracting 10 - 8 by finding the number that makes 10 when added to 8	1.OA.4	Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*
5	Relate counting to addition and subtraction Example: counting on 2 to add 2	1.OA.5	Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
6	Add and subtract within 20. a. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by counting on. b. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by making ten. c. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by decomposing a number leading to a ten. Example: 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9 d. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by using the relationship between addition and subtraction. Example: Knowing that 8 + 4 = 12, one knows 12 – 8 = 4	1.OA.6	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

	e. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by creating equivalent but easier or known sums. Example: adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13		
7	Explain that the equal sign means "the same as." Determine whether equations involving addition and subtraction are true or false. Example: determining which of the following equations are true and which are false: 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2	1.OA.7	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*
8	Solve for the unknown whole number in various positions in an addition or subtraction equation, relating three whole numbers that would make it true. Example: determining the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = ? – 3, 6 + 6 = ?.	1.OA.8	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = � – 3, 6 + 6 = �.*
9	Reproduce, extend, and create patterns and sequences of numbers using a variety of materials.		
10	Extend the number sequence from 0 to 120. a. Count forward and backward by ones, starting at any number less than 120. b. Read numerals from 0 to 120. c. Write numerals from 0 to 120. d. Represent a number of objects from 0 to 120 with a written numeral.	1.NBT.1	Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
11	Explain that the two digits of a two-digit number represent amounts of tens and ones. a. Identify a bundle of ten ones as a "ten." b. Identify the numbers from 11 to 19 as composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. Identify the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 as one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).	1.NBT.2	Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones — called a "ten." b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
12	Compare pairs of two-digit numbers based on the values of the tens and ones digits, recording the results of comparisons with the symbols >, =, and < and orally with the words "is greater than," "is equal to," and "is less than."	1.NBT.3	Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
13	Add within 100, using concrete models or drawings and strategies based on place value. a. Add a two-digit number and a one-digit number. b. Add a two-digit number and a multiple of 10. c. Demonstrate that in adding two-digit numbers, tens are added to tens, ones are added to ones, and sometimes it is necessary to compose a ten.	1.NBT.4	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

	d. Relate the strategy for adding a two-digit number and a one-digit number to a written method and explain the reasoning used.		
14	Given a two-digit number, mentally find 10 more or 10 less than the number without having to count, and explain the reasoning used.	1.NBT.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
15	Subtract multiples of 10 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Relate the strategy to a written method and explain the reasoning used.	1.NBT.6	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
16	Organize, represent, and interpret data with up to three categories. a. Ask and answer questions about the total number of data points in organized data. b. Determine "how many" in each category using up to three categories of data. c. Determine "how many more" or "how many less" are in one category than in another using data organized	1.MD.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
17	Order three objects by length; compare the lengths of two objects indirectly by using a third object.	1.MD.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.
18	Determine the length of an object using non-standard units with no gaps or overlaps, expressing the length of the object with a whole number.	1.MD.2	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*
19	Tell and write time to the hours and half hours using analog and digital clocks.	1.MD.3	Tell and write time in hours and half-hours using analog and digital clocks.
20	Identify pennies and dimes by name and value.		
21	Build and draw shapes which have defining attributes. a. Distinguish between defining attributes and non-defining attributes. Examples: Triangles are closed and three- sided, which are defining attributes; color, orientation, and overall size are non-defining attributes.	1.G.1	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
22	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.	1.G.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
23	Partition circles and rectangles into two and four equal shares and describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of.	1.G.3	Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these

	a. Describe "the whole" as two of or four of the shares of circles and rectangles partitioned into two or four equal shares. b. Explain that decomposing into more equal shares creates smaller shares of circles and rectangles.		examples that decomposing into more equal shares creates smaller shares.

