3rd Grade Math Map **Unit 1: Addition and Subtraction Application (within 100)**

(August, September)

Desired Outcomes

Standard(s):

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.

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.

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.

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.

Transfer: Students will apply…

- Understanding of elapsed time to solve real-world situations and relate to day-to-day activities.
- Addition and subtraction problem solving skills to create and interpret picture and bar graphs.
- Knowledge of perimeter to real-world problem solving situations.

Understandings: *Students will understand that …*

- Information can be represented in bar graph and picture graph form. These graphs can be used to help us solve one- and two- step math problems.
- Elapsed time is the interval of time, given a specific unit, from a starting time to an ending time.
- Perimeter and addition are related.
- A linear unit is used to measure perimeter.

Essential Questions:

- How can understanding the relationship between addition and subtraction aid us in problem solving?
- How do we use data represented in bar graphs and picture graphs to make sense of the world around us?
- How is time represented and measured?
- How does elapsed time help us to plan and organize real life responsibilities?
- How does knowing the distance around objects (perimeter) support us in the real world?

Highlighted Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

*
1. **Make sense of problems and persevere in solving them.** Students can tell if word problems involve addition or subtraction and choose a modality to represent the problem. Problems should encompass real-world situations involving distance, time, and graphs as well as money (either dollars or cents, but not mixed).
2. **Reason abstractly and quantitatively.** Students will demonstrate their abstract and quantitative reasoning by adding and subtracting 3-digit numbers to see if solutions are reasonable.
3. **Construct viable arguments and critique the reasoning of others.** Students will create visual models of word problems (manipulatives or pictures) and explain their models. Given a perimeter and a length or width, students use objects or pictures to find the missing length or width. They justify and communicate their solutions using words, diagrams, pictures, numbers, and an interactive whiteboard. They will also listen to each other, explain what their peers have said, and give reasons why they agree or disagree.

* 4. **Model with mathematics.** In this unit, students demonstrate modeling by transferring raw data to graphical representations and to real-world situations. Students can transfer between modalities to solve real-world problems.

* 5. **Use appropriate tools strategically.** Strategic use of tools is demonstrated when given a digital clock students draw hands on an analog clock. It can be demonstrated when students use number lines to represent time or other visual models to represent real-world problems and estimations. It can also be demonstrated when students use manipulatives to explain their 3-digit calculations.

6. **Attend to precision.** Students demonstrate precision by fluently adding and subtracting 3-digit numbers and telling time accurately to the minute. They use precise language to describe their strategies.
7. **Look for and make use of structure.** Students demonstrate this standard by identifying the type of story problem (adding to, taking from, putting together, taking apart, comparing). They also demonstrate understanding of structure by building and describing 3-digit numbers and explaining their value, by analyzing the structure of a graph, and showing the location of an unknown in relation to an equation or visual model.
8. **Look for express regularity in repeated reasoning.** Students demonstrate this standard when they use the clock structure and relate it to a number line. When students set up a scaled graph and when students use the structures of word problems to solve problems, they demonstrate their ability to use repeated reasoning.

Prerequisite Skills/Concepts: *Students should already be able to…* • Know from memory with fluency and automaticity sums of all one-digit numbers. • Fluently add and subtract within 100. • Use addition and subtraction within 100 to solve one- and two- step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. • Count and skip count within 1000 by 5s, 10s, 100s. • Add up to four two-digit numbers with and without regrouping. • Subtract two digit numbers with and without regrouping. • Use place value and properties of operations to explain why addition and subtraction strategies work. • Read and write numbers to 1000 using word, standard, and expanded form. • Mentally add and subtract 10 and 100 from a number 100-900. • Compare 3-digit numbers using < = > symbols. • Add two digit numbers with and without regrouping.	**Advanced/Concepts:** *Some students may be ready to…* • Fluently add & subtract multi-digit whole numbers using the standard algorithm. • Solve multi-step problems for perimeter involving more complex polygons and rectangles.
Knowledge: *Students will know…* • Addition and subtraction computation and problem solving strategies. • A.M. represents time from midnight to noon. • P.M. represents time from noon to midnight. • 60 min = 1 hour.	**Skills:** *Students will be able to do…* • Tell and write time to the nearest minute. (3.MD.1) • Solve word problems involving elapsed time. (3.MD.1) • Use a number line or clocks to model elapsed time and record calculations. (3.MD.1) • Draw and label a picture graph and bar graph to represent a data set (including the scale, title, categories, etc.). (3.MD.3) • Solve one- and two-step “how many more” and “how many less” problems using information presented in bar graphs. (3.MD.3) • Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths. (3.MD.8) • Solve real world and mathematical problems involving perimeters of polygons, including finding an unknown side length. (3.MD.8)

