AERO/Common Core Alignment 3-5

Note: In yellow are the AERO Standards and inconsistencies between AERO and Common Core are noted by the strikethrough (~~ccc~~) notation.

Table of Contents

Critical Areas of Focus	**3**
Critical Areas of Focus Described	**4**
Mathematical Practices	**7**
AERO Performance Indicators mapped to Common Core Standards	**16**
Table 1 from Common Core	**40**

Critical Areas
3-5
Instructional time should focus on four critical areas

Critical Areas	3	4	5
Numbers (Multiplication and Division)	Developing understanding of multiplication and division and strategies for multiplication and division within 100;	Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends;	Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations
Fractions	Developing understanding of fractions, especially unit fractions (fractions with numerator 1);	Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers;	Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions);
Measurement	Developing understanding of the structure of rectangular arrays and of area;		
Geometry	Describing and analyzing two-dimensional shapes	Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.	Developing understanding of volume

Critical Areas Described
Grade 3

1. Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

2. Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

3. Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

4. Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

Grade 4

1. Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

2. Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

3. Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

Grade 5

1. Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

2. Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

3. Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Standards for Mathematical Practices 3-5

Mathematical Practices Mathematically proficient students…	**3**	**4**	**5**
Make sense of problems and persevere in solving them.	3.MP.1 Explain to themselves the meaning of a problem and look for ways to solve it. May use concrete objects or pictures to help them conceptualize and solve problems. May check their thinking by asking themselves, "Does this make sense?" Listen to the strategies of others and will try different approaches. Will use another method to check their answers	4.MP.1 Know that doing mathematics involves solving problems and discussing how they solved them. Explain to themselves the meaning of a problem and look for ways to solve it. May use concrete objects or pictures to help them conceptualize and solve problems. May check their thinking by asking themselves, "Does this make sense?" Listen to the strategies of others and will try different approaches. They often will use another method to check their answers.	5.MP.1 Solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. Solve problems related to volume and measurement conversions. Seek the meaning of a problem and look for efficient ways to represent and solve it. *They may check their thinking by asking themselves, "What is the most efficient way to solve the problem?", "Does this make sense?", and "Can I solve the problem in a different way?".*

Mathematical Practices Mathematically proficient students…	**3**	**4**	**5**
Reason abstractly and quantitatively.	3.MP.2 Recognize that a number represents a specific quantity. Connect the quantity to written symbols and Create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities.	4.MP.2 Recognize that a number represents a specific quantity. Connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. Extend this understanding from whole numbers to their work with fractions and decimals. Write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts.	5.MP.2 Recognize that a number represents a specific quantity. Connect quantities to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. Extend understanding from whole numbers to their work with fractions and decimals. Write simple expressions that record calculations with numbers and represent or round numbers using place value concepts.

Mathematical Practices Mathematically proficient students...	3	4	5
Construct viable arguments and critique the reasoning of others.	3.MP.3 May construct arguments using concrete referents, such as objects, pictures, and drawings. Refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" Explain their thinking to others and respond to others' thinking.	4.MP.3 May construct arguments using concrete referents, such as objects, pictures, and drawings. Explain their thinking and make connections between models and equations. Refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" Explain their thinking to others and respond to others' thinking.	5.MP.3 Construct arguments using concrete referents, such as objects, pictures, and drawings. Explain calculations based upon models and properties of operations and rules that generate patterns. Demonstrate and explain the relationship between volume and multiplication. Refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" Explain their thinking to others and respond to others' thinking.

Mathematical Practices Mathematically proficient students...	3	4	5
Model with mathematics.	3.MP.4 Experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. Connect the different representations and explain the connections. Evaluate their results in the context of the situation and reflect on whether the results make sense.	4.MP.4 Experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Connect the different representations and explain the connections. Able to use all of these representations as needed. Evaluate their results in the context of the situation and reflect on whether the results make sense.	5.MP.4 Experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Connect the different representations and explain the connections and use all of the representations as needed. Evaluate their results in the context of the situation and whether the results make sense. Evaluate the utility of models to determine which models are most useful and efficient to solve problems.

Mathematical Practices Mathematically proficient students...	**3**	**4**	**5**
Use appropriate tools strategically.	3.MP.5 Consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. *For EXAMPLE, they may use graph paper to find all the possible rectangles that have a given perimeter*. Compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles.	4.MP.5 Consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. *For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles*. Use other measurement tools to understand the relative size of units within a system Express measurements given in larger units in terms of smaller units.	5.MP.5 Consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. *For instance, they may use unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions.* Use graph paper to accurately create graphs and solve problems or make predictions from real world data.

