Grade Three Mathematics Focus: Operational Strategies and Fluency with Multiplication and Division

Develop understanding of multiplication and division strategies within 100; develop an understanding of fractions; area and rectangular arrays; two dimensional shapes

Numbers and Operations in Base Ten

Common Core State Standards

- 3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100.
- 3.NBT.A.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. Use place value understanding to round whole numbers to the nearest 10 or 100.
- 3.NBT.A.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.

Unit Name: Number and Operations in Base 10	**Enduring Understanding** ● Our number system is based on groups of ten ● Place value can be used to compare and order numbers	**Essential Questions** ● Why do we use numbers, what are their properties, and how does our number system function? ● Why is place value important?
Knows: ● Procedure for rounding whole numbers ● Properties of operations ● Strategies involving place-value, properties of operations, and inverse operations ● Multiples of 10 in the range 10 – 90	**Understands:** ● The purpose of rounding to the nearest 10 or the nearest 100 ● Addition and Subtraction are inversely related operations ● The concept of regrouping and redistributing when adding and subtracting ● The product of a multiple of 10 is 10 times more than the basic fact product	**Does:** ● Use place-value understanding to round whole numbers to the nearest ten or hundred ● Fluently add and subtract within 1000 using strategies based on place-value, properties of operations, manipulatives, and/or the relationship between addition and subtraction ● Multiply one-digit whole numbers by multiples of 10 in the range 10 – 90, using strategies based on place-value and properties of operations

Essential Vocabulary: Rounding, sum, difference, product, place value

Numbers and Operations-Fractions

Common Core State Standards

- 3.NF.A.1 Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.
- 3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.
  - 3.NF.A.2.A Represent a fraction 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 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.
  - 3.NF.A.2.B Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.
- 3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
  - 3.NF.A.3.A Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
  - 3.NF.A.3.B Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
  - 3.NF.A.3.C Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
  - 3.NF.A.3.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.

Unit Name: Number and Operations-Fractions	**Enduring Understanding** ● A fraction is composed of a numerator (number of equal parts being described) and a denominator (number of equal parts in a whole). ● A fraction can be represented with visual models, such as partitioned shapes, parts of a set, and points on a number line.	**Essential Questions** ● What is a fraction? ● How can fractions be represented? ● Why are unit fraction important?
Knows: ● A unit fraction is the quantity formed by 1 part when a whole is partitioned into equal parts ● When the denominator gets larger, more parts are formed and each part gets smaller ● A fraction is a number on the number line ● Two fractions are equivalent (equal) if they represent the same amount of the whole and the same point on the number line ● If fractions have the	**Understands:** ● Fractions are numbers that exist between whole numbers ● Whole numbers can be broken down into fractional parts ● Number lines can be used to compare fractions with like denominators or like numerators ● A fraction is relative to the size of the whole. Models can be used to compare fractional amounts ● The numerator refers to the number of equal sized pieces ● The denominator tells the number of equal parts in the whole ● Fractions continue past 1 on a number line ● Comparing fractions is valid only when the two fractions refer to the	**Does:** ● Partition a number line into equal parts and label the fractional parts ● Represent fractions (unit fractions, equivalent fractions) on a number line diagram ● Recognize and generate simple equivalent fractions ● Explain why fractions are equivalent, e.g., using a visual fraction model ● Recognize and express whole numbers as fractions

same denominator, the fraction with the greater numerator is the greater fraction ● If fractions have the same numerator, the fraction with the lesser denominator is the greater fraction	same whole	● Compare fractions using <, =, or >, while reasoning about their size and/or using a visual fraction model
Essential Vocabulary: Fraction, numerator, denominator, unit fraction, equivalent, compare, Greater than (>), Less than (<), equal		

Operations and Algebraic Thinking		
Common Core State Standards ● 3.OA.A.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. ● 3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 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. ● 3.OA.A.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.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. ● 3.OA.B.5 Apply properties of operations as strategies to multiply and divide. ● 3.OA.B.6 Understand division as an unknown-factor problem. ● 3.OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. ● 3.OA.D.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.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.		
Unit Name: **Operations and Algebraic Thinking**	**Enduring Understanding** ● Multiplication and division are inverse operations ● There are patterns in arithmetic and the larger world ● Mathematical explanations can be given using words, pictures, numbers, or symbols ● Equations can model real-world problems	**Essential Questions** ● How are multiplication and division related? ● How can one use the relationship between multiplication and division to find products and quotients? ● How can one use properties as strategies to solve problems? ● How can patterns be used to solve problems?
Knows: ● Properties of operations (commutative,	**Understands:** ● The total number of objects, when grouped, can be found most efficiently by multiplication	**Does:** ● Apply properties (commutative, associative, and distributive) of operations as strategies to

