Mathematics: Grades K-8

Benchmark#	Description	Idea/Standard	Subject	Grade	Body Of Knowledge/ Strand
MAFS.K.CC.1.1	Count to 100 by ones and by tens.	Know number names and the count sequence. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.CC.1.2	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	Know number names and the count sequence. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.CC.1.3	Read and write numerals from 0 to 20. Represent a number of objects with a written numeral 0–20 (with 0 representing a count of no objects).	Know number names and the count sequence. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.CC.2.4	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.	Count to tell the number of objects. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.CC.2.5	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.	Count to tell the number of objects. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.CC.3.6	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.	Compare numbers. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.CC.3.7	Compare two numbers between 1 and 10 presented as written numerals.	Compare numbers. (Major Cluster)	Mathematics	K	Counting and Cardinality
MAFS.K.G.1.1	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.*	Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). (Additional Cluster)	Mathematics	K	Geometry
MAFS.K.G.1.2	Correctly name shapes regardless of their orientations or overall size.	Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). (Additional Cluster)	Mathematics	K	Geometry
MAFS.K.G.1.3	Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).	Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). (Additional Cluster)	Mathematics	K	Geometry
MAFS.K.G.2.4	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).	Analyze, compare, create, and compose shapes. (Supporting Cluster)	Mathematics	K	Geometry
MAFS.K.G.2.5	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	Analyze, compare, create, and compose shapes. (Supporting Cluster)	Mathematics	K	Geometry
MAFS.K.G.2.6	Compose simple shapes to form larger shapes. *For example, “Can you join these two triangles with full sides touching to make a rectangle?”*	Analyze, compare, create, and compose shapes. (Supporting Cluster)	Mathematics	K	Geometry
MAFS.K.MD.1.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	Describe and compare measurable attributes. (Additional Cluster)	Mathematics	K	Measurement and Data
MAFS.K.MD.1.2	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.*	Describe and compare measurable attributes. (Additional Cluster)	Mathematics	K	Measurement and Data

MAFS.K.MD.1.a	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.*	Describe and compare measurable attributes. (Additional Cluster)	Mathematics	K	Measurement and Data
MAFS.K.MD.2.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	Classify objects and count the number of objects in each category. (Supporting Cluster)	Mathematics	K	Measurement and Data
MAFS.K.NBT.1.1	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.	Work with numbers 11–19 to gain foundations for place value. (Major Cluster)	Mathematics	K	Number and Operations in Base Ten
MAFS.K.OA.1.1	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (Major Cluster)	Mathematics	K	Operations and Algebraic Thinking
MAFS.K.OA.1.2	Solve addition and subtraction word problems[1], and add and subtract within 10, e.g., by using objects or drawings to represent the problem ([1]Students are not required to independently read the word problems.)	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (Major Cluster)	Mathematics	K	Operations and Algebraic Thinking
MAFS.K.OA.1.4	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.	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (Major Cluster)	Mathematics	K	Operations and Algebraic Thinking
MAFS.K.OA.1.5	Fluently add and subtract within 5.	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (Major Cluster)	Mathematics	K	Operations and Algebraic Thinking
MAFS.K.OA.1.a	Use addition and subtraction within 10 to solve word problems involving both addends unknown, e.g., by using objects, drawings, and equations with symbols for the unknown numbers to represent the problem. (Students are not required to independently read the word problems.)	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (Major Cluster)	Mathematics	K	Operations and Algebraic Thinking
MAFS.1.G.1.1	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.	Reason with shapes and their attributes. (Additional Cluster)	Mathematics	1	Geometry
MAFS.1.G.1.2	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.	Reason with shapes and their attributes. (Additional Cluster)	Mathematics	1	Geometry
MAFS.1.G.1.3	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 examples that decomposing into more equal shares creates smaller shares.	Reason with shapes and their attributes. (Additional Cluster)	Mathematics	1	Geometry
MAFS.1.MD.1.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.	Measure lengths indirectly and by iterating length units. (Major Cluster)	Mathematics	1	Measurement and Data
MAFS.1.MD.1.a	Understand how to use a ruler to measure length to the nearest inch. a. Recognize that the ruler is a tool that can be used to measure the attribute of length. b. Understand the importance of the zero point and end point and that the length measure is the span between two points.	Measure lengths indirectly and by iterating length units. (Major Cluster)	Mathematics	1	Measurement and Data

