GOMath!

Grade 5

Curriculum

Lower Township Elementary Schools
2015

Course Description:

In Grade 5, instructional time should focus on three critical areas: developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and developing understanding of volume.

Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Course Goals:

A. Operations and Algebraic Thinking – 5.OA
- Write and interpret numerical expressions.
- Analyze patterns and relationships.

B. Number and Operations in Base Ten – 5.NBT
- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

C. Number and Operations—Fractions – 5.NF
- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

D. Measurement and Data – 5.MD
- Convert like measurement units within a given measurement system.
- Represent and interpret data.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

E. Geometry – 5.G
- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

Course Enduring Understandings:

Ideas that have lasting value beyond the classroom. Consider, "what do we want students to understand and be able to use several years from now, after they have forgotten the details?"

A. Operations and Algebraic Thinking – 5.OA
- Mathematical operations are used in solving problems in which new value is produced from one or more values.
- Algebraic thinking involves choosing combining, and applying effective strategies for answering quantitative questions.

B. Number and Operations in Base Ten – 5.NBT
- Understanding place value can lead to number sense and efficient strategies for computing with numbers.

C. Number and Operations—Fractions – 5.NF
- Fractions and decimals allow for quantities to be expressed with greater precision than with just whole numbers.

D. Measurement and Data – 5.MD
- Measurement processes are used in everyday life to describe and quantify the world.
- Data displays describe and represent data in alternative ways.

E. Geometry – 5.G
- Geometric attributes (such as shapes, lines, angles, figures, and planes) provide descriptive information about an object's properties and position in space and support visualization and problem solving.

Common Core State Standards:

Grade 5 Overview

Operations and Algebraic Thinking

- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Number and Operations in Base Ten

- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations—Fractions

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data

- Convert like measurement units within a given measurement system.
- Represent and interpret data.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Geometry

- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Operations and Algebraic Thinking 5.OA

Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

Analyze patterns and relationships.

3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

Number and Operations in Base Ten 5.NBT

Understand the place value system.

1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
3. Read, write, and compare decimals to thousandths.
    a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
    b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
4. Use place value understanding to round decimals to any place.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5. Fluently multiply multi-digit whole numbers using the standard algorithm.
6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Number and Operations—Fractions 5.NF

Use equivalent fractions as a strategy to add and subtract fractions.

1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*
2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
    a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd.)*
    b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
5. Interpret multiplication as scaling (resizing), by:
    a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
    b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]
    a. Interpret division of a unit fraction by a non-zero whole number,

and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.*

b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 x (1/5) = 4.*

c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

Measurement and Data 5.MD

Convert like measurement units within a given measurement system.

1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Represent and interpret data.

2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

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

3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

   a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

   b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

   a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

   b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

   c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Geometry 5.G

Graph points on the coordinate plane to solve real-world and mathematical problems.

1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).
2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Classify two-dimensional figures into categories based on their properties.

3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
4. Classify two-dimensional figures in a hierarchy based on properties.

Unit Names:

Operations and Algebraic Thinking
Numbers and Operations in Base Ten
Number and Operations - Fractions
Measurement and Data
Geometry

Materials :

GOMath! 2015 Series, Houghton-Mifflin Harcourt.

GOMath! Personal Trainer
GOMath! Academy

Common Core Mathematics State Standards Grade 5

Infusion of Technology :

Standard	Indicator
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Course Assessments:

District Grading Policy:
Tests
Quizzes
District Benchmarks
Homework/Classwork

Formative Assessments:
Classwork
Homework
Center Work

Summative Assessments:
District Unit Assessments
District Benchmark Assessments
Problem Solving
End-of-year Assessment
Performance Assessments

Content Area:	Mathematics	Grade(s)	5
Unit Plan Title:	Operations and Algebraic Thinking		

Anchor Standard (ELA) or Domain (Math)

Operations and Algebraic Thinking – 5.OA

- Write and interpret numerical expressions.
- Analyze patterns and relationships.

Overview/Rationale

Students will write and interpret numerical expressions; use the order of operations; and use rules to create numerical patterns in order to solve problems that involve algebra. Students use algebraic thinking by choosing, combining, and applying effective strategies for answering quantitative questions. Students write and interpret numerical expressions; using the order of operations, using rules to create numerical patterns in order to solve problems that involve algebra. Students use parenthesis, brackets, or braces in numerical expressions, and evaluate expression with these symbols. Students develop the understanding of basic algebraic operations in order to solve problems that require algebraic thinking.

Standard(s)

- 5.OA.A.1 Use parenthesis, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
- 5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculations "add 8 and 7, then multiply by 2" as 2 x (8+ 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.
- 5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. For ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.