A Side-by-Side Comparison of the Second Grade Standards
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	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Use addition and subtraction within 100 to solve one- and two-step word problems by using drawings and equations with a symbol for the unknown number to represent the problem.	2.OA.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem
2	Fluently add and subtract within 20 using mental strategies such as counting on, making ten, decomposing a number leading to ten, using the relationship between addition and subtraction, and creating equivalent but easier or known sums. a. State automatically all sums of two one-digit numbers.	2.OA.2	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
3	Use concrete objects to determine whether a group of up to 20 objects is even or odd. a. Write an equation to express an even number as a sum of two equal addends.	2.OA.3	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
4	Using concrete and pictorial representations and repeated addition, determine the total number of objects in a rectangular array with up to 5 rows and up to 5 columns. a. Write an equation to express the total number of objects in a rectangular array with up to 5 rows and up to 5 columns as a sum of equal addends.	2.OA.4	Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends
5	Reproduce, extend, create, and describe patterns and sequences using a variety of materials.		
6	Explain that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. a. Explain the following three-digit numbers as special cases: 100 can be thought of as a bundle of ten tens, called a “hundred,” and the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	2.NBT.1	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a “hundred.” b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
7	Count within 1000 by ones, 5s, 10s, and 100s.	2.NBT.2	Count within 1000; skip-count by 5s, 10s, and 100s.
8	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	2.NBT.3	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
9	Compare two three-digit numbers based on the value of the hundreds, tens, and ones digits, recording the results of comparisons with the symbols >, =, and < and orally with the words “is greater than,” “is equal to,” and “is less than.”	2.NBT.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

10	Fluently add and subtract within 100, using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	2.NBT.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
11	Use a variety of strategies to add up to four two-digit numbers.	2.NBT.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.
12	Add and subtract within 1000 using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. a. Explain that in adding or subtracting three- digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
13	Mentally add and subtract 10 or 100 to a given number between 100–900.	2.NBT.8	Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
14	Explain why addition and subtraction strategies work, using place value and the properties of operations.	2.NBT.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.
15	Measure lengths of several objects to the nearest whole unit. a. Create a line plot where the horizontal scale is marked off in whole-number units to show the lengths of several measured objects.	2.MD.9	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
16	Create a picture graph and bar graph to represent data with up to four categories. a. Using information presented in a bar graph, solve simple "put-together," "take-apart," and "compare" problems.	2.MD.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
17	Measure the length of an object by selecting and using standard units of measurements shown on rulers, yardsticks, meter sticks, and measuring tapes.	2.MD.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
18	Measure objects with two different units, and describe how the two measurements relate to each other and the size of the unit chosen.	2.MD.2	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
19	Estimate lengths using the following standard units of measurement: inches, feet, centimeters, and meters.	2.MD.3	Estimate lengths using units of inches, feet, centimeters, and meters.
20	Measure to determine how much longer one object is than another, expressing the length difference of the two objects using standard units of length.	2.MD.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
21	Use addition and subtraction within 100 to solve word problems involving same units of length, representing the problem with drawings (such as drawings of rulers) and/or equations with a symbol for the unknown number.	2.MD.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
22	Create a number line diagram using whole numbers with equally spaced points and use it to represent whole-number sums and differences within 100.	2.MD.6	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0,

			1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
23	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. a. Express an understanding of common terms such as, but not limited to, *quarter past, half past*, and *quarter to*.	2.MD.7	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
24	Solve problems with money. a. Identify nickels and quarters by name and value. b. Find the value of a collection of quarters, dimes, nickels, and pennies. c. Solve word problems by adding and subtracting within one dollar, using the $ and ¢ symbols appropriately (not including decimal notation).	2.MD.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?
25	Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. a. Recognize and draw shapes having specified attributes. Examples: a given number of angles or a given number of equal faces.	2.G.1	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
26	Partition a rectangle into rows and columns of same-size squares, and count to find the total number of squares.	2.G.2	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
27	Partition circles and rectangles into two, three, or four equal shares. Describe the shares using such terms as *halves, thirds, half of*, or *a third of*, and describe the whole as *two halves, three thirds*, or *four fourths*. a. Explain that equal shares of identical wholes need not have the same shape.	2.G.3	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

A Side-by-Side Comparison of the Third Grade Standards
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1	Illustrate the product of two whole numbers as equal groups by identifying the number of groups and the number in each group and represent as a written expression.	3.OA.1	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.
2	Illustrate and interpret the quotient of two whole numbers as the number of objects in each group or the number of groups when the whole is partitioned into equal shares.	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. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.
3	Solve word situations using multiplication and division within 100 involving equal groups, arrays, and measurement quantities; represent the situation using models, drawings, and equations with a symbol for the unknown number.	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.
4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = � ÷ 3, 6 × 6 = ?.
5	Develop and apply properties of operations as strategies to multiply and divide.	3.OA.5	Apply properties of operations as strategies to multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)
6	Use the relationship between multiplication and division to represent division as an equation with an unknown factor.	3.OA.6	Understand division as an unknown-factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.
7	Use strategies based on properties and patterns of multiplication to demonstrate fluency with multiplication and division within 100. a. Fluently determine all products obtained by multiplying two one-digit numbers.	3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 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.
8	Create and justify solutions for two-step word problems using the four operations and write an equation with a letter standing for the unknown quantity. Determine reasonableness of answers using	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.

