

Mathematics

Grade 3

Grade(s):	Grade 3
Discipline/Course:	Mathematics
Course Title:	Grade 3 Mathematics
Prerequisite(s):	Grade 2 Mathematics
Course Description: <i>Program of Studies</i>	Grade 3 students move from additive thinking to multiplicative thinking, deepening their understanding of addition and subtraction as they make connections to multiplication and division within 100. They develop an understanding of multiplication and the inverse relationship with division with whole numbers through the use of multiple representations e.g. equal-sized groups, arrays, area models, and equal jumps on a number line for multiplication and successive subtraction, partitioning, and sharing for division. Relationships can be generalized and represented through rules. Fractions are understood in terms of unit fractions and parts of a whole. Objects and geometric shapes and figures can be described and categorized based on measurement and classification of special attributes. Multiplication concepts are developed through the use of a variety of models, including the area model.
Course Essential Questions:	• How are multiplication and division related to addition and subtraction? • How does equal-sized grouping of quantities help make computation more efficient? • How is a fraction the same and different from a whole number?
Course Enduring Understandings:	• Multiplication and division are related to addition and subtraction. • Multiplication and division are inversely related. • There are place value patterns that result from adding and subtracting ten and multiplying and dividing by ten. • Unit fractions can be counted and added or subtracted. • Tools like number lines help to visualize numbers, number relationships and fractions. • The size of the whole matters when considering and comparing fractions.

Duration:	1 year
Course Materials/Resources:	Bridges 2nd ed.
FPS Course Academic Expectation(s):	☒ Exploring and Understanding (EU) ☐ Synthesizing and Evaluating (SE) ☐ Creating and Constructing (CC) ☒ Conveying Ideas (CI) ☐ Collaborating Strategically (CS) ☐ Using Communication Tools (UCT)
At a Glance	Unit 1: Addition and Subtraction Patterns (Bridges Unit 1 and August/September Number Corner) Unit 2: Introduction to Multiplication (Bridges Unit 2 and October Number Corner) Unit 3: Multiplication, Division, and Area (Bridges Unit 5 and February Number Corner) Unit 4: Multi-digit Addition and Subtraction (Bridges Unit 3 and November/December Number Corner) Unit 5: Measurement and Fraction (Bridges Unit 4 and January Number Corner) Unit 6: Geometry (Bridges Unit 6 and March Number Corner) Unit 7: Extending Multiplication and Fractions (Bridges Unit 7 and April, May/June Number Corner)

Unit 1: Addition and Subtraction Patterns	The mathematical focus of Unit 1 is a review and extension of skills and concepts introduced in second grade: number relationships, operations, facts to 20, adding 10 to any 2- or 3-digit number, and adding 2-digit numbers. In third grade, the goal is to help students use these relationships and their understanding of the operations to further develop their multi-digit addition and subtraction strategies. While Unit 1 revolves largely around facts to 20, and the pattern of adding 10s and getting to 10s, students will work on multi-digit addition and subtraction in future units.
Standard(s):	Operations and Algebraic Thinking Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.OA.9 - Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. Number and Operations in Base Ten Use place value understanding and properties of operations to perform multi-digit arithmetic 3.NBT.2 - Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
Essential Question(s):	• How do patterns with addition of equal groups help us to make generalizations or rules? • How could we compose or decompose numbers to make them easier to add and subtract? • Which strategy is the most efficient for adding or subtracting given a set of numbers and why? • How do you know if expressions are equivalent? • How do partial sums and differences make it easier to do mental computations? • How can mathematics problems be written as mathematical expressions?
Enduring Understanding(s):	• Identifying patterns in mathematics helps us to make generalizations. • Equivalence may be shown as models and equations. (i.e. $4+8 = 7+5$)