Technology Standards	
Standard	Indicator
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of

	the data.
8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Standards for Mathematical Practice(s)

1. **Make sense of problems and persevere in solving problems.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Essential Question(s)

- **In what ways can operations affect numbers?**
- **How can different strategies be helpful when solving a problem?**

Enduring Understandings

- **Mathematical operations are used in solving problems in which new value is produced from one or more values.**
- **Algebraic thinking involves choosing combining, and applying effective strategies for answering quantitative questions.**

In this unit plan, the following 21st Century Life and Career Ready Practices are encouraged, taught and assessed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives

- Write and interpret numerical expressions by
  - Using parentheses, brackets, or braces to group an expression within multi-step numerical expressions.
  - Evaluating numerical expressions with parentheses, brackets, or braces.
  - Representing a calculation expressed verbally with a numerical expression.
  - Analyzing expressions without solving.
- Analyze patterns and relationships by
  - Generating two numerical patterns with the same starting number for two given rules.
  - Explaining the relationship between the two numerical patterns by comparing how each pattern grows or by comparing the relationship between each of the corresponding terms from each pattern.

- Forming ordered pairs out of corresponding terms from each pattern and graph them on a coordinate plane.

Assessments

- **Pre and Formative**
  - Classwork, homework, center work
  - Problem Solving Benchmarks
- **Summative**
  - Chapter 1, 6, 9 Tests
- **Other assessment measures**
  - Oral assessments
  - Personal Math Trainer

Teaching and Learning Actions

Instructional Strategies D	**Instructional Strategies** - Breaking down the task - Providing step-by-step prompts - Daily testing - Repeated practice - Sequenced Review - Directed Questioning and Responses - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction - Think Aloud - Peer Tutoring - Active Participation - Warm-Up Activities - Meaningful Real Life Connections - Modeling - Teachers demonstrates, student uses models to problem solve - Centers - Manipulatives – Concrete Experiences - Goal Setting - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers - Make Predictions/Estimation - Writing Explanations - Scaffolding - Extended Form - Draw a Picture - Guess and Check - Working Backwards - Multistep
Activities D	- Using Open Number Sentences - Solving Addition and Subtraction Number Stories - “Name that Number” Game

	- Parentheses in Number Stories - Order of Operations - Multiplication Facts Routine - Finding Factor Pairs - “Multiplication Top-It” Game - Review the Meaning of Divisibility - Use Fact Triangles to Practice Multiplication Facts - “Factor Captor” Game - Finding and Investigating Properties of Other Square Numbers - “Factor Bingo” Game - “Unsquaring”/ Finding Square Root of Numbers - Practice division and extended division facts - Rename numbers - Develop a mental division strategy - Explore divisibility rules - Solve division number stories and interpret remainders - “First to 100” Game - Explore division with a calculator - Solve algebraic expressions - Use formula to make table and then line graphs - Create line graphs with two sets of data - Personal Math Trainer - GoMath Academy
Resources	**Operations and Algebraic Thinking**
5.OA.1 GOMath Grade 5 • Lesson: 1.3, 1.10, 1.11, 1.12 5.OA.2 GOMath Grade 5 • Lesson: 1.10, 6.4, 5.OA.3 GOMath Grade 5 • Lesson: 9.5, 9.6, 9.7	
Suggested Time Frame:	By the end of grade 5

Content Area:	Mathematics	Grade(s)	5
Unit Plan Title:	Number and Operations in Base Ten		

Anchor Standard (ELA) or Domain (Math)

Number and operations is Base Ten – 5.NBT

- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Overview/Rationale

Students continue to extend division to 2-digit divisors, integrating decimal fractions into the place value system. Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. Students finalize fluency with muti-digit addition, subtraction, multiplication and division. Students apply their understanding of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. Students develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers to understand and explain why the procedures for multiplying and dividing finite decimals make sense. Students compute products and quotients of decimals to hundredths efficiently and accurately.

Standard(s)

- 5.NBT.A.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

- 5.NBT.A. 2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

- 5.NBT.A.3 Read, write, and compare decimals to thousandths.
  a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g. 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 x (1/10) + 9 x (1/100) + 2 x (1/1000).
  b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

- 5.NBT.A.4 Use place value understanding to round decimals to any place.

- 5.NBT.B.5 Fluently multiply multi-digit whole numbers using the standard algorithm.

- 5.NBT.B.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship

between multiplication and division. Illustrate and explain the calculation buy using equations, rectangular arrays, and/or area models.

