LCCS 5th Grade Math Curriculum Overview

Month	Unit
September	Unit 1: Math Is..
September	Unit 2: Volume
October	Unit 3: Place Value and Number Relationships
November	Unit 4: Add and Subtract Decimals
December	Unit 5: Multiply Multi-Digit Whole Numbers
January	Unit 6: Multiply Decimals
January	Unit 7: Divide Whole Numbers
January	Unit 8: Divide Decimals
February	Unit 9: Add and Subtract Fractions
March	Unit 10: Multiply Fractions
April	Unit 11: Divide Fractions
May	Unit 12: Measurement and Data
May	Unit 13: Geometry
June	Unit 14: Algebraic Thinking

Unit 1: Math Is..
At a Glance: The focus of this unit is threefold: ● to build students' agency as doers of mathematics. It is important that students understand that math is not just something done in school. Math is part of our daily lives and shows up in almost every activity. It is also important that students see themselves as skilled doers of

math, so helping them understand that doing math is not just carrying out operations or calculations. Rather, doing math is more accurately making sense of and solving problems and finding patterns and relationships among quantities and numbers. Lesson 1-1 helps students see themselves as doers of math as they examine their attitudes towards math and their images of themselves as doers of math.

- to build students' proficiency with the habits of mind that are integral to doing mathematics. These include the thinking that makes up the problem-solving process and that is involved in finding patterns and relationships among quantities and values. Lessons 1-2 through 1-5 focus on helping students build proficiency with these habits of mind.
- to build understanding of the norms of interaction that allow for a productive math learning environment where students can develop, refine, and enhance the habits of mind that are integral to doing math. Lesson 1-6 offers the opportunity for students to develop together the classroom norms for math for the school year.

Timeline:
10 Days

Unit 2: Volume

At a Glance:

In this unit, students explore measurable attributes of different figures and discover that all 3-dimensional figures have a measurable attribute of the space inside, which is called volume. They discover that volume can be measured by packing the figure with unit cubes and that there must be no gaps or overlaps of the unit cubes.

Students extend their understanding of multiplication as equal groups to discovered that the volume of a rectangular prism can be calculated by multiplying the number of unit cubes in one layer by the number of layers. Students generalize methods for calculating volume of rectangular prisms to derive the formulas $V = l \times w \times h$ and $V = B \times h$.

Students discover that volume is additive. They can calculate the volume of composite solid figures by decomposing the figure into rectangular prisms, then add the volumes.

Students apply the volume formulas to solve real-world problems, including problems involving unknown dimensions.

Timeline:
10 Days

Unit 3: Place Value and Number Relationships

At a Glance:

Our number system is called a base-10 place-value system because it takes 10 of one unit to equal 1 unit in the place-value position to the left of the given unit.

Students in Grade 5 have several years of experience with whole-number place value and fraction concepts, and in Grade 4 they began to investigate decimals in tenths and hundredths. They learn that it takes 10 hundredths to equal 1 tenth, and it takes 10 tenths to equal 1.

As students learn more about decimals, they need every opportunity to tie current learning to established understanding. Lesson 3-1 of this unit reviews whole-number place value. Students are asked questions such as: "What pattern do you see as you move from one place to another?" "How does the value of the 3 in the thousands place compare to the value of the 3 in the hundreds place?"

Students learn that the value of a digit in a decimal, as its value in a whole number, depends upon its place in the number. So, the value of a digit is 10 times what it would be in the place to its right, and its value is 1/10 what it would be to its left.

As students progress through the unit, you may want to provide them with place-value charts and digits cards to give them frequent opportunities to experience concrete correspondences among place values.

Timeline:
9 Days

Unit 4: Add and Subtract Decimals

At a Glance:

As students approach learning to add and subtract decimals, they are equipped with the understanding of whole-number operations and decimal place value. They have experience with using number lines, grids, and other visual representations to help them add and subtract. Students build on this prior knowledge as they develop strategies for adding and subtracting decimals.

The explorations with multiple representations provide students opportunities to visualize and internalize how decimals behave during addition and subtraction. This allows for a much deeper understanding than merely memorizing and applying algorithms.

Students estimate sums and differences by using rounded numbers and compatible numbers. Estimation strategies are taught prior to finding exact results so that students have tools to use to check for reasonableness.

Students learn to find exact sums and differences using multiple representations including tenths and hundredths grids and number lines. Students also learn how to decompose decimals to perform operations on their parts.

Allow students plenty of time to explore the strategies in each lesson. When they ultimately use the standard algorithm for each decimal operation,

this learning will give them a foundation of deeper understanding.

Timeline:
14 Days

Unit 5: Multiply Multi-Digit Whole Numbers

At a Glance:

In this unit, students are guided gradually from their previous understanding to more value-filled multiplication and a concrete understanding of multi-digit multiplication. They begin by writing powers of 10 in exponential form and use this work to identify patterns when multiplying by powers of 10.

Students then begin to estimate products, using compatible numbers and rounding. Estimation gives students a way to think about computation with larger numbers. For example, the magnitude of the product 5,386 × 13 may not be as easy for students to comprehend as 5,000 × 10. That may be because students may lose sense of the magnitude of the product when they work through the steps of finding 5,386 × 13. After they estimate products, students begin finding exact products by using area models and partial products.

