MATHEMATICS
GRADE 5

EWING PUBLIC SCHOOLS
2099 Pennington Road
Ewing, NJ 08618

Board Approval Date: February 25, 2019 Michael Nitti
Revised by: District Math Staff Superintendent

In accordance with The Ewing Public Schools' Policy 2230, Course Guides, this curriculum has been reviewed and found to be in compliance with all policies and all affirmative action criteria.

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Course Description and Rationale

The Ewing Public Schools' Math Vision

The Ewing Public Schools will deliver an instructional program in mathematics where students are actively engaged in the discovery of math concepts and are applying these concepts in ways that they find meaningful and relevant.

Ewing students will be mathematical thinkers who can reason, communicate and solve problems.

Ultimately, Ewing students will master and will be able to utilize these math concepts and skills throughout their lives.

In this fifth grade course in mathematics, students focus on three critical areas: (1) 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); (2) 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 (3) developing understanding of volume.

While students will utilize a constructivist approach to investigate relationships in math, this approach will be balanced with a level of practice needed to attain skill mastery. Throughout the course, students will be actively engaged in problem solving through reasoning. Students will be expected to communicate their reasoning and problem solving on a daily basis through written and verbal formats.

In the end, the goal of this course is to develop young mathematicians with the habits of mind enabling them to meet the vision shared above, enabling their future success in mathematics.

21st Century Skills - During this course, students will work on developing, to an age appropriate level, the following 21st century skills:

Career Readiness Pathways:

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP12. Work productively in teams while using cultural global competence.

Learning and Innovation Skills:

Creativity and Innovation:

Think Creatively

- Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts

Work Creatively with Others

- View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Critical Thinking And Problem Solving:

Reason Effectively

- Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Use Systems Thinking

- Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems

Make Judgments and Decisions

- Effectively analyze and evaluate evidence, arguments, claims and beliefs
- Synthesize and make connections between information and arguments
- Interpret information and draw conclusions based on the best analysis

Solve Problems

- Identify and ask significant questions that clarify various points of view and lead to better solutions

Communication And Collaboration:

Communicate Clearly

- Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
- Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions
- Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact
- Communicate effectively in diverse environments (including multi-lingual)

Collaborate with Others

- Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

Information, Media, and Technology Skills:

Informational Literacy:

Access and Evaluate Information

- Evaluate information critically and competently

Use and Manage Information

- Use information accurately and creatively for the issue or problem at hand

Life and Career Skills:

Social and Cross-Cultural Skills:

Interact Effectively with Others

- Know when it is appropriate to listen and when to speak

Work Effectively in Diverse Teams

- Respond open-mindedly to different ideas and values

Be Responsible to Others

- Act responsibly with the interests of the larger community in mind

Technology Integration:

8.1 Educational Technology
All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

ELA Integration:

NJSLS.RI.5.1. Quote accurately from a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.

NJSLS.RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.

NJSLS.SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.

- Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
- Follow agreed-upon rules for discussions and carry out assigned roles.
- Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

NJSLS.SL.5.2. Summarize a written text read aloud or information presented in diverse media and formats (e.g., visually, quantitatively, and orally).

NJSLS.SL.5.3. Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

NJSLS.L.5.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- Interpret figurative language, including similes and metaphors, in context.
- Recognize and explain the meaning of common idioms, adages, and proverbs.
- Use the relationship between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

NJSLS.L.5.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., *however, although, nevertheless, similarly, moreover, in addition*).

Unit 1: Multiplication, Division, and Volume

Why Is This Unit Important?

In this unit, students will solve multi-digit multiplication and division problems, utilizing their understanding of the patterns and relationships between place values. Students will define their understanding of order of operations, as well as developing fluency with interpreting numerical expressions without evaluating them. Students will develop an understanding of why multiplication and division procedures work based on the meaning of base-ten numerals and properties of operations. Students will recognize volume as an attribute of three-dimensional space while understanding 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.

The big ideas embedded through this unit are:

- Numeric reasoning involves fluency and facility with numbers
- Algebra provides language through which we communicate the patterns in mathematics
- Spatial sense and geometric relationships are a means to solve problems and make sense of a variety of phenomena

Enduring Understandings:

- Understand the base-ten patterns and relationships represented by place value in our number system
- Understand how to use the base-ten patterns and relationships inherent in place value in multiplication in all strategies including the standard American algorithm
- Understand the relationship between multiplication and division and how it can be utilized when solving problems
- Understand the properties of operations and how they can be used to solve multiplication and division problems
- Understand the similarities and differences between strategies utilized to solve multiplication and division problems
- Understand how there are several ways to represent and interpret numerical expressions that can be separate from but useful in evaluating them
- Understand 2-dimensional and 3-dimensional concepts of space and relating volume, area and length to multiplication and to addition
- Understand how equations describe patterns

Essential Questions:

- How did you break apart numbers to solve multiplication problems?
- How did you solve real world problems with multiplication/division?
- How did you use multiplication to solve division?
- How do you multiply multi-digit whole numbers using the standard algorithm?
- How do you find the quotient of whole numbers with up to four digit dividends and two digit divisors?
- How do you solve a division problem by breaking the dividend into parts?
- How do you measure volume?
- How do you determine the number of cubes that will fit into a box made by a given pattern?
- How do you find the volume for a rectangular prism?
- When do you determine volume to solve real world and mathematical problems?