	• Compose and decompose whole numbers using partial sums and differences, both standard and non-standard groupings, to help flexibly and efficiently compute with numbers. • Flexible use of strategies to find sums and differences depend on understanding and number sense. • Equivalent expressions can be represented differently. • A variety of representations for creating and solving word problems can be used for addition and subtraction, and numeric expressions match the problem.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...) • patterns among basic addition facts • effective strategies for subtraction facts to twenty • patterns and relationships in related facts • efficient double-digit addition strategies • place value patterns • addition to a friendly number • addition and subtraction of 2-digit numbers within story problems. • multi-step addition and subtraction problems, and with story problems • equations represent story problems • models: ○ number rack • addition strategies: ○ add zero (+0) ○ count on (+1, +2, +3) ○ doubles ○ double plus or minus one ○ make ten (=10) ○ add ten (+10) ○ add nine (+9) ○ leftover facts • subtraction strategies:

- zero (-0)
- count backwards (-1, -2, -3)
- take all
- neighbors (1 or 2 away)
- take half
- take away ten (-10)
- back to ten
- up to ten
- leftover facts

Skills: (Students will be able to...)

- solve one-step addition story problems with sums to 100 involving situations of putting together, with unknowns in all positions.
- solve one-step subtraction story problems with minuends to 100 involving situations of taking from and comparing, with unknowns in all positions.
- fluently add with sums to 20 using mental strategies.
- fluently subtract with minuends to 20 using mental strategies.
- recall from memory all sums of two 1-digit numbers.
- round whole numbers to the nearest ten.
- round whole numbers to the nearest hundred.
- solve addition story problems with sums to 100 involving lengths given the same units.
- identify patterns among basic addition facts.
- identify patterns among basic subtraction facts.
- determine whether two expressions are equal.
- use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add fluently with sums to 1,000.
- write story problems to represent equations and write equations to represent story problems.
- apply algebraic properties of commutativity and associativity to addition problems.
- compose and decompose whole numbers to flexibly and efficiently add and subtract numbers.
- identify and solve addition and subtraction problems with different problem structures,

	including change and comparison problems.
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Unit 2: Introduction to Multiplication	Unit 2 focuses on helping students develop a conceptual understanding of multiplication. This unit introduces multiplication by immersing students in a wide variety of multiplicative situations. When solving problems that are embedded in different contexts and that invite them to think of the operation in different ways, students make use of a variety of models for multiplication, including equal groups, arrays, the number line, and ratio tables. They also apply the associative and distributive properties to develop efficient, reliable, and generalizable strategies for multiplying. They track these strategies on a multiplication table featuring products from 0 to 100 and apply what they have learned by solving problems that involve scaled graphs and story problems with multiple steps and operations. Third graders begin developing flexible and fluent use of all four operations for numbers 0-10.
Standard(s):	Operations and Algebraic Thinking Represent and solve problems involving multiplication and division. 3.OA.1 - Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7. 3.OA.2 - Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$. 3.OA.3 - Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. 3.OA.4 - Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = ? \div 3$, $6 \times 6 = ?$. Understand properties of multiplication and the relationship between multiplication and division.

3.OA.5 - Apply properties of operations as strategies to multiply and divide. Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property)

Solve problems involving the four operations, and identify and explain patterns in arithmetic.

3.OA.8 - Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

3.OA.9 - Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.

For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

Represent and interpret data.

3.MD.3 - Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Measurement and Data

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

3.MD.7 - Relate area to the operations of multiplication and addition.

b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical

	reasoning.
Essential Question(s):	• How does decomposing numbers to compute using partial products and partial factors make mental computations more efficient? • How are multiplication and division related to addition and subtraction? • How is multiplication related to division? • How do algebraic properties help make estimating and solving problems easier? • How can mathematical problems be represented through mathematical expressions?
Enduring Understanding(s):	• There are often multiple and valid approaches to solving mathematical problems. • Different situations (numbers) lend themselves to using different computation strategies. • Multiplication and division are efficient methods that are related to addition and subtraction. • Multiplication and division are inverse relations. • A variety of strategies for computing can be generalized to become rules that can be applied to new and different problems. (generalized procedures) • Distributive property of multiplication over addition and subtraction builds on using known facts to find unknown products. Partial factors can also be used for division. • Benchmark numbers help to make computation easier to estimate and mentally compute. • Place value patterns and estimation support multiplicative thinking. • Multiplication and division can be modeled using arrays, number lines, sets and to visualize patterns and processes.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...) • related multiples of 2-10 can be used to help solve related multiplication problems. • repeated addition, skip counting and doubling are efficient methods to find values. • additional strategies, including proportional relationships and partial products. • ratio tables to solve story problems. • multi-digit addition and multiplication $(7 \times 4) + (4 \times 5) = 48$. • basic multiplication facts to 100. • the product of any number and 0 is 0 (zero product property). • the product of any number and 1 is that number (multiplicative identity property).