	c. Recognize that the units marked on a ruler have equal length intervals and fit together with no gaps or overlaps. These equal interval distances can be counted to determine the overall length of an object.				
MAFS.1.MD.2.3	Tell and write time in hours and half-hours using analog and digital clocks.	Work with time and money. (Additional Cluster)	Mathematics	1	Measurement and Data
MAFS.1.MD.2.a	Identify and combine values of money in cents up to one dollar working with a single unit of currency[1]. a. Identify the value of coins (pennies, nickels, dimes, quarters). b. Compute the value of combinations of coins (pennies and/or dimes). c. Relate the value of pennies, dimes, and quarters to the dollar (e.g., There are 100 pennies *or* ten dimes *or* four quarters in one dollar.) ([1]Students are not expected to understand the decimal notation for combinations of dollars and cents.)	Work with time and money. (Additional Cluster)	Mathematics	1	Measurement and Data
MAFS.1.MD.3.4	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.	Represent and interpret data. (Supporting Cluster)	Mathematics	1	Measurement and Data
MAFS.1.NBT.1.1	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.	Extend the counting sequence. (Major Cluster)	Mathematics	1	Number and Operations in Base Ten
MAFS.1.NBT.2.2	Understand that the two digits of a two-digit number represent amounts of tens and ones. 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). d. Decompose two-digit numbers in multiple ways (e.g., 64 can be decomposed into 6 tens and 4 ones or into 5 tens and 14 ones).	Understand place value. (Major Cluster)	Mathematics	1	Number and Operations in Base Ten
MAFS.1.NBT.2.3	Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.	Understand place value. (Major Cluster)	Mathematics	1	Number and Operations in Base Ten
MAFS.1.NBT.3.4	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.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	1	Number and Operations in Base Ten
MAFS.1.NBT.3.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	1	Number and Operations in Base Ten
MAFS.1.NBT.3.6	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.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	1	Number and Operations in Base Ten

MAFS.1.OA.1.1	Use addition and subtraction within 20 to solve word problems[1] 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 ([1]Students are not required to independently read the word problems.)	Represent and solve problems involving addition and subtraction. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.1.2	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.	Represent and solve problems involving addition and subtraction. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.2.3	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.)*	Understand and apply properties of operations and the relationship between addition and subtraction. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.2.4	Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*	Understand and apply properties of operations and the relationship between addition and subtraction. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.3.5	Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).	Add and subtract within 20. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.3.6	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).	Add and subtract within 20. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.4.7	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.*	Work with addition and subtraction equations. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.1.OA.4.8	Determine the unknown whole number in an addition or subtraction equation relating to 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 = [].*	Work with addition and subtraction equations. (Major Cluster)	Mathematics	1	Operations and Algebraic Thinking
MAFS.2.G.1.1	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.	Reason with shapes and their attributes. (Additional Cluster)	Mathematics	2	Geometry
MAFS.2.G.1.2	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	Reason with shapes and their attributes. (Additional Cluster)	Mathematics	2	Geometry
MAFS.2.G.1.3	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.	Reason with shapes and their attributes. (Additional Cluster)	Mathematics	2	Geometry
MAFS.2.MD.1.1	Measure the length of an object to the nearest inch, foot, centimeter, or meter by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.	Measure and estimate lengths in standard units. (Major Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.1.2	Describe the inverse relationship between the size of a unit and number of units needed to measure a given object. *Example: Suppose the perimeter of a room is lined with one-foot rulers. Now, suppose we want to line it with yardsticks instead of rulers. Will we need more or fewer yardsticks than rulers to do the job? Explain your answer.*	Measure and estimate lengths in standard units. (Major Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.1.3	Estimate lengths using units of inches, feet, yards, centimeters, and meters.	Measure and estimate lengths in standard units. (Major Cluster)	Mathematics	2	Measurement and Data