Acquired Knowledge:

- The base-ten relationship inherent in our place value number structure
- Properties of operations: associative, commutative, distributive
- The role of place value and properties of operations in multiplication strategies
- The relationship between multiplication and division
- The role of place value and properties of operations in division strategies
- The order of operations along with why the order exists as it does
- The identity, representation of, interpretation of and evaluation of numerical expressions
- Know the similarities and differences between perimeter, area, and volume
- Know the formulas for determining volume and from where they are derived

Acquired Skills:

- Analyze patterns and relationships
- Solve multi-digit multiplication problems using partial products
- Solve multi-digit multiplication problems using place value strategies
- Use and interpret notation that represents division and relating division and multiplication notations *(Example* $\overline{15\,)\,170}$ *= __, so ___ x15=170)*
- Use known multiplication/division combinations to find equivalent multiplication/division combinations (e.g., 18=3 x 6 is equivalent to 3 (2 x 3) AND 18 ÷ 6 = 3 is equivalent to 18 ÷ (2 x 3)
- Solve division problems by breaking the dividend into parts
- Solve division problems using partial products
- Solve two-digit divisor division problems using place value strategies
- Find whole number quotients of whole numbers with up to four digit dividends and two digit divisors *(Use strategies based on place value, properties of operations and/or the relationship between multiplication and division)*
- Describe and compare strategies used to solve division problems
- Use all four operations with multi-digit whole numbers and with decimals to hundredths, using concrete models and drawings based on place value, properties of operations and relate the strategy to a written method and explain reasoning
- Fluently multiply multi-digit whole numbers using the standard algorithm
- Write and interpret numerical expressions
- Convert different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real world problems
- Determine the attributes of a unit cube
- Use cubic units (cm, in., ft.) and improvised units to measure volume
- Determine the number of cubes that will fit into a box made by a given pattern
- Develop a strategy for determining the volume for rectangular prisms leading to using the formula for volume (V= l x w x h)
- Find the volume for rectangular prisms
- Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volume of the non-overlapping parts applying this technique to solving real world problems *(i.e., Taking an L-Shaped prism and finding the total volume by breaking it up into two rectangular prisms)* Use cubic units (cm, in., ft.) to measure volume
- Determine volume of rectangular prisms using fractional measure
- Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume

Instructional Materials:

- Quarter 1 Math Module
- Chart Paper
- Markers
- Color Tiles
- Index Cards
- Dice
- 6-Sided
- 10-Side
- Connecting Cubes
- Communicators with Dry Erase Markers
- Digit Cards
- Calculators
- Two-Color Counters
- Compare Cards
- Family Support Videos, Grade 5, Quarter 1
- Investigations in Numbers, Data and Space:
  - Grade 5, Unit 1
  - Grade 5, Unit 2

Suggested Learning Activities:

Supplements:

- Assessment Checklist: Equivalence in Multiplication/Division
- Charts with possible strategies-array and partial product methods
- Chart of formulas for volume and area

Enrichments:

- Order of operation challenges
- Formulating expressions
- Determine the number of cubes that will fit into boxes made by a given pattern
- Design a box that can be completely filled with several differently shaped rectangular packages
- Build a prism with three times the volume of a given pyramid

Assessments:

Formative Assessment:

- Do now questions
- Group discussions/presentations:
  - Propose higher order questions
  - Present information to students and ask a question
  - Have students discuss their answers with their peers at their table and discuss together as a group
- Homework

Summative Assessment:

- Explain why doubling one factor in a multiplication expression (a x b) and dividing the other by 2 results in an equivalent fraction
- Multiplication strategy application and justification
- Division strategy application and justification
- Finding the Volume of Rectangular Prisms
- Measuring Volume in Cubic Centimeters

Benchmark:

- Operations & Expressions Assessment
- Volume Assessment
- Multiplication of Whole Numbers Assessment
- Division of Whole Numbers Assessment
- First Quarter Mathematics Assessment

Alternative Assessment:

- Modified Tests and Quizzes
- Modified project requirements and rubrics

List of Applicable New Jersey Student Learning Standards for Mathematics Covered In This Unit:

- NJSLS.MP.1-8
- NJSLS.5.MD.3-5
- NJSLS.5.NBT.5-6
- NJSLS.5.OA.1-2

Suggested Learning Experiences and Instructional Activities:

- Money for Chores
- Order of Operations: Modeling with Tiles
- Order of Operations: Story Contexts
- Order of Operations: Museum Walk
- Order of Operations: Expressions Match It
- Order of Operations: Expressions Puzzle
- Order of Operations: Order of Operations Bingo
- Volume: Constructing Boxes
- Volume: Developing Strategies
- Volume: Changing Dimensions
- Volume: Different Sized Packages
- Volume: Doubling & Halving
- Volume: Using Formulas
- Multiplication: Partial Product Roulette Game
- Multiplication: Transitioning to U.S. Standard Algorithm
- Multiplication: Three-in-a-Row Game
- Division: Strategies for Division
- Division: Predicting Quotients
- Division: Division Compare Game
- Division: Problem-Solving
- Division: Largest Quotient Wins Game
- Multiplication & Division: Seeing the Connections Between Area Models

Technology:

- Multi-Digit Multiplication Game - http://www.mathplayground.com/multiplication05.html
- Manipulating Volume of Rectangular Prism - