

Course Information

Grade(s):	Grade 4
Discipline/Course:	Mathematics
Course Title:	Grade 4 Mathematics
Prerequisite(s):	Grade 3 Mathematics
Course Description: <i>Program of Studies</i>	Students in grade 4 develop an understanding and proficiency with whole number operations and extend this understanding to multi-digit whole number multiplication and division including the use of efficient procedures. Number relationships and properties of operations provide generalizable methods for efficient computation and problem solving strategies. Students comprehend fractional equivalence as a balance, and quantities can be represented differently with models and expressions. Geometric figures can be analyzed and classified using attributes such as having parallel sides, perpendicular sides, angle measures, and symmetry. Angle measure is understood as a measure of a rotation and is additive. Shapes and solids can be described through estimated and actual measurement. Students trust the measure for comparison without needing to physically match objects. Predictions can be made by identifying patterns and analyzing information gathered from organized data.
Course Essential Questions:	<ul style="list-style-type: none"> ● How do expressions represent mathematical problems and vs.? ● How can four operations apply to multi-digit computation and what are efficient ways to mentally calculate solutions to problems? ● How can decomposing multi-digit numbers based on place value help to make computation efficient? ● What are prime and composite numbers and how do they relate to each other? ● How are fractions compared? ● How can fractions be used with addition and subtraction? ● What are angles, and how are they measured? ● How are geometric shapes and solids measured and categorized? ● How can collecting, organizing and displaying data help us analyze information and make

	<p>reasonable and informed decisions?</p>
<p>Course Enduring Understandings:</p>	<ul style="list-style-type: none"> ● Numbers are factors and multiples of other numbers. ● Mathematical problems can be written as mathematical expressions and vs. ● Commutative property for addition and multiplication - The order of addends or factors does not change the result. (i.e. $10 + 3 = 3 + 10$ or $10 \times 3 = 3 \times 10$) ● Associative property for addition and multiplication the order in which addends are added and factors are multiplied to not change the result. i.e. $(2 + 3) + 4 = 2 + (3 + 4)$, and $(2 \times 3) \times 4 = 2 \times (3 \times 4)$. ● The distributive property uses partial products to simplify multiplication problems, e.g., $15 \times 12 = (10 + 5) \times (10 + 2) = 100 + 20 + 50 + 10 = 180$.) ● Our number system is structured around multiples of ten. ● The expanded form shows the place value structure as multiples of ten. e.g. or $1,472 = 1,000 + 400 + 70 + 2$ or, (1 thousand) + (4 hundreds) + (7 tens) + (2 units) or, $1,472 = (1 \times 1,000) + (4 \times 100) + (7 \times 10) + (2 \times 1)$, or $(1 \times 10 \times 10 \times 10) + (4 \times 10 \times 10) + (7 \times 10) + (2 \times 1)$ ● Numbers can be composed and decomposed to make estimation and mental computation easier. ● Angles can be measured and are additive. ● A fraction is a division problem and the denominator is the divisor. ● Fractions can be compared to determine relative amounts.
<p>Course Standards <i>Note: The Board of Education adopted elementary mathematics standards for this course will remain the same; however, the sequence of units and standards among units may shift</i></p>	<p>Students are expected to:</p> <p>MP.1. Make sense of problems and persevere in solving them. <i>In fourth grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. They use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.</i></p> <p>MP.2. Reason abstractly and quantitatively. <i>Fourth graders recognize that a number represents a specific quantity. They connect the quantity to written</i></p>

