Course Information

Grade(s):	Grade 5
Discipline/Course:	Mathematics
Course Title:	Grade 5 Mathematics
Prerequisite(s):	Grade 4 Mathematics
Course Description: *Program of Studies*	Students in grade 5 flexibly use computation skills to reason when solving real world problems with whole numbers and compute fluently with basic operations. The algebraic properties used with whole numbers (associative, commutative, and distributive) continue to be applied to fractions and decimals. Equivalence is maintained when fractional numbers are represented in different ways. Substitutions are used to deepen the understanding of equivalence and generalizations enable students to write expressions and formulas. Volume is recognized as an attribute of three-dimensional space. Students understand how the concepts of volume relate to multiplication and addition.
Course Essential Questions:	● How do patterns and functions help us describe data and physical phenomena and solve a variety of problems? ● How are quantitative relationships represented by numbers? ● How do geometric relationships and measurements help us to solve problems and make sense of our world? ● How can collecting, organizing and displaying data help us analyze information and make reasonable and informed decisions?
Course Enduring Understandings:	Insights learned from exploring generalizations through the essential questions. Students will understand that: ● Patterns and functional relationships can be represented and analyzed using a variety of strategies, tools, and technologies. ● Quantitative relationships can be expressed numerically in multiple ways in order to make connections and simplify calculations using a variety of strategies, tools and technologies.

	● Shapes and structures can be analyzed, visualized, measured and transformed using a variety of strategies, tools, and technologies. ● Data can be analyzed to make informed decisions using a variety of strategies, tools, and technologies.
Course Standards *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 over time in response to student performance needs.*	**Students are expected to:** MP.1. Make sense of problems and persevere in solving them. *Students in fifth grade solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. They solve problems related to volume and measurement conversions. Students 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?".* MP.2. Reason abstractly and quantitatively. *Fifth graders recognize that a number represents a specific quantity. They 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. 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.* MP.3. Construct viable arguments and critique the reasoning of others. *Fifth grade students construct arguments using concrete referents, such as objects, pictures, and drawings. They explain calculations based upon models and properties of operations and rules that generate patterns. They demonstrate and explain the relationship between volume and multiplication. They refine their mathematical communication skills as they participate in mathematical 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.* MP.4. Model with mathematics. *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. Fifth graders evaluate their results in the context of the situation and determine whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.* MP.5. Use appropriate tools strategically. *Fifth 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 unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions. They use graph paper to accurately create graphs and solve problems or make predictions from real world data. MP.6. Attend to precision. *Grade 5 students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. They are careful about specifying 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.* MP.7. Look for and make use of structure. *In fifth grade, students 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. They examine numerical patterns and relate them to a rule or a graphical representation.* MP.8. Look for and express regularity in repeated reasoning. *Fifth graders use repeated reasoning to understand algorithms and make generalizations about patterns. Students 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. Students explore operations with fractions with visual models and begin to formulate generalizations.* Adapted from Connecticut Standards for Mathematics
FPS Academic Expectation(s):	**Exploring and Understanding** *When students engage in problem solving situations, they should be able to understand the problem, determine relevant information, and ask relevant additional questions.* **Synthesizing and Evaluating** *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.* **Creating and Constructing** *Engaged in a problem solving situation, students should implement a plan.* **Conveying Ideas** *Students should be able to use correct mathematical language and logically display their work for the desired problem.* **Collaborating Strategically** *Students should be able to work collaboratively to solve problems.*

	Using Communication (Media) Tools *Students should be able to explore and choose the correct tools to illustrate their mathematical work to solve a specific problem.*
Duration:	1 year
Course Materials/Resources:	Bridges 2nd ed. Fairfield Public Schools Units
Additional Resources (Optional)	Illustrative Mathematics About Teaching Mathematics, Marilyn Burns Contexts for Learning Mathematics, Fosnot et al.