MAFS.2.MD.1.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	Measure and estimate lengths in standard units. (Major Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.2.5	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.	Relate addition and subtraction to length. (Major Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.2.6	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.	Relate addition and subtraction to length. (Major Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.3.7	Tell and write time from analog and digital clocks to the nearest five minutes.	Work with time and money. (Supporting Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.3.8	Solve one- and two-step word problems involving dollar bills (singles, fives, tens, twenties, and hundreds) or coins (quarters, dimes, nickels, and pennies) using $ and ¢ symbols appropriately. Word problems may involve addition, subtraction, and equal groups situations[1]. *Example: The cash register shows that the total for your purchase is 59¢. You gave the cashier three quarters. How much change should you receive from the cashier?* a. Identify the value of coins and paper currency. b. Compute the value of any combination of coins within one dollar. c. Compute the value of any combinations of dollars (e.g., If you have three ten-dollar bills, one five-dollar bill, and two one-dollar bills, how much money do you have?). d. Relate the value of pennies, nickels, dimes, and quarters to other coins and to the dollar (e.g., There are five nickels in one quarter. There are two nickels in one dime. There are two and a half dimes in one quarter. There are twenty nickels in one dollar). (1See glossary Table 1)	Work with time and money. (Supporting Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.4.9	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.	Represent and interpret data. (Supporting Cluster)	Mathematics	2	Measurement and Data
MAFS.2.MD.4.10	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.	Represent and interpret data. (Supporting Cluster)	Mathematics	2	Measurement and Data
MAFS.2.NBT.1.1	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).	Understand place value. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.1.2	Count within 1000; skip-count by 5s, 10s, and 100s.	Understand place value. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.1.3	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	Understand place value. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.1.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	Understand place value. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten

MAFS.2.NBT.2.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.2.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.2.7	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.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.2.8	Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.NBT.2.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.	Use place value understanding and properties of operations to add and subtract. (Major Cluster)	Mathematics	2	Number and Operations in Base Ten
MAFS.2.OA.1.1	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.	Represent and solve problems involving addition and subtraction. (Major Cluster)	Mathematics	2	Operations and Algebraic Thinking
MAFS.2.OA.1.a	Determine the unknown whole number in an equation relating four or more whole numbers. For example, determine the unknown number that makes the equation true in the equations 37 + 10 + 10 = _____ + 18, ? – 6 = 13 – 4, and 15 – 9 = 6 + .	Represent and solve problems involving addition and subtraction. (Major Cluster)	Mathematics	2	Operations and Algebraic Thinking
MAFS.2.OA.2.2	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	Add and subtract within 20. (Major Cluster)	Mathematics	2	Operations and Algebraic Thinking
MAFS.2.OA.3.3	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.	Work with equal groups of objects to gain foundations for multiplication. (Supporting Cluster)	Mathematics	2	Operations and Algebraic Thinking
MAFS.2.OA.3.4	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.	Work with equal groups of objects to gain foundations for multiplication. (Supporting Cluster)	Mathematics	2	Operations and Algebraic Thinking
MAFS.3.G.1.1	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.	Reason with shapes and their attributes. (Supporting Cluster)	Mathematics	3	Geometry
MAFS.3.G.1.2	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.*	Reason with shapes and their attributes. (Supporting Cluster)	Mathematics	3	Geometry
MAFS.3.MD.1.1	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.	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (Major Cluster)	Mathematics	3	Measurement and Data
MAFS.3.MD.1.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (Major Cluster)	Mathematics	3	Measurement and Data