- 5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Technology Standards	
Standard	Indicator
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Standards for Mathematical Practice(s)

9. **Make sense of problems and persevere in solving problems.**
10. **Reason abstractly and quantitatively.**
11. **Construct viable arguments and critique the reasoning of others.**
12. **Model with mathematics.**
13. **Use appropriate tools strategically.**
14. **Attend to precision.**
15. **Look for and make use of structure.**
16. **Look for and express regularity in repeated reasoning.**

Essential Question(s)

- How does a digit's position affect its value?

Enduring Understandings

- Understanding place value can lead to number sense and efficient strategies for computing with numbers.

In this unit plan, the following 21st Century themes and skills are addressed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives

- Understand the place value system by
  - Recognizing that each plane to the left is 10 times larger in a multi-digit number (e.g., 2, 20, 200).
  - Recognizing that each place to the right is 1/10 as much in a multi-digit number (e.g., 2, 2/10, 2/100).
  - Expressing powers of 10 using while-number exponents (e.g., $10=10^1$, $100=10^2$, $1000=10^3$).
  - Illustrating and explaining a pattern for how the number of zeros of a product – when multiplying a whole number by power of 10 – relates to the power of 10 (e.g., 500 – which is 5 x 100, or 5 x 10^2 – has two zeros in its product).
  - Illustrating and explaining a pattern for how multiplying or dividing any decimal by a power of 10 relates to the placement of the decimal point (e.g., dividing 15.3 by 100 or $15.3 \div 10^2$, results in 0.153 – where the decimal point in the quotient is 2 places to the left of where it was in the dividend).
  - Reading and writing decimals to the thousandths in word form, base-ten numerals, and expanded form.
  - Comparing two decimals to the thousandths using place value and record the comparison using symbols <, >, or =.
  - Explaining how to use place value and what digits to look at to round decimals to any place.
  - Using the value of the digit to the right of the place to be rounded to determine whether to round up

or down.
    - Rounding decimals to any place.
- Perform operations with multi-digit whole numbers and with decimals to hundredths by
    - Explaining the standard algorithm for multi-digit whole number multiplication.
    - Using the standard algorithm to multiply multi-digit while numbers with ease.
    - Demonstrating division of a whole number with four-digit dividends and two-digit divisors using place value, rectangular arrays, area model, and other strategies.
    - Solving division of a whole numbers with four-digit dividends and two-digit divisors using properties of operations and equations.
    - Explaining my chosen strategy.
    - Adding, subtracting, multiplying, and dividing decimals to hundredths using strategies based on place value, properties of operations, or other strategies.
    - Explaining and illustrating strategies using concrete models or drawings when adding, subtracting, multiplying, and dividing decimals to hundredths.

Assessments

- **Pre and Formative**
    - Classwork, homework, center work
    - Problem Solving

- **Summative**
    - Chapter 1, 2, 3, 4, 5 Tests

- **Other assessment measures**
    - Oral assessments
    - Personal Math Trainer
    - Teacher created assessments

Teaching and Learning Actions

Instructional Strategies *D*	**<u>Instructional Strategies</u>** - Breaking down the task - Providing step-by-step prompts - Daily testing - Repeated practice - Sequenced Review - Directed Questioning and Responses - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction - Think Aloud - Peer Tutoring - Active Participation - Warm-Up Activities - Meaningful Real Life Connections - Modeling - Teachers demonstrates, student uses models to problem solve - Centers - Manipulatives – Concrete Experiences - Goal Setting

	- Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers - Make Predictions/Estimation - Writing Explanations - Scaffolding - Extended Form - Draw a Picture - Guess and Check - Working Backwards - Multistep
Activities *D*	- Review Algorithms - Add Whole Numbers and Decimals - "Addition Top It" Game - Compare millions, billions, trillions - "High Number Toss" Game - Powers of 10 - Examine and Solve Problems using Student Reference Book - Review Arrays - Find All Possible Rectangular Arrays for a Number - Review Fact Families - Use a Calculator to Test Divisibility - Introduce Divisibility Rules - "Factor Captor" Game - Factor Strings and Prime Factorization - "Name that Number" Game - Introduce the Estimation Challenge Problem - Estimate products - Experiment with spinners - "Multiplication Bull's Eye" Game - Estimate and solve multiplication problems - Copy line segments and find lengths with a compass - Measure angles formed by intersecting lines - "High Number Toss" Decimal Version Game - Explore tessellations and regular tessellations - "Angle Tangle" Game - Find the sums of angles in polygons - Find the median for the sums of angles - Divide polygons into triangles - Practice division and extended division facts - Develop a mental division strategy - Explore divisibility rules - "First to 100" Game - Scientific Notation