	number sense, context, mental computation, and estimation strategies including rounding.		
9	Recognize and explain arithmetic patterns using properties of operations.	3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.
10	Identify the nearest 10 or 100 when rounding whole numbers, using place value understanding.	3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.
11	Use various strategies to add and subtract fluently within 1000.	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.
12	Use concrete materials and pictorial models based on place-value and properties of operations to find the product of a one-digit whole number by a multiple of ten (from 10 to 90).	3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.
13	Demonstrate that a unit fraction represents one part of an area model or length model of a whole that has been equally partitioned; explain that a numerator greater than one indicates the number of unit pieces represented by the fraction.	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.
14	Interpret a fraction as a number on the number line; locate or represent fractions on a number line diagram. a. Represent a unit fraction (*1/b*) on a number line by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts as specified by the denominator. b. Represent a fraction (*a/b*) on a number line by marking off *a* lengths of slze (*1/b*) from zero.	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.
15	Explain equivalence and compare fractions by reasoning about their size using visual fraction models and number lines. a. Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. b. Compare two fractions with the same numerator or with the same denominator by reasoning about their size (recognizing that actions must refer to the same whole for the comparison to be valid.) Record comparisons using <, >, or = and justify conclusions	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.
16	Tell and write time to the nearest minute; measure time intervals in minutes (within 90 minutes.) a. Solve real world problems involving addition and subtraction of time intervals in minutes by representing the problem on a number line diagram.	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.
17	Estimate and measure liquid volumes and masses of objects using liters (l), grams (g), and kilograms (kg). a. Use the four operations to solve one-step word problems involving masses or volumes given in the same metric units.	3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).6 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.
18	Find the area of a rectangle with whole number side lengths by tiling without gaps or overlays and counting unit squares.	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 × b and a × 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 non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
20	Relate area to the operations of multiplication using real-world problems, concrete materials, mathematical reasoning, and the distributive property.		
21	Decompose rectilinear figures into smaller rectangles to find the area, using concrete materials.		
19	Count unit squares (square cm, square m, square in, square ft, and improvised or non-standard units) to determine area.	3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
22	Construct rectangles with the same perimeter and different areas or the same area and different perimeters.	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.
23	Solve real-world problems involving perimeters of polygons, including finding the perimeter given the side lengths and finding an unknown side length of rectangles.		
24	For a given or collected set of data, create a scaled (one-to-many) picture graph and scaled bar graph to represent a data set with several categories. a. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled graphs.	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. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

25	Measure lengths using rulers marked with halves and fourths of an inch to generate data and create a line plot marked off in appropriate units to display the data.	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.
26	Recognize and describe polygons (up to 8 sides), triangles, and quadrilaterals (rhombuses, rectangles, and squares) based on the number of sides and the presence or absence of square corners. a. Draw examples of quadrilaterals that are and are not rhombuses, rectangles, and squares.	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.
		3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For 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.
		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.

A Side-by-Side Comparison of the Fourth Grade Standards
in the
2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Interpret and write equations for multiplicative comparisons.	4.OA.1	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
2	Solve word problems involving multiplicative comparison using drawings and write equations to represent the problem, using a symbol for the unknown number.	4.OA.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
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.	4.OA.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.
4	For whole numbers in the range I 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 I to 100 is prime or composite.	4.OA.4	Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
5	Generate and analyze a number or shape pattern that follows a given rule.	4.OA.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.
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.	4.NBT.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.
7	Read and write multi-digit whole numbers using standard form, word form, and expanded form.	4.NBT.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit

			numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
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.	4.NBT.3	Use place value understanding to round multi-digit whole numbers to any place.
10	Use place value strategies to fluently add and subtract multi-digit whole numbers and connect strategies to the standard algorithm.	4.NBT.4	Fluently add and subtract multi-digit whole numbers using 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.	4.NBT.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply 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.
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 explain quotients using equations, rectangular arrays, and/or area models.	4.NBT.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
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: a/b is equivalent to ma/mb	4.NF.1	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
14	Compare two fractions with different numerators and different denominators using concrete models, benchmarks (0, 1/2, 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.	4.NF.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
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.	4.NF.3	Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8. c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition

	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.		and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using 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: 9/8 = 9 x 1/8 b. Extend previous understanding of multiplication to multiply a whole number times any fraction less than one. Example: $4\,x\frac{2}{3} = \frac{4x2}{3} = 8/3$ c. Solve word problems involving multiplying a whole number times a fraction using visual fraction models and equations to represent the problem. Examples: 3 x ½, 6 x 1/8	4.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?
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.	4.NF.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.4 For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.
18	Use models and decimal notation to represent fractions with denominators of 10 and 100.	4.NF.6	Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.
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.	4.NF.7	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
20	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.	4.MD.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...
21	Use the four operations to solve measurement word problems with distance, intervals of time, liquid volume, mass of objects, and money.	4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and

	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.		problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
22	Apply area and perimeter formulas for rectangles in real-world and mathematical situations.	4.MD.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.
23	Identify an angle as a geometric shape formed wherever two rays share a common endpoint.	4.MD.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles. b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.
24	Use a protractor to measure angles in whole-number degrees and sketch angles of specified measure.	4.MD.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
25	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.	4.MD.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
26	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 (1/2, 1/4, 1/8). b. Solve problems involving addition and subtraction of fractions using information presented in line plots.	4.MD.4	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.
27	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines, and identify these in two-dimensional figures.	4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. 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 angles as a category, identify right triangles.	4.G.2	Classify 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. Recognize 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.	4.G.3	Recognize 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. Identify line-symmetric figures and draw lines of symmetry.

A Side-by-Side Comparison of the Fifth Grade Standards

in the

2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Write, explain, and evaluate simple numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving parentheses, brackets, or braces, using commutative associative, and distributive properties.	5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
2	2. Generate two numerical patterns using two given rules and complete an input/output table for the data. a. Use data from input/output table to identify apparent relationships between corresponding terms. b. Form ordered pairs from values in an input/output table. c. Graph ordered pairs from an input/output table on a coordinate plane.	5.OA.3	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.
3	Using models and quantitative reasoning, explain that in a multi-digit number, including decimals, a digit in any place represents ten times what It represents in the place to Its right and 1/10 of what It represents in the place to its left. a. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, using whole-number exponents to denote powers of 10. b. Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10, using whole-number exponents to denote powers of 10.	5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
		5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
4	Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. Example: 347.392 - 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) + 2 x (1/1000). b. Compare two decimals to thousandths based on the meaning of the digits in each place, using >, =, and < to record the results of comparisons.	5.NBT.3	Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
5	Use place value understanding to round decimals to any place.	5.NBT.4	Use place value understanding to round decimals to any place.

6	Fluently multiply multi-digit whole numbers using the standard algorithm.	5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
7	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 up to four-digit dividends and two-digit divisors. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
8	Add, subtract, multiply, and divide decimals to hundredths using strategies based on place value, properties of operations, and/or the relationships between addition/subtraction and multiplication/division; relate the strategy to a written method, and explain the reasoning used. a. Use concrete models and drawings to solve problems with decimals to hundredths. b. Solve problems in a real-world context with decimals to hundredths.	5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
9	Model and solve real-word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally, and assess the reasonableness of answers. Example: Recognize an incorrect result 2/5 + ½ = 3/7 by observing that 3/7 < ½.	5.NF.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.
10	Add and subtract fractions and mixed numbers with unlike denominators, using fraction equivalence to calculate a sum or difference of fractions or mixed numbers with like denominators.	5.NF.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)
11	Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers. a Model and interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a/b$) b. Use visual fraction models, drawings, or equations to represent word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers	5.NF.3	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
12	Apply and extend previous understandings of multiplication to find the product of a fraction times a whole number or a fraction times a fraction. a. Use a visual fraction model (area model, set model, or linear	5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to

	model) to show (a/b) x q and create a story context for this equation to interpret the product as a parts of a partition of q into b equal parts. b. Use a visual fraction model (area model, set model, or linear model) to show (a/b) x (c/d) and create a story context for this equation to interpret the product. c. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. d. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side ls to show that the area is the same as would be found by multiplying the side lengths.		show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.) b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
13	Interpret multiplication as scaling (resizing). a. Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. Example: Use reasoning to determine which expression is greater? 225 or ¾ x 225: 11/50 or 3/2 x 11/50 b. Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number and relate the principle of fraction equivalence. c. Explain why multiplying a given number by a fraction less than 1 results in a product smaller than the given number and relate the principle of fraction equivalence.	5.NF.5	Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n×a)/(n×b) to the effect of multiplying a/b by 1.
14	Model and solve real-world problems involving multiplication of fractions and mixed numbers using visual fraction models, drawings, or equations to represent the problem.	5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
15	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions and illustrate using visual fraction models, drawings, and equations to represent the problem. b. Create a story context for a unit fraction divided by a whole number, and use a visual fraction model to show the quotient. c. Create a story context for a whole number divided by a unit fraction, and use a visual action model to show the quotient.	5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3. b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4. c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