MAFS.3.MD.2.3	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.*	Represent and interpret data. (Supporting Cluster)	Mathematics	3	Measurement and Data
MAFS.3.MD.2.4	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.	Represent and interpret data. (Supporting Cluster)	Mathematics	3	Measurement and Data
MAFS.3.MD.3.5	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.	Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (Major Cluster)	Mathematics	3	Measurement and Data
MAFS.3.MD.3.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (Major Cluster)	Mathematics	3	Measurement and Data
MAFS.3.MD.3.7	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.	Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (Major Cluster)	Mathematics	3	Measurement and Data
MAFS.3.MD.4.8	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.	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. (Additional Cluster)	Mathematics	3	Measurement and Data
MAFS.3.NBT.1.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	Use place value understanding and properties of operations to perform multi-digit arithmetic. (Additional Cluster)	Mathematics	3	Number and Operations in Base Ten
MAFS.3.NBT.1.2	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.	Use place value understanding and properties of operations to perform multi-digit arithmetic. (Additional Cluster)	Mathematics	3	Number and Operations in Base Ten
MAFS.3.NBT.1.3	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.	Use place value understanding and properties of operations to perform multi-digit arithmetic. (Additional Cluster)	Mathematics	3	Number and Operations in Base Ten
MAFS.3.NF.1.1	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.	Develop understanding of fractions as numbers. (Major Cluster)	Mathematics	3	Number and Operations - Fractions
MAFS.3.NF.1.2	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.	Develop understanding of fractions as numbers. (Major Cluster)	Mathematics	3	Number and Operations - Fractions
MAFS.3.NF.1.3	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.	Develop understanding of fractions as numbers. (Major Cluster)	Mathematics	3	Number and Operations - Fractions
MAFS.3.OA.1.1	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.*	Represent and solve problems involving multiplication and division. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.1.2	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.*	Represent and solve problems involving multiplication and division. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.1.3	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.	Represent and solve problems involving multiplication and division. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.1.4	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 = ?.	Represent and solve problems involving multiplication and division. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.2.5	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.)*	Understand properties of multiplication and the relationship between multiplication and division. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.2.6	Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	Understand properties of multiplication and the relationship between multiplication and division. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking

MAFS.3.OA.3.7	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.	Multiply and divide within 100. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.4.8	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.	Solve problems involving the four operations, and identify and explain patterns in arithmetic. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.3.OA.4.9	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.*	Solve problems involving the four operations, and identify and explain patterns in arithmetic. (Major Cluster)	Mathematics	3	Operations and Algebraic Thinking
MAFS.4.G.1.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (Additional Cluster)	Mathematics	4	Geometry
MAFS.4.G.1.2	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.	Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (Additional Cluster)	Mathematics	4	Geometry
MAFS.4.G.1.3	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.	Draw and identify lines and angles, and classify shapes by properties of their lines and angles. (Additional Cluster)	Mathematics	4	Geometry
MAFS.4.MD.1.1	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), ...*	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. (Supporting Cluster)	Mathematics	4	Measurement and Data
MAFS.4.MD.1.2	Use the four operations to solve word problems[1] involving distances, intervals of time, and money, including problems involving simple fractions or decimals[2]. Represent fractional quantities of distance and intervals of time using linear models. ([1]See glossary Table 1 and Table 2) ([2]Computational fluency with fractions and decimals is not the goal for students at this grade level.)	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. (Supporting Cluster)	Mathematics	4	Measurement and Data
MAFS.4.MD.1.3	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.*	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. (Supporting Cluster)	Mathematics	4	Measurement and Data
MAFS.4.MD.2.4	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.*	Represent and interpret data. (Supporting Cluster)	Mathematics	4	Measurement and Data
MAFS.4.MD.3.5	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 b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.	Geometric measurement: understand concepts of angle and measure angles. (Additional Cluster)	Mathematics	4	Measurement and Data

MAFS.4.MD.3.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	Geometric measurement: understand concepts of angle and measure angles. (Additional Cluster)	Mathematics	4	Measurement and Data
MAFS.4.MD.3.7	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.	Geometric measurement: understand concepts of angle and measure angles. (Additional Cluster)	Mathematics	4	Measurement and Data
MAFS.4.NBT.1.1	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.*	Generalize place value understanding for multi-digit whole numbers. (Major Cluster)	Mathematics	4	Number and Operations in Base Ten
MAFS.4.NBT.1.2	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.	Generalize place value understanding for multi-digit whole numbers. (Major Cluster)	Mathematics	4	Number and Operations in Base Ten
MAFS.4.NBT.1.3	Use place value understanding to round multi-digit whole numbers to any place.	Generalize place value understanding for multi-digit whole numbers. (Major Cluster)	Mathematics	4	Number and Operations in Base Ten
MAFS.4.NBT.2.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.	Use place value understanding and properties of operations to perform multi-digit arithmetic. (Major Cluster)	Mathematics	4	Number and Operations in Base Ten
MAFS.4.NBT.2.5	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.	Use place value understanding and properties of operations to perform multi-digit arithmetic. (Major Cluster)	Mathematics	4	Number and Operations in Base Ten
MAFS.4.NBT.2.6	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.	Use place value understanding and properties of operations to perform multi-digit arithmetic. (Major Cluster)	Mathematics	4	Number and Operations in Base Ten
MAFS.4.NF.1.1	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.	Extend understanding of fraction equivalence and ordering. (Major Cluster)	Mathematics	4	Number and Operations - Fractions
MAFS.4.NF.1.2	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.	Extend understanding of fraction equivalence and ordering. (Major Cluster)	Mathematics	4	Number and Operations - Fractions
MAFS.4.NF.2.3	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.*	Build fractions from unit fractions by applying and extending previous understandings of operations on	Mathematics	4	Number and Operations - Fractions