	- Positive and Negative Numbers - Plot order pairs and match number stories to graphs - “Hidden Treasure “ Game - Find area of polygons - “Frac-Tac-Toe” Game - Solve pan-balance problems - Solve algebraic expressions - Solving Problems involving Units of Weight and Capacity - Review Subtraction Algorithms - Subtracting Whole Numbers and Decimals - “Subtraction Target Practice” Game - Use Open Number Sentences - Solve Addition and Subtraction Number Stories - Organize Date in Line Plots - Write and rename fractions as decimals - Round decimals - “Estimation Squeeze” Game - Use a calculator to convert fractions to decimals - Explore the purpose of percents - Convert fractions to percents - Review bar graphs and circle graphs and graph data - Find personal measures - Organize data in a stem and leaf plot - “Finish First” Game - Find area of rectangles - Subtraction of Positive and Negative Numbers - Copy triangles without a protractor - Copy triangles with compass and straight edge only - Organize and describe class data and review data landmarks - Identify various plots - Find volume of rectangular prisms - Interpret graphs - Class demonstration using “Investigating Circumference” - Find volume of cylinders, pyramids, cones using tri-fold activity - Review and use traditional method and partial quotient algorithm of division - “Divisibility Dash” Game - Solve division number stories and interpret remainders - Make magnitude estimates and solve decimal division problems - Construct a circle graph using the percent circle - Make a sample; graph and predict base of sample - Create line graphs with two sets of data
Resources	**Number and Operations in Base Ten**

5.NBT.A.1
GOMath Grade 5:

- Lessons: 1.1, 1.2, 3.1, 3.2

5.NBT.A.2
GOMath Grade 5:

- Lessons: 1.4, 1.5, 4.1, 4.3, 4.4, 4.7, 4.8, 5.1, 5.6

5.NBT.A.3a
GOMath Grade 5:

- Lessons: 3.1, 3.2

5.NBT.A.3b
GOMath Grade 5:

- Lessons: 3.3

5.NBT.A.4
GOMath Grade 5:

- Lessons: 3.4

5.NBT.B.5
GOMath Grade 5:

- Lessons: 1.6, .1.7

5.NBT.B.6
Everyday Mathematics Grade 5:

- Lessons: 1.8, 1.9, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9

5.NBT.B.7
GOMath Grade 5:

- Lessons: 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8

Suggested Time Frame:	By the end of grade 5

Content Area:	Mathematics	Grade(s)	5
Unit Plan Title:	Number and Operations - Fractions		

Anchor Standard (ELA) or Domain (Math)

Number and Operations - Fractions– 5.NF

- Use equivalent fractions as a strategy to add and subtract fractions.
- Apply and extend previous understandings of multiplication and division to multiply and divide factions.

Overview/Rationale

Students will extend their knowledge of fractions and the real world applications. Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. Students develop fluency with addition and subtraction of fractions. Students use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. Students add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions with like denominators. Students develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students solve word problems involving addition and subtraction of fractions referring the same whole.

Standard(s)

- 5.NF.A.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)
- 5.NF.A.2 Solve word problems involving additions and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answer. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.
- 5.NF.B.3 Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g. by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 whole are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50 pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
- 5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by fraction.
  a. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts;

equivalently, as the results of a sequence of operations a x q ÷ b). For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (in general, (a/b) x (c/d) = ac/bd.)

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

- 5.NF.B.5 Interpret multiplication as scaling (resizing) by:
  a. Comparing the size of a product to the size of one factor on the basis of the size of the pother factor, without performing the indicated multiplication.
  b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the gi9ven number; and relating the principle of fraction equivalence a/b = (nxa)/(nxb) to the effect of multiplying a/b by 1.
- 5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
- 5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
  a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.
  b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 ÷ (1/5), and use a visual model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 x (1/5) = 4.
  c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

Technology Standards	
Standard	Indicator
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.P.C.1	Collaborate with peers by participating in

	interactive digital games or activities.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Standards for Mathematical Practice(s)

17. **Make sense of problems and persevere in solving problems.**
18. **Reason abstractly and quantitatively.**
19. **Construct viable arguments and critique the reasoning of others.**
20. **Model with mathematics.**
21. **Use appropriate tools strategically.**
22. **Attend to precision.**
23. **Look for and make use of structure.**
24. **Look for and express regularity in repeated reasoning.**

Essential Question(s)

- Why express quantities, measurements, and number relationships in different ways?

Enduring Understandings

- Fractions and decimals allow for quantities to be expressed with greater precision than with just whole numbers.