<p><i>over time in response to student performance needs.</i></p>	<p><i>symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions that record calculations with numbers and represent or round numbers using place value concepts.</i></p> <p>MP.3. Construct viable arguments and critique the reasoning of others.</p> <p><i>In fourth grade, students construct arguments using concrete referents such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in discussions involving questions like “How did you get that?” and “Why is that true?” They explain their thinking to others and respond to others’ thinking.</i></p> <p>MP.4. Model with mathematics.</p> <p><i>Students 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. Students connect the different representations and explain the connections. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.</i></p> <p>MP.5. Use appropriate tools strategically.</p> <p><i>Fourth graders 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. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.</i></p> <p>MP.6. Attend to precision.</p> <p><i>Fourth graders develop mathematical communication skills, using clear and precise language in discussions with others and in their own reasoning. They are 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.</i></p> <p>MP.7. Look for and make use of structure.</p> <p><i>In fourth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial products model). They relate representations of counting problems, such as tree diagrams and arrays, to the multiplication principle of counting. They generate number or shape patterns that follow a given rule.</i></p> <p>MP.8. Look for and express regularity in repeated reasoning.</p> <p><i>Fourth graders notice repetitive actions in computation to make generalizations. Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions.</i></p> <p><small>Adapted from the Connecticut Standards for Mathematics</small></p>
<p>FPS Academic Expectation(s):</p>	<p>Exploring and Understanding</p> <p><i>When students engage in problem solving situations, they should be able to understand the problem,</i></p>

	<p><i>determine relevant information, and ask relevant additional questions.</i></p> <p>Synthesizing and Evaluating <i>Engaging in a problem solving situation, students should be able to analyze the most efficient approach, and reflect on the process used to solve the problem.</i></p> <p>Creating and Constructing <i>Engaged in a problem solving situation, students should implement a plan.</i></p> <p>Conveying Ideas <i>Students should be able to use correct mathematical language and logically display their work for the desired problem.</i></p> <p>Collaborating Strategically <i>Students should be able to work collaboratively to solve problems.</i></p> <p>Using Communication (Media) Tools <i>Students should be able to explore and choose the correct tools to illustrate their mathematical work to solve a specific problem.</i></p>
Duration:	1 year
Course Materials/Resources:	Bridges 2nd ed. Fairfield Public Schools Math Units
Additional Resources (Optional)	Illustrative Mathematics About Teaching Mathematics, Marilyn Burns Contexts for Learning Mathematics, Fosnot et al.

Unit 1

Unit 1: Factors and Multiples : Whole Number Concepts, Estimation, and Computation with Multiplication and Division	<p>The purpose of this unit is to establish classroom routines in mathematical context. The first unit is intended to engage students in thinking differently about previously taught material. The focus of the lesson is on learning how to engage one another, as mathematicians, emphasizing the mathematical practices and developing 21st century skills. Class discourse is enhanced by using turn & talk, think-pair-share, justify reasoning, and constructing viable arguments. Students represent their thinking using mathematical models and numbers, questioning peers for deeper understanding and clarification. The correctness of solutions lies within the logic of the mathematics. Efficient and flexible methods for estimation, mental computation, and calculating, including the standard algorithms, deepen understanding of the properties and operations that are used to solve problems.</p>
Learning Goals	
Standard(s):	<p>Operations and Algebraic Thinking Use the four operations with whole numbers to solve problems. 4.0A.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.</p> <p>4.0A.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.</p> <p>Generate and analyze patterns. 4.0A.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.</p>

	<p>Measurement and Data Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</p> <p>4.MD.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. <i>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), ...</i></p> <p>4.MD.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.</p>
<p>Essential Question(s):</p>	<ul style="list-style-type: none"> ● How do benchmark numbers help to solve problems involving measurement? ● How are mathematical problems written as expressions and how do you know if two equivalent expressions are equivalent? ● How do partial products and partial factors make it easier to do mental computations? ● What are prime and composite numbers? ● How can using all the prime number factors and the associative property help you find all the other factors of a whole number?
<p>Enduring Understanding(s):</p>	<ul style="list-style-type: none"> ● Benchmark numbers help to flexibly and efficiently multiply and divide numbers. ● Whole numbers are factors and multiples of other numbers. ● Mathematical problems can be written as mathematical expressions and vs. ● Commutative property for addition and multiplication - The order of addends or factors does not change the result. (i.e. $10 + 3 = 3 + 10$ or $10 \times 3 = 3 \times 10$) ● Associative property for addition and multiplication the order in which addends are added and