Mathematical Practices Mathematically proficient students...	**3**	**4**	**5**
Attend to precision.	3.MP.6 Use clear and precise language in their discussions with others and in their own reasoning. Are careful about specifying units of measure and state the meaning of the symbols they choose. *For example , when figuring out the area of a rectangle they record their answers in square units.*	4.MP.6 Develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. Careful about specifying units of measure and state the meaning of the symbols they choose. *For instance, they use appropriate labels when creating a line plot.*	5.MP.6 Refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. Specify units of measure and state the meaning of the symbols they choose. *For instance, when figuring out the volume of a rectangular prism they record their answers in cubic units.*

Mathematical Practices Mathematically proficient students...	3	4	5
Look for and make use of structure.	3.MP.7 Look closely to discover a pattern or structure. *For example, students use properties of operations as strategies to multiply and divide (commutative and distributive properties).*	4.MP.7 Look closely to discover a pattern or structure. *For instance, students use properties of operations to explain calculations (partial products model).* Relate representations of counting problems such as tree diagrams and arrays to the multiplication principal of counting. Generate number or shape patterns that follow a given rule.	5.MP.7 Look closely to discover a pattern or structure. *For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals.* Examine numerical patterns and relate them to a rule or a graphical representation.

Mathematical Practices Mathematically proficient students...	3	4	5
Look for and express regularity in repeated reasoning.	3.MP.8 Notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. *For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56.* Continually evaluate their work by asking themselves, "Does this make sense?"	4.MP.8 Notice repetitive actions in computation to make generalizations Use models to explain calculations and understand how algorithms work. Use models to examine patterns and generate their own algorithms. *For example, students use visual fraction models to write equivalent fractions.*	5.MP.8 Use repeated reasoning to understand algorithms and make generalizations about patterns. Connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers and perform all operations with decimals to hundredths. Explore operations with fractions with visual models and begin to formulate generalizations.

AERO Performance Indicators Mapped to Common Core Standards

3-5

Clusters	3	4	5
Counting	~~Count by hundreds and thousands starting at any number from 1 to 9,999~~	~~Count by thousands and ten thousands starting at any number from 1 to 99,999~~	~~Count by thousands, ten thousands, and hundred thousands, starting at any number from 1 to999,999~~
Reading and Writing Numbers	~~Identify, read aloud and write numbers to 10,000~~	~~Read and write numbers to at least 100,000~~	**5.NBT.3** (DOK 1) Read, write, and compare decimals to thousandths. 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)*. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. Round, order, and compare, using symbols, decimals to the tenths, hundredths, and thousandths place Read, write, compare, and order all whole numbers, fractions, mixed numbers and decimals using multiple strategies (e.g. symbols, manipulatives, number line, and place value concepts) ~~Read and write numbers to at least 1,000,000~~
Comparing whole numbers	~~Compare and order numbers from 0 to at least 10,000 using the words equal to, greater than, less than, greatest, or least and recording the results of comparisons with the symbols >, =, and <. when appropriate~~ ~~Use symbols (i.e., <, =, >) and models to compare and order whole numbers through 9,999~~		~~Compare and order numbers from 0 to at 1,000,000 using the words equal to, greater than, less than, greatest, or least and recording the results of comparisons with the symbols >, =, and <. when appropriate~~

Clusters	3	4	5
Place Value- Magnitude of numbers	~~Name the number that is 10 more than or 100 more than any number from 0 through 9,999 and 10 less than or 100 less than any number from 100 through 10,000~~	**4.NBT.1** (DOK 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 (Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.)* **4.NBT.2** (DOK 1) **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. Identify and interpret the place value for each digit in numbers through ~~99,999~~ Use symbols (i.e., <, =, >) and models to compare and order whole numbers through ~~99,999~~ Compare and order numbers from 0 to at ~~100,000~~ using the words equal to, greater than, less than, greatest, or least and recording the results of comparisons with the symbols >, =, and <. when appropriate	5.NBT.1 (DOK 1,) **Recognize** that in a multi-digit number, a digit in one place represents 10 times as much as it represents in its place to the right and 1/10 of what it represents in the place to the left. Identify and use place value positions of whole numbers and decimals to hundredths 5.NBT.2 (DOK 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. Recall from memory multiplying and dividing by 10, 100, and 1,000