In this unit plan, the following 21st Century Career Ready Practices are encouraged, taught, and assessed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives

- Use equivalent fractions as a strategy to add and subtract fractions by
  - Determining common multiples of unlike denominators.
  - Creating equivalent fractions using common multiples.
  - Adding and subtracting fractions with unlike denominators (including mixed numbers) using equivalent fractions.
  - Solving addition and subtraction word problems involving fractions using visual models or equations.
  - Estimating strategies, benchmark fractions and number sense to check if my answer is reasonable.
- Apply and extend previous understanding of multiplication and division to multiply and divide fractions by
  - Explaining that fractions (a/b) can be represented as a division of the numerator by the denominator (a ÷ b) and illustrate why a ÷ b can be represented by the fraction a/b.
  - Solving word problems involving the division of whole numbers and interpret the quotient – which could be a whole number, mixed number, or fraction – in the

context of the problem.

- Explaining and illustrating my solution strategy using visual fraction models or equations that represent the problem.
- Creating story contexts for problems involving multiplication of a fraction and a whole number ((a/b) x q) or multiplication of two fractions ((a/b) x (c/d)) by interpreting multiplication with fractions in the same way that I would interpret multiplication with whole numbers (e.g. 2/3 x 4 can be interpreted as "If I need 2/3 cups of sugar for 1 batch of cookies, how much sugar do I need to make 4 batches of cookies?")
- Explaining why (a/b) x q = (a x q)/b by using visual models to show that q is partitioned into b equal parts, and a parts of each partition results in (a x q)/b (e.g., in 2/3 x 4, there are 4 wholes in which each whole is partitioned into thirds, and two of the thirds are needed from each of the whole ((2 x 4)/3 = 8/3)).
- Explaining why (a/b) x (c/d) = (a x b)/(c x d) by using visual models to show that c/d is partitioned into b equal parts, and a parts are needed which results in (a x b)/(c x d) (e.g., in 2/3 x 4/5, there is 4/5 of a whole that is partitioned into thirds – which results in 4/5 looking like 4/15 + 4/15 + 4/15 – and two parts as are needed (2 x 4/15 = 8/15)).
- Using unit fraction squares to prove the area of rectangles with fractional side lengths.
- Determining the area of rectangles with fractional side lengths by multiplying the side lengths.
- Interpreting the relationship between the size of the factors to the size of the product.
- Explaining why multiplying a given number by a number or fraction greater than 1 results in a product greater than the given umber (e.g., if 3/4 is the given number and it is multiplied by 5, the product results in a fraction that is larger than ¾).
- Explaining why multiplying a given number by a fraction less than 1 results in a product less than the given number (e.g., if 5 is the given number and it is multiplied by 3/4, the product results in a fraction that is less than 5).
- Explaining multiplication as scaling (to enlarge or reduce) using a visual model.
- Multiplying a given fraction by 1 (e.g., 2/2, 5/5) to find an equivalent fraction (e.g., 3/4 x 2/2 = 6/8).
- Solving real world problems involving multiplication of fractions and mixed numbers and interpret the product in the context of the problem.
- Explaining or illustrating my solution strategy using visual fraction models or equations that represent the problem.
- Creating story contexts for problems involving division of a unit fraction by a whole number (1/b ÷ n) or division of a whole number by a unit fraction (n ÷ 1/b) by interpreting division with fractions in the same way that I would interpret division with whole numbers (e.g., 1/3 ÷ 4 can be interpreted as "how big would each piece be if I had to share a 1/3 slice of pizza with 4 people?")
- Solving real world problems involving division of unit fractions by non-zero whole numbers by unit fractions, and interpret the quotient in the context of the problem.
- Explaining or illustrating my solution strategy using visual fraction models or

equations that represent the problem.

Assessments

- **Pre and Formative**
  - Classwork, homework, center work
  - Problem Solving Benchmarks

- **Summative**
  - Chapters 2, 6, 7, 8 Tests

- **Other assessment measures**
  - Oral assessments
  - Personal Math Trainer
  - Teacher created assessments

Teaching and Learning Actions

Instructional Strategies D	**Instructional Strategies** - Breaking down the task - Providing step-by-step prompts - Daily testing - Repeated practice - Sequenced Review - Directed Questioning and Responses - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction - Think Aloud - Peer Tutoring - Active Participation - Warm-Up Activities - Meaningful Real Life Connections - Modeling - Teachers demonstrates, student uses models to problem solve - Centers - Manipulatives – Concrete Experiences - Goal Setting - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers - Make Predictions/Estimation - Writing Explanations - Scaffolding - Extended Form - Draw a Picture - Guess and Check - Working Backwards - Multistep
Activities	- Introduce fraction stick chart, add with fraction sticks - "Fraction Top-It Addition" Game

