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2019 Alabama Mathematics COS

DM = Dimensions Math

Kindergarten

	K Standard Description	DM	Chapter	Lesson
Foundations of Counting				
Know number names and the count sequence.				
1	Count to forward orally from 100 by ones and by tens. Count backward orally from 10 to 0 by ones.	PK	4	1, 2
			6	1, 2
		KA	3	4, 5
			KB	7
		12	1-8	
2	Count to 100 by ones beginning with any given number between 0 and 99.	KB	12	2-8
3	Write numbers 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).	KA	2	6-11
			3	7-10
		KB	7	2-9
Count to tell the number of objects.				
4	Connect counting to cardinality using a variety of 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 that each successive number name refers to a quantity that is one larger.	KA	2	1-11
			3	1-12
		KB	7	1-11
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.	KA	2	1-11
			3	1-10
		KB	7	1-11



	K Standard Description	DM	Chapter	Lesson
Compare numbers.				
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, or other strategies.	KA	6	1, 2
7	Compare two numbers between 1 and 10 presented as written numerals (without using inequality symbols).	KA	6	3, 4, 5
Operations and Algebraic Thinking				
Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.				
8	Represent addition and subtraction up to 10 with objects, fingers, pennies, mental images, drawings, claps or other sounds, acting out situations, verbal explanations, expressions, or equations.	KB	8	1-14
			9	1-12
			10	1-12
9	Solve addition and subtraction word problems, and add and subtract within 10, by using objects or drawings to represent the problem.	KB	9	1-12
			10	1-12
			11	1-6
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.	KB	9	1-12
			10	1-12
11	For any number from 1 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.	KB	8	11
12	Fluently add and subtract within 5.	KB	8	5, 6
			9	7, 8, 11
			10	4-7
			11	7, 10
Understand simple patterns.				
13	Duplicate and extend simple patterns using concrete objects.	PKA	3	2, 3, 4
		KA	4	8, 9



	K Standard Description	DM	Chapter	Lesson
Operations with Numbers				
Work with numbers 11-19 to gain foundations for place value.				
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.	KB	7	1-4
Data Analysis				
Collect and analyze data and interpret results.				
15	Classify objects into given categories of 10 or fewer; count the numbers of objects in each category and sort the categories by count. a. Categorize data on Venn diagrams, pictographs, and "yes-no" charts using real objects, symbolic representations, or pictorial representations. <i>Venn diagrams and "yes-no" charts are not specifically covered.</i>	KA	1	5, 6
			11	4
Measurement				
Describe and compare measurable attributes.				
16	Describe measurable attributes of objects (length, weight, height) of a single object using vocabulary such as long/short, heavy/light, or tall/short. <i>This standard is covered within the standard of comparing objects.</i>	KA	5	1-10
17	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.	KA	5	1-10
Geometry				
Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).				
18	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.	KA	4	4-7
19	Correctly name shapes regardless of their orientations or overall sizes.	KA	4	3-12



	K Standard Description	DM	Chapter	Lesson
20	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	KA	4	1, 2
Analyze, compare, create, and compose shapes.				
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 "corners") and other attributes.	KA	4	4-8, 10
22	Model shapes in the world by building them from sticks, clay balls, or other components and by drawing them.	KA	4	1-12
23	Use simple shapes to compose larger shapes.	KA	4	10



Grade 1

	G1 Standard Description	DM	Chapter	Lesson
Operations and Algebraic Thinking				
Represent and solve problems involving addition and subtraction.				
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.	1A	3	1-6
			4	1-8
			5	5, 6
			6	1-5
			7	1-4
		1B	11	1, 2
2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	1B	13	7
Understand and apply properties of operations and the relationship between addition and subtraction.				
3	Apply properties of operations as strategies to add and subtract.	1A	3	4
			4	7
			5	5, 6
			6	1, 2, 3
			7	1, 2, 3
		1B	13	7
4	Explain subtraction as an unknown-addend problem.	1A	4	1-7
		1B	12	6
Add and subtract within 20.				
5	Relate counting to addition and subtraction.	1A	3	5
			4	3



	G1 Standard Description	DM	Chapter	Lesson
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. d. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by using the relationship between addition and subtraction. e. Demonstrate fluency with addition and subtraction facts with sums or differences to 10 by creating equivalent but easier or known sums.	1A	4	3
			6	1, 2, 3
			7	1, 2, 3
Work with addition and subtraction equations.				
7	Explain that the equal sign means “the same as.” Determine whether equations involving addition and subtraction are true or false.	1A	3	1, 4
			7	1, 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.	1A	3	4
			4	3, 6, 10
			5	2
Understand simple patterns.				
9	Reproduce, extend, and create patterns and sequences of numbers using a variety of materials.	1A	5	3
			8	2, 4
		1B	12	4
			16	3
Operations with Numbers: Base Ten				
Extend the counting sequence.				
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.	1B	12	1, 2
			16	1