Clusters	3	4	5
Rounding	3.NBT.1. **(DOK 1)** **Use** place value understanding to round whole numbers to the nearest 10 or 100. Round whole numbers through ~~10,000~~ to the nearest ten, hundred, and ~~thousand~~ and round fractions to the nearest whole number Apply estimation skills (rounding, benchmarks, compatible numbers) to solve and evaluate reasonableness of an answer	4.NBT.3 (DOK 1) **Use** place value understanding to round multi-digit whole numbers to any place Round whole numbers to 1,000,000 to any place value and round decimals to the nearest whole, 10th, or 100th place.	5.NBT.4 (DOK 1) **Use** place value understanding to round decimals to any place. Round, order, and compare, using symbols, decimals to the tenths, hundredths, and thousandths place
Fluency	3. NBT.2 **(DOK 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 Add or subtract with numbers less than ~~100~~ ~~using mental arithmetic~~ 3.OA.7 **(DOK 1,2)** **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.**	4.OA.6 **Fluently** add and subtract multi-digit whole numbers using the standard algorithm Use mental math and estimation strategies to predict the results of computations (*i.e., whole numbers, addition and subtraction of fractions*) and to test the reasonableness of solutions 4.NBT.4 (DOK 1) **Fluently** add and subtract multi-digit whole numbers using the standard algorithm Add and subtract whole numbers (up to five – digit number) Name the number that is 100 more than or 1000 more than any number from 0 through 99,999 and 100 less than or 1000 less than any number	5.NBT.5 (DOK 1) **Fluently** multiply multi-digit whole numbers using the standard algorithm. Multiply four-digit numbers by two-digit numbers (including whole numbers and decimals).

Clusters	3	4	5
Multiplication and Division- whole numbers /decimals	3.NBT.3 **(DOK 1,2)** **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. 3.OA.5: **(DOK 1,2)** **Apply** properties of operations as **strategies** to multiply and divide. (Note: Students need not use formal terms for these properties.) *Examples: Commutative property of multiplication.) (Associative property of multiplication) (Distributive property.)* Use and explain the operations of multiplication and division including the properties (e.g., identity element of multiplication, commutative property, property of zero, associative property, inverse operations). Describe and show relationships between strategies and procedures for multiplying and dividing that involve addition and subtraction and explain strategies	4.NBT.5 (DOK 1,2) **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. Represent multiplication of up to four-digit by one digit numbers and describe how that representation connects to the related number sentence Apply models for multiplication (*e.g., equal-sized groups, arrays, area models, equal intervals on the number line*), place value, and properties of operations (*commutative, associative, and distributive*). ~~Recall from memory multiplication facts for numbers from 1 to 10~~ (3rd grade Common Core) 4.NBT.6 (DOK 1,2) **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. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors	5.NBT.6 (DOK 1,2) **Find** whole-number quotients of whole numbers with up to four-digit dividends and two- digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. **Illustrate and explain** the calculation by using equations, rectangular arrays, and/or area models. 5.NBT.7. (DOK 1,2,3) **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. Add, subtract, multiply, and divide (with and without remainders) using non-negative rational numbers Multiply four-digit numbers by two-digit numbers (including whole numbers and decimals). Add, subtract, multiply, and divide fractions, decimals to hundredths, using concrete models or drawings and strategies based on place value Determine totals, differences, and change due for monetary amounts in practical situations

Clusters	3	4	5
Multiplication /Division (Factors/Multiples)	3.OA.1 **(DOK 1,2)** **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* Identify whole number factors and/or pairs of factors for a given whole number ~~through 24~~. Apply models of multiplication (e.g., equal-sized groups, arrays, area models, equal "jumps" on number lines and hundreds charts) and division (e.g., repeated subtraction, partitioning, and sharing) to solve problems 3.OA.2 **(DOK 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* 3.OA.6 **(DOK 1,2)** **Understand** division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.* Illustrate with manipulatives when a number is divisible by ~~2, 3, 5, or 10~~ Apply the inverse relationship between multiplication and division (e.g., 5 x 6 = 30, 30 ÷ 6 = 5) and the relationship between multiples and factors	4.OA.1 (DOK 1,2) **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 **4.OA.4** (DOK 1) **Find** all factor pairs for a whole number in the range 1–100. **Recognize** that a whole number is a multiple of each of its factors. **Determine** whether a given whole number in the range 1–100 is a multiple of a given one-digit number. **Determine** whether a given whole number in the range 1– 100 is prime or composite. Identify factors of composite numbers less than 100 ~~Use divisibility concepts to classify numbers as prime or composite~~	~~Identify all whole number factors and pairs of factors for a given whole number through 144~~ ~~Model and distinguish between factor and multiple and prime and composite numbers.~~