D	- Develop a rule for addition and subtraction of fractions - Use fraction sticks to add and subtract fractions - Use a clock and develop strategies to add and subtract fractions - Explore equivalent fractions - “Fraction Capture” Game - Use multiples and factors to find common denominators - Solve fraction number stories - Comparing Fractions - “Build It” Game - Add mixed numbers - Subtract mixed numbers - “Mixed Number Spin” Game - Using a Calculator to Add Fractions - **“**Fraction Action, Fraction Friction” Game - Find area of triangles and parallelograms - Create line graphs with two sets of data - Review basic fraction ideas and solve part and whole / fraction of whole problems - “Fraction Top-It” Game - Write and rename fractions as decimals, round decimals - “Estimation Squeeze” Game - Develop a rule for addition and subtraction of fractions - Use fraction sticks to add and subtract fractions - “Divisibility Dash” Game - Fold paper to solve fractions of fraction problems - “Fraction Spin” Game - Use an area model for fraction multiplication to solve problems - Use area model and algorithm to multiply fractions and whole numbers - “Name that Number” Game - Multiply mixed numbers - **“**Frac-Tac-Toe” Game - Find area of rectangles - Show relationships between capacity and volume - Finding Surface Area - Review the Meaning of Divisibility - Use Fact Triangles to Practice Multiplication Facts - “Factor Captor” Game - Practice division and extended division facts - Develop a mental division strategy - Explore divisibility rules - Solve pan-balance problems with 2 balances - Use a clock and develop strategies to add and subtract fractions

	- Explore equivalent fractions - Solve number stories involving division of fractions - Use factor trees to find prime factorization - Write number models to match number stories
Resources	**Number and Operations - Fractions**
5.NF.A.1 GOMath Grade 5: • Lessons: 6.1, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10 5.NF.A.2 GOMath Grade 5: • Lessons: 6.1, 6.2, 6.3, 6.5, 6.6, 6.7, 6.9 5.NF.B.3 GOMath Grade 5: • Lessons: 2.7, 8.3 5.NF.B.4a GOMath Grade 5: • Lessons: 7.1, 7.2, 7.3, 7.4, 7.6 5.NF.B.4b GOMath Grade 5: • Lessons: 7.4, 7.7, 7.10 5.NF.B.5a GOMath Grade 5: • Lessons: 7.5, 7.6, 7.8 5.NF.B.5b GOMath Grade 5: • Lessons: 7.5, 7.6, 7.8 5.NF.B.6 GOMath Grade 5: • Lessons: 7.9, 7.10 5.NF.B.7 GOMath Grade 5: • Lessons: 8.2 5.NF.B.7a GOMath Grade 5: • Lessons: 8.1, 8.4, 8.5 5.NF.B.7c GOMath Grade 5: • Lessons: 8.1, 8.2, 8.4, 8.5 5.NF.B.7c GOMath Grade 5: • Lessons: 8.1, 8.4, 8.5	
Suggested Time Frame:	By the end of grade 5

Content Area:	Mathematics	Grade(s)	5
Unit Plan Title:	Measurement and Data		

Anchor Standard (ELA) or Domain (Math)

Measurement and Data – 5.MD

- Convert like measurement units within a given measurement system.
- Represent and interpret data
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Overview/Rationale

Students continue to gain experience with plotting fractional amounts onto graphs. Students use operation on fractions to solve problems involving information presented in line plots. Students will convert among customary units and metric units for length, weight and capacity; read and interpret measurement data; use cubic units to find volume of rectangular prisms; find volumes of irregular solids in order to solve problems. Students organize data by choosing and constructing appropriate data representations with suitable scales (e.g., line plots, line graphs, bar graphs, tables, and charts). Students develop the basis of understanding geometric shapes, composition and problem solving by applying measurement and data analysis.

Standard(s)

- 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system(e.g., convert 5cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

- 5.MD.B.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

- 5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
  - *5.MD.C.3a A cube with side length 1 unit, called a "unit cube" is said to have "one cubic unit" of volume, and can be used to measure volume.*
  - *5.MD.C.3b A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.*

- 5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

- 5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
  a. 5.MD.C.5a Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the height by the area of the base. Represent threefold whole- number products as volumes, e.g., to represent the

associative property of multiplication.

b. 5.MD.C.5b Apply the formulas V= l x w x h and V= B x h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

c. 5.MD.C.5c Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Technology Standards	
Standard	Indicator
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Standards for Mathematical Practice(s)

25. **Make sense of problems and persevere in solving problems.**
26. **Reason abstractly and quantitatively.**
27. **Construct viable arguments and critique the reasoning of others.**
28. **Model with mathematics.**
29. **Use appropriate tools strategically.**
30. **Attend to precision.**
31. **Look for and make use of structure.**
32. **Look for and express regularity in repeated reasoning.**

Essential Question(s)

- Why does “what” we measure influence “how” we measure?
- Why display data in different ways?