	G1 Standard Description	DM	Chapter	Lesson
	d. Represent a number of objects from 0 to 120 with a written numeral. Students count within 100, not 120, in the DM textbook. The DM Teacher’s Guide 1B has an extension for counting to 120.			
Understand place value.				
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).	1A	5	1
		1B	12	1, 2, 3
			16	1, 2, 3
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.” Symbols are not used until DM 2A.	1B	12	4
			16	4
Use place-value understanding and properties of operations to add and subtract.				
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. d. Relate the strategy for adding a two-digit number and a one-digit number to a written method and explain the reasoning used.	1B	13	1, 3, 4
			16	2, 3
			17	1, 2, 3
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.	1B	12	3
			16	3
			17	2, 9



	G1 Standard Description	DM	Chapter	Lesson
15	Subtract multiples of 10 in the range 10-90 (positive or zero differences) 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.	1B	12	3
			16	3
			17	2, 9
Data Analysis				
Collect and analyze data and interpret results.				
16	Organize, represent, and interpret data with up to three categories. <ol style="list-style-type: none"> Ask and answer questions about the total number of data points in organized data. Summarize data on Venn diagrams, pictographs, and "yes-no" charts using real objects, symbolic representations, or pictorial representations. Determine "how many" in each category using up to three categories of data. Determine "how many more" or "how many less" are in one category than in another using data organized into two or three categories. Venn diagrams and "yes-no" charts are not covered in DM.	1B	11	3
Measurement				
Describe and compare measurable attributes.				
17	Order three objects by length; compare the lengths of two objects indirectly by using a third object.	1B	10	1, 2
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.	1B	10	3
Work with time and money.				
19	Tell and write time to the hours and half hours using analog and digital clocks.	1B	18	1, 2
20	Identify pennies and dimes by name and value.	1B	19	1



	G1 Standard Description	DM	Chapter	Lesson
Geometry				
Reason with shapes and their attributes.				
21	Build and draw shapes which have defining attributes. a. Distinguish between defining attributes and non-defining attributes.	1A	8	1, 2
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.	1A	8	3
23	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. 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.	1B	15	1, 2



Grade 2

	G2 Standard Description	DM	Chapter	Lesson
Operations and Algebraic Thinking				
Represent and solve problems involving addition and subtraction.				
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. <i>Lessons in chapter 2 of DM 2A cover sums to 20. All the lessons in chapter 3 of DM 2A include addition and subtraction within 1,000.</i>	1B	17	1-12
		2A	2	1, 2, 3
			3	1-4, 7, 8
Add and subtract within 20.				
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 the sums of two one-digit numbers.	1A	6	1-5
			7	1-6
		2A	2	1-4
Work with equal groups of objects to gain foundations for multiplication.				
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.	3A	4	6
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.	1B	14	1
		2A	6	1, 2, 3
Understand simple patterns.				
5	Reproduce, extend, create, and describe patterns and sequences using a variety of materials.	2A	7	1, 4, 7
		2B	9	1, 5
			15	4, 6



	G2 Standard Description	DM	Chapter	Lesson
Operations with Numbers: Base Ten				
Understand place value.				
6	Explain that the three digits of a three-digit number represent amounts of hundreds, tens, and ones a. Explain the following as special cases: 100 can be thought of as a bundle of 10 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).	2A	1	4, 5
7	Count within 1000 by fives, tens, and hundreds <i>In DM 2A, students skip count by 5s to 50. In DM 2B, they count by 5s to 100 in the context of counting nickels and telling time to the 5-minute mark.</i>	2A	1	4, 7
			7	1, 2, 7
		2B	10	1
			12	1
8	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	2A	1	4, 5
9	Compare two three-digit numbers based on value of the hundreds, tens, and ones digits, recording the results of comparisons with the symbols using $>$, $=$, and $<$ and orally with the words “is greater than,” “is equal to,” and “is less than.”	2A	1	6
Use place-value understanding and properties of operations to add and subtract.				
10	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. <i>Lessons in DM 2A include addition and subtraction within 1,000.</i>	2A	1	1, 2
			3	1, 2, 3, 7
		2B	8	1, 3, 6
11	Use a variety of strategies to add up to four two-digit numbers. <i>DM 2A textbook lessons cover adding up to three 3-digit numbers. DM Teacher's Guide 2A has an extension on adding up to four 2-digit numbers.</i>	2A	3	3, 6
12	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the	2A	3	1-12
		2B	8	1-10



	G2 Standard Description	DM	Chapter	Lesson
	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.			
13	Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.	2A	1	2, 7
14	Explain why addition and subtraction strategies work, using place value and the properties of operations.	2A	2	1-4
			3	1-10
		2B	8	1-9
Data Analysis				
Collect and analyze data and interpret results.				
15	Measure lengths of several objects to the nearest whole unit. a. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units. <i>Line plots are not covered until DM 4B.</i>			
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. b. Using Venn diagrams, pictographs, and "yes-no" charts, analyze data to predict an outcome. <i>Venn diagrams and "yes-no" charts are not covered in DM as part of data analysis.</i>	2B	14	1-7
Measurement				
Measure and estimate lengths in standard units.				
17	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, or measuring tapes.	2A	4	1-7
18	Measure objects with two different units, and describe how the two measurements relate to each other and the size of the unit chosen.	2A	4	1