	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 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.	whole numbers. (Major Cluster)			
MAFS.4.NF.2.4	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?*	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. (Major Cluster)	Mathematics	4	Number and Operations - Fractions
MAFS.4.NF.3.5	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	Understand decimal notation for fractions, and compare decimal fractions. (Major Cluster)	Mathematics	4	Number and Operations - Fractions
MAFS.4.NF.3.6	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.*	Understand decimal notation for fractions, and compare decimal fractions. (Major Cluster)	Mathematics	4	Number and Operations - Fractions
MAFS.4.NF.3.7	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	Understand decimal notation for fractions, and compare decimal fractions. (Major Cluster)	Mathematics	4	Number and Operations - Fractions
MAFS.4.OA.1.1	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.	Use the four operations with whole numbers to solve problems. (Major Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.4.OA.1.2	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.	Use the four operations with whole numbers to solve problems. (Major Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.4.OA.1.3	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.	Use the four operations with whole numbers to solve problems. (Major Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.4.OA.1.a	Determine whether an equation is true or false by using comparative relational thinking. *For example, without adding 60 and 24, determine whether the equation 60 + 24 = 57 + 27 is true or false.*	Use the four operations with whole numbers to solve problems. (Major Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.4.OA.1.b	Determine the unknown whole number in an equation relating four whole numbers using comparative relational thinking. *For example, solve 76 + 9 = n + 5 for n by arguing that nine is four more than five, so the unknown number must be four greater than 76.*	Use the four operations with whole numbers to solve problems. (Major Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.4.OA.2.4	Investigate factors and multiples.				

	a. Find all factor pairs for a whole number in the range 1–100. b. 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. c. Determine whether a given whole number in the range 1–100 is prime or composite.	Gain familiarity with factors and multiples. (Supporting Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.4.OA.3.5	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.*	Generate and analyze patterns. (Additional Cluster)	Mathematics	4	Operations and Algebraic Thinking
MAFS.5.G.1.1	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).	Graph points on the coordinate plane to solve real-world and mathematical problems. (Additional Cluster)	Mathematics	5	Geometry
MAFS.5.G.1.2	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.	Graph points on the coordinate plane to solve real-world and mathematical problems. (Additional Cluster)	Mathematics	5	Geometry
MAFS.5.G.2.3	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.*	Classify two-dimensional figures into categories based on their properties. (Additional Cluster)	Mathematics	5	Geometry
MAFS.5.G.2.4	Classify and organize two-dimensional figures into Venn diagrams based on the attributes of the figures.	Classify two-dimensional figures into categories based on their properties. (Additional Cluster)	Mathematics	5	Geometry
MAFS.5.MD.1.1	Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) 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.	Convert like measurement units within a given measurement system. (Supporting Cluster)	Mathematics	5	Measurement and Data
MAFS.5.MD.2.2	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.*	Represent and interpret data. (Supporting Cluster)	Mathematics	5	Measurement and Data
MAFS.5.MD.3.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (Major Cluster)	Mathematics	5	Measurement and Data

	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.				
MAFS.5.MD.3.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (Major Cluster)	Mathematics	5	Measurement and Data
MAFS.5.MD.3.5	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 × w × h and V = B × 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.	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (Major Cluster)	Mathematics	5	Measurement and Data
MAFS.5.NBT.1.1	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.	Understand the place value system. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten
MAFS.5.NBT.1.2	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.	Understand the place value system. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten
MAFS.5.NBT.1.3	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.	Understand the place value system. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten
MAFS.5.NBT.1.4	Use place value understanding to round decimals to any place.	Understand the place value system. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten
MAFS.5.NBT.2.5	Fluently multiply multi-digit whole numbers using the standard algorithm.	Perform operations with multi-digit whole numbers and with decimals to hundredths. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten
MAFS.5.NBT.2.6	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	Perform operations with multi-digit whole numbers and with decimals to hundredths. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten
MAFS.5.NBT.2.7	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.	Perform operations with multi-digit whole numbers and with decimals to hundredths. (Major Cluster)	Mathematics	5	Number and Operations in Base Ten