Enduring Understandings

- Measurement processes are used in everyday life to describe and quantify the world.
- Data displays describe and represent data in alternative ways.

In this unit plan, the following 21st Century Career Ready Practices are encouraged, taught, and assessed.

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives

- Convert like measurement units within a given measurement system by
  - Converting (change) measurement units within the same measurement system (e.g., 24 inches to 2 feet).
  - Solving multi-step word problems using measurement conversions.
- Represent and interpret data by
  - Creating a line plot with a given set of unit fraction measurements.
  - Solving problems using data on line plots.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition by
  - Identifying volume as an attribute of a solid figure.
  - Recognizing that a cube with 1 unit side length is “one cubic unit” of volume.
  - Explaining a process for finding the volume of a solid figure by filling it with unit cubes without gaps and overlaps.
  - Measuring the volume of a hollow three-dimensional figure by filling it with unit cubes without gaps and counting the number of unit squares.
  - Using unit cubes to determine the volume of a rectangular prism.
  - Explaining multiplication of the area of the base *(l x w = b)* by the height *(b x h = V)* will result

in the volume.
- Relating finding the product of three numbers to finding volume and relate both to the associative property of multiplication.
- Using the formulas to determine the volume of rectangular prisms.
- Decomposing an irregular figure by finding the sum of the volumes of each of the decomposed prisms.
- Solving real world problems involving volume.

Assessments

- **Pre and Formative**
  - Classwork, homework, center work
  - Problem Solving Benchmarks

- **Summative**
  - Chapters 9, 10 and 11 Tests

- **Other assessment measures**
  - Oral assessments
  - Personal Math Trainer
  - Teacher created assessments

Teaching and Learning Actions

Instructional Strategies *D*	**Instructional Strategies** - Breaking down the task - Providing step-by-step prompts - Daily testing - Repeated practice - Sequenced Review - Directed Questioning and Responses - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction - Think Aloud - Peer Tutoring - Active Participation - Warm-Up Activities - Meaningful Real Life Connections - Modeling - Teachers demonstrates, student uses models to problem solve - Centers - Manipulatives – Concrete Experiences - Goal Setting - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers - Make Predictions/Estimation - Writing Explanations - Scaffolding - Extended Form - Draw a Picture

	- Guess and Check - Working Backwards - Multistep
Activities *D*	- Introducing the Estimation Challenge Problem - Compare millions, billions, trillions - "High Number Toss" Game - Find personal measures - Organize data in a stem and leaf plot - "Finish First" Game - Show relationships between capacity and volume - Find area of a circle - Find volume of cylinders, pyramids, cones using tri-fold activity - Solving Problems involving Units of Weight and Capacity - "Name that Number" Game - Organize and describe class data and review data landmarks - Solve pan-balance problems with 2 balances - Find volume of rectangular prisms - Find volume - **"**Polygon Capture" Game - Solve pan-balance problems - Classify/Compare geometric solids - **"**3D Shape Sort" Game - Plot order pairs and translations - **"**Hidden Treasure Game" - **S**olve algebraic expressions - Finding Surface Area - Find area of rectangles
Resources	**Measurement and Data**

5.MD.A.1

GOMath Grade 5:

- Lessons: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7

5.MD.B.2

GOMath Grade 5:

- Lessons: 9.1

5.MD.C.3

GOMath Grade 5:

- Lessons: 11.4

5.MD.C.3a

GOMath Grade 5:

- Lessons: 11.5

5.MD.C.3b

GOMath Grade 5:

- Lessons: 11.6, 11.7

5.MD.C.4
GOMath Grade 5:

- Lessons: 11.6, 11.7

5.MD.C.5a
GOMath Grade 5:

- Lessons: 11.8, 11.9

5.MD.C.5b
GOMath Grade 5:

- Lessons: 11.8, 11.9, 11.10, 11.11

5.MD.C.5c
GOMath Grade 5:

- Lessons: 11.11

Suggested Time Frame:	By the end of Grade 5

Content Area:	Mathematics	Grade(s)	5
Unit Plan Title:	Geometry		

Anchor Standard (ELA) or Domain (Math)

Geometry - 5.G.1

- Graph points on the coordinate plane to solve real-world and mathematical problems.
- Classify two-dimensional figures into categories based on their properties.

Overview/Rationale

Students develop strategies based on prior knowledge and understanding of what they already know about reading, plotting and identifying ordered pairs in quadrant one. Students locate points; create paths, and measure distances on maps, scale drawings, and grids using provided scales. Students sort, classify and name shapes and solids using their attributes. Students make and test conjectures about geometric relationships including measurements of shapes and solids. Students will identify angles, lines and polygons; symmetric figures and line of symmetry. Students will use manipulatives and work problems to investigate geometry.