	G2 Standard Description	DM	Chapter	Lesson
19	Estimate lengths using the following standard units of measurement: inches, feet, centimeters, and meters.	2A	4	2, 4, 7
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.	2A	4	1, 5
Relate addition and subtraction to length.				
21	Use addition and subtraction within 100 to solve word problems involving same units of length. Representing the problems with drawings (such as drawings of rulers) and/or equations with a symbol for the unknown number.	2A	4	1, 3, 5, 8
22	Create a number line diagram using whole numbers and use it to represent whole-number sums and differences within 100. <i>Students do not use a number line to add or subtract past 20 in Dimensions Math. Number lines are used in 3A to illustrate some mental math strategies. Students do relate calculations to length with the use of bar models in problem solving.</i>			
Work with time and money.				
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, <i>quarter past</i> , <i>half past</i> , and <i>quarter to</i> .	1B	18	3
		2B	12	1, 3
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). <i>DM 2 does include decimal notation.</i>	2B	10	1, 2, 3, 6, 7



	G2 Standard Description	DM	Chapter	Lesson
Geometry				
Reason with shapes and their attributes.				
25	Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. a. Recognize and draw shapes having specified attributes.	2B	15	2, 5
26	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	2B	11	1, 2
27	Partition circles and rectangles into two, three, or four equal shares. Describe the shares using terms such as <i>halves</i> , <i>thirds</i> , <i>half of</i> , or <i>a third of</i> , and describe the whole as <i>two halves</i> , <i>three thirds</i> , or <i>four fourths</i> . a. Explain that equal shares of identical wholes need not have the same shape.	2B	11	1, 2, 3



Grade 3

	G3 Standard Description	DM	Chapter	Lesson
Operations and Algebraic Thinking				
Represent and solve problems involving multiplication and division.				
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. <i>DM 2 covers multiplication where one of the factors is 2, 3, 4, 5, or 10, and division by 2, 3, 4, 5, or 10.</i>	2A	6	1, 2
		3A	4	1, 2, 4
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.	2A	6	4, 5
		3A	4	3, 4
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.	2A	6	1-11
		2B	9	1-9
		3A	4	1-10
		3B	8	1, 2, 6, 7
4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	2A	6	1-11
		2B	9	1-9
		3A	4	1-10
		3B	8	1, 2, 6, 7
Understand properties of multiplication and the relationship between multiplication and division.				
5	Develop and apply properties of operations as strategies to multiply and divide.	2A	6	1-11
			7	1-9
		2B	9	1-10
		3A	4	1-7
		3B	8	1-11
6	Use the relationship between multiplication and division to represent division as an equation with an unknown factor.	2A	6	4, 5
		3A	4	3, 4



	G3 Standard Description	DM	Chapter	Lesson
Multiply and divide within 100.				
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. b. State automatically all products of two one-digit numbers by the end of third grade.	2A	7	2, 5, 8, 9
		2B	9	2, 3, 6-9
		3A	4	1-10
		3B	8	1, 2, 6, 7
Solve problems involving the four operations, and identify and explain patterns in arithmetic.				
8	Determine 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 number sense, context, mental computation, and estimation strategies including rounding. <i>The DM textbooks and workbooks use blanks, not letters, for unknowns. The DM Teacher's Guides 3, 4, and 5 include optional material where letters are used instead of blanks.</i>	3A	2	11, 12
			3	6, 7
			4	9, 10
			5	6-9
			6	5, 9
		3B	8	5, 10
11	7, 8			
9	Recognize and explain arithmetic patterns using properties of operations	3A	1	7
			2	5
		3B	8	1, 2, 6, 7
Operations with Numbers: Base Ten				
Use place-value understanding and properties of operations to perform multi-digit arithmetic.				
10	Identify the nearest 10 or 100 when rounding whole numbers, using place value understanding.	3A	1	9, 10
11	Use various strategies to add and subtract fluently within 1000.	2A	3	1-10
		3A	3	1, 2, 3
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).	3A	5	1



	G3 Standard Description	DM	Chapter	Lesson
Operations with Numbers: Fractions				
Develop understanding of fractions as numbers. Fractions are not limited to those with denominators of 2, 3, 4, 6, and 8 in DM.				
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.	2B	11	2, 3, 4
		3B	9	1-4
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 diagram 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 diagram by marking off a lengths of size $1/b$ from zero.	3B	9	2, 3, 4
			10	1
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 fractions must refer to the same whole for the comparison to be valid). Record comparisons using $<$, $>$, or $=$ and justify conclusions.	3B	9	2, 3, 4
			10	1, 2, 3
Data Analysis				
Represent and interpret data.				
16	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. Determine a simple probability from a context that includes a picture.	2B	14	1, 2, 3
		3A	7	1, 2, 3