	<p>factors are multiplied to not change the result. i.e. $(2 + 3) + 4 = 2 + (3 + 4)$, and $(2 \times 3) \times 4 = 2 \times (3 \times 4)$.</p> <ul style="list-style-type: none"> • The distributive property uses partial products to simplify multiplication problems, e.g., $15 \times 12 = (10 + 5) \times (10 + 2) = 100 + 20 + 50 + 10 = 180$.) • Our number system is structured around multiples of ten. • The expanded form shows the place value structure as multiples of ten. e.g. or $1,472 = 1,000 + 400 + 70 + 2$ or, (1 thousand) + (4 hundreds) + (7 tens) + (2 units) or, $1,472 = (1 \times 1,000) + (4 \times 100) + (7 \times 10) + (2 \times 1)$, or $(1 \times 10 \times 10 \times 10) + (4 \times 10 \times 10) + (7 \times 10) + (2 \times 1)$ • Addition, subtraction, multiplication, and division by multiples of ten make estimation and computation easier.
<p>Learning Goal(s): <i>Students will be able to use their learning to:</i></p>	<p>Look for and generate number patterns that follow a given rule.</p> <p>Use properties of operations to model mathematical thinking when solving multiplication problems.</p> <p>Develop and use models to represent their thinking and use the models as tools for solving problems.</p> <p>Construct viable arguments to explain and defend reasoning to others and respond critically to others' reasoning.</p>

Unit 2

Unit 2: Whole Number Place Value Concepts, Estimation and Computation	<p>This unit extends student understanding of addition and subtraction using benchmark numbers. Students estimate and make mental computation problems simpler by identifying ‘menatly friendlier’ numbers and use the commutative and associative as strategies. This unit focuses on place value to 1,000,000 and multi-digit addition and subtraction strategies. Students apply place value understanding to round multi-digit whole numbers to any place. Students explore benchmarks and relative sizes for length, time, liquid volume, mass, and weight. Students use ratio tables to convert units within the same measuring system, and apply some of the place value and multi-digit computation skills they’ve been practicing to solve story problems related to measurement.</p>
Learning Goals	
Standard(s):	<p>Number and Operations in Base Ten Generalize place value understanding for multi-digit whole numbers. 4.NBT.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 $700 \div 70 = 10$ by applying concepts of place value and division.</p> <p>4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.</p> <p>Use place value understanding and properties of operations to perform multi-digit arithmetic. 4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.</p> <p>Measurement and Data 4.MD.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</p>

	<p>larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. <i>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), ...</i></p>
<p>Essential Question(s):</p>	<ul style="list-style-type: none"> ● What pattern do you notice in our number system when you multiply and divide by multiples of ten, 10, 100, 1,000, 10,000...? ● How do benchmark numbers help you solve problems? ● How does computation with double digit numbers apply to multi-digit numbers? ● How do you know if equivalent expressions are equivalent?
<p>Enduring Understanding(s):</p>	<ul style="list-style-type: none"> ● Benchmark numbers help to flexibly and efficiently add & subtract numbers. ● Commutative property for addition. ● Associative property for addition. ● Our number system is structured around multiples and factors of ten. ● The expanded form shows the place value structure as multiples of ten. e.g. $4,236 = (4 \text{ thousands}) + (2 \text{ hundreds}) + (3 \text{ tens}) + (6 \text{ units})$ or $1,472 = 1,000 + 400 + 70 + 2$ ● Equivalent quantities can be represented differently. e.g. $1,472 =$ <ul style="list-style-type: none"> ○ $(1 \times 1,000) = (4 \times 100) + (7 \times 10) + (2 \times 1)$, or ○ $(1 \times 10 \times 10 \times 10) + (4 \times 10 \times 10) + (7 \times 10) + (2 \times 1)$ ● Addition, subtraction, multiplication, and division by multiples of ten make estimation and mental computation easier.
<p>Learning Goal(s): <i>Students will be able to use their learning to:</i></p>	<p>Look for and make use of structure to understand that our number system is structured around multiples of ten.</p> <p>Make sense of problems involving place value and magnitude and reason abstractly when comparing, ordering, and finding equivalence of larger numbers</p> <p>Construct viable arguments and critique the reasoning of others when composing and decomposing</p>