Clusters	3	4	5
Solving problems/equations	3.OA.3 **(DOK 1,2)** **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*. (Note: See Appendix, Table 2.) Generate and solve two step addition and subtraction problems and one step multiplication problems based on practical situations 3.OA.4 **(DOK 1,2)** **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 = ?.* Select and/or write number sentences (equations) to find the unknown in problem-solving contexts involving two-digit times one-digit multiplication using appropriate labels Model, explain, and solve open number sentences including addition, subtraction, and multiplication facts. Create models for the concept of equality, recognizing that the equal sign (=) denotes equivalent Complete number sentences with the appropriate words and symbols (+, -, >,< =)	4.OA.2 (DOK 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*. (Note: See Appendix, Table 2) Generate and solve addition, subtraction, multiplication, and division problems using whole numbers in practical situations 4.OA.3 (DOK 1,2,3) **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. Select and/or write number sentences (equations) to find the unknown in problem-solving contexts involving two-digit by one-digit division using appropriate labels Determine the value of variables in equations; justify the process used to make the determination Select the solution to an equation from a given set of numbers. Model, explain, and solve open number sentences including addition, subtraction, multiplication, and division	5.OA.1 (DOK 1) **Use** parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.2 (DOK 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.* Solve problems by finding the next term or missing term in a pattern or function table using real world situations Find possible solutions to an ~~inequality~~ involving a variable using whole numbers as a replacement set. Determine the value of variables in equations and ~~inequalities~~, justifying the process.

Clusters	3	4	5
Solving problems/equations	3.OA.8 (DOK 1,2,3) **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. Determine the value of missing quantities or variables within equations or number sentences, and justify the process used. Select and/or write number sentences (equations) to find the unknown in problem-solving contexts involving two-digit times one-digit multiplication using appropriate labels Complete number sentences with the appropriate words and symbols (+, -, >,< =) Model, explain, and solve open number sentences including addition, subtraction, and multiplication facts. Apply estimation skills (rounding, benchmarks, compatible numbers) to solve and evaluate reasonableness of an answer Create models for the concept of equality, recognizing that the equal sign (=) denotes equivalent terms such that 4+3=7, 4+3=6+1, or 7=5+2.		

Clusters	3	4	5
Numerical Patterns	3.OA.9 **(DOK 1,2,3)** **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* Recognize and describe patterns using objects and numbers found in tables, number charts, and charts Use number patterns to skip count by 2's, 3's, 5's, and 10' Create, describe, and extend growing and repeating patterns with physical materials and symbols including number	4.OA.5 (DOK 1,2) **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.* Create, describe, and extend growing and repeating patterns with physical materials and symbols including numbers. Identify and describe patterns resulting from operations involving even and odd numbers (such as even + even = even)	**5.OA.3** (DOK 1,2) **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.* Identify, describe, and represent patterns and relationships in the number system, including triangular numbers and perfect squares Devise a rule for an input/output function table, describing it in words and symbols. Interpret and write a rule for a one operation function table

Clusters	3	4	5
Fractions- understanding	3.NF.1 (DOK 1,2) **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. Use concrete models and pictorial representations to demonstrate the meaning of fractions (proper and improper) as parts of a whole, parts of a set, and division by whole numbers through twelfths		
Fractions- models	3.G.2 (DOK 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* 3.NF.2 (DOK 1,2) **Understand** a fraction as a number on the number line; represent fractions on a number line diagram. 3.NF.2a (DOK 1,2,) **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.		