	G3 Standard Description	DM	Chapter	Lesson
	b. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled graphs.			
17	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. <i>Students measure lengths to various fractions in the workbook when learning about fractions, but line plots are not covered until DM 4B.</i>	4B	9	3
Measurement				
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.				
18	Tell and write time to the nearest minute and 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. <i>DM 3B lessons include adding and subtracting time intervals in hours and minutes, not just minutes.</i>	2B	12	1-4
		3B	14	1, 2, 3
19	Estimate and measure liquid volumes and masses of objects using liters (l), grams (g), and kilograms (kg), and liters (l). a. Use the four operations to solve one-step word problems involving masses or volumes given in the same metric units. <i>DM 3B lessons include compound units, e.g. 4 kg 20 g.</i>	2A	5	1, 2
		2B	13	1, 2
		3B	11	1-8
Geometric measurement: understand concepts of area and relate area to multiplication and to addition				
20	Find the area of a rectangle with whole number side lengths by tiling without gaps or overlays and counting unit squares.	3B	13	1, 2
21	Count unit squares (square cm, square m, square in, square ft, and improvised or non-standard units) to determine area.	3B	13	1, 2



	G3 Standard Description	DM	Chapter	Lesson
22	Relate area to the operations of multiplication using real-world problems, concrete materials, mathematical reasoning, and the distributive property.	3B	13	3, 4, 5, 9
23	Decompose rectilinear figures into smaller rectangles to find the area, using concrete materials.	3B	13	4, 5, 9
Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures				
24	Construct rectangles with the same perimeter and different areas of the same area and different perimeters.	3B	13	8
25	Solve real-world problems involving perimeters of polygons, including finding the perimeter given the side lengths and finding an unknown side length of rectangles.	3B	13	6, 8
Geometry				
Reason with shapes and their attributes				
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.	3B	12	4, 5, 6



Grade 4

	G4 Standard Description	DM	Chapter	Lesson
Operations and Algebraic Thinking				
Solve problems with whole numbers using the four operations.				
1	Interpret and write equations for multiplicative comparison.	3A	4	8, 9, 10
		4A	4	1-4
2	Solve word problems involving multiplicative comparison using drawings and write equations to represent the problem, using a symbol for the unknown number.	3A	4	8, 9, 10
		4A	4	1-4
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. The DM textbook and workbook use blanks, not letters, for unknowns. The DM Teacher’s Guides 3, 4, and 5 include optional material where letters are used instead of blanks.	4A	2	1-5
			3	5
			4	4, 8
			5	4-7
Gain familiarity with factors and multiples.				
4	For whole numbers in the range 1 to 100, find all factor pairs, identifying a number as a multiple of each of its factors. a. Determine whether a whole number in the range 1 to 100 is a multiple of a given one-digit number. b. Determine whether a whole number in the range 1 to 100 is prime or composite.	4A	3	1, 3, 4
Generate and analyze patterns.				
5	Generate and analyze a number or shape pattern that follows a given rule. This is not explicitly covered in a specific lesson in DM 4, other than increasing or decreasing by a digit in one or more places. Some problems in the workbook do include analyzing patterns.	4A	1	3
		5B	12	5



	G4 Standard Description	DM	Chapter	Lesson
Operations with Numbers: Base Ten				
Generalize place-value understanding for multi-digit whole numbers.				
6	Using models and quantitative reasoning, explain that in a multi-digit whole number, a digit in any place represents ten times what it represents in the place to its right.	4A	1	1, 2
7	Read and write multi-digit whole numbers using standard form, word form, and expanded form.	4A	1	1, 2
8	Use place value understanding to compare two multi-digit numbers using $>$, $=$, and $<$ symbols.	4A	1	4
9	Round multi-digit whole numbers to any place using place value understanding.	4A	1	5, 6
Use place value understanding and properties of operations to perform multi-digit arithmetic with whole numbers.				
10	Use place value strategies to fluently add and subtract multi-digit whole numbers and connect strategies to the standard algorithm.	4A	2	1-4
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. DM 3 lessons cover multiplying a whole number of up to three digits by a one-digit number.	3A	5	1-9
		3B	8	2, 8
		4A	4	1-6
12	Use strategies based on place value, properties of operations, and/or the relationship between multiplication and division to find whole-number quotients and remainders with one-digit divisors and up to four-digit dividends. a. Illustrate and/or explain quotients using equations, rectangular arrays, and/or area models. DM 3 lessons cover dividing a whole number of up to three digits.	3A	6	1-9
		3B	8	2, 8
		4A	5	1, 2, 3



	G4 Standard Description	DM	Chapter	Lesson
Operations with Numbers: Fractions				
Extend understanding of fraction equivalence and ordering. Fractions in DM 4 are not limited to those with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100.				
13	Using area and length fraction models, explain why one fraction is equivalent to another, taking into account that the number and size of the parts differ even though the two fractions themselves are the same size. a. Apply principles of fraction equivalence to recognize and generate equivalent fractions.	3B	10	1, 2, 3
		4A	6	1
14	Compare two fractions with different numerators and different denominators using concrete models, benchmarks (0, $\frac{1}{2}$, 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.	3B	10	1, 2
		4A	6	2
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.				
15	Model and justify decompositions of fractions and explain addition and subtraction of fractions as joining or separating parts referring to the same whole. a. Decompose a fraction as a sum of unit fractions and as a sum of fractions with the same denominator in more than one way using area models, length models, and equations. b. Add and subtract fractions and mixed numbers with like denominators using fraction equivalence, properties of operations, and the relationship between addition and subtraction. c. Solve word problems involving addition and subtraction of fractions and mixed numbers having like denominators, using drawings, visual fraction models, and equations to represent the problem.	3B	10	7, 8, 9
		4A	6	3-6
			7	1-6