MAFS.5.NF.1.1	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.)*	Use equivalent fractions as a strategy to add and subtract fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.NF.1.2	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	Use equivalent fractions as a strategy to add and subtract fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.NF.2.3	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*	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.NF.2.4	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 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.	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.NF.2.5	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.	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.NF.2.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.NF.2.7	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?*	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Major Cluster)	Mathematics	5	Number and Operations - Fractions
MAFS.5.OA.1.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	Write and interpret numerical expressions. (Additional Cluster)	Mathematics	5	Operations and Algebraic Thinking
MAFS.5.OA.1.2	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.*	Write and interpret numerical expressions. (Additional Cluster)	Mathematics	5	Operations and Algebraic Thinking
MAFS.5.OA.2.3	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.*	Analyze patterns and relationships. (Additional Cluster)	Mathematics	5	Operations and Algebraic Thinking
MAFS.6.EE.1.1	Write and evaluate numerical expressions involving whole-number exponents.	Apply and extend previous understandings of arithmetic to algebraic expressions. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.1.2	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 $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*	Apply and extend previous understandings of arithmetic to algebraic expressions. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.1.3	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*	Apply and extend previous understandings of arithmetic to algebraic expressions. (Major Cluster)	Mathematics	6	Expressions & Equations

MAFS.6.EE.1.4	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.*	Apply and extend previous understandings of arithmetic to algebraic expressions. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.2.5	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.	Reason about and solve one-variable equations and inequalities. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.2.6	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.	Reason about and solve one-variable equations and inequalities. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.2.7	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 non-negative rational	Reason about and solve one-variable equations and inequalities. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.2.8	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.	Reason about and solve one-variable equations and inequalities. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.EE.3.9	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.*	Represent and analyze quantitative relationships between dependent and independent variables. (Major Cluster)	Mathematics	6	Expressions & Equations
MAFS.6.G.1.1	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.	Solve real-world and mathematical problems involving area, surface area, and volume. (Supporting Cluster)	Mathematics	6	Geometry
MAFS.6.G.1.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction 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.	Solve real-world and mathematical problems involving area, surface area, and volume. (Supporting Cluster)	Mathematics	6	Geometry
MAFS.6.G.1.3	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.	Solve real-world and mathematical problems involving area, surface area, and volume. (Supporting Cluster)	Mathematics	6	Geometry
MAFS.6.G.1.4	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.	Solve real-world and mathematical problems involving area, surface area, and volume. (Supporting Cluster)	Mathematics	6	Geometry
MAFS.6.NS.1.1	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	Apply and extend previous understandings of multiplication and division to divide fractions by fractions. (Major Cluster)	Mathematics	6	The Number System
MAFS.6.NS.2.2	Fluently divide multi-digit numbers using the standard algorithm.	Compute fluently with multi-digit numbers and find common factors and multiples. (Additional Cluster)	Mathematics	6	The Number System
MAFS.6.NS.2.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	Compute fluently with multi-digit numbers and find common factors and multiples. (Additional Cluster)	Mathematics	6	The Number System

MAFS.6.NS.2.4	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).*	Compute fluently with multi-digit numbers and find common factors and multiples. (Additional Cluster)	Mathematics	6	The Number System
MAFS.6.NS.3.5	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.	Apply and extend previous understandings of numbers to the system of rational numbers. (Major Cluster)	Mathematics	6	The Number System
MAFS.6.NS.3.6	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.	Apply and extend previous understandings of numbers to the system of rational numbers. (Major Cluster)	Mathematics	6	The Number System
MAFS.6.NS.3.7	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 ^{o}C > -7 ^{o}C to express the fact that -3 ^{o}C is warmer than -7 ^{o}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.*	Apply and extend previous understandings of numbers to the system of rational numbers. (Major Cluster)	Mathematics	6	The Number System