- the order in which numbers are multiplied does not change their product (commutative property).
- the product of a sum and any number is equal to the sum of the products of each added and the number (distributive property).
- the way in which numbers being multiplied are grouped does not change their product (associative property).
- strategies:
 - one by one counting
 - additive strategies: repeated addition and skip counting
 - multiplicative strategies: doubling and halving
 - multiplication fact strategies
 - zero (x0) and identity (x1) properties
 - doubles (x2)
 - doubles plus one (x3)
 - double doubles (x4)
 - double double double (x8)
 - ten facts (x10)
 - half-ten facts (x5)
 - half-ten Plus one (x6)
 - ten minus one (x9)
- models:
 - number line
 - array
 - ratio table

Skills: (Students will be able to...)

- interpret products of whole numbers.
- interpret quotients of whole numbers.
- solve multiplication story problems with products to 100 involving situations of equal groups, arrays and measurement quantities.

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| | <ul style="list-style-type: none">• solve for the unknown in a multiplication equation involving 3 whole numbers (a multiplicand, multiplier, and product).• apply properties of operations as strategies to multiply.• fluently multiply with products to 100 using strategies.• identify patterns among basic multiplication facts.• model and solve multiplication-problems using arrays, number lines, and place value patterns.• develop and use models to represent patterns and processes for efficiently solving multiplication problems. |
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Unit 3: Multiplication, Division, and Area	Unit 3 addresses three distinct but interrelated concept clusters: the relationship between multiplication and division, the two different interpretations of division, and the relationship between multiplication and area. Students again build arrays, but use them to model and solve division as well as multiplication problems. Story problems play a major role in helping students to connect their everyday experiences with division to more formal mathematical concepts. Students encounter two different interpretations of division—sharing and grouping—and have numerous opportunities to build understandings of both. This unit revolves around fact families, and an introduction to area. Although greater numbers are explored, automaticity with basic facts is the goal with all four operations 0-10 by the end of grade 3.
Standard(s):	Operations and Algebraic Thinking Represent and solve problems involving multiplication and division. 3.OA.1 - Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7. 3.OA.2 - Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$. 3.OA.3 - Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. 3.OA.4 - Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = ? \div 3$, $6 \times 6 = ?$. Understand properties of multiplication and the relationship between multiplication and division.

3.OA.5 - Apply properties of operations as strategies to multiply and divide. Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property)

3.OA.6 - Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.

Multiply and divide within 100.

3.OA.7 - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Solve problems involving the four operations, and identify and explain patterns in arithmetic.

3.OA.8 - Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Measurement and Data

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

3.MD.5 - Recognize area as an attribute of plane figures and understand concepts of area measurement.

- A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.
- A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.

3.MD.6 - Measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units).

3.MD.7 - Relate area to the operations of multiplication and addition.

	a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
Essential Question(s):	• How do partial products and partial quotients (factors) make it easier to do mental computations? • How can math problems be represented by expressions and equations? • How is multiplication related to division? • What are efficient ways to compute? • How does finding the area of rectangles help with understanding multiplication and division?
Enduring Understanding(s):	• Different situations lend themselves to using different computation strategies. • Multiplication and division are efficient methods that are related to addition and subtraction. • Multiplication and division are inverse relations. • A variety of strategies for computing can be generalized rules which can be applied to similar problems. • Distributive property of multiplication over addition and over subtraction can be applied using standard and non-standard numbers. • Benchmark numbers help to make it easier to mentally compute and make estimations. • Place value patterns and estimation support understanding of multiplication and division. • Multiplication and division can be modeled, e.g. sets, arrays, and number lines.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...) • division is the inverse of multiplication, just as subtraction is the inverse of addition. • division can be interpreted as sharing or grouping. • fact families help us understand the connection between multiplication and division. • basic division facts to 100. • the numbers being multiplied correspond to the dimensions of a rectangle, and the product of those numbers corresponds to the area of the rectangle. • area of a rectangle can be found by multiplication.