16	Convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real-world problems.	5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
17	Identify volume as an attribute of solid figures, and measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised (non-standard) units. a. Pack a solid figure without gaps or overlaps using n unit cubes to demonstrate volume as n cubic units.	5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
		5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
18	Relate volume to the operations of multiplication and addition, and solve real-world and mathematical problems involving volume. a. Use the associative property of multiplication to find the volume of a right rectangular prism with unit cubes. Show that the volume can be determined by multiplying the three edge lengths or by multiplying the height by the area of the base. b. Apply the formulas V = l x w x h and V = B x h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems. c. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the two parts, applying this technique to solve real-world problems.	5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas V = l x w x h and V = b x h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
19	Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). a. Add, subtract, multiply, and divide fractions to solve problems involving information presented in line plots.	5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.
20	Graph points in the first quadrant of the coordinate plane, and interpret coordinate values of points to represent real-world and mathematical problems.	5.G.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
21	Classify triangles according to side length (isosceles, equilateral, scalene) and angle measure (acute, obtuse, right, equiangular).		
22	Classify quadrilaterals in a hierarchy based on properties.	5.G.4	Classify two-dimensional figures in a hierarchy based on properties.
23	Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. Example: All rectangles have four right angles, and squares have four right angles, so squares are rectangles.	5.G.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

		5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.
		5.G.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

A Side-by-Side Comparison of the Sixth Grade Standards
in the
2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Use appropriate notations [a/b, a to b, a:b] to represent a proportional relationship between quantities and use ratio language to describe the relationship between quantities.	6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."
2	Use unit rates to represent and describe ratio relationships.	6.RP.2	Understand the concept of a unit rate a/b associated with a ratio a:b with $b \neq 0$, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."
3	Use ratio and rate reasoning to solve mathematical and real-world problems including but not limited to percent, measurement conversion, and equivalent ratios, using a variety of models, including tables of equivalent ratios, tape diagrams, double number lines, and equations.	6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
4	Interpret and compute quotients of fractions using visual models and equations to represent problems. Use quotients of fractions to analyze and solve problems.	6.NS.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual

			fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?
5	Fluently divide multi-digit whole numbers using the standard algorithm.	6.NS.2	Fluently divide multi-digit numbers using the standard algorithm.
6	Add, subtract, multiply, and divide decimals using the standard algorithms.	6.NS.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
7	Use the distributive property to express the sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers with no common factor.	6.NS.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2).
8	Find the greatest common factor (GCF) and least common multiple (LCM) of two or more whole numbers. a. Use factors and multiples to determine prime factorization.		
9	Use signed numbers to describe quantities that have opposite directions or values and to represent quantities in real-world contexts.	6.NS.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
10	Locate integers and other rational numbers on a horizontal or vertical line diagram. a. Define opposites as numbers located on opposite sides of 0 and the same distance from 0 on a number line. b. Use rational numbers in real-world and mathematical situations, explaining the meaning of 0 in each situation.	6.NS.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
11	Find the position of pairs of integers and other rational numbers on the coordinate plane. a. Identify quadrant locations of ordered pairs on the coordinate plane based on the signs of the x and y coordinates. b. Identify (a, b) and (a, -b) as reflections across the x—axis. c. Identify (a, b) and (-a, b) as reflections across the y-axis.	6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

	d. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane, including finding distances between points with the same first or second coordinate.		
12	Explain the meaning of absolute value and determine the absolute value of rational numbers in real-world contexts.	6.NS.7	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C. c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars. d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.
13	Compare and order rational numbers and absolute value of rational numbers with and without a number line in order to solve real-world and mathematical problems.		
14	Write, evaluate, and compare expressions involving whole number exponents.	6.EE.1	Write and evaluate numerical expressions involving whole-number exponents.
15	Write, read, and evaluate expressions in which letters represent numbers in real-world contexts. a. Interpret a variable as representing an unknown value for any number in a specified set, depending on the context. b. Write expressions to represent verbal statements and real-world scenarios. c. Identify parts of an expression using mathematical terms such as sum, term, product, factor, quotient, and coefficient. d. Evaluate expressions (which may include absolute value and Whole number exponents) with respect to order of operations.	6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 – y. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.
		6.EE.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