MAFS.6.NS.3.8	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.	Apply and extend previous understandings of numbers to the system of rational numbers. (Major Cluster)	Mathematics	6	The Number System
MAFS.6.RP.1.1	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."*	Understand ratio concepts and use ratio reasoning to solve problems. (Major Cluster)	Mathematics	6	Ratios & Proportional Relationships
MAFS.6.RP.1.2	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 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."*	Understand ratio concepts and use ratio reasoning to solve problems. (Major Cluster)	Mathematics	6	Ratios & Proportional Relationships
MAFS.6.RP.1.3	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. e. Understand the concept of Pi as the ratio of the circumference of a circle to its diameter. (1See Table 2 Common Multiplication and Division Situations)	Understand ratio concepts and use ratio reasoning to solve problems. (Major Cluster)	Mathematics	6	Ratios & Proportional Relationships
MAFS.6.SP.1.1	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.*	Develop understanding of statistical variability. (Additional Cluster)	Mathematics	6	Statistics & Probability
MAFS.6.SP.1.2	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.	Develop understanding of statistical variability. (Additional Cluster)	Mathematics	6	Statistics & Probability

MAFS.6.SP.1.3	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.	Develop understanding of statistical variability. (Additional Cluster)	Mathematics	6	Statistics & Probability
MAFS.6.SP.2.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	Summarize and describe distributions. (Additional Cluster)	Mathematics	6	Statistics & Probability
MAFS.6.SP.2.5	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.	Summarize and describe distributions. (Additional Cluster)	Mathematics	6	Statistics & Probability
MAFS.7.EE.1.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	Use properties of operations to generate equivalent expressions. (Major Cluster)	Mathematics	7	Expressions & Equations
MAFS.7.EE.1.2	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."*	Use properties of operations to generate equivalent expressions. (Major Cluster)	Mathematics	7	Expressions & Equations
MAFS.7.EE.2.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using	Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (Major Cluster)	Mathematics	7	Expressions & Equations
MAFS.7.EE.2.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations 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.*	Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (Major Cluster)	Mathematics	7	Expressions & Equations
MAFS.7.G.1.1	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.	Draw, construct, and describe geometrical figures and describe the relationships between them. (Additional Cluster)	Mathematics	7	Geometry
MAFS.7.G.1.2	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.	Draw, construct, and describe geometrical figures and describe the relationships between them. (Additional Cluster)	Mathematics	7	Geometry
MAFS.7.G.1.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Draw, construct, and describe geometrical figures and describe the relationships between them. (Additional Cluster)	Mathematics	7	Geometry

MAFS.7.G.2.4	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.	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (Additional Cluster)	Mathematics	7	Geometry
MAFS.7.G.2.5	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.	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (Additional Cluster)	Mathematics	7	Geometry
MAFS.7.G.2.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. (Additional Cluster)	Mathematics	7	Geometry
MAFS.7.NS.1.1	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.* 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.	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. (Major Cluster)	Mathematics	7	The Number System
MAFS.7.NS.1.2	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.	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. (Major Cluster)	Mathematics	7	The Number System
MAFS.7.NS.1.3	Solve real-world and mathematical problems involving the four operations with rational numbers.	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. (Major Cluster)	Mathematics	7	The Number System
MAFS.7.RP.1.1	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.*	Analyze proportional relationships and use them to solve real-world and mathematical problems. (Major Cluster)	Mathematics	7	Ratios & Proportional Relationships
MAFS.7.RP.1.2	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.	Analyze proportional relationships and use them to solve real-world and mathematical problems. (Major Cluster)	Mathematics	7	Ratios & Proportional Relationships
MAFS.7.RP.1.3	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.*	Analyze proportional relationships and use them to solve real-world and mathematical problems. (Major Cluster)	Mathematics	7	Ratios & Proportional Relationships
MAFS.7.SP.1.1	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.	Use random sampling to draw inferences about a population. (Supporting Cluster)	Mathematics	7	Statistics & Probability
MAFS.7.SP.1.2	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.*	Use random sampling to draw inferences about a population. (Supporting Cluster)	Mathematics	7	Statistics & Probability
MAFS.7.SP.2.3	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.*	Draw informal comparative inferences about two populations. (Additional Cluster)	Mathematics	7	Statistics & Probability
MAFS.7.SP.2.4	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.*	Draw informal comparative inferences about two populations. (Additional Cluster)	Mathematics	7	Statistics & Probability
MAFS.7.SP.3.5	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.	Investigate chance processes and develop, use, and evaluate probability models. (Supporting Cluster)	Mathematics	7	Statistics & Probability