- strategies:
 - Sharing, grouping, & using known facts
 - use multiplication facts

Skills: (Students will be able to...)

- interpret products of whole numbers; write story problems or describe problem situations to match a multiplication expression or equation.
- interpret quotients of whole numbers, write story problems or describe problem situations to match a division expression or equation.
- solve division story problems with dividends to 100 involving situations of equal groups.
- solve for the unknown in a multiplication or division equation involving 3 whole numbers.
- solve division problems by finding an unknown factor.
- fluently multiply with products to 100 with strategies.
- fluently divide with dividends to 100 using strategies.
- solve two-step story problems using multiplication and division.
- demonstrate an understanding that a square with a side length of 1 unit is called a “unit square” and has 1 square unit of area.
- demonstrate an understanding that a plane figure that can be covered without gaps or overlaps by n unit squares has an area of n square units.
- measure the area of a plane figure by counting the number of square units that cover it, with no gaps or overlap.
- find the area of a rectangle with whole-number side lengths by tiling it.
- represent the product of two numbers as the area of a rectangle with side lengths equal to those two numbers.
- find the area of a rectangle by multiplying its side lengths.
- use repeated reasoning to find strategies such as doubling, halving, benchmark numbers and properties of multiplication and related understanding of division to efficiently compute
- use appropriate tools strategically to find area.
- connect area models to multiplication concepts.

Unit 4: Multi-digit Addition and Subtraction	The mathematical focus of Unit 4 is additive thinking. Unit 4 reviews and extends students' thinking about place value, multi-digit addition and subtraction, and problem solving. Students are introduced to the idea of rounding 2- and 3-digit numbers to the nearest ten and the nearest hundred. This skill is extended into the realm of computation, as students use rounding as a way to estimate and check the results of adding and subtracting multi-digit numbers. Along with reviewing and deepening their understandings of strategies learned in second grade, students are introduced to the standard algorithms for adding and subtracting multi-digit numbers toward the end of the unit.
Standard(s):	Number and Operations in Base Ten Use place value understanding and properties of operations to perform multi-digit arithmetic 3.NBT.1 - Use place value understanding to round whole numbers to the nearest 10 or 100. 3.NBT.2 - Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. Operations and Algebraic Thinking Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.OA.8 - Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Essential Question(s):	• How can using place value patterns and understanding of number relationships help with estimation? • What pattern occurs in our number system when multiplying and dividing by (10, 100, 1,000, 10,000...)? • How do benchmark numbers help us think and solve problems? • How are adding or subtracting equal groups similar to multiplication and division?

Enduring Understanding(s):	- Using place value patterns and understanding of number relationships is foundational to estimation. - Skip counting is counting equal groups and leads to repeated addition. - Repeated addition & subtraction is a pattern that can be extended. (i.e. 120, 220, 320, 420...) - Repeated addition leads to multiplicative thinking, e.g., 5 equal groups of 10 is 5 groups of 10 or 10, five times written as $5 \times 10 = 50$. - Our number system is structured around multiples and factors of ten. - The place value structure is based on multiples of or powers of ten, including the expanded form, e.g., $4,236 =$ - o (4 thousands) + (2 hundreds) + (3 tens) + (6 units) or $4,000+200+30+6$ - o $(4 \times 1,000) + (2 \times 100) + (3 \times 10) + (6 \times 1)$, or - o $(4 \times 10 \times 10 \times 10) + (2 \times 10 \times 10) + (3 \times 10) + (6 \times 1)$ - Equivalent expressions can be represented differently.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...) - two- and three-digit numbers can be rounded to the nearest ten or the nearest hundred. - rounding and computational estimation go hand in hand. Rounding numbers is useful in estimating the results of 2- and 3-digit addition and subtraction, as well as checking answers for reasonableness. - some situations call for exact answers, while others call for estimates, and it's important to be able to distinguish the two. - there are a variety of strategies for adding and subtracting 2- and 3-digit numbers with accuracy, efficiency, and flexibility. - strategies for multi-digit addition include : - o place value splitting - o keeping one addend whole—add a friendly number - o keeping one addend whole—get to a friendly number - o give & take (compensation) - o standard addition algorithm (note: While this progression of strategies goes from least to most sophisticated, this

does not mean that a student must go through the progression one step at a time. Instead, teachers can use the list as a helpful map to see how student thinking might be nudged to new levels)