16	Generate equivalent algebraic expressions using the properties of operations, including inverse, identity, commutative, associative, and distributive.	6.EE.3	Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expressionv6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.
17	Determine whether two expressions are equivalent and justify the reasoning.	6.EE.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.
18	Determine whether a value is a solution to an equation or inequality by using substitution to conclude whether a given value makes the equation or inequality true.	6.EE.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
19	19. Write and solve an equation in the form of x+p=q or px=q for cases in which p, q, and x are all non-negative rational numbers to solve real-world and mathematical problems. a. Interpret the solution of an equation in the context of the problem.	6.EE.7	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.
20	Write and solve inequalities in the form of x>c, x<c, x≥c, x≤c to represent a constraint or condition in a real-world or mathematical problem. a. Interpret the solution of an inequality in the context of the problem. b. Represent the solutions of inequalities on a number line and explain that the solution set may contain infinitely many solutions.	6.EE.8	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
21	Identify, represent and analyze two quantities that change in relationship to one another in real-world or mathematical situations. a. Use tables, graphs, and equations to represent the relationship between independent and dependent variable.	6.EE.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.
22	Write examples and non-examples of statistical questions, explaining that a statistical question anticipates variability in the data related to the question.	6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.
23	Calculate, interpret, and compare measures of center (mean, median, mode) and variability (range and interquartile range) in real-world data sets.	6.SP.3	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

	a. Calculate the measures of center and determine which measure of center best represents a real-world data set, based on extreme values. b. Calculate the variability (range or interquartile range) and determine which measure of center best represents a real-world data set. c. Interpret the measures of center and variability in the context of a problem.	6.SP.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
24	Represent numerical data graphically, using dot plots (line plots), histograms, stem and leaf plots, and box plots. a. Analyze the graphical representation of data by describing the center, spread, shape (including approximately symmetric or skewed), and unusual features (including gaps, peaks, and clusters). b. Use graphical representations of real-world data to describe the context from which they were collected	6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
		6.SP.5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
25	Graph polygons in the coordinate plane given coordinates of the vertices to solve real-world and mathematical problems. a. Determine missing vertices of a rectangle with the same x-coordinate or the same y-coordinate when graphed in the coordinate plane. b. Use coordinates to find the length of a side between points having the same x—coordinate or the same y-coordinate. c. Calculate perimeter and area of a polygon graphed in the coordinate plane (limit to polygons with vertices having the same x-coordinate or the same y-coordinate).	6.G.3	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
26	Calculate the area of triangles, special quadrilaterals, and other polygons by composing and decomposing them into known shapes. a. Apply the techniques of composing and decomposing polygons to find area in the context of solving real-world and mathematical problems.	6.G.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
27	Determine the surface area of three-dimensional figures by representing them with nets composed of rectangles and triangles to solve real-world and mathematical problems.	6.G.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
28	Apply previous understanding of volume of right rectangular prisms to those with fractional edge lengths to solve real-world and	6.G.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction

	mathematical problems. a. Use models (cubes or drawings) and the volume formulas (V = lwh and V = Bh) to find and compare volumes of right rectangular prisms.		edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

A Side-by-Side Comparison of the Seventh Grade Standards
in the
2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Compute unit rates of length, area, and other quantities measured in like or different units that include ratios of fractions.	7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.
2	Represent a relationship between two quantities and determine whether the two quantities are related proportionally. a. Use equivalent ratios displayed in a table or in a graph of the relationship in the coordinate plane to determine whether a relationship between two quantities is proportional. b. Identify the constant of proportionality (unit rate) and express the proportional relationship using multiple representations including tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Explain in context the meaning of a point (x,y) on the graph of a proportional relationship, with special attention to the points (0,0) and (1, r) where r is the unit rate.	7.RP.2	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
3	Solve multi-step percent problems in context using proportional reasoning, including simple interest, tax, gratuities, commissions, fees, markups and markdowns, percent increase, and percent decrease.	7.RP.3	Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.
4	Apply and extend knowledge of operations of whole numbers, fractions, and decimals to add, subtract, multiply, and divide rational numbers including integers, signed fractions, and decimals. a. Identify and explain situations where the sum of opposite quantities is 0 and Opposite quantities are defined as additive inverses. b. Interpret the sum of two or more rational numbers, by using a	7.NS.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