Unit 1

Unit 1: **Factors and Volume**	The purpose of this unit is to establish classroom routines through the context of mathematics. The first unit is intended to engage students in thinking differently about previously taught material. The lessons focus on learning how to engage one another as mathematicians using 21st century skills. Class discourse is enhanced by using turn & talk, think-pair-share, justify reasoning, and constructing viable arguments for mathematical thinking. 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 of estimation and computation, including mental math and the standard algorithms, deepen understanding of the properties and operations that are used to solve problems.
Learning Goals	
Standard(s):	**Measurement and Data** **Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.** 5.MD.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. 5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft., and improvised units. 5.MD.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. **Operations and Algebraic Thinking** **Write and interpret numerical expressions.** 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.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 $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$,without having to calculate the indicated sum or product. **Number and Operations in Base Ten** **Perform operations with multi-digit whole numbers and with decimals to hundredths.** 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. 5.NBT.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.
Essential Question(s):	● How do benchmark numbers help to estimate and justify reasonableness of answers to computation problems?

	• How do understanding factors and factor relationships help with understanding fractional relations? • Which strategy is the most efficient in a specific situation for computing and why? • How do written expressions represent mathematical problems? • How can using all the prime number factors and the associative property help you find all the other factors of a number? • Why is it important to consider the numbers before selecting a strategy to solve a problem? • What is volume and how can volume be measured and compared?
Enduring Understanding(s):	• Benchmark numbers help to flexibly and efficiently add and subtract and multiply and divide numbers to mentally compute and estimate reasonableness of answers. • Commutative property for addition and for multiplication. • Associative property for addition and for multiplication. • Distributive property to simplify multiplication and partial factors to simplify division problems. • Division is partitive and quotative (sharing or grouping: 12 cookies shared by 3 people, or 12 cookies in bags of 3). • Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
Learning Goal(s): *Students will be able to use their learning to:*	Make sense of problems to use order of operations to evaluate equations. Reason abstractly and quantitatively by building models to represent and solve for volume of an object. Ask questions and investigate prime and composite numbers to deepen an understanding of number relationships.. Use tools and clear and precise language to defend or counter one's reasoning or the reasoning of others.

Unit 2

Unit 2: Fractions	The purpose of this unit is to deepen the understanding of fractions. Students understand the larger the denominator, the smaller the equal unit parts and the numerator is the count of these unit parts. Students understand the connection between fractions and division and can explain why the fraction symbol indicates division. Benchmark fractions are used to help estimate solutions to problems. Equivalence is different representations of the same quantity, and equivalent forms can be substituted for each other. The commutative, associative, and distributive properties used with whole numbers also apply to fractions.
Learning Goals	
Standard(s):	**Number and Operations—Fractions** **Use equivalent fractions as a strategy to add and subtract fractions.** 5.NF.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.) 5.NF.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.** 5.NF.3 Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example,

	interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 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? 5.NF.5 Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b =(n×a)/(n×b) to the effect of multiplying a/b by 1. 5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3. b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4. c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins? **Operations and Algebraic Thinking** **Write and interpret numerical expressions.** 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with

	these symbols. 5.OA.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.
Essential Question(s):	● What are different ways fractions can be represented and how do they relate to each other? ● How can fractions (mixed numbers, improper fractions) be represented visually, e.g. on the number line or ruler? ● Why can equivalent fractional forms be substituted for each other? ● How do benchmark fractions help you to estimate, compare, compute, and judge reasonableness of answers? ● How can mathematical problems involving fractions be represented using basic operations? ● How do you interpret division of a unit fraction by a non-zero whole number or a whole number by a unit fraction and compute?
Enduring Understanding(s):	● Benchmark fractions are helpful for estimating, comparing and computing. ● When comparing fractions, the size of the whole matters. ● The algebraic properties with whole numbers continue to be applied to fractions. ● Fractions indicate division and the denominator is the divisor. ● The more the whole is divided into equal parts, the smaller the parts (12ths are smaller than 4ths). ● Equivalent fractions are different representations of the same quantity. ● Equivalent fractions can be thought of as a ratio relationship (1 out of 2, 2 out of 4). ● Knowing the factors of composite numbers helps us to identify common factors. This allows us to compare and find equivalent fractions. ● Equivalent fractions can be substituted for each other. ● Addition and subtraction of fractions must have like denominators.

	• Strategies are developed to divide fractions in general, by reasoning about the relationship between multiplication and division. • Interpret division of a whole number by a unit fraction or a unit fraction by a non-zero whole number and compute, e.g., ÷ 4 (Four students were sharing of a pan of brownies. How much of the pan will each student get if they share the brownies equally?)
Learning Goal(s): *Students will be able to use their learning to:*	Model with mathematics to investigate equivalent fractions and fractions as division. Reason abstractly and quantitatively to add and subtract fractions with like and unlike denominators. Construct viable arguments to compare fractions and mixed numbers to conceptualize fractions, estimate fractions, and use benchmark fractions. Attend to precision of language, refine reasoning, explain thinking to others, and respond to others' thinking related to understanding fractions.

Unit 3

Unit 3: Place Value Concepts, Estimation and Computation	The purpose of this unit is to deepen the understanding of place value by recognizing that the base-ten system extends infinitely in two directions. The understanding of multiples of 10 with whole numbers is extended to numbers less than one. Students use patterns in our number system for numbers between 1,000,000 and 0.001. Students use algebraic properties and their knowledge of the structure of our place value system to flexibly estimate and compute with large and small numbers. Open number lines, area models, time measurement, and the use of benchmark numbers as referent are helpful to visualize fractions and operations with fractions.
Learning Goals	
Standard(s):	**Number and Operations in Base Ten** **Understand the place value system** 5.NBT.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. 5.NBT.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. 5.NBT.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., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$. b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. 5.NBT.4 Use place value understanding to round decimals to any place. **Perform operations with multi-digit whole numbers and with decimals to hundredths.** 5NBT.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. **Measurement and Data** **Convert like measurement units within a given measurement system.** 5.MD.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.
Essential Question(s):	● What patterns emerge in the base-ten system when using powers of 10, and on the right side of the decimal? ● How are these patterns helpful when composing and decomposing numbers? ● How do benchmark numbers help to estimate, mentally compute, and solve problems involding decimal numbers? ● How are two expressions equivalent or not equivalent? ● How do partial products and partial quotients (factors) make it easier to estimate and perform mental computations? ● How does using the expanded form make it easier to estimate, compute and judge the reasonableness of answers? ● How can visual models be helpful in understanding the concepts and processes when adding, subtracting, multiplying and dividing decimals?
Enduring Understanding(s):	● Place value patterns extend infinitely in both directions. ● Equivalent quantities can be represented differently (expanded form), e.g., 1,472= o 1,000 + 400 + 70 + 2 = (1 thousand)+(4 hundreds)+(7 tens)+(2 units) o (1 x 1,000) + (4 x 100) + (7 x 10) + (2 x 1), or o (1 x 10 x 10 x 10) + (4 x 10 x 10) + (7 x 10) + (2 x 1), or o (1 x 10^3) + (4 x 10^2) + (7 x 10) + (2 x 1) ● These equivalent forms may be used to generalize rules for efficient computing. ● Expanded form allows us to represent and substitute numbers, e.g., 4232 = (4 x 1,000) + (2 x 100) + (3 x 10) + 2, or 42.32 = (4 x 10) + (2 x 1) + (3 x 0.1) + (2 x 0.01)

	• The algebraic properties (associative, commutative, and distributive) with whole numbers applies to decimal fractions as it does with whole numbers. • Concrete and pictorial models can help make visible the processes of adding, subtracting, multiplying and dividing decimals to hundredths.
Learning Goal(s): *Students will be able to use their learning to:*	Model with mathematics to read, write, order, and compare decimals. Reason abstractly and quantitatively with place value patterns when multiplying and dividing by powers of ten. Look for and make use of structure to understand fraction/decimal equivalence. Compare and describe relative magnitude of fractions, decimals, and mixed numbers using visual models.

Unit 4

Unit 4: Multiplication and Division of Whole Numbers and Decimals	The purpose of this unit is to develop proficiency with the properties of operations (commutative, Associative and distributive properties) with whole numbers and decimals. Students develop the understanding that algebraic properties apply to decimal numbers in the same way they apply to whole numbers.Students use partial quotients and the inverse relationship with multiplication to solve problems. Students understand that there are division patterns when dividing with remainders.
Learning Goals	
Standard(s):	**Operations and Algebraic Thinking** **Write and interpret numerical expressions.** 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.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.* **Perform operations with multi-digit whole numbers and with decimals to hundreths.** 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. 5.NBT.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. 5.NBT.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.
Essential Question(s):	• What pattern do you notice in our base-ten system when using powers of 10? • How are these patterns helpful when composing and decomposing numbers? • How do benchmark numbers help to estimate, mentally compute, and solve problems? • How do you know if two expressions are equivalent? • How do partial products and partial quotients (factors) make it easier to estimate and perform mental computations? • How does using the expanded form make it easier to estimate, compute and judge the reasonableness of answers? • How can visual models be helpful in understanding the concepts and processes when adding, subtracting, multiplying and dividing decimals?
Enduring Understanding(s):	• Place value patterns extend infinitely in both directions. • Equivalent quantities can be represented differently (expanded form), e.g., 1,472= o 1,000 + 400 + 70 + 2 = (1 thousand)+(4 hundreds)+(7 tens)+(2 units) o (1 x 1,000) + (4 x 100) + (7 x 10) + (2 x 1), or o (1 x 10 x 10 x 10) + (4 x 10 x 10) + (7 x 10) + (2 x 1), or o (1 x 10^3) + (4 x 10^2) + (7 x 10) + (2 x 1) • These equivalent forms may be used to generalize rules for efficient computing. • Expanded form allows us to represent and substitute numbers, e.g., 4232 = (4 x 1,000) + (2 x 100) + (3 x 10) + 2, or 42.32 = (4 x 10) + (2 x 1) + (3 x 0.1) + (2 x 0.01) • The algebraic properties (associative, commutative, and distributive) with whole numbers applies to decimal fractions as it does with whole numbers. • Concrete and pictorial models can help make visible the processes of adding, subtracting, multiplying and dividing decimals to hundredths, e.g., 3 tenths subtracted from 4 wholes. The whole number must be divided into tenths.

Learning Goal(s): *Students will be able to use their learning to:*	Reason abstractly and quantitatively to explore properties of operations (Commutative, Associative and Distributive properties) to make computation easier. Use appropriate tools strategically (including estimation) to add, subtract, multiply and divide whole numbers and decimals to hundredths. Look for and make use of structure to find whole number quotients based on place value, the properties of operations, and/or the relationship between multiplication and division.

Unit 5

Unit 5: **Fraction Operations**	The purpose of this unit is to connect the understanding that algebraic properties (associative, commutative, and distributive) used with whole numbers continue to be applied to fractional numbers. Estimation is important for judging the reasonableness of comparisons and computation with fractions and decimals. Students extend the use of addition and subtraction with fractions and use the distributive property to multiply fractions and mixed numbers. They use equivalence to work with mixed numbers and improper fractions. Students write expressions, equations, and use formulas with fractions and mixed numbers to estimate and solve problems. Students are provided opportunities to use proportional reasoning to justify solutions to problems.
Learning Goals	
Standard(s):	**Use equivalent fractions as a strategy to add and subtract fractions.** 5.NF.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.) 5.NF.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.** 5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4

	= 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.) 5.NF.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. **Operations and Algebraic Thinking** **Write and interpret numerical expressions.** 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.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. **Measurement and Data** **Represent and interpret data.** 5.MD.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.
Essential Question(s):	• What different strategies can be used to compute fractions? • Which strategy is the most efficient for estimating and computing fractions for a given situation and why? • What needs to be considered to estimate with fractions? • How do benchmark fractions help you to mentally compute? • How does the distributive property help to estimate and multiply fractions and mixed numbers? • How can equivalence be maintained if the form of the fraction or decimal is changed?

Enduring Understanding(s):	- Equivalent fractions and/or decimals can be substituted when operating on them. - Benchmark fractions help to estimate, compare, compute numbers mentally, and judge the reasonableness of answers. - The distributive property and arrays provide visual models for multiplying fractions and mixed numbers. - When multiplying two rational numbers the product may be equal to, greater than, or less than the factors, e.g., 4/5 x 2/2 =8/10, 1 ½ x 3 = 4 ½ , ¼ x ½ = 1/8 - The algebraic properties with whole numbers apply to fractions. - Equivalent fractions are different representations of the same quantity. - Equivalent fractions can be thought of as a ratio relationship (1 out of 2, 2 out of 4) - Knowing the factors of composite numbers helps us to identify common factors in the denominator. This allows us to compare and find equivalent fractions. - Equivalent fractions can be substituted for each other.
Learning Goal(s): *Students will be able to use their learning to:*	**Use equivalent fractions as a strategy to add and subtract fractions.** Develop and use models to represent proportional reasoning and equivalence (arrays, clock model, money model). Plan and conduct investigations to multiply fractions by fractions using models. Use the distributive property to multiply fractions and mixed numbers. Use tools and clear and precise language to explain that equivalent fractions, including decimal fractions, are a representation of the same quantity.

Unit 6

Unit 6: **Geometry**	The purpose of this unit is to use points on a coordinate plane to represent and then interpret real world and mathematical problems. Two dimensional figures can be categorized in a hierarchy based on their properties. Students use attributes to compare polygons and solids and identify commonalities and subsets. Students understand that the relationship among attributes helps to define polygons and solids.
Learning Goals	
Standard(s):	**Graph points on the coordinate plane to solve real-world and mathematical problems.** 5.G.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 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.** 5.G.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. 5.G.4 Classify two-dimensional figures in a hierarchy based on properties **Operations and Algebraic Thinking** **Analyze patterns and relationships.** 5.OA.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.
Essential Question(s):	• How can estimations and actual measurement of parts help to classify polygons and solids? • What attribute can you use to classify polygons and solids? • What structures, patterns, and/or relationships emerge when graphing data? • What does a graph represent information and how can data inform decisions?
Enduring Understanding(s):	• The first number indicates how far to travel from the origin in the direction of one axis. • The second number indicates how far to travel from the origin in the direction of the second axis. • The names of the two axes and the coordinates correspond. • Data can represent and illuminate information in problems. • Attributes of polygons and solids enable us to categorize and classify them. • Polygons and solids can be described through measures of their parts. • Polygons can be moved in a plane or space. • Polygons and solids may be viewed from different perspectives.
Learning Goal(s): *Students will be able to use their learning to:*	Analyze and interpret the structures, patterns, and/or relationships that emerge when graphing data. Ask questions and investigate to represent real world mathematical problems by graphing points in the first quadrant of the coordinate plane. Use clear and precise language to defend or counter one's reasoning or the reasoning of others to describe that attributes belonging to a category of two-dimensional figures also belong to all

	subcategories.

Unit 7

Unit 7: Measurement and Data	The purpose of this unit is to collect data involving measurement in order to convert and compare quantities within a given measurement system. Students recognize customary and metric units of measure and benchmarks for measurement. Students will understand that different unit measures and ratios are involved in converting units of measure (hours and minutes, feet and inches, centimeters and meters). This continues to build on the concept that substitutions may be made with equivalent values.
Learning Goals	
Standard(s):	**Measurement and Data** **Convert like measurement units within a given measurement system.** 5.MD.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.** 5.MD.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. **Number and Operations in Base Ten** **Perform operations with multi-digit whole numbers and with decimals to hundredths.** 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. 5.NBT.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. 5NBT.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.
Essential Question(s):	● What is the best way to organize a particular set of data and why? ● How does organizing data help us understand information? ● What conjectures can be made based on the data? If data collection continued what would happen based on current evidence? ● How does the analysis of data influence a decision or choice? ● How does the size of a sampling affect the reasonableness of a prediction? ● What trends can be identified from a set of data? ● Why does the size of the unit matter? ● What benchmarks are helpful when estimating a measure and why? ● How do you convert between measures? ● How can one unit of measure be converted into another within the same form of measurement?
Enduring Understanding(s):	● Data can be organized and presented in different ways to provide different information. ● The reasonableness of an answer may be affected by the size of the sampling of data. ● Predictions can be made by analyzing information gathered from organized data. ● Interpreting data can influence a decision or choice. ● A unit measure represents the distance between marks on a scale. ● Measurement involves a ratio of the unit size to the size of the whole. ● The same unit must be used to measure and compare two objects. ● The smaller the unit of measure the more units are needed to measure the same object. ● There are specific ratios used to convert measures. ● Different tools and units are appropriate for measuring specific objects in different contexts.

Learning Goal(s): *Students will be able to use their learning to:*	Reason abstractly and quantitatively to explore properties of operations (Commutative, Associative and Distributive properties) to make computation more efficient. Use different measurement tools in different contextual situations. Develop and use models as a tool for thinking and to represent thinking. Ask questions and investigate sets of data for the information it suggests. Construct explanations and develop formulas to describe relationships between different unit measures within a single measurement system. Use tools and clear and precise language to define the relationship and ratios when converting units.