	G4 Standard Description	DM	Chapter	Lesson
16	<p>Apply and extend previous understandings of multiplication to multiply a whole number times a fraction.</p> <p>a. Model and explain how a non-unit fraction can be represented by a whole number times the unit fraction.</p> <p>b. Extend previous understanding of multiplication to multiply a whole number times any fraction less than one.</p> <p>c. Solve word problems involving multiplying a whole number times a fraction using visual fraction models and equations to represent the problem.</p>	4A	8	1, 2, 3
Understand decimal notation for fractions, and compare decimal fractions.				
17	<p>Express, model, and explain the equivalence between fractions with denominators of 10 and 100.</p> <p>a. Use fraction equivalency to add two fractions with denominators of 10 and 100.</p>	4B	12	1-4
18	Use models and decimal notation for fractions with denominators 10 or 100.	4B	12	1-4
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.	4B	12	8
Data Analysis				
Represent and interpret data.				
20	<p>Interpret data in graphs (picture, bar, and line plots) to solve problems using numbers and operations.</p> <p>a. Create a line plot to display a data set of measurements in fractions of a unit ($1/2, 1/4, 1/8$).</p> <p>b. Solve problems involving addition and subtraction of fractions using information presented in line plots.</p>	4A	9	3



	G4 Standard Description	DM	Chapter	Lesson
Measurement				
Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.				
21	Select and use an appropriate unit of measurement for a given attribute (length, mass, liquid volume, time) within one system of units: metric - km, m, cm; kg, g, l, ml; customary - lb, oz; time - hr, min, sec. a. Within one system of units, express measurements of a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.	4B	10	1-8
22	Use the four operations to solve word problems with distance, intervals of time, liquid volume, mass of objects, and money, a. Solve measurement problems involving simple fractions or decimals. b. Solve measurement problems that require expressing measurements given in a larger unit in terms of a smaller unit. c. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	4B	10	1-8
			13	1-9
23	Apply area and perimeter formulas for rectangles in real-world and mathematical problems.	4B	11	1-6
Geometric measurement: understand concepts of angle and measure angles.				
24	Identify an angle as a geometric shape formed wherever two rays share a common endpoint.	3B	12	1, 2, 3
		4B	15	1
25	Use a protractor to measure angles in whole-number degrees using a protractor and sketch angles of specified measure.	4B	15	2, 3
26	Decompose an angle into non-overlapping parts to demonstrate that the angle measure of the whole is the sum of the angle measures of the parts. a. Solve addition and subtraction problems on a diagram to find unknown angles in real-world or mathematical problems.	4B	15	4, 5, 6



	G4 Standard Description	DM	Chapter	Lesson
Geometry				
Draw and identify lines and angles, and classify shapes by properties of their lines and angles.				
27	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines, and identify these in two-dimensional figures. Points, line segments, and rays are defined in the DM Teacher’s Guide 4B only with a supplementary activity.	4B	15	3
			16	1, 2, 3
28	Identify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size. a. Describe right triangles as a category, and identify right triangles.	4B	16	4, 5, 6
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.	4B	16	5



Grade 5

	G5 Standard Description	DM	Chapter	Lesson
Operations and Algebraic Thinking				
Write and interpret numerical expressions.				
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.	5A	2	1-4
Analyze patterns and relationships.				
2	Generate two numerical patterns using two given rules and complete an input/output table for the data. a. Use data from an 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.	5B	12	5
Operations with Numbers: Base Ten				
Understand the place-value system.				
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. Exponents are not used in DM until they are specifically defined in DM 6, not just for powers of 10.	5A	1	1-5
		5B	9	6, 7



	G5 Standard Description	DM	Chapter	Lesson
4	Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ to record the results of comparisons.	5B	9	1, 2, 3
5	Use place-value understanding to round decimals to thousandths.	5B	9	4
Perform operations with multi-digit whole numbers and with decimals to hundredths.				
6	Fluently multiply multi-digit whole numbers using the standard algorithm. <i>DM 4A lessons cover multiplying a number of up to 5-digits by a 1-digit number and by a 2-digit number and a number of up to 3 digits by a 2-digit number. DM 5A lessons review multiplying by a two-digit number.</i>	4A	4	1-8
		5A	3	1, 2
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.	5A	3	4-9
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. <i>DM 4A lessons cover adding and subtracting decimals to hundredths and multiplying and dividing decimals to hundredths by a 1-digit whole number. DM 5B lessons cover adding and</i>	4B	13	1-9
			14	1-9
		5B	10	1-10