Students then relate their understanding of partial products to an algorithm. When multiplying multi-digit numbers, the standard addition abstract process: when students multiply the digits in the correct order, they can regroup accurately. They are then fully aware of the actual quantities with which they are working.

Timeline:
12 Days

Unit 6: Multiply Decimals

At a Glance:

In this unit, students extend on their understanding from Grade 4 of multiplying whole numbers and fractions to multiplying decimals. They use estimation to determine the reasonableness of their answers. Students apply their understanding of multiplying decimals to solve problems in real-world contexts.

Students apply their knowledge of decimal fractions, place value, and the properties of operations to multiply decimals. Later in the unit, students revisit and make use of the pattern they discovered to make a generalization about the placement of the decimal in the product.

Students discover that place value and multiplication strategies work the same way with decimal operations as they do with whole number

operations.

- Students can extend their understanding based on these explorations with decimal grids to generalize their methods and understanding. They move to the generalized area model, which serves as a template for their thinking and use of the Distributive Property and partial products. For example, consider 0.25 × 73.
- Students can decompose the factors by place value and set up the following area representation of the product. Now, if students explore further by finding the products 25 × 73, 2.5 × 73, 2.5 × 7.3, and 0.25 × 7.3, they can see that the number of decimal places in the product equals the total decimal places in the factors.

Timeline:
10 days

Unit 7: Divide Decimals

At a Glance:

Dividing by a (positive) decimal less than 1 is not always intuitive. When children first learn about the effect of each operation, they see that addition and multiplication have increases that are generally bigger than the first addend or factor, whereas subtraction and division generally have answers that are less than the minuend or dividend.

This unit opens with use of different-sized glasses and jugs to illustrate division by decimals. This is an important opportunity to help students form a concrete understanding that does not have "make smaller." When you ask, for example, how many small (0.2-liter) glasses are in a 2-liter jug, students better understand the nature of division: not simply making numbers smaller—but finding out how many of one amount are in another.

As the unit progresses, even when size is not involved, provide frequent "how many fit into" prompts, to consistently remind students that they are to find out how many of a certain decimal are in a given number.

Models may be helpful when making informal connections to dividing a whole number by a decimal. Models help students understand that dividing something into smaller pieces produces more pieces than dividing it into larger pieces. For example, a ruler can be used to show that twenty 0.1-centimeter segments fit into 2 centimeters. Thus 2 ÷ 0.1 = 20 is an example where the quotient is greater than the dividend.

A strategy used to divide a number by a decimal is to multiply the dividend and the divisor by the same power of 10 so that the divisor becomes a whole number. Students can use representations to show that the quotient does not change as a result of this process. For example, students can use decimal grids to show what 1.2 ÷ 0.6 and 1.2 ÷ 0.6 are in full view, and to 0.6 grid: (4 groups of 0.5 are in 0.6 grid). Those numbers can then be compared to 90 ÷ 2 = 2 and 60 ÷ 3 = 4 for students to conclude that the respective quotients (based on decimals and whole numbers) are the same.

Timeline:
10 Days

Unit 8: Divide Decimals

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Timeline:
10 Days

Unit 9: Add and Subtract Fractions

At a Glance:

Students begin this unit by estimating sums and differences of fractions. Estimates are used by mathematically proficient students to check the reasonableness of answers. Since halves and ones can be so easy to work with, students use these as benchmarks to help them estimate. They can round each number they are working with to a benchmark and get a quick idea of what the sum or difference should be. Students learn that they round to a half if the numerator is about half of the denominator. If the numerator is very close to the denominator, the fraction rounds to 1. If the numerator is much less than the denominator, the fraction rounds to 0.

Students extend the work they did in Grade 4 as they work with fractions with unlike denominators. To start, they apply concepts from Grade 3 to

determine how the fractions can be written using a single denominator. They know the denominator tells the unit fraction used to build it. Fractions with unlike denominators are built using different unit fractions. Students get a sense of this and what to do about it by working with physical representations, such as fraction circles and fraction tiles.

Moving from the visual/physical to symbolic manipulations, students use what they learned in Grade 4 about equivalent fractions. They use this relationship to obtain equivalent fractions with common denominators. They are exposed to problems for which only one of the fractions must be rewritten with a common denominator as well as those where both fractions need to be rewritten with a common denominator. After fractions are written with a common denominator, students can add and subtract fractions as they have done previously, by adding and subtracting the numerators, respectively.

They further apply this process with mixed numbers, recognizing that the fractional parts need to be expressed with a common denominator to add or subtract. However, regrouping might be necessary if the sum of the fractional parts is greater than 1 or if the fraction subtraction expression is less than the second fractional part. In these cases, students regroup 1 from the fractional part or the whole part as necessary.

Timeline:
15 Days

Unit 10: Multiply Fractions

At a Glance:

In this unit, students review and build on their work from Grade 4, when they multiplied fractions and mixed numbers by whole numbers using models. That work is extended to give students a generalized understanding of multiplication with whole numbers, fractions, and mixed numbers in any combination.