	number line and in real-world contexts. c. Define subtraction of rational numbers as addition of additive inverses. d. Use a number line to demonstrate that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. e. Extend strategies of multiplication to rational numbers to develop rules for multiplying signed numbers, showing that the properties of the operations are preserved. f. Divide integers and explain that division by zero is undefined. Interpret the quotient of integers (with a nonzero divisor) as a rational number. g. Convert a rational number to a decimal using long division, explaining that the decimal form of a rational number terminates or eventually repeats.		b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.
		7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real- world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
5	Solve real-world and mathematical problems involving the four operations of rational numbers, including complex fractions. Apply properties of operations as strategies where applicable.	7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
6	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7.EE.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
7	Generate expressions in equivalent forms based on context and explain how the quantities are related.	7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that “increase by 5%” is the same as “multiply by 1.05.”
8	Solve multi-step, real-world and mathematical problems involving rational numbers (integers, signed fractions and decimals), converting between forms as needed. Assess the reasonableness of answers using mental computation and estimation strategies.	7.EE.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If

			a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
9	9. Use variables to represent quantities in real-world or mathematical problems and construct algebraic expressions, equations, and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality, and interpret it in the context of the problem.	7.EE.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.
10	Solve problems involving scale drawings of geometric figures, including computation of actual lengths and areas from a scale drawing and reproduction of a scale drawing at a different scale.	7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
11	Construct geometric shapes (freehand, using a ruler and a protractor, and using technology), given measurement constraints with an emphasis on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	7.G.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
12	Describe the two-dimensional figures created by slicing three-dimensional figures into plane sections.	7.G.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
13	Explain the relationships among circumference, diameter, area, and radius of a circle to demonstrate understanding mathematical problems of formulas for the area and circumference of a circle. a. Informally derive the formula for area of a circle. b. Solve area and circumference problems in real-world and mathematical situations involving circles.	7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
14	Use facts about supplementary, complementary, vertical, and adjacent angles in multi-step problems to write and solve simple equations for an unknown angle in a figure.	7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

15	Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right rectangular prisms.	7.G.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
16	Examine a sample of a population to generalize information about the population. a. Differentiate between a sample and a population. b. Compare sampling techniques to determine whether a sample is random and thus representative of a population, explaining that random sampling tends to produce representative samples and support valid inferences. c. Determine whether conclusions and generalizations can be made about a population based on a sample. d. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest, generating multiple samples to gauge variation and making predictions or conclusions about the population. e. Present an informal understanding of statistical bias.	7SP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
		7SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.
17	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	7SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
18	Make informal comparative inferences about two populations using measures of center and variability and/ or mean absolute deviation in context.	7SP.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
19	Use a number from 0 to 1 to represent the probability of a chance event occurring, demonstrating that larger numbers indicate greater likelihood of the event occurring, while a number near zero indicates an unlikely event.	7SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
20	Define and develop a probability model, including models that may or may not be uniform, where uniform models assign equal probability to all outcomes and non-uniform models involve events that are not equally likely. a. Collect and use data to predict probabilities of events. b. Compare probabilities from a model to observe frequencies, explaining possible sources of discrepancy.	7SP.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that

			a girl will be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?
21	Approximate the probability of an event by collecting data (experimental probability) and compare it to theoretical probability. a. Observe the long-run relative frequency of an event using simulation or technology and use those results to predict approximate relative frequency.	7SP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.
22	Find probabilities of simple and compound events through experimentation or simulation and by analyzing the sample space, representing the probabilities as percents, decimals, or fractions. a. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams, and determine the probability of an event by finding the fraction of outcomes in the sample space for which the compound event occurred. b. Design and use a simulation to generate frequencies for compound events. c. Represent events described in everyday language in terms of outcomes in the sample space which composed the event.	7SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

A Side-by-Side Comparison of the Eighth Grade Standards
in the
2019 Alabama Course of Study: Mathematics and the Common Core State Standards for Mathematics