	G5 Standard Description	DM	Chapter	Lesson
	subtracting decimals to thousandths, multiplying decimals to thousandths by a decimal of up to 2 digits, dividing decimals by a 2-digit whole number, and dividing a whole number by a decimal.			
Operations with Numbers: Fractions				
Use equivalent fractions as a strategy to add and subtract fractions.				
9	Model and solve real-world 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. DM 4A lessons cover adding and subtracting fractions with related denominators.	4A	7	2-7
		5A	4	2-4
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.	5A	4	5-9
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.				
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 ($a/b = a \div b$). 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.	4A	6	7, 8
		5A	4	1
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 model) to show $(a/b) \times q$ and	4A	8	1-9
		5A	5	1-11
			7	2



	G5 Standard Description	DM	Chapter	Lesson
	<p>create a story context for this equation to interpret the product as a parts of a partition of q into b equal parts.</p> <p>b. Use a visual fraction model (area model, set model, or linear model) to show $(a/b) \times (c/d)$ and create a story context for this equation to interpret the product.</p> <p>c. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</p> <p>d. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths to show that the area is the same as would be found by multiplying the side lengths.</p>			
13	<p>Interpret multiplication as scaling (resizing).</p> <p>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.</p> <p>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.</p> <p>c. Explain 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.</p>	5A	5	2-8
14	<p>Model and solve real-world problems involving multiplication of fractions and mixed numbers using visual fraction models, drawings, or equations to represent the problem.</p>	5A	5	1-9
15	<p>Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.</p> <p>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.</p>	5A	6	1, 4



	G5 Standard Description	DM	Chapter	Lesson
	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 fraction model to show the quotient.			
Data Analysis				
Represent and interpret data.				
16	Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$). a. Add, subtract, multiply, and divide fractions to solve problems involving information presented in line plots.	4A	9	3
		5B	12	3
Measurement				
Convert like measurement units within a given measurement system.				
17	Convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real-world problems.	4B	10	1-8
		5A	7	1
		5B	9	8
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.				
18	Identify volume as an attribute of solid figures, and measure volumes by counting unit cubes, using cubic cm, 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.	5A	8	1
19	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 and relate it to packing the 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 $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right	5A	8	2-8



	G5 Standard Description	DM	Chapter	Lesson
	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, and applying this technique to solve real-world problems.			
Geometry				
Graph points on the coordinate plane to solve real-world and mathematical problems.				
20	Graph points in the first quadrant of the coordinate plane, and interpret coordinate values of points to represent real-world and mathematical problems.	4A	9	1, 2
		5B	12	4, 5, 6
Classify two-dimensional figures into categories based on their properties.				
21	Classify triangles according to side length (isosceles, equilateral, scalene) and angle measure (acute, obtuse, right, equiangular).	5B	11	3
22	Classify quadrilaterals in a hierarchy based on properties.	5B	11	6
23	Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.	5B	11	3, 6



Grade 6

	G6 Standard Description	DM	Chapter	Lesson
Proportional Reasoning				
Develop an understanding of ratio concept and use reasoning about ratios to solve problems.				
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.	6A	5	1
			6	1, 2
2	Use unit rates to represent and describe ratio relationships.	6A	6	2
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.	6A	5	1, 2
			6	1, 2, 3
Number Systems and Operations				
Use prior knowledge of multiplication and division to divide fractions.				
4	Interpret and compute quotients of fractions using visual models and equations to represent problems. a. Use quotients of fractions to analyze and solve problems.	6A	2	2
Compute multi-digit numbers fluently and determine common factors and multiples.				
5	Fluently divide multi-digit whole numbers using a standard algorithm to solve real-world and mathematical problems.	5A	3	4-9
		6A	1	4
6	Add, subtract, multiply, and divide decimals using a standard algorithm.	6A	3	1-4
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.	6A	1	3
8	Find the greatest common factor (GCF) and least common multiple (LCM) of two or more whole numbers.	6A	1	2



	G6 Standard Description	DM	Chapter	Lesson
	a. Use factors and multiples to determine prime factorization.			
Apply knowledge of the number system to represent and use rational numbers in a variety of forms.				
9	Use signed numbers to describe quantities that have opposite directions or values and to represent quantities in real-world contexts.	6A	4	1
10	Locate integers and other rational numbers on a horizontal or vertical line diagram. a. Define <i>opposites</i> 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.	6A	4	2
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. 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.	6B	10	1, 2, 3
12	Explain the meaning of absolute value and determine the absolute value of rational numbers in real-world contexts.	6A	4	2
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.	6A	4	2
Algebra and Functions				
Apply knowledge of arithmetic to read, write, and evaluate algebraic expressions.				
14	Write, evaluate, and compare expressions involving whole number exponents.	6B	8	1



	G6 Standard Description	DM	Chapter	Lesson
15	Write, read, and evaluate expressions in which letters represent numbers in real-world contexts. a. Interpret a variable as 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 <i>sum</i> , <i>term</i> , <i>product</i> , <i>factor</i> , <i>quotient</i> , and <i>coefficient</i> . d. Evaluate expressions (which may include absolute value and whole number exponents) with respect to order of operations.	6B	8	1
16	Generate equivalent algebraic expressions using the properties of operations, including inverse, identity, commutative, associative, and distributive.	6B	8	2
17	Determine whether two expressions are equivalent and justify the reasoning.	6B	8	2
			9	1
Use equations and inequalities to represent and solve real-world or mathematical problems.				
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.	6B	9	1, 2
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.	6B	9	1
20	Write and solve inequalities in the form of $x>c$, $x<c$, $x\geq c$, or $x\leq c$ to represent a constraint or condition in a real-world or mathematical problem. a. Interpret the solution of an inequality in the context of a problem. b. Represent the solutions of inequalities on a number line and explain that the solution set may contain infinitely many solutions.	6B	9	2