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners will benefit from:

- Explicit instruction for time and perimeter measurement vocabulary, and picture graph and bar graph vocabulary.
- The use of visual tools such as analog clocks and digital clocks, tiles, geoboards, etc.
- Time interval number labels, including fractional partitions.
- Vertical and horizontal scaled graph models, including picture graphs and bar graphs.

Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
place value whole number elapsed time model scale (of graph) add (addition) sum subtract (subtraction) graph picture graph bar graph perimeter	data symbol key category title labels compare how many more/less tally marks chart survey quarter to/till quarter of quarter past quarter after midnight noon

Assessment

Summative Assessments Pictograph Graph Summative Bar Graph Summative Solving Perimeter Problems		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Time Pre-Assessment • Graphing Pre-Assessment • Measurement Pre-Assessment	• Time Assessment • Elapsed Time Assessment • Picture Graph Assessment • Bar Graph Assessment • Asking Questions about Graphs • Perimeter with Manipulatives and Grids • Perimeters with Geoboards • Perimeter of Polygons All Sides Given • Finding Perimeters of Polygons with Missing Sides • Finding Perimeters of Polygons with Unknown Side When Perimeter is Given • Measuring Perimeters in the Real World • Measuring Perimeters Using Measurement Tools	• Student Self-Assessment • Solving Perimeter Problems Summative

Grade 3 **Unit 2: Introduction to Area**

(September and October)

Desired Outcomes

Standard(s):

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

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

a. A square unit 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.6 Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).

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.

Transfer: *Students will apply…*

Area measurement to real-world problem solving situations.

Add To, Result Unknown Example: If the area of a garden is measured in square feet, one side of the garden is 8 feet and another side is 2 feet. What is the area of the garden?

Solution: 8 + 8 = ? or 2 + 2 + 2 + 2 = 16

Understandings: *Students will understand that …*

- Everyday objects have a variety of attributes, each of which can be measured in many ways.
- Area and addition are related.
- Perimeter and area are related.

Essential Questions:

- How can understanding the relationship between addition and area aid in problem solving?
- How are area and perimeter measured?

Highlighted Mathematical Practices:

1. Make sense of problems and persevere in solving them. Students can tell if word problems involve perimeter and/or area and choose a representation appropriate to the problem. Problems will encompass mathematical and real-world situations.

2. Reason abstractly and quantitatively. Students will demonstrate their abstract and quantitative reasoning counting square tiles and see the relationship between counting patterns and repeated addition.

3. Construct viable arguments and critique the reasoning of others. Students will create visual models of word problems (manipulative or picture) and explain their models. Students will use objects or pictures to show rectangles with the same perimeter, but different area. Students justify and communicate their solutions using words, diagrams, pictures, numbers, and an interactive whiteboard. They will also listen to each other, explain what their peers have said, and give reasons why they agree or disagree.

* **4. Model with mathematics.** In this unit, students demonstrate modeling by transferring rectangle area representations to real-world situations. Students can transfer between modalities to solve real-world problems.

* **5. Use appropriate tools strategically.** Strategic use of tools is demonstrated when students use square units to measure area and linear units to measure perimeter.

* **6. Attend to precision.** Students will use the measurement process precisely. For example when using square units, students will understand units must be of equal size and the inside of a figure must be covered completely.

* **7. Look for and make use of structure.** Students demonstrate understanding of structure by drawing rectangular arrays, determining perimeter and area, and describing and analyzing these attributes of the arrays.

8. Look for express regularity in repeated reasoning. When students can decompose rectangles into rectangular arrays of squares and relate quantities to repeated addition they use repeated reasoning.

Prerequisite Skills/Concepts:

- Use a ruler to measure side length.
- Solve real world and mathematical problems involving perimeters of polygons.
- Find the perimeter given the side lengths.
- Find an unknown side length.
- Exhibiting rectangles with the same perimeter.

