5th Grade LEUSD Learning Targets in Mathematics

The learning targets below are intended to provide a guide for teachers in determining whether students are exhibiting characteristics of being on pace to meet the standard at the end of the year, as well as for reporting to parents their child's progress towards attainment of the standard. They are not intended to be fully inclusive of what a child is expected to be able to do, but rather serve as a guide for categorizing their progress towards achieving the standards at the end of the year. For a fuller description of each item, please reference the standards, the CA Math Framework and/or the Progressions Documents.

Major Cluster	1st Trimester Learning Targets	2nd Trimester Learning Targets	3rd Trimester Learning Targets
Understand the place-value system	Reasons why in multi-digit whole numbers a digit in one place represents 10 times what it represents in the place to its right and 1/10 of what it represents in the place to its left Reads decimals using fractional language, and writes decimals in fractional form, as well as expanded notation Explains why multiplying by a power of 10 shifts the digits of a whole number or decimal that many places to the left	Reasons why in decimal numbers a digit in one place represents 10 times what it represents in the place to its right and 1/10 of what it represents in the place to its left Explains patterns in the number of zeros in the product when multiplying a number by powers of 10 Explains patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10 Uses concrete models or drawings and number lines to extend understanding of decimal numbers to the thousandths place Understands the size of decimal numbers and relates them to common benchmarks such as 0, 0.5 and 1	5.NBT.1, 5.NBT.2, 5.NBT.3 AND 5.NBT.4
Perform operations with multi-digit whole numbers and decimals to hundredths	Developing reasoning and estimation strategies for dividing whole numbers with two-digit divisors Beginning to use equations, rectangular arrays and/or area models to illustrate and explain calculations of quotients of whole numbers with two-digit divisors	Uses models to support the same place value understanding for adding and subtracting decimals that was used for whole numbers, and connects that understanding to adding fractions with denominators of 10 and 100 Uses the standard algorithm to fluently compute products of whole numbers Breaks the dividend apart into like base-ten units and applies	5.NBT.5, 5.NBT.6 AND 5.NBT.7

	Before considering decimal multiplication more generally, reasons why the product of a number times 0.1 or 0.01 is ten or a hundred times as small as the multiplicand Uses reasoning to explain the placement of the decimal point in other products of decimals	the distributive property to find the quotient place by place, or by viewing division as finding an unknown factor Before considering decimal division more generally, reasons why dividing by 0.1 or 0.01 gives a quotient ten or a hundred times as large as the dividend Uses various models to support understanding of decimal operations	
Use equivalent fractions as a strategy to add and subtract fractions	Before moving into the standard algorithm for adding fractions and mixed numbers, uses visual fraction models (area models, number lines, etc) to build understanding	Understands adding fractions with different denominators (where one denominator is a divisor of the other) as a process of expressing both summands in terms of the same unit fraction Makes sense of fractional quantities through reasoning and estimating mentally and detects incorrect results through reasoning about quantities Solves addition and subtraction problems with fractions that requires "re-naming" only one of the fractions	5.NF.1 AND 5.NF.2
Apply and extend previous understandings of multiplication and division to multiply and divide fractions	Uses understanding of equal sharing to connect fractions with division and can create a story context to represent problems involving division of whole numbers as fractions	Using understanding of multiplication, beginning to develop the general formula for the product of two fractions and reasons with many examples using fraction strips and number line diagrams (and area models for more complicated examples) Developing understanding that multiplying a quantity by a number smaller than 1 produces a smaller quantity Beginning to apply the understanding of multiplication as scaling to reason that ½ x 3 is half the size of 3 Uses the relationship between division and multiplication, and story problems, to begin working with simple fraction division problems through reasoning Using visual models to show the quotient of division involving unit fractions and whole numbers	5.NF.3, 5.NF.4, 5.NF.5, 5.NF.6 AND 5.NF.7

Geometric measurement: understand concepts of volume, and relate volume to multiplication and to addition		Views volume as the number of cubes in *n* layers with a given area through "packing" right rectangular prisms Understands that prisms can be decomposed into layers Derives the formula for volume Uses the associative property of multiplication and decomposition of numbers using factors to investigate rectangular prisms with a given number of cubic units Understands that volume is additive and can be found in shapes that are composed of 2 right rectangular prisms put together (concrete steps, etc)	5.MD.3, 5.MD.4 AND 5.MD.5
Graph points in the coordinate plane to solve real-world math problems		Views the coordinate system as an intersection of 2 perpendicular number lines Understands changing the order of the ordered pairs changes the location of the coordinate point Realizes the importance of both direction and distance in plotting points Beginning to represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane	5.G.1 AND 5.G.2

** The word *fluent* is used in the Standards to mean "fast and accurate. Fluency in each grade involves a mixture of just knowing some answers, knowing some answers from patterns (e.g., "adding 0 yields the same number"), and knowing some answers from the use of strategies. It is important to push sensitively and encouragingly toward fluency of the designated numbers at each grade level, recognizing that fluency will be a mixture of these kinds of thinking which may differ across students.

** A central theme in multi-digit arithmetic is to encourage students to develop methods they understand, can explain and can think about, rather than merely following a sequence of directions, rules or procedures they do not understand.

** Generally, the California Common Core State Standards for Mathematics distinguish between strategies and algorithms. In the present discussion, the standard algorithm refers to multiplying numbers digit by digit and recording the products piece by piece. Note that the method of recording the algorithm is not the same as the algorithm itself, in the sense that the "partial products" method, which lists every digit-by-digit product separately, is a completely valid recording method for the standard algorithm. Ultimately, the standards call for understanding the standard algorithm in terms of place value, and this should be the most important goal for instruction.

Grade 5

In grade 5, instructional time should focus on three critical areas: (1) 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); (2) extending division to two-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; and (3) developing understanding of volume.

(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.

Grade 5 Overview

Operations and Algebraic Thinking

- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Number and Operations in Base Ten

- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations—Fractions

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data

- Convert like measurement units within a given measurement system.
- Represent and interpret data.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Geometry

- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

5 Grade 5

Operations and Algebraic Thinking 5.OA

Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

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.*

2.1 Express a whole number in the range 2–50 as a product of its prime factors. For example, find the prime factors of 24 and express 24 as 2 × 2 × 2 × 3. CA

Analyze patterns and relationships.

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.*

Number and Operations in Base Ten 5.NBT

Understand the place value system.

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.

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.

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.

4. Use place value understanding to round decimals to any place.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5. Fluently multiply multi-digit whole numbers using the standard algorithm.

6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

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.

Number and Operations—Fractions 5.NF

Use equivalent fractions as a strategy to add and subtract fractions.

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, $a/b + c/d = (ad + bc)/bd$.)*

2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.*

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

3. Interpret a fraction as division of the numerator by the denominator *($a/b = a \div b$).* Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

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 *$a \times q \div b$. For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)*

   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.

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 *$a/b = (n \times a)/(n \times b)$* to the effect of multiplying *a/b* by 1.

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.

7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]

   a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.*

1. 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.

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?*

Measurement and Data 5.MD

Convert like measurement units within a given measurement system.

1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.

Represent and interpret data.

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.*

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
   a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
   b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.
4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
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 $V = l \times w \times h$ 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.

Geometry 5.G

Graph points on the coordinate plane to solve real-world and mathematical problems.

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).

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.

Classify two-dimensional figures into categories based on their properties.

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.*

4. Classify two-dimensional figures in a hierarchy based on properties.