	G6 Standard Description	DM	Chapter	Lesson
Identify and analyze relationships between independent and dependent variables.				
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 variables.	6B	10	3
Data Analysis, Statistics, and Probability				
Use real-world and mathematical problems to analyze data and demonstrate an understanding of statistical variability and measures of center.				
22	Write examples and non-examples of statistical questions, explaining that a statistical question anticipates variability in the data related to the question.	6B	13	1
23	Calculate, interpret, and compare measures of center (mean, median, mode) and variability (range and interquartile range) in real-world data sets. a. Determine which measure of center best represents a real-world data set. b. Interpret the measures of center and variability in the context of a problem.	6B	13	1
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, clusters, and extreme values). b. Use graphical representations of real-world data to describe the context from which they were collected.	6B	13	2, 3
Geometry and Measurement				
Graph polygons in the coordinate plane to solve real-world and mathematical problems.				
25	Graph polygons in the coordinate plane given coordinates of the vertices to solve real-world and mathematical problems.	6B	10	1, 2



	G6 Standard Description	DM	Chapter	Lesson
	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 (limiting to polygons in which consecutive vertices have the same x -coordinate or the same y -coordinate).			
Solve real-world and mathematical problems to determine area, surface area, and volume.				
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.	6B	11	1, 2, 3
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.	6B	12	2
28	Apply previous understanding of volume of right rectangular prisms to those with fractional edge lengths to solve real-world and 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.	6B	12	1



Grade 7

	G7 Standard Description	DM	Chapter	Lesson
Proportional Reasoning				
Analyze proportional relationships and use them to solve real-world and mathematical problems.				
1	Calculate unit rates of length, area, and other quantities measured in like or different units that include ratios or fractions.	7A	6	2
2	Represent a relationship between two quantities and determine whether the two quantities are related proportionally. <ul style="list-style-type: none"> 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. 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. 	7A	6	1
		7B	14	3
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.	7A	7	1-4
Number Systems and Operations				
Apply and extend prior knowledge of addition, subtraction, multiplication, and division to operations with rational numbers.				
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. <ul style="list-style-type: none"> a. Identify and explain situations where the sum of opposite quantities is 0 and opposite quantities are defined as additive inverses. 	7A	2	1-7



	G7 Standard Description	DM	Chapter	Lesson
	b. Interpret the sum of two or more rational numbers, by using a number line and in real-world contexts. c. Explain 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 non-zero 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.			
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.	7A	2	5, 7
Algebra and Functions				
Create equivalent expressions using the properties of operations.				
6	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7A	4	1-5
7	Generate expressions in equivalent forms based on context and explain how the quantities are related.	7A	3	2
			4	1-5
Solve real-world and mathematical problems using numerical and algebraic expressions, equations, and inequalities.				
8	Solve multi-step real-world and mathematical problems involving rational numbers (integers, signed fractions and decimals), converting between forms as needed. Assess the	7A	2	5, 7
			3	1, 2, 3



	G7 Standard Description	DM	Chapter	Lesson
	reasonableness of answers using mental computation and estimation strategies.			
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.	7A	3	3
			5	1-4
		7B	11	1-4
Data Analysis, Statistics, and Probability				
Make inferences about a population using random sampling.				
10	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. Informally explain situations in which statistical bias may exist.	7B	15	1
			16	2



	G7 Standard Description	DM	Chapter	Lesson
Make inferences from an informal comparison of two populations.				
11	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.	7B	15	2-5
12	Make informal comparative inferences about two populations using measures of center and variability and/or mean absolute deviation in context.	7B	15	2-5
Investigate probability models.				
13	Use a number from 0 to 1 to represent the probability of a chance event occurring, explaining that larger numbers indicate greater likelihood of the event occurring, while a number near zero indicates an unlikely event.	7B	16	2
14	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 observed frequencies, explaining possible sources of discrepancy.	7B	16	2, 3
15	Approximate the probability of an event using data generated by a simulation (experimental probability) and compare it to the theoretical probability. a. Observe the relative frequency of an event over the long run, using simulation or technology, and use those results to predict approximate relative frequency.	7B	16	2, 3
			17	1
16	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,	7B	17	1-4