Advanced Skills/Concepts:

- Solve multi-step problems for area involving more complex polygons and rectangles.

Knowledge: *Students will know…*	**Skills**: *Students will be able to do…*
• Addition problem solving strategies. • A square unit is used to measure area.	• Recognize areas as an attribute of plane figures and understand concepts of area measurement. (3.MD.5) • Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units). (3.MD.6) • 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. (3.MD.8)

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners will benefit from:

- An awareness of area measurement vocabulary.
- Labels for square measurement units.
- The use of visual tools such as tiles, geoboards, etc.

Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
attribute perimeter area square unit square cm, square m square in. square ft. nonstandard units array	plane figure gap overlap tiling side length decomposing linear polygon

Assessment		
Summative Assessments Unit and Area Post-Assessment Petting Zoo Performance Task Tiling the Floor		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
Partitioning Shapes Units and Area Pre-Assessment	Area and Addition Equations How Many Units in My Units? Estimating and Measuring Area Perimeter Length & Width Perimeter – Area Relationships	Units and Area Pre-Assessment

Grade 3 **Unit 3: Multiplication and Division Concept**

(October, November, December)

Standard(s):

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.

3.OA.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.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

3.OA.5 Apply properties of operations as strategies to multiply and divide.

Understand properties of multiplication and the relationship between multiplication and division.

3.OA.6 Understand division as an unknown-factor problem.

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 × 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.

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.

Transfer: *Students will apply…*

- Their understanding of area to represent real-world situations using multiplication and division equations.
- Their understanding of repeated addition and subtraction to represent real-world situations involving equal groups.

Example: There are 7 bags with 3 apples in each bag for the field trip. How many apples in all? ***7 x 3 = ?***

Understandings: *Students will understand that …*

- Multiplication and division are related operations.
- The operations of multiplication and division are related to Area.
- Real world situations involving equal groups and area can be represented with multiplication and division equations and models.
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Essential Questions:

- How will modeling with equal groups help us in understanding multiplication situations?
- How does modeling division problems help in problem solving?
- How can the strategy of breaking apart (decomposing) numbers make multiplication easier to understand?
- How can we use multiplication to solve division problems?
- What are some strategies that can make multiplication and division easier to understand?

Highlighted Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

* **1. Make sense of problems and persevere in solving them.** Students demonstrate their ability to persevere and identify appropriate strategies to solve multiplication and division problems embedded within sophisticated problem-solving situations.

* **2. Reason abstractly and quantitatively.** Students demonstrate reasoning by justifying and explaining products of whole numbers as groups of objects (equal groups/equal sharing). Students will make the connection between quantity and area models of multiplication and division.

3. Construct viable arguments and critique the reasoning of others. Students will explain why specific multiplication and division strategies work. They will also listen to each other and explain what their peers have said.

* **4. Model with mathematics.** In this unit, students are asked to use various modalities to show multiplication and division situations (drawings, arrays,
* objects, etc.). Students are asked to communicate how their visuals represent these situations.

5. Use appropriate tools strategically. Students will use concrete models to represent multiplication and division situations.

6. Attend to precision. Students represent and describe the process of computations using inverse operations to justify their work.

7. Look for and make use of structure. Students will recognize and identify patterns existing within and between multiplication and division. Students will utilize parentheses to display the structure of these problems, i.e., 2(3 x 4) or 15 – (2 x 3). Students use this knowledge when applying strategies to evaluate real-world situations of multiplication and division embedded within various problem-solving structures.

8. Look for express regularity in repeated reasoning. Students will observe commonalities within and between multiplication and division.