associative, and distributive) • Strategies to multiply, divide and solve for unknowns • Procedure to round a number • Process for estimating • When to estimate and when to solve	• Multiplication and division are inverse operations • Division can be used to solve a missing factor problem • Multiplication can be used to solve a missing divisor problem • Using properties of operations can make problem solving easier • There are strategies to find patterns in a sequence of numbers	multiply and divide • Find the answer to a division problem by solving the related unknown-factor problem • Fluently multiply and divide within 100 (using efficient strategies) • Write equations to represent word problems with a letter standing for the unknown quantity • Solve two-step word problems using the four operations • Assess the reasonableness of answers using mental computation and estimation strategies including rounding • Identify and explain arithmetic patterns
Essential Vocabulary: Factor, product, divisor, dividend, quotient, multiples, commutative property, associative property, distributive property, rounding, estimate, multiply, divide		

Measurement and Data

Common Core State Standards

- 3.MD.A.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.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). 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.
- 3.MD.B.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.
- 3.MD.B.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.
- 3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.
  - 3.MD.C.5.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.
  - 3.MD.C.5.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.C.6 Measure areas by counting unit squares (square cm, square m., square in., square ft., and improvised units).
- 3.MD.C.7 Relate area to the operations of multiplication and addition.
  - 3.MD.C.7.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.
  - 3.MD.C.7.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.
  - 3.MD.C.7.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.
  - 3.MD.C.7.D Recognize 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.
- 3.MD.D.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.

Unit Name: Measurement and Data	**Enduring Understanding**	**Essential Questions**
	• Events can be measured by duration • The concept of time can be applied to solve problems	• How are addition and subtraction used to determine the length of time?

	• Graphs are visual representations of data • Different scales are needed to represent various data • Area is the inside measurement of a flat surface • Perimeter is the measurement of the outline of a shape	• Why do we need to measure the area of a surface? • How do we use and interpret data to draw conclusions? • How can one determine the best representation to display data?
Knows: • How to tell time to the minute, quarter hour, half hour, and hour • Characteristics of pictographs, bar graphs, and line plots • Area from perimeter and how to find each • Units of measurement for area and perimeter	**Understands:** • Time intervals involve a start time and an end time • Area measurement involves covering a surface • Area is related to the operations of multiplication and division • Rectangles with the same perimeter can have different areas • Rectangles with the same area can have different perimeters • Area of a rectangle found by tiling is the same as would be found by multiplying the side lengths • Data can be represented, interpreted, and analyzed • Multiple strategies can be used for solving real-world area problems	**Does:** • Tell time to the nearest minute • Solve word problems involving addition and subtraction of time intervals in minutes • Estimate and measure liquid volumes and masses of objects using grams (g), kilograms (kg), and liters (l) • Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes • Draw a graph to represent a data set with several categories (ie. Bar graph, picture graph, and line plot) • Answer questions about graphs by interpreting the information on the graphs • Measure items to the nearest ½ or ¼ inch • Find the area of a rectangle with whole-number side lengths by tiling it and by multiplying side lengths and then compare the two • Find areas of shapes by decomposing them into non-overlapping rectangles and adding the areas of the non overlapping parts • Find the perimeter of a polygon given the side lengths • Find an unknown side length of a polygon • Solve real-world and mathematical problems involving perimeters of polygons • Investigate the relationship between perimeter and area
Essential Vocabulary: Area, perimeter, grams, kilograms, liters, volume, mass, bar graph, line plot, picture		

graph

Geometry		
Common Core State Standards ● 3.G.A.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.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.		
Unit Name: Geometry	**Enduring Understanding** ● Two-dimensional shapes with or without curved sides can be classified and analyzed by their attributes ● 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) ● Partitioning shapes into equal parts helps to find the total area of a shape	**Essential Questions** ● How are polygons defined? ● How can I understand the relationship among angles, triangles, and polygons? ● How can I explore the relationships among quadrilaterals, trapezoids, parallelograms, rhombuses, rectangles, and squares? ● How can partitioning shapes help to understand area?
Knows: ● Attributes of shapes and attributes that define categories of shapes ● Unit fractions ● Categories of shapes	**Understands:** ● Shared attributes can define a larger category (e.g., rhombuses and rectangles are part of the category called quadrilaterals.) ● Shapes can be partitioned into unit fractions to express area ● The relationship among angles, triangles, and polygons	**Does:** ● Classify rhombuses, rectangles, and squares as examples of quadrilaterals ● Analyze quadrilaterals and explore the relationships among parallelograms, rectangles, squares, rhombuses, and trapezoids ● Draw quadrilaterals that match a description ● Draw examples of quadrilaterals that do not belong to a defined subcategory ● Partition shapes into parts with equal areas ● Express area of a part of a shape as a unit fraction of the whole
Essential Vocabulary: Quadrilaterals, polygons, unit fractions, attributes, area, angle, vertices, parallel, parallelogram		