	G7 Standard Description	DM	Chapter	Lesson
	<p>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.</p> <p>b. Design and use a simulation to generate frequencies for compound events.</p> <p>c. Represent events described in everyday language in terms of outcomes in the sample space which composed the event.</p>			
Geometry and Measurement				
Construct and describe geometric figures, analyzing relationships among them.				
17	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.	7B	14	1
18	Construct geometric shapes (freehand, using a ruler and a protractor, and using technology), given a written description or 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.	7A	8	1-5
19	Describe the two-dimensional figures created by slicing three-dimensional figures into plane sections.	7B	13	2
Solve real-world and mathematical problems involving angle measure, circumference, area, surface area, and volume.				
21	<p>Explain the relationships among circumference, diameter, area, and radius of a circle to demonstrate understanding of formulas for the area and circumference of a circle.</p> <p>a. Informally derive the formula for area of a circle.</p> <p>b. Solve area and circumference problems in real-world and mathematical situations involving circles.</p>	7B	12	2
21	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.	7A	8	2



	G7 Standard Description	DM	Chapter	Lesson
22	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.	7B	13	1, 2



Grade 8

	G8 Standard Description	DM	Chapter	Lesson
Number Systems and Operations				
Understand that the real number system is composed of rational and irrational numbers.				
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 or terminates. b. Convert a decimal expansion that repeats into a rational number. <i>Converting a decimal expansion that repeats into a rational number is not covered in DM 8.</i>	5B	10	6, 7
		6A	3	3
		7A	2	6
2	Locate rational approximations of irrational numbers on a number line, compare their sizes, and estimate the values of the irrational numbers.	8A	1	7
Algebra and Functions				
Apply concepts of integer exponents and radicals.				
3	Develop and apply properties of integer exponents to generate equivalent numerical and algebraic expressions.	8A	1	1
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.	7A	1	5
		8A	1	1, 7
5	Estimate and compare very large or very small numbers in scientific notation.	8A	1	5, 6
6	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. 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.	8A	1	5, 7



	G8 Standard Description	DM	Chapter	Lesson
Analyze the relationship between proportional and non-proportional situations.				
7	Determine whether a relationship between two variables is proportional or non-proportional.	7B	14	3
8	Graph proportional relationships. a. Interpret the unit rate of a proportional relationship, describing 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.	8A	2	1
		8B	8	1
9	Interpret $y = mx + b$ as defining a linear equation whose graph is a line with m as the slope and b as the y -intercept. a. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in a coordinate plane. b. Given two distinct points in a coordinate plane, find the slope of the line containing the two points 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 slopes for two different sets of points are equal, demonstrate that the linear equations that include those two sets of points may have different y -intercepts.	8A	2	1, 2
		8B	8	1
			11	2, 3
10	Compare proportional and non-proportional linear relationships represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions) to solve real-world problems.	8B	8	1
			11	2, 3
Analyze and solve linear equations and systems of two linear equations.				
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 $a = b$ (where a and b are different numbers).	7A	5	1, 2
		8A	2	1



	G8 Standard Description	DM	Chapter	Lesson
	b. Represent and solve real-world and mathematical problems with equations and interpret each solution in the context of the problem.			
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.	8A	2	2-5
Explain, evaluate, and compare functions.				
13	Determine whether a relation is a function, defining a function as a rule that assigns to each input (independent value) exactly one output (dependent value), and given a graph, table, mapping, or set of ordered pairs.	8B	8	1
14	Evaluate functions defined by a rule or an equation, given values for the independent variable.	8B	8	1
15	Compare properties of functions represented algebraically, graphically, numerically in tables, or by verbal descriptions. a. a. Distinguish between linear and non-linear functions.	8B	8	1, 2
Use functions to model relationships between quantities.				
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.	8B	11	2, 3
17	Analyze the relationship (increasing or decreasing, linear or non-linear) between two quantities represented in a graph.	8B	11	2, 3
			9	1, 2



	G8 Standard Description	DM	Chapter	Lesson
Data Analysis, Statistics, and Probability				
Investigate patterns of association in bivariate data.				
18	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.	8B	13	3
19	Given a scatter plot that suggests a linear association, informally draw a line to fit the data, and assess the model fit by judging the closeness of the data points to the line.	8B	13	3
20	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.	8B	13	3
21	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.	8B	13	1, 2
Geometry and Measurement				
Understand congruence and similarity using physical models or technology.				
22	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. Given a pair of two-dimensional figures, determine if a series of rigid motions maps one figure onto the other, recognizing that if such a sequence exists the figures are congruent; describe the transformation sequence that verifies a congruence relationship.	8A	6	1, 2



23	Use coordinates to describe the effect of transformations (dilations, translations, rotations, and reflections) on two-dimensional figures.	8A	6	3, 4
24	Given a pair of two-dimensional figures, determine if a series of dilations and rigid motions maps one figure onto the other, recognizing that if such a sequence exists the figures are similar; describe the transformation sequence that exhibits the similarity between them.	8A	6	3, 4
Analyze parallel lines cut by a transversal.				
25	Analyze and apply properties of parallel lines cut by a transversal to determine missing angle measures. a. Use informal arguments to establish that the sum of the interior angles of a triangle is 180 degrees.	8A	7	1, 2
Understand and apply the Pythagorean Theorem.				
26	Informally justify the Pythagorean Theorem and its converse.	8B	10	1, 2
27	Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane.	8B	10	1, 3
28	Apply the Pythagorean Theorem to determine unknown side lengths of right triangles, including real-world applications.	8B	10	1, 3