	2019 Alabama Course of Study: Mathematics		Common Core State Standards for Mathematics
1	Define the real number system as composed of rational and irrational numbers. a. Explain that every number has a decimal expansion; for rational numbers, the decimal expansion repeats in a pattern or terminates. b. Convert a decimal expansion that repeats in a pattern into a rational number.	8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
2	Locate rational approximations of irrational numbers on a number line, compare their size, and estimate the value of the irrational number.	8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
3	Develop and apply properties of integer exponents to generate equivalent numerical and algebraic expressions.	8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.
4	Use square root and cube root symbols to represent solutions to equations. a. Evaluate square roots of perfect squares (less than or equal to 225) and cube roots of perfect cubes (less than or equal to 1000). b. Explain that the square root of a non-perfect square is irrational. Example: the square root of 2	8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
5	Estimate and compare very large or very small numbers in scientific notation.	8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.
6	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.	8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for

	a. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. b. Interpret scientific notation that has been generated by technology.		measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
7	Determine whether a relationship between two variables is proportional or non-proportional.		
8	Graph proportional relationships. a. Interpret the unit rate of a proportional relationship, the constant of proportionality as the slope of the graph, which goes through the origin and has the equation y = mx where m is the slope.	8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
9	Derive the equation y = mx + b where m is the slope and b is the y-intercept. a. Interpret the equation y = mx + b as defining a linear equations, whose graph is a straight line. b. Given two distinct points in the coordinate plane, find the slope of the line and explain why it will be the same for any two distinct points on the line. c. Graph linear relationships, interpreting the slope as the rate of change of the graph and the y-intercept as the initial value. d. Given that the slope between two sets of points is the same, demonstrate that the equations may have different y-intercepts.	8.EE.6 8.F.3	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.
10	Compare linear relationships, proportional and non-proportional, represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions) to solve real-world problems.		
11	Solve multi-step linear equations in one variable, including rational number coefficients, and equations that require using the distributive property and combining like terms. a. Determine whether linear equations in one variable have one solution, no solution, or infinitely many solutions of the form x = a, a=a or a=b results (where a and b are different numbers). b. Represent and solve real-world and mathematical problems with equations and interpret the solution in the context of the problem.	8.EE.7	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
12	Solve systems of two linear equations in two variables by graphing and substitution. a. Explain that the solution(s) of systems of two linear equations in two variables corresponds to points of intersection on their graphs because points of intersection satisfy both equations simultaneously. b. Interpret and justify the results of systems of two linear equations in two variables (one solution, no solution, or infinitely many solutions) when applied to real—world and mathematical problems.	8.EE.8	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.

			c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.
13	Determine whether a relation is a function, defining a function as a rule that assigns to each input (independent) exactly one output (dependent), and given a graph, table, mapping, or set of ordered pairs.	8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
14	Evaluate functions given values for the independent variable.		
15	Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. a. Distinguish between linear and non-linear functions.	8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
16	Construct a function to model a linear relationship between two variables. a. Interpret the rate of change (slope) and initial value of the linear function from a description of a relationship or from two points in a table or graph.	8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
17	Analyze the relationship (increasing or decreasing, linear or non-linear) between two quantities represented in a graph. a. Sketch a graph that exhibits the features of a function that has been described in words.	8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
18	Verify experimentally the properties of rigid motions (rotations, reflections, and translations): lines are taken to lines, and line segments are taken to line segments of the same length; angles are taken to angles of the same measure; and parallel lines are taken to parallel lines. a. Verify that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rigid motions; given two congruent figures, describe the transformation(s) mapping the preimage to the image.	8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
		8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
19	Use coordinates to describe the effect of transformations (dilations, translations, rotations, and reflections) on two-dimensional figures.	8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
20	Verify that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rigid motions and dilations. a. Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.	8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
21	Apply properties of parallel lines cut by a transversal to determine missing angle measures.	8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel

	a. Use informal arguments to establish that the sum of the interior angles of a triangle is 180 degrees.		lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.
22	Informally justify the Pythagorean Theorem and its converse.	8.G.6	Explain a proof of the Pythagorean Theorem and its converse.
23	Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane.	8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
24	Apply the Pythagorean Theorem to determine unknown side lengths of right triangles, including real-world applications.	8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
25	Informally derive the formulas for the volume of cones and spheres by experimentally comparing the volumes of cones and spheres with the same radius and height to a cylinder with the same dimensions.	8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
26	Use formulas to calculate the volumes of three-dimensional figures to solve real-world problems.		
27	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities, describing patterns in terms of positive, negative, or no association, linear and non-linear association, clustering, and outliers.	8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
28	Given a scatter plot that suggests a linear association, informally draw a line of best fit, and assess the strength of the association by judging the closeness of the data points to the line.	8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
29	Use a linear model of a real-world situation to solve problems and make predictions. a. Describe the rate of change and y-intercept in the context of a problem using a linear model of a real-world situation.	8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
30	Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects, using relative frequencies calculated for rows or columns to describe possible associations between the two variables.	8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?