Prerequisite Skills/Concepts: *Students should already be able to…* • Model with equal groups by partitioning rectangles. • Solve equations for the unknown. • Identify arithmetic patterns.	**Advanced Skills/Concepts:** *Some students may be ready to…* • Identify and work with factors and multiples. • Multiply and divide multi-digit whole numbers. • Multiply fractions by whole numbers.
Knowledge: *Students will know…* • Multiplication and division facts.	**Skills**: *Students will be able to …* • Interpret products of whole numbers as the total number of objects in "so many" groups of "so many" objects each. (3.OA.1) • Interpret whole-number quotients of whole numbers as the number of objects in *each* share or as a number of *equal* shares. (3.OA.2) • Determine the unknown whole number in a multiplication and division equation relating three whole numbers. (3.OA.4) • Apply properties of operations as strategies to multiply and divide. (3.OA.5) • Understand division as an unknown-factor problem. (3.OA.6) • Fluently multiply and divide within 100, using various strategies. (3.OA.7) • Identify arithmetic patterns (including patterns in the addition table or multiplication table). (3.OA.9) • Explain arithmetic patterns using properties of operations. (3.OA.9)

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners will benefit from:

- Concrete models of multiplication and division processes.
- Repeated verbalization of processes along with an Anchor Chart highlighting terms and steps.

Academic Vocabulary:	
Critical Terms: multiplication decomposing array multiple product factor divisor dividend quotient remainder equal groups equal shares fact family/related facts	**Supplemental Terms:** inverse operation distributive property commutative property zero property identity equation

Assessment

Summative Assessments

Modeling Multiplication and Division With Manipulatives

Multiplication and Division Situations

Patterns and Properties

Pre-Assessments	Formative Assessments	Self-Assessments
• Repeated Addition • Even or Odd Prove-It • Multiplication and Division Concepts	• Interpreting Products • Interpreting Quotients • Is this a Family? • Modeling Multiplication and Division With Manipulatives • Multiplication and Division Situations • Using Strategies & Properties of Multiplication and Division	• Multiplication and Division Concepts

Desired Outcomes

Standard(s):

Represent and solve problems involving multiplication and division

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.

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.

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 (+, -, x, ÷.) 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.

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

3.MD.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.

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 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.

Use place value understanding and properties of operations to perform multi-digit arithmetic.

3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.

Transfer: *Students will apply…*

- The use of equal-sized groups, arrays, and area models to multiplication and division situations.
- Understanding of area models of multiplication.
- Problem-solving situations to multiply and divide to solve real-world problem situations.

Arrays of objects Unknown factor problem situation example: Twenty stickers have been arranged on a sheet into 5 rows. How many columns will there be?

5 x ? = 20

Understandings: *Students will understand that …*

- Area is additive.
- Modeling multiplication and division problems based upon their problem-solving structure can help in finding solutions.
- There is a relationship between area and multiplication.
- Properties of Operations will assist in problem-solving situations.
- Metric measurement units are related to place value concepts/multiples of 10.

Essential Questions:

- How can modeling multiplication and divisions problems help in finding their solutions?
- What is the relationship between area and multiplication?
- What are the Properties of Operations?
- How does metric measurement connect to multiples of 10?

Highlighted Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

*
1. **Make sense of problems and persevere in solving them.** Students demonstrate their ability to persevere and utilize problem-solving structures to solve multiplication and division problems.
2. **Reason abstractly and quantitatively.** Students will reason about the problem-solving structure and employ it to justify and explain their solution. Students will make the connection between quantity and area models of multiplication and division.

* 3. **Construct viable arguments and critique the reasoning of others.** Students may construct arguments using concrete models, such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions that the teacher facilities by asking questions such as "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.

* 4. **Model with mathematics**. In this unit, students experiment with representing multiplication and division problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. Students will generate various mathematical representations to both equations and story problems, and explain the connections between representations.

5. **Use appropriate tools strategically.** Students will use concrete models to represent multiplication and division situations.
6. **Attend to precision**. Students represent and use clear and precise mathematical language in their discussions with others and in their own reasoning about multiplication and division problem solving.

* 7. **Look for and make use of structure.** Students will recognize and utilize properties of operations to evaluate real-world problem-solving situations involving multiplication and division.

* 8. **Look for and express regularity in repeated reasoning.** Students will observe commonalities within multiplication and division, such as using the distributive property.