Throughout the unit, students continue the practice of estimating to check the reasonableness of answers. They use tools such as drawings, fraction tiles, and area models to make connections to multiplication of whole numbers and to make sense of what it means to multiply fractions. Students use that understanding to develop efficient strategies.

To start, students build their understanding of multiplying a fraction by a whole number and develop two processes for approaching the concept.

Scaling is essentially the resizing of a number. Understanding this concept enables students to reason about the size of a product without having to multiply by a number. A factor greater than 1 produces a product that is greater than the number, and multiplying a number by a factor less than 1 generates a product that is less than the number. Multiplying two (positive) fractions that are both less than 1 generates a product less than either of the two factors. The idea that it is possible for a product to be less than one or both factors is a difficult concept.

Timeline:

15 Days

Unit 11: Divide Fractions

At a Glance:

This unit builds on earlier work with division and fractions to establish that a fraction describes an indicated division. Students divide fractions, limited to division of a whole number by a unit fraction and division of a unit fraction by a non-zero whole number. They explore situations involving equal sharing division and equal grouping division. Students use models to help determine quotients. Formal procedures for dividing fractions and mixed numbers are developed in Grade 6. In making connections between division and fractions, students write equations with fractions to describe division situations.

Students use different representations when they find the quotient of a unit fraction divided by a whole number in equal-sharing situations.

They observe patterns, but some still have difficulty comprehending how a quotient can be greater than the dividend. The use of simple models illustrates how dividing a whole number (the dividend) by a unit fraction (the divisor) involves finding the number of small pieces that fill into a larger piece (the whole). In such situations, the number of little pieces that fit in is greater than the dividend. A common misconception is that students may interpret a problem such as $8 \div 1/4$ as 8 being equally divided into 4 parts. To verify their results, students can use the relationship between multiplication and division to check their answers.

Timeline:
11 Days

Unit 12: Measurement and Data

At a Glance:

In Kindergarten and Grade 1, students become familiar with categorical data and ways to display it, such as picture graphs and bar graphs. In Grade 2, they are introduced to measurement data. They generate measurement data by measuring and recording lengths to the nearest whole unit and represent the data on a line plot. In Grade 3, they work with measurements in fractions of a unit, and in Grades 4 and 5, they create line plots for a variety of data sets and solve problems based on the data using operations appropriate for the grade. A line plot uses an appropriately scaled number line to present the values of the measurements in a data set. Each measurement is represented by an X or dot placed above the number line, directly over the location of its value.

The line plot is an efficient way to display, compare, and interpret the data. When students are proficient at constructing line plots, they can be presented with line plots for a variety of measurement contexts and asked to interpret them. New work in this unit connects to their prior expectations for Grade 5, which also call for solving problems using computations with fractions and mixed numbers.

Students also learn that the same measure can be expressed in different units. Students learn to convert between units within a measurement system using their previously-learned skills in multiplication and division.

Timeline:
9 Days

Unit 13:Geometry

At a Glance:

Using an ordered pair of numbers called coordinates identifies the location of a point on the coordinate plane. The point of intersection of the two axes is a coordinate plane called the origin. By convention, the horizontal axis is called the x-axis; the vertical axis, the y-axis. The first coordinate in an ordered pair, the x-coordinate, tells the point's distance from the origin along the x-axis. The second coordinate, the y-coordinate, tells the point's distance from the origin along the y-axis. Students graph ordered pairs, interpret coordinate values of points in the context of a situation, and draw a line to connect points. Students make predictions about other points that are not specifically graphed on a line.

Then students build on their earlier work of classifying two-dimensional shapes based on properties. Students now look for structure as they classify two-dimensional figures in a hierarchy.

A hierarchy classifies figures into categories according to properties. Most often, a hierarchy includes a diagram showing relationships among categories and subcategories—with the most general category at the top. Each subcategory is more specific than the one above it—and has all the properties of the category above, with at least one additional property. Students build hierarchies for two-dimensional triangles and quadrilaterals. Triangles are sorted and classified by the lengths of their sides (equilateral, isosceles, scalene) and the sizes of their angles (acute, right, obtuse). A special case is noted as an isosceles triangle is one with at least two sides that are the same length, which makes an equilateral triangle a special case, or subcategory of isosceles.

Quadrilaterals are placed into hierarchies based on side length, congruency, and angle type. These hierarchies reinforce an understanding as to why a given polygon might have multiple names.

Timeline:
10 Days

Unit 14:Algebraic Thinking

At a Glance:

Using an ordered pair of numbers called coordinates identifies the location of a point on the coordinate plane. The point of intersection of the two axes is a coordinate plane called the origin. By convention, the horizontal axis is called the x-axis; the vertical axis, the y-axis. The first coordinate in an ordered pair, the x-coordinate, tells the point's distance from the origin along the x-axis. The second coordinate, the y-coordinate, tells the point's distance from the origin along the y-axis. Students graph ordered pairs, interpret coordinate values of points in the context of a situation, and draw a line to connect points. Students make predictions about other points that are not specifically graphed on a line.

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10 Days