	<p>numbers to estimate and make mental computations within 1000000.</p> <p>Use tools and clear and precise language to solve problems in a variety of ways and defend thinking and respond to the thinking of others.</p>
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Unit 3

Unit 3: Whole Number Concepts, Estimation, and Multi-digit Computation	<p>The purpose of this unit is to deepen understanding of the basic operations with multiplication and division by applying algebraic properties. The goal by the end of grade 4 is for students to have flexible and fluent use of a repertoire of strategies to estimate and compute with multi-digit whole numbers, including, the standard algorithms, and other efficient procedures. Students use mathematical models, construct viable arguments and justify reasoning as to why a strategy yields the solution to a problem or why an algorithm will work. Understanding of the inverse relationship of multiplication and division are developed through problem solving as students analyze different problem structures. Number sense is deepened while students focus on the numbers rather than the manipulation of digits.</p>
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Learning Goals

Standard(s):	<p>Operations and Algebraic Thinking Use the four operations with whole numbers to solve problems.</p> <p>4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ 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.</p> <p>4.OA.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.</p> <p>Gain familiarity with factors and multiples.</p> <p>4.OA.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a</p>
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	<p>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.</p> <p>Number and Operations in Base Ten Generalize place value understanding for multi-digit whole numbers. 4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p>Measurement and Data Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. 4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. <i>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.</i></p>
Essential Question(s):	<ul style="list-style-type: none"> ● How can you decompose a number into parts to make it a “mentally friendlier” number to calculate? ● How can a mathematical problem be interpreted as expressions? ● How do partial products and partial factors make it easier to do mental computations? ● What are the different ways symbols are used to show division? ● How do factors and products show the relationship between multiplication and division? ● How do partial products and partial factors make it easier to estimate and do mental computations with multiplication and division?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Factors and products show the relationship between multiplication and division. ● Commutative property applies to addition and multiplication. ● Associative property applies to addition and multiplication. ● The distributive property uses partial products and can simplify multiplication problems.

	<ul style="list-style-type: none"> • Addition, subtraction, multiplication, and division using benchmark numbers make estimation and computation more efficient.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	<p>Use models to help reason quantitatively and abstractly about numbers which develops deeper understandings of place value and the ability to calculate fluently with large numbers.</p> <p>Use appropriate tools such as base ten area pieces to solve multi-digit multiplication problems.</p> <p>Examine patterns to develop a stronger sense of place value and an ability to multiply by powers of ten with fluency and understanding.</p> <p>Create and use array models to help look for and make use of structure. The structures evident in an array provide a visual justification for application of the properties of multiplication.</p>

Unit 4

Unit 4: Fractions	The purpose of this unit is to develop an understanding of fraction equivalence and operations with fractions. Students develop the understanding that properties of operations with whole numbers also apply to operations with fractions. They build a foundational understanding of fractions and how they relate to decimals. Students make the connection between fractions and division. When making comparisons, the size of the whole matters. Estimation strategies using benchmark numbers deepens the understanding of fractions and decimals.
Learning Goals	
Standard(s):	<p>Operations and Algebraic Thinking Generate and analyze patterns. 4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. <i>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.</i></p> <p>Number and Operations—Fractions Extend understanding of fraction equivalence and ordering. 4.NF.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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.</p> <p>4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as $1/2$. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.</p> <p>Build fractions from unit fractions by applying and extending previous understandings of</p>

operations on whole numbers.

4.NF.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: $3/8 = 1/8 + 1/8 + 1/8$; $3/8 = 1/8 + 2/8$; $2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$.