Prerequisite Skills/Concepts:	**Advanced Skills/Concepts:**
Students should already be able to…	*Some students may be ready to…*
• Model with equal groups by partitioning rectangles. • Solve basic problem-solving structures. • Relate metric measurement to concepts and multiples of 10.	• Identify and work with factors and multiples. • Multiply and divide multi-digit whole numbers. • Solve multi-step problems.
Knowledge: *Students will know…*	**Skills:** *Students will be able to …*
• Multiplication and division facts. • Problem-solving structures for area/arrays and for equal groups. • Metric measurements units for liquid volume and weight.	• Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. (3.OA.3) • Use drawings and equations with a symbol for the unknown number to represent the problem. (3.OA.3) • Relate area to the operations of multiplication and addition. (3.MD.7) • 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 $a \times c$. (3.MD.7) • Use area models to represent the distributive property in mathematical reasoning. (3.MD.7) • Solve two-step word problems using the four operations. (3.OA.8)

	• Represent these problems using equations with a letter standing for the unknown quantity. (3.OA.8) • Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (3.OA.8) • Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (3.MD.2) • 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.2) • 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. (3.OA.7) • Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations. (3.NBT.3)

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners will benefit from:

- Concrete models of multiplication and division processes.
- Anchor Charts highlighting mathematical vocabulary specific to unit.
- Repeated practice verbalizing solution pathways.

Academic Vocabulary:	
Critical Terms: multiplication division array area equal groups equal shares multiple product factor divisor dividend quotient remainder fact family unknown strategies reasonableness mental computation operation estimation patterns gram kilogram liter	**Supplemental Terms:** inverse operation distributive property commutative property zero property identity equation milliliter

Assessment		
Summative Assessments Multiplication and Division with Mass Multiplication and Division with Liquid Volume Multiplication and Division Problem Solving		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
Linear Measurement Problems Interpreting Arrays	Multiply by Multiples of 10 Solving Two-Step Word Problems Where's the Unknown Interpreting Arrays Using Strategies	Multiplication and Division Problem Solving Solving Two-Step Word Problems

(February, March, April)

Desired Outcomes

Standard(s):

Develop understanding of fractions as numbers

3.NF.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.2 Understand fractions as a number on a number line. Represent fractions on number line diagram.

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.

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.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., ½ = 2/4, 4/6 = 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 comparison with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

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.

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.

Transfer: *Students will apply…*

Problem-solving skills to understand fractions as they relate to real-world problem situations, such as in measurement, cooking, pizza, money, music, etc.

Put Together/Take Apart, Addend Unknown Example: A recipe needs 3/4 teaspoon salt. The chef has 1/8 tsp. salt. How much more salt does the chef need for the recipe?

Solution: 1/8 + □ = 3/4

Understandings: *Students will understand that …*

- The size of the fractional part is relative to the size of the whole.
- Fractions represent quantities where a whole is divided into equal-sized parts using models, manipulatives, words, and/or number lines.
- Fractions can be used as a tool to understand and model quantities and relationships.
- Fractions are composed of unit fractions.
- Fractions that represent equal-sized quantities are equivalent.

Essential Questions:

- What do fractions represent?
- What makes fractions equivalent?

Highlighted Mathematical Practices:

1. **Make sense of problems and persevere in solving them.** Students demonstrate their ability to persevere and utilize reasoning to make sense of part-part-whole relationships.
* 2. **Reason abstractly and quantitatively.** Students will reason about the size of fractions. Students will make the connection between area models and linear models of fractions.
3. **Construct viable arguments and critique the reasoning of others.** Students may construct arguments using concrete models of fractions to reason about the whole as they examine the fractional parts. They explain their thinking to others and respond to others' thinking.
* 4. **Model with mathematics**. In this unit, students representing fractions and wholes in multiple ways including numbers, words (mathematical language), drawing pictures, objects, etc. Both area models of fractions and linear models will be used.
* 5. **Use appropriate tools strategically.** Students will use concrete models to represent part-part-whole relationships.
6. **Attend to precision**. Students represent and use clear and precise mathematical language in their descriptions of fractions as specifying the whole.
* 7. **Look for and make use of structure.** Students will recognize and utilize the structure of the part-part-whole relationships between various fractional pieces.
8. **Look for express regularity in repeated reasoning.** Students will observe commonalities within the various models for fractional pieces and what they represent.