Standard(s)

- 5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction on one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
- 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
- 5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 5.G.B.4 Classify two-dimensional figures into categories based on their properties.

Technology Standards	
Standard	Indicator
8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Standards for Mathematical Practice(s)

33. **Make sense of problems and persevere in solving problems.**
34. **Reason abstractly and quantitatively.**
35. **Construct viable arguments and critique the reasoning of others.**
36. **Model with mathematics.**
37. **Use appropriate tools strategically.**
38. **Attend to precision.**
39. **Look for and make use of structure.**
40. **Look for and express regularity in repeated reasoning.**

Essential Question(s)

- How does geometry better describe objects?

Enduring Understandings

- Geometric attributes (such as shapes, lines, angles, figures, and planes) provide descriptive information about an object's properties and position in space and support visualization and problem solving.

In this unit plan, the following 21st Century Career Ready Practices are encouraged, taught and assessed

Career Ready Practices	
1. Act as a responsible and contributing citizen and employee.	**X**
2. Apply appropriate academic and technical skills	**X**
3. Attend to personal health and financial well-being.	**X**
4. Communicate clearly and effectively and with reason.	**X**
5. Consider the environmental, social and economic impacts of decisions	**X**
6. Demonstrate creativity and innovation.	**X**
7. Employ valid and reliable research strategies.	**X**
8. Utilize critical thinking to make sense of problems and persevere in solving them.	**X**
9. Model integrity, ethical leadership and effective management.	**X**
10. Plan education and career paths aligned to personal goals.	**X**
11. Use technology to enhance productivity.	**X**
12. Work productively in teams while using cultural global competence.	**X**

Student Learning Targets/Objectives

- Graph points on the coordinate plane to solve real-world and mathematical problems by
  - Constructing a coordinate system with two intersecting perpendicular lines and recognize that the intersection is called the origin and it is the point where 0 lies on each of the lines.
  - Recognizing that the horizontal axis is generally labeled as the x- axis, and the vertical axis is generally labeled as the y-axis.
  - Identifying an ordered pair (3, 2) as an x-coordinate followed by a y-coordinate.
  - Explaining the relational between the ordered pair and the location on the coordinate plane.
  - Determining when a mathematical problem has a set of ordered pairs.
  - Graphing points in the first quadrant of a coordinate plane using a set of ordered pairs.
  - Relating the coordinate values of any graphed point to the context of the problem.

Assessments

- **Pre and Formative**
  - Classwork, homework, center work
  - Problem Solving Benchmarks

- **Summative**
  - Chapters 9 and 11 Tests

- **Other assessment measures**
  - Oral assessments
  - Personal Math Trainer
  - Teacher created assessments

Teaching and Learning Actions	
Instructional Strategies *D*	**<u>Instructional Strategies</u>** - Breaking down the task - Providing step-by-step prompts - Daily testing - Repeated practice - Sequenced Review - Directed Questioning and Responses - Sequence Tasks from Easy to Difficult - Individual/Small-Group/Whole Class Instruction - Think Aloud - Peer Tutoring - Active Participation - Warm-Up Activities - Meaningful Real Life Connections - Modeling - Teachers demonstrates, student uses models to problem solve - Centers - Manipulatives – Concrete Experiences - Goal Setting - Mental Math - Pencil & Paper Skills - Calculator Use/Technology - Graphic Organizers - Make Predictions/Estimation - Writing Explanations - Scaffolding - Extended Form - Draw a Picture - Guess and Check - Working Backwards - Multistep
Activities *D*	- Plot order pairs and match number stories to graphs - “Hidden Treasure Game” - Plot order pairs and transformations - Plot order pairs and translations - Use formula to make table and then line graphs - Create line graphs with two sets of data - Interpret graphs - Introduce the geometry template - Measure and draw angles - Sort polygons by properties

	- "Polygon Capture" Game - Explore tessellations and regular tessellations - "Angle Tangle" Game - Practice division and extended division facts - Develop a mental division strategy - Explore divisibility rules - "Name that Number" Game
Resources	Geometry G5
5.G.A.1 GOMath Grade 5: • Lessons: 9.2 5.G.A.2 GOMath Grade 5: • Lessons: 9.3, 9.4, 9.7 5.G.B.3 GOMath Grade 5: • Lessons: 11.1, 11.2, 11.3 5.G.B.4 GOMath Grade 5: • Lessons: 11.1, 11.2, 11.3	
Suggested Time Frame:	By the end of Grade 5