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.

4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

a. Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.*

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 $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)

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?*

Understand decimal notation for fractions, and compare decimal fractions.

4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express $3/10$ as $30/100$, and add $3/10 + 4/100 = 34/100$.*

4.NF.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as

	<p>62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.</p> <p>4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model.</p> <p>Measurement and Data Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</p> <p>4.MD.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.</p> <p>Represent and interpret data.</p> <p>4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. <i>For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</i> Generalize place value understanding for multi-digit whole numbers.</p> <p>4.NBT.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. <i>For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.</i></p>
<p>Essential Question(s):</p>	<ul style="list-style-type: none"> ● How is a fraction like division? ● How do benchmark fractions help you to estimate and solve problems? ● What strategies could we use to add and subtract fractions? ● In what ways can two fractions be equivalent?

	<ul style="list-style-type: none"> ● What does “remainder” mean in the context of the division problem?, e.g., an integer, a left over, or a fractional part, or do you need to adjust your answer? Example: There are 36 people for 10 person vans, how many vans do you need? ● How do you know when a fraction is larger or smaller than another? ● When can $\frac{1}{2}$ be a smaller quantity than $\frac{1}{4}$? ● What is a mixed number? ● What are fractions on a number line or ruler? ● How are fractions and decimals similar? ● What are benchmark decimals and how do they relate to benchmark fractions? ● How do you know which fraction or decimal is larger or smaller?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Benchmark fractions are helpful for estimating and computing. ● The more the whole is divided into equal parts, the smaller the parts, e.g. 8ths are smaller than 4ths ● The denominator is the number of equal parts and the numerator is the number of equal parts being considered. ● Equivalent fractions are different representations of the same quantity. ● A fraction with the same numerator and denominator is equal to one whole. ● Fractions are relations - the size of the whole (unit) is important, and when comparing fractions the size of the whole matters. ● Fractional parts can be represented using different models, e.g., as set model (or groups), area model, or linear model ● Benchmark numbers like $\frac{1}{2}$ or $\frac{1}{4}$ help to flexibly and efficiently estimate sums and differences with fractions. ● Algebraic properties that apply to whole numbers also apply to fractional numbers. ● A fraction is a division problem and the denominator is the divisor. ● Benchmark decimals like 0.25, or 0.5 are helpful for estimating and computing. ● Decimals are base-ten fractions, and there are many ways to represent an equivalent quantity, e.g., $\frac{1}{2}$, $\frac{5}{10}$, 0.5, 0.50. ● Fractions can be applied to a multiplicative context.

Learning Goal(s):

Students will be able to use their learning to:

Develop and use a variety of models to represent fractional parts and use them as tools for solving problems.

Reason quantitatively and abstractly to recognize that fractions and decimals can represent a equivalent quantities differently.

Use base ten pieces as a model for decimal numbers and justify comparisons of those numbers.

Attend to precision while using models to consider the relationships among fractions and decimals.

Build foundational understanding of fractions as operators.

Unit 5

Unit 5: Geometry and Measurement	The purpose of this unit is to develop the understanding that an angle measure is a measure of rotation and that angle measure is additive. Spatial reasoning using geometrical models to identify polygons and visualize spatial relationships is developed. Students describe, analyze, compare, and classify two-dimensional shapes. Students classify shapes by properties of their lines and angles.
Learning Goals	
Standard(s):	<p>Geometric measurement: understand concepts of angle and measure angles.</p> <p>4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:</p> <p>a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a “one-degree angle,” and can be used to measure angles.</p> <p>b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.</p> <p>4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.</p> <p>4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.</p> <p>Geometry</p> <p>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</p> <p>4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.</p>