Clusters	3	4	5
Addition and Subtraction- fractions	3.NF.2b (DOK 1,2) **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. Use concrete models to add and subtract simple common fractions with the same denominator.	4.NF.3 (DOK 1,2,3) **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. 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.*	**5.NF.1** (DOK 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. 5.NF.2 (DOK 1,2,3) **Solve** word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g*., by using visual fraction models or equations to represent the problem*. **Use** benchmark fractions and number sense of fractions to **estimate mentally and assess** the reasonableness of answers. NOTE: This Standard involves the application of Standard **5.NF.1.** Use models and drawings, and find common denominators to compare fractions with unlike denominators Model addition and subtraction of mixed numbers with and without regrouping and fractions with like and unlike denominators Select and/or use an appropriate operation(s) to show understanding of addition and subtraction of ~~non-negative decimals~~ and/or fractions

Clusters	3	4	5
Multiplication and Division of fractions		4.NF.4 (DOK 1,2) **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?*	5.NF.3 (DOK 1,2) **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* 5.NF.5 (DOK 1,2,3) **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 **5.NF.6** (DOK 1,2) **Solve** real world problems involving multiplication of fractions and mixed numbers, e.g., *by using visual fraction models or equations to represent the problem*. Select, sequence, and use appropriate operations to solve multi-step word problems with whole numbers

Clusters	3	4	5
Multiplication and Division of fractions continued			**5.NF.7** (DOK 1,2) **Apply and extend** previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (*Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.*) 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*.

Clusters	3	4	5
Fractions- Equality	**3.NF.3** (DOK 1,2,3) **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* Identify, name and use equivalent fractions with denominators 2, 4 and 8 Determine the equivalency among ~~decimals~~, fractions, ~~and percents (e.g., half = 50% and 1/4 = 0.25 = 25%).~~	4.NF.1 (DOK 1,2,3) **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. Write a fraction equivalent to a given fraction using common multiples. And simplify fractions using common factors. 4.NF.2 (DOK 1,2,3) **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*. Use models to connect and compare equivalent fractions ~~and decimals~~.	

Clusters	3	4	5
Place Value- fractions/ decimals	~~Use numbers, words, pictures, and physical objects to read, write, and represent decimal numbers (to the tenths) between 0 and 1, between 1 and 2, etc.~~	4.NF.5 (DOK 1,) **Express** a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* (Note: Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.) 4.NF.6 (DOK 1) **Use** decimal notation for fractions with denominators 10 or 100. Use numbers, words, pictures, and physical objects to read, write, and represent decimal numbers (to the hundredths) between 0 and 1, between 1 and 2, etc Determine the equivalency among decimals, fractions, ~~and percents (e.g., 49/100 = 0.49 = 49%~~).	~~Determine decimal equivalents or approximations of common fractions (i.e., 1/4, 1/2, 3/4, and 1 whole)~~ ~~Relate equivalent fractions and decimals with and without models, including locations on a number line.~~ ~~Determine the equivalency between and among fractions, decimals, and percents in contextual situations~~

Clusters	3	4	5
Comparing fractions/decimals	3.NF.3d (DOK 1,2,3) **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*. Compare and order fractions by using models, benchmarks (0, 1⁄2, 1), or common numerators or denominators	4.NF.2 (DOK 1,2,3) **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.* Use models to connect and compare equivalent fractions ~~and decimals~~. 4.NF.7 (DOK 1,2,3) **Compare** two decimals to hundredths by reasoning about their size. **Recognize** that comparisons are valid only when the two decimals refer to the same whole. **Record** the results of comparisons with the symbols >, =, or <, and **justify** the conclusions, e.g., by using a visual model. Compare and order positive fractions (including positive mixed numbers) and decimals on the number line, in number sentences, and in lists Compare and order positive fractions (including positive mixed numbers) and decimals on the number line, in number sentences, and in lists	**5.NBT.3** (DOK 1) **Read, write, and compare** decimals to thousandths. **Read and write** decimals to thousandths using base-ten numerals, number names, and expanded form, **Compare** two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to **record** the results of comparisons. Round, order, and compare, using symbols, decimals to the tenths, hundredths, and thousandths place Read, write, compare, and order all whole numbers, fractions, mixed numbers and decimals using multiple strategies (e.g. symbols, manipulatives, number line, and place value concepts)