Prerequisite Skills/Concepts: *Students should already be able to…* • Divide shapes (circles and rectangles) into no more than 4 equal sections and use vocabulary terminology to describe. • Measure length and represent that data in a line plot.	**Advanced Skills/Concepts:** *Some students may be ready to…* • Identify and work with more fifths, tenths, twelfths and/or fractions with unlike denominators.
Knowledge: *Students will know…*	**Skills**: *Students will be able to …* • Divide shapes into parts with equal areas. (3.G.2) • Represent the area of each part as a unit fraction. (3.G.2) • Represent a whole using unit fractions. (3.NF.1) • Use the term numerator to indicate the number of parts and denominator to represents the total number of parts a whole is partitioned into. (3.NF.1) • Represent a fraction as the composition of unit fractions. (3.NF.1) • Divide a number line diagram into equal segments and label the appropriate fractional parts. (3.NF.2) • Model equivalent fractions using manipulatives, pictures, or number line diagrams and explain in words why the fractions are equivalent. (3.NF.3) • Represent whole numbers as fractions using area models, number line diagrams, and numbers. (3.NF.3) • Compare two fractions with the same numerator or same denominator using visual models, symbols and words. (3.NF.3) • Recognize that comparisons are valid only when the two fractions refer to identical wholes. (3.NF.3) • Generate measurement data by measuring lengths to the ¼ and ½ inch. (3.MD.4) • Show data in a line plot given a scale in ½, ¼, or whole numbers. (3.MD.4)

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners will benefit from:

- Concrete models and manipulatives showing composing and decomposing of shapes into fractions.
- Anchor Charts and visuals highlighting mathematical vocabulary specific to fractions.

Academic Vocabulary:	
Critical Terms: partition equal parts fraction equal distance (intervals) equivalent equivalence reasonable denominator numerator justify unit fraction sixth eighth	**Supplemental Terms:** line plot fraction half third fourth part – part - whole comparison linear measurement (using a unit fraction to show distance)

Assessment		
Summative Assessments Fractions and Equivalence Performance Task (Part 1 and Part 2) Number Line Critique		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**

Partitioning Shapes	Fractional Concepts Build a Fraction Model Putting Fractions On a Number line Fractions Greater Than One On Number Lines Finding Fractions on a Number Line Representing Fractions On a Number lLine Fractions and Number Lines Are these Equivalent? Generating Equivalent Fractions Fraction Go Fish Level 2 What's the Fractional Representation (Part 1 and Part 2) Fraction War Fraction Comparisons Is it a Fair Comparison? Measuring Caterpillars Fraction Concentration	Self-Assessment (I can. . .)

Desired Outcomes

Standard(s):

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.

Transfer: *Students will apply…*

Knowledge of shapes by drawing representations in different categories that share attributes and recognize those shapes (quadrilaterals) in real world settings.

Understandings: *Students will understand that …*

- Objects can be described and compared using their geometric attributes.
- Figures are categorized according to their attributes.

Essential Questions:

- How can 2-dimensional shapes be described?
- How are geometric figures constructed?

Highlighted Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

*
1. **Make sense of problems and persevere in solving them.** Students demonstrate their ability to persevere by drawing shapes with pre-specified attributes.
2. **Reason abstractly and quantitatively.** Students demonstrate reasoning by justifying and explaining attributes of quadrilaterals in words and drawings.
3. **Construct viable arguments and critique the reasoning of others.** Students will be able to explain why specific shapes are called quadrilaterals. They will also listen to each other and explain what their peers have said.
4. **Model with mathematics.** In this unit, students are asked to use various modalities and model shapes with manipulatives or drawings. They are asked to communicate how their visuals represent these shapes.
5. **Use appropriate tools strategically.** Students will use concrete models to represent shapes. Students will use concrete models to represent shapes.

* 6. **Attend to precision.** Students precisely solve problems such as finding all the possible different compositions of quadrilaterals that make other quadrilaterals.

* 7. **Look for and make use of structure.** Students will observe, identify, and categorize quadrilaterals based upon attributes.

8. **Look for and express regularity in repeated reasoning.** Students will notice commonalities in attributes.

Prerequisite Skills/Concepts:	**Advanced Skills/Concepts:**
• Grade 2 students work with shapes as they recognize, identify and draw various shapes based upon attributes.	• Connect lines to lines of symmetry in two-dimensional figures. • Identify angles. • Classify shapes by the properties of their angles.
Knowledge: *Students will know…* • Geometric shapes that represent quadrilaterals. • Shapes are categorized. • Quadrilaterals are two-dimensional.	**Skills:** *Students will be able to do…* • Analyze, compare, and classify 2-dimensional shapes by their properties. (3.G.1) • Draw shapes with pre-specified attributes. (3.G.1) • Investigate, describe, and reason about decomposing and composing quadrilaterals to make other quadrilaterals. (3.G.1) • Rotate arrays physically and mentally to view them as compositions of smaller arrays. (3.G.1) • Understand that shapes in different categories may share attributes and belong to a larger category. (3.G.1) • Recognize and draw examples of more complex quadrilaterals. (3.G.1)

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

English language learners will benefit from:

- Labeling shapes on anchor charts and providing manipulates in those shapes for identification/matching purposes.
- Identifying real world objects that represent various quadrilaterals.
- Relating the terms 'quad' and 'lateral' to students' native languages.

Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
Quadrilateral Rhombus Rectangle Square Attribute Geometric 2-dimensional Plane	Angle Degree Compare Flat Solid 3-dimensional

Assessment

Summative Assessments

Quadrilateral Hierarchy

Pre-Assessments	Formative Assessments	Self-Assessments
Prior Knowledge	Geometry Journal Is it a Quadrilateral? Identify Shapes Using Attributes Shape Riddles	Geometry Journal Using Attributes

Desired Outcomes

Standard(s):

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.

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.

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.

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.

Transfer: *Students will apply…*

- Knowledge and skills to perform real world tasks such as estimating distance/mileage; calculating grocery bills by rounding prices and adding the estimates; etc.

Understandings: *Students will understand that …*

- Rounding is a method of approximating an answer.

Essential Questions:

- How is rounding an efficient method of estimating?
- Why and when would we round?
- How does rounding help assess the reasonableness of a solution?

Highlighted Mathematical Practices: (Practices to be explicitly emphasized are indicated with an *.)

1. **Make sense of problems and persevere in solving them.** Students will solve real-world problems involving the need for estimation and rounding and make appropriate decision when rounding is required.
* 2. **Reason abstractly and quantitatively.** Students make appropriate decisions when rounding is required. Students will also use rounding to estimate their sums and differences when adding and subtracting.
3. **Construct viable arguments and critique the reasoning of others.** Students will justify their process and reasoning for rounding numbers. They will listen and comment upon others' reasoning.
* 4. **Model with mathematics.** Students will use modeling with various manipulatives, drawings, and words to represent an estimation/rounding situation. Students will model their addition and subtraction problem solving.
5. **Use appropriate tools strategically.** Students will use manipulatives to model their rounding and/or their addition and subtraction solutions.
6. **Attend to precision.** Students will justify their strategy for finding a solution.
* 7. **Look for and make use of structure.** Students will model the rounding process and reasoning for rounding to represent the structure of the base-ten number system.
8. **Look for and express regularity in repeated reasoning.** Students notice the patterns of the number system and how it can be applied to the rounding process.

Prerequisite Skills/Concepts:	**Advanced Skills/Concepts:**
• Fluency in addition and subtraction skills to within 100 and experience with multi-digit addition and subtraction skills to 1000. • Solving one and two step situational problems	• Use place value understanding to round whole numbers to the nearest 10 or 100. (3. NBT.1) • 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. (3. NBT.2)
Knowledge: *Students will know…* • When to round in a real-life situation.	**Skills:** *Students will be able to do…* • Add and subtract within 1000. • Model algorithms based upon place value, properties of operations and/or the relationship between adding and subtracting.

WIDA Standard:

English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
English language learners will benefit from:

- Repetitive use of rounding/estimating terminology.

Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
Place value Round Addition Add Addend Sum Subtraction Subtract Difference Strategies Properties *about (ELL)* *close to (ELL)*	Associative Commutative Distributive halfway

Assessment

Summative Assessments

My Dog Weighs More

True/False Equations

Road Trip Planning

Pre-Assessments	Formative Assessments	Self-Assessments
• Composing & Decomposing 3-Digit Numbers • Modeling Addition and Subtraction with 3-digit Numbers • A Day at the Carnival	• How Many Pets • Roll and Round • Roller Coaster Rounding • Number Line Strategies • Addition on Number Lines • Subtraction on Number Lines • Roll and Add • Roll and Subtract • Closest Sum • Closest Difference	• Roll and Round • Roll and Add • Roll and Subtract • Closest to the Target