MAFS.7.SP.3.6	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.*	Investigate chance processes and develop, use, and evaluate probability models. (Supporting Cluster)	Mathematics	7	Statistics & Probability
MAFS.7.SP.3.7	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*	Investigate chance processes and develop, use, and evaluate probability models. (Supporting Cluster)	Mathematics	7	Statistics & Probability
MAFS.7.SP.3.8	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?*	Investigate chance processes and develop, use, and evaluate probability models. (Supporting Cluster)	Mathematics	7	Statistics & Probability
MAFS.8.EE.1.1	$3^{-5}\cdot 3^{-3}$ and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times = = 1/3^3 = 1/27$.*	Work with radicals and integer exponents. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.EE.1.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.	Work with radicals and integer exponents. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.EE.1.3	$10^8 \cdot 10^9$ nbers 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 × and the population of the world as 7 × , and determine that the world population is more than 20 times larger.*	Work with radicals and integer exponents. (Major Cluster)	Mathematics	8	Expressions & Equations

MAFS.8.EE.1.4	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 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.	Work with radicals and integer exponents. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.EE.2.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways	Understand the connections between proportional relationships, lines, and linear equations. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.EE.2.6	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.	Understand the connections between proportional relationships, lines, and linear equations. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.EE.3.7	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.	Analyze and solve linear equations and pairs of simultaneous linear equations. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.EE.3.8	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.*	Analyze and solve linear equations and pairs of simultaneous linear equations. (Major Cluster)	Mathematics	8	Expressions & Equations
MAFS.8.F.1.1	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.	Define, evaluate, and compare functions. (Major Cluster)	Mathematics	8	Functions
MAFS.8.F.1.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a*	Define, evaluate, and compare functions. (Major Cluster)	Mathematics	8	Functions
MAFS.8.F.1.3	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 = s^2 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.*	Define, evaluate, and compare functions. (Major Cluster)	Mathematics	8	Functions

MAFS.8.F.2.4	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.	Use functions to model relationships between quantities. (Major Cluster)	Mathematics	8	Functions
MAFS.8.F.2.5	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.	Use functions to model relationships between quantities. (Major Cluster)	Mathematics	8	Functions
MAFS.8.G.1.1	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.	Understand congruence and similarity using physical models, transparencies, or geometry software. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.1.2	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.	Understand congruence and similarity using physical models, transparencies, or geometry software. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.1.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	Understand congruence and similarity using physical models, transparencies, or geometry software. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.1.4	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.	Understand congruence and similarity using physical models, transparencies, or geometry software. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.1.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel 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.*	Understand congruence and similarity using physical models, transparencies, or geometry software. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.2.6	Explain a proof of the Pythagorean Theorem and its converse.	Understand and apply the Pythagorean Theorem. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.2.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	Understand and apply the Pythagorean Theorem. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.2.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	Understand and apply the Pythagorean Theorem. (Major Cluster)	Mathematics	8	Geometry
MAFS.8.G.3.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. (Additional Cluster)	Mathematics	8	Geometry
MAFS.8.NS.1.1	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.	Know that there are numbers that are not rational, and approximate them by rational numbers. (Supporting Cluster)	Mathematics	8	The Number System
MAFS.8.NS.1.2	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., π^2). *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.*	Know that there are numbers that are not rational, and approximate them by rational numbers. (Supporting Cluster)	Mathematics	8	The Number System

MAFS.8.SP.1.1	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.	Investigate patterns of association in bivariate data. (Supporting Cluster)	Mathematics	8	Statistics & Probability
MAFS.8.SP.1.2	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.	Investigate patterns of association in bivariate data. (Supporting Cluster)	Mathematics	8	Statistics & Probability
MAFS.8.SP.1.3	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.*	Investigate patterns of association in bivariate data. (Supporting Cluster)	Mathematics	8	Statistics & Probability