Clusters	3	4	5
Measurement	3.MD.2 (DOK 1,2) **Measure and estimate** liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (*Note: Excludes compound units such as cm3 and finding the geometric volume of a container*.) **Add, subtract, multiply, or divide** to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to **represent** the problem. (Note: *Excludes multiplicative comparison problems -- problems involving notions of "times as much"*; see Appendix, Table 2.) Compare, order, and describe objects by various measurable attributes for area and volume/capacity Select and use the appropriate standard units of measure, abbreviations, and tools for measuring length, weight, and capacity Select and use appropriate units of measure and measure to a required degree of accuracy (to the nearest 1⁄2 unit) Estimate and measure length using fractional parts to the nearest 1⁄2 unit in the Metric system.	4.MD.1 (DOK 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), ...* Estimate and convert units of measure for length, area, and weight with the same measurement system (metric) Measure length, area, weight , and temperature, to a required degree of accuracy in metric systems Estimate and measure a given object to the nearest millimeter Convert capacity, weight/mass, and length within the metric system of measurement	5.MD.1 (DOK 1,2) **Convert** among different-sized standard measurement units within a given measurement system (*e.g., convert 5 cm to 0.05 m), and **use** these conversions in solving multi-step, real world problems*.) Convert units within a given measurement system to include length, weight/mass, and volume Estimate and convert units of measure for weight and volume/capacity within the same measurement system (metric)

Clusters	3	4	5
Data	3.MD.3 (DOK 1,2) **Draw** a scaled picture graph and a scaled bar graph to **represen**t a data set with several categories. **Solv**e 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.* 3.MD.4 (DOK,2) **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 Compare data and interpret quantities represented on tables and different types of graphs (line plots, pictographs, and bar graphs), make predictions, and solve problems based on the information Use a variety of graphical representations including ~~frequency tables and~~ plots to organize and represent data Pose questions that can be used to guide data collection, organization, and representation	4.MD.4 (DOK 1,2) **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* . Use a variety of graphical representations including frequency tables and plots to organize and represent data Compare data and interpret quantities represented on tables and graphs including line graphs, bar graphs, frequency tables, and ~~stem-and-leaf~~ plots to make predictions and solve Pose questions that can be used to guide data collection, organization, and representation	5.MD.2 (DOK 1,2) **Mak**e 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. Compare data and interpret quantities represented on tables and graphs, including line graphs, ~~stem-and-leaf plots~~, ~~histograms, and box-and-whisker plot~~s to make predictions, and solve problems based on the information Use a variety of graphical representations including including line graphs, ~~stem-and-leaf plots, histograms, and box-and-whisker plots~~ to organize and represent data Make predictions and draw conclusions based on data collected from a sample group ~~Pose questions that can be used to guide the collection of categorical and numerical data~~
Probability	~~Record results of activities involving chance (e.g., coin flips, dice rolls) and make reasonable predictions based upon data~~ ~~Develop and conduct grade-appropriate experiments using concrete objects (e.g. counters, number cubes, spinners) to determine the likeliness of events and list all outcomes~~	~~Design and conduct a simple probability experiment using concrete objects, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results~~	~~Construct a sample space and make a hypothesis as to the probability of a real-life situation overtime, test the prediction with experimentation, and present conclusions~~ ~~Determine combinations and permutations of given real-world situations by multiple strategies including creating lists~~ ~~Represent relationships using Venn diagrams~~

Clusters	3	4	5
Area, Perimeter and Volume	**3.MD.5** (DOK 1,2) **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. **3.MD.6** (DOK 1,2) **Measure** areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). **3.MD.7** (DOK 1,2) **Relate** area to the operations of multiplication and addition. 3.MD.7d **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 3.MD.8 (DOK 1,2) 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. Estimate and measure perimeter and area, using links, tiles, grid paper, geoboards, and dot paper	4.MD.3 (DOK 1,2) **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.* Describe relationships of rectangular area to numerical multiplication	**5.MD.3** (DOK 1) **Recognize** volume as an attribute of solid figures and **understand** concepts of volume measurement A. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. B. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. **5.MD.4** (DOK 1,2) **Measure** volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. Measure volume and ~~weight~~ to a required degree of accuracy in the metric systems

			5.MD.5 (DOK 1,2) **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 $V = l \times w \times h$ and $V = b \times h$ 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.