- strategies for Multi-Digit Subtraction include:
 - removal (take away)
 - place value splitting
 - finding the difference (distance)
 - constant difference
 - standard subtraction algorithm
- models:
 - open number line
 - base ten pieces
- the standard algorithms for multi-digit addition and subtraction works in a consistent and reliable manner for all combinations, decisions about which method or strategy to use should be based on the numbers themselves.

Skills: (Students will be able to...)

- round whole numbers to the nearest ten.
- round whole numbers to the nearest hundred.
- use strategies based on place value, properties of operations, or the relationship between addition and subtraction to add fluently with sums to 1,000.
- use strategies based on place value, properties of operations, or the relationship between addition and subtraction to subtract fluently with minuends to 1,000.
- solve two-step story problems using the four operations.
- Reason abstractly and quantitatively about equivalent expressions and how they can be represented differently.
- Ask questions and investigate how using place value patterns and understanding of number relationships helps in determining estimations.
- Construct explanations of how using patterns, structures and relationships of our place value

	system help when multiplying and dividing numbers. • Compare and order 4-digit numbers based on understanding of place value and relative magnitude of number.
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Unit 5: Fractions and Measurements	The mathematical focus of Unit 5 is the development of measurement and fraction concepts. The purpose of this unit is to deepen the understanding of fractions as a whole decomposed into equal parts. Students understand the part-whole relationship as equal groups and equal shares of a whole unit. Each of these equal shares can be counted as a unit fraction. There are many ways for students to represent
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	fractions as parts of a whole, parts of sets, area models, or units on a number line. Students compare and order fractional quantities and recognize equivalence. Students will relate fractions to measurement while measuring elapsed time, length, weight and volume. Models such as number lines and line plots will be used to organize information to make understandings visible.
Standard(s):	Operations and Algebraic Thinking Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.OA.8- Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding Number and Operations—Fractions Develop understanding of fractions as numbers. 3.NF.1 - Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$. 3.NF.2 - Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction $\frac{1}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line. b. Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line. 3.NF.3 - Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Measurement and Data

Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

3.MD.1 - Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).¹ Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Represent and interpret data.

3.MD.4 - Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Geometry

Reason with shapes and their attributes.

3.G.2 - Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $1/4$ of the area of the shape

Essential Question(s):	• What is a fraction? • How do benchmark fractions help us to estimate solutions to problems? • How can you tell when a fraction is larger/smaller when comparing fractions? • How do you know when two fractions represent the same quantity? • How can you use what you know about multiplication and division to help you think about fractions? • How can you read, write and tell time on analog and digital clocks to the nearest hour, half hour, and quarter hour? • How can you tell time to the nearest minute? • How can you use an open number line to measure elapsed time in hours and minutes? • How do you know which metric or customary unit to use to measure the length, weight or volume? • How can you read and organize data in a line plot?
Enduring Understanding(s):	• 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. • Fractional parts must be of equal size. • Equivalent fractions can represent the same quantity, e.g. $\frac{1}{2} = \frac{2}{4}$ • A fraction with the same numerator and denominator is equal to one whole. • Fractions are relations - the size of a fractional part is relative to the size of the whole and the size of the whole (unit) is important. • Fractional parts can be represented as sets (or groups), area, or linear models. • Fractional parts are represented by demarcations, but are not the demarcations themselves, e.g. a linear measurement is the distance between 0 and $\frac{1}{2}$ not the mark that indicates $\frac{1}{2}$. • Fractions can be added and subtracted.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...)

- mass is the amount of stuff, of matter, in an object. In third grade, mass is measured in units of grams and kilograms. The tool for measuring mass is the pan balance scale, with which we compare an object's mass to the known mass of objects, such as the metric measures that often accompany balance scales.
- volume is the space that an object or substance occupies. In third grade, liquid volume is measured in units of milliliters and liters. The tool to measure volume is a graduated cylinder (a measuring container that is marked in units).
- time is measured in seconds, minutes, and hours, as well as in larger units such as days, weeks, months, and years. Third graders extend the time-telling skills they developed in second grade to telling time on analog and digital clocks to the minute. They also work with situations and story problems to determine the amount of time that has passed, or elapsed. here, the number line proves to be a valuable tool.
- fractions have multiple meanings. They are complex concepts. A fraction involves the relationship between the numerator to the denominator. With the part-whole definition of fractions, we can find fractions of sets and fractions of whole. We can also talk about the measurement meaning of fractions. When we consider a distance traveled that falls between 0 and 1 on a number line, the point that marks the end of that distance can be called the location of a particular fraction on the number line.
- unit fractions are fractions with the numerator 1. They represent an individual's share in a fair sharing situation. They also represent the distance from 0 to the unit fraction. Common fractions are fractions with a number other than 1 in the numerator. Common fractions can be written as the sum of unit fractions. For example, $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$.
- measurement, with its continuous quality, demands that students count spans instead of tick marks.
- models:
 - common referents (everyday objects)
 - open number line
 - pattern blocks, paper rectangles, number lines

Skills: (Students will be able to...)

- model with fractions to determine the relationship between fractions and division.
- identify fractional parts and equivalent fractions within a whole.
- model and explain with fractions that the size of the whole matters when considering and comparing fractions.
- use appropriate tools such as a number line strategically to model and compare fractions,
- establish start time, end time, and determine elapsed time.
- attend to precision when measuring length, weight, volume and mass.
- record and analyze data using a line plot.
- solve two step story problems using addition, subtraction, and multiplication.
- fluently add and subtract with sums to 1000.
- demonstrate an understanding of a unit fraction $\frac{1}{b}$ as 1 of b equal parts into which a whole has been partitioned (e.g., $\frac{1}{4}$ is 1 of 4 equal parts of a whole).
- demonstrate an understanding of a fraction $\frac{a}{b}$ as a equal parts, each of which is $\frac{1}{b}$ of a whole (e.g., $\frac{3}{4}$ is 3 of 4 equal parts of a whole or 3 parts that are each $\frac{1}{4}$ of a whole).
- locate $\frac{1}{b}$ on the number line after partitioning the interval from 0 to 1 into b equal parts.
- show a fraction $\frac{a}{b}$ on a number line by marking off, starting at 0, a length of $\frac{1}{b}$ each and labeling the resulting interval $\frac{a}{b}$.
- identify equivalent fractions by comparing their size.
- recognize simple equivalent fractions.
- recognize fractions that are equivalent to whole numbers.
- compare two fractions with the same numerator or the same denominator; use the symbols $>$, $=$, and $<$ to record comparisons of two fractions; demonstrate that fractions can be compared only when they refer to the same whole.
- tell and write time to the nearest minute; measure time intervals in minutes.
- solve story problems involving addition or subtraction of time intervals in minutes.
- solve story problems involving addition of mass measurements given in grams.
- solve story problems involving subtraction of mass measurements given in grams.
- solve story problems involving addition or subtraction of lengths given in centimeters.
- partition shapes into parts with equal areas; express the area of each equal part of a whole as a unit fraction of the whole.

**Unit 6:
Geometry**

In Unit 6, students develop increasingly precise ways to describe, classify, and make generalizations about two-dimensional shapes, particularly quadrilaterals. Students learn to identify and describe the attributes of rectangles, squares, parallelograms, trapezoids, and rhombuses. Students explore polygons in a variety of creative ways. They form polygons and special quadrilaterals to build understanding that shared attributes can define a larger category. Geometry and measurement are combined as students

	measure the perimeters and areas of polygons. Students apply what they've learned about quadrilaterals and area in the context of fractions. Students are expected to partition shapes into parts with equal areas, and express the area of each equal part as a unit fraction of the whole
Standard(s):	Geometry Reason with shapes and their attributes. 3.G.1 - Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. 3.G.2 - Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $\frac{1}{4}$ of the area of the shape. Measurement and Data Geometric measurement: understand concepts of area and relate area to multiplication and to addition. 3.MD.5 - Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units. 3.MD.7 - Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular

	areas in mathematical reasoning. d. Recognize the area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. 3.MD.8 - Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
Essential Question(s):	• How can shapes be composed and decomposed into other shapes? • What attributes are shared and not shared among different shapes? • What needs to be considered when estimating measures and how do they compare to the actual measures of shapes and why? • In what ways are shapes the same, similar or different when they are moved in space? • What attributes can you use to sort and classify two-dimensional shapes? • What patterns emerge when finding the area and perimeter of shapes? • How does finding the area of rectangles help with understanding multiplication and division? • How are area models related to the distributive property?
Enduring Understanding(s):	• Equal units of measure can be used to quantify geometric attributes. • The orientation (transformations) of the shape does not change the shape, e.g., a square rotated 45° is still a square. • Shapes and solids can be composed and decomposed (part-whole relations). • Geometric shapes can be described through estimated and actual measurements. • Area is measured in square units. • Parts of shapes can be described in fractional terms. • Area is an attribute of two-dimensional regions. • Shapes are alike and different based on their geometric attributes.

	• Shapes in different categories may share attributes. • A unit measure represents an amount between demarcations rather than a mark on a scale itself. • The area model can be represented mathematically by the distributive property of multiplication over addition or over subtraction.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...) • attributes of quadrilaterals. • examples and non-examples of quadrilaterals. • congruence and similarity of figures. • geometric attributes of polygons. • perimeter is the measure of the sides of the figure. • shapes can have the same perimeter with different areas. • shapes can have the same area with different perimeters. • shapes can be divided into congruent and non-congruent halves. • the region of a divided shape can be measured. • models: ○ tanagrams ○ toothpicks ○ colored tiles ○ linear units ○ geoboards Skills: (Students will be able to...) • find the area of a rectangle by multiplying its side lengths. • find the area of a figure that can be decomposed into non-overlapping rectangles, and solve related story problems. • find the perimeter of a polygon, given its side lengths, and solve related story problems. • find an unknown side length of a polygon, given its perimeter and other side lengths. • identify rhombuses, rectangles, and squares as quadrilaterals.

	● draw or construct quadrilaterals that are not rhombuses, rectangles, or squares. ● identify shared attributes of shapes in different categories. ● group shapes in different categories according to shared attributes that define a broader category. ● describe and use attributes to define, compare, and categorize polygons. ● use models to compose and decompose geometric shapes and explain relationships. ● attend to precision when measuring the area and perimeter of polygons. ● analyze and interpret irregular polygons by decomposing the shape to determine the area.
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Unit 7: Extending Multiplication and Fractions	Unit 7 provides a review of material covered earlier in the year, as well as opportunities to extend skills and concepts into work with larger numbers and bigger ideas. Early in the unit, students learn to multiply single digits by multiples of 10. That skill is then extended into building and sketching 1-digit by 2-digit multiplication combinations. Working with multiplication beyond the basic facts provides rich opportunities to review the commutative and distributive properties and tap into the power of the associative property of multiplication. Having worked previously with fractions as parts of a whole and
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	distances along a number line, students are introduced to linear and area models that allow them to see fractions as parts of a set as well as a parts of a whole. The unit ends with a foray into data collection, representation, and interpretation.
Standard(s):	Operations and Algebraic Thinking Represent and solve problems involving multiplication and division. 3.OA.1 - Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7. Understand properties of multiplication and the relationship between multiplication and division. 3.OA.5 - Apply properties of operations as strategies to multiply and divide. Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property) Multiply and divide within 100. 3.OA.7 - Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. Solve problems involving the four operations, and identify and explain patterns in arithmetic. 3.OA.8- Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. Number and Operations in Base Ten 3.NBT.3 - Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9×80, 5×60) using strategies based on place value and properties of operations.

Number and Operations—Fractions

Develop understanding of fractions as numbers.

3.NF.1 - Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$.

3.NF.2 - Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction $\frac{1}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line.

b. Represent a fraction $\frac{a}{b}$ on a number line diagram by marking off a lengths $\frac{1}{b}$ from 0. Recognize that the resulting interval has size $\frac{a}{b}$ and that its endpoint locates the number $\frac{a}{b}$ on the number line.

3.NF.3 - Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

b. Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.

Examples: Express 3 in the form $3 = \frac{3}{1}$; recognize that $\frac{6}{1} = 6$; locate $\frac{4}{4}$ and 1 at the same point of a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole.

Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.

Geometry

Reason with shapes and their attributes.

3.G.2 - Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the

	whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as $\frac{1}{4}$ of the area of the shape
Essential Question(s):	• How does the size of the denominator affect the size of the fractional part? • What strategies can be used to identify and prove that two fractions are equivalent? • How can properties help in solving multiplication problems with larger numbers? • How are fractions represented and compared on a number line? • How can multiplication and division be used to model problems?
Enduring Understanding(s):	• The size of a fractional part is relative to the size of the whole; as the denominator increases, the size of each equal part decreases. • Fractions that represent the same portion of a whole or the same point on a number line are equivalent, even if they have different numerators and denominators. • The Distributive and Associative Properties of multiplication can be used to decompose large factors into smaller, more manageable parts • Fractions can be accurately represented as specific points on a number line, allowing for comparison and the identification of whole number equivalents.
Learning Goal(s): <i>Students will be able to use their learning to:</i>	Content: (Students will know...) • mass is the amount of stuff, of matter, in an object. In third grade, mass is measured in units of grams and kilograms. The tool for measuring mass is the pan balance scale, with which we compare an object's mass to the known mass of objects, such as the metric measures that often accompany balance scales. • volume is the space that an object or substance occupies. In third grade, liquid volume is measured in units of milliliters and liters. The tool to measure volume is a graduated cylinder (a measuring container that is marked in units). • time is measured in seconds, minutes, and hours, as well as in larger units such as days, weeks, months, and years. Third graders extend the time-telling skills they developed in second grade to telling time on analog and digital clocks to the minute. They also work with situations and story problems to determine the amount of time that has passed, or elapsed.

Here, the number line proves to be a valuable tool.

- fractions have multiple meanings. They are complex concepts. A fraction involves the relationship between the numerator to the denominator. With the part-whole definition of fractions, we can find fractions of sets and fractions of whole. When we consider a distance traveled that falls between 0 and 1 on a number line, the point that marks the end of that distance can be called the location of a particular fraction on the number line.
- unit fractions are fractions with the numerator 1. They represent an individual's share in a fair sharing situation. They also represent the distance from 0 to the unit fraction.
- common fractions are fractions with a number other than 1 in the numerator. Common fractions can be written as the sum of unit fractions. For example, $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$.
- measurement, with its continuous quality, demands that students count spans instead of tick marks.
- the area of a rectangle with whole-number side lengths can be found by multiplying the side lengths
- products to 100 with fluency.
- models:
 - common referents (everyday objects)
 - open number line
 - pattern blocks, paper rectangles, number lines

Skills: (Students will be able to...)

- multiply using the commutative, associative, and distributive properties.
- fluently multiply with products to 100 using strategies.
- solve-two step story problems using addition, subtraction, and multiplication.
- write equations with a letter standing for the unknown quantity to represent two-step story problems.
- assess the reasonableness of answers to story problems using mental computation, rounding, and other estimation strategies.
- multiply whole numbers from 1 to 9 by multiples of 10 from 10 to 90 using strategies based on place value and properties of operations.

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| | <ul style="list-style-type: none"> • demonstrate an understanding of a unit fraction $1/b$ as 1 of b equal parts into which a whole has been partitioned or an understanding of a fraction a/b as a equal parts, each of which is $1/b$ of a whole. • locate fractions on the number line, and place fractions in their correct positions. • show a fraction a/b on a number line by marking off, starting at 0, a lengths of $1/b$ each and labeling the resulting interval a/b. • identify equivalent fractions by comparing their sizes or their locations on a number line. • generate and recognize simple equivalent fractions. • recognize fractions that are equivalent to whole numbers. • compare two fractions with the same numerator or the same denominator. • use the symbols $>$, $=$, and $<$ to record comparisons of two fractions; and explain why one fraction must be greater than or less than another fraction. • use the area model for multiplication to illustrate the distributive property. • express the area of each equal part of a whole as a unit fraction of the whole. |
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