	<p>4.G.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.</p> <p>4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</p>
Essential Question(s):	<ul style="list-style-type: none"> ● What are angles and how are they measured? ● How are polygons similar and different? ● How does knowing attributes of different polygons help to understand relationships among them? ● What attributes can you use to sort and classify the polygons? ● How do you know if two polygons are congruent or similar? ● How do you know if a polygon is symmetrical? ● What are lines, rays, and how do they relate to angles?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Polygons can be composed and decomposed into other shapes. ● Attributes of polygons enable us to categorize and classify them. ● Polygons are two-dimensional figures. ● Some polygons have more than one line of symmetry. ● Two-dimensional figures can be classified by the presence/absence of parallel or perpendicular line or angles. ● Right angles can be classified in their own category. ● Angle measures are a measure of rotation? ● Angle measures are additive.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	<p>Develop and use models to understand and represent the concepts of angle measurements.</p> <p>Use appropriate tools strategically to measure and name angles and to recognize angle measure as</p>

additive.

Reason abstractly and quantitatively to classify polygons by angles and sides.

Use models and clear and precise language to classify polygons by their specific attributes.

Unit 6

Unit 6: Division and Multiplication	<p>The purpose of this unit is to build on the understanding of basic operations with whole numbers and to develop fluency with efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Students flexibly select and use efficient procedures from a repertoire of strategies, including the standard algorithms to solve problems. This includes decomposing numbers and using the commutative, associative and distributive property to efficiently compute solutions to problems involving whole numbers. Understandings of place value, properties of operation, and the relationship of multiplication and division using generalizable procedures are used to compute to find factors, products and multi-digit dividends. Estimation is an integral and integrated part of the problem solving process. Connections to fractional parts of a whole are reinforced involving division problems with remainders. Students extend their understanding of the area and perimeter of rectangles, focusing on the role division plays in area and perimeter problems. Students find unknown dimensions for area and perimeter problems.</p>
Learning Goals	
Standard(s):	<p>Operations and Algebraic Thinking Use the four operations with whole numbers to solve problems.</p> <p>4.OA.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.</p> <p>Generalize place value understanding for multi-digit whole numbers. 4.NBT.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 $700 \div 70 = 10$ by applying concepts of place value and division.</p>

	<p>4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place. Use place value understanding and properties of operations to perform multi-digit arithmetic.</p> <p>4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p>4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p>Measurement and Data Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</p> <p>4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. <i>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.</i></p>
<p>Essential Question(s):</p>	<ul style="list-style-type: none"> ● How does decomposing numbers make mental computation more efficient? ● How do benchmark numbers help to estimate and solve problems? ● How do partial products and partial factors make it easier to do mental computations? ● How do partial products and partial factors make it easier to estimate? ● How can “remainders” be interpreted in the context of a division problem? (i.e. is it a whole number like ‘6 left over’, a fractional part $3\frac{3}{5}$, or do you need to adjust your answer? (There are 54 people and vans each hold 10 people. How many vans do you need?))
<p>Enduring Understanding(s):</p>	<ul style="list-style-type: none"> ● The distributive property using 2- and 3-digit numbers may be represented using the array model. ● Factors and products show the relationship between multiplication and division. ● Commutative property for addition and multiplication

	<ul style="list-style-type: none"> ● Associative property for addition and multiplication ● Distributive property of multiplication over addition and over subtraction. ● Partial sums, partial products and partial factors help to simplify problems when estimating and mentally computing. ● Addition, subtraction, multiplication, and division by multiples of ten make estimation and computation easier. ● Division is sharing (partitive) or grouping (quotative), e.g., 12 cookies shared by 3 people, or 12 cookies in bags of 3. ● Multiplication and division are inverse relations. ● The use of equivalent expressions and substitutions develop flexibility in approaching and solving problems.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	<p>Develop and use models to represent problem situations in a variety of ways.</p> <p>Investigate problems and use properties of operations and models to efficiently solve multiplication and division problems including partial products and partial quotients.</p> <p>Interpret remainders of division problems and construct viable arguments to explain thinking and respond to others.</p> <p>Distinguish between partitive and quotative division problems.</p> <p>Make sense of and solve problems that involve repeated reasoning to develop generalized methods for division.</p>