Clusters	3	4	5
Time	3.MD.1 (DOK 1,2) **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*. Tell time to the nearest minute using digital and analog clocks Use elapsed time in half-hour increments, beginning on the hour or half-hour, to determine start, end, and elapsed time ~~Recognize the number of weeks in a year, days in a year, and days in each month~~	4.MD.2 (DOK 1,2) **Use** the four operations to solve word problems involving distances, **intervals of time,** liquid volumes, masses of objects, **and money**, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. **Represent** measurement quantities using diagrams such as number line diagrams that feature a measurement scale. Use elapsed time in quarter-hour increments, beginning on the quarter-hour, to determine start, end, and elapsed time ~~Use A.M. and P.M. appropriately in describing time~~	~~Determine equivalent periods of time, including relationships between and among seconds, minutes, hours, days, months, and years~~
Money	~~Determine possible combinations of coins and bills to equal given amounts~~ ~~Read, write and use money notation~~	4.MD.2 (DOK 1,2) **Use** the four operations to solve word problems involving distances, **intervals of time,** liquid volumes, masses of objects, **and money**, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Use money notation to add and subtract given monetary amounts Determine totals for monetary amounts in practical situations	

Clusters	3	4	5
Geometry- shapes	**3.G.1** (DOK 1,2) **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. Describe, compare, analyze, and classify two-dimensional shapes by sides ~~and angles~~ ~~Identify, describe, and classify: cube, sphere, prism, pyramid, cone, and cylinder in terms of the number and shape of faces, edges, and vertices~~ ~~Describe the transformational motions of geometric figures (translation/slide, reflection/flip, and rotation/turn)~~ ~~Analyze the results of combining and subdividing circles, triangles, quadrilaterals, pentagons, hexagons, and octagons~~	4.G.2 (DOK 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. Analyze and describe the similarities and differences between and among two dimensional geometric shapes, figures, and models using mathematical language Identify, classify and draw triangles based on their properties ~~Analyze the relationship between three-dimensional geometric shapes in the form of cubes, rectangular prisms, and cylinders and their two-dimensional nets~~ ~~Represent the two-dimensional shapes trapezoids, rhombuses, and parallelograms and the three- dimensional shapes cubes, rectangular prisms, and cylinders~~ 4.G.3 (DOK 1) **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. Identify shapes that are congruent, similar, and/or symmetrical using a variety of methods including ~~transformational motions~~ Compare figures to determine congruence using ~~geometric transformations (motions), Such as reflections (flips), rotations (turns), and translations (slides~~).	5.G.3 (DOK 1,2) **Understand** that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles* 5.G.4 (DOK 1,2) **Classify** two-dimensional figures in a hierarchy based on properties. Analyze and describe the characteristics of symmetry relative to classes of polygons (parallelograms, triangles, etc Predict and describe the effects of combining, dividing, and changing shapes into other shapes ~~Represent concepts of congruency, similarity and/or symmetry using a variety of methods including dilation and transformational motion~~ ~~Predict the results of multiple transformations on a geometric shape when combinations of translation, reflection, and rotation are used~~.

Clusters	3	4	5
Geometry (Lines and Angles)	~~Identify, draw, and describe horizontal, vertical, and oblique lines~~ ~~Identify and create shapes that have lines of symmetry~~	4.G.1 (DOK 1) **Draw** points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. **Identify** these in two-dimensional figures. Identify, draw, label, and describe points, line segments, rays, and angles	
Geometry- angles		4..MD.5 (DOK 1) **Recognize** angles as geometric shapes that are formed wherever two rays share a common endpoint, and **understand** concepts of angle measure Identify, draw, and classify angles, including straight, right, obtuse, and acute 4.MD.6 (DOK 1) **Measure** angles in whole-number degrees using a protractor. **Sketch** angles of specified measure. 4.MD.7 (DOK 1,2) **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.* Use appropriate tools to determine, estimate, and compare units for measurement of weight/m)ass, area, size of angle (using the benchmark angles 45°, 90°, 180°, 270°, and 360, temperature, length, distance, and volume in metric systems and time in real-life situations.	

Clusters	3	4	5
Coordinate planes	~~Use coordinates to give or follow directions from one point to another on a map or grid.~~	~~Locate and label ordered pairs in the first quadrant of the coordinate plane~~	**5.OA.3** (DOK 1,2) **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** **5.G.1** (DOK 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).* 5.G.2 (DOK 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 coordinates representing geometric shapes in the first quadrant

Table 1. Common multiplication and division situations.[7]

	Unknown Product	**Group Size Unknown** ("How many in each group?" Division)	**Number of Groups Unknown** ("How many groups?" Division)
	3x6=?	**3 x ? = 18, and 18 ÷ 3 = ?**	**? x 6 = 18, and 18 ÷ 6 =?**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[4] Area[5]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[7]The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

[4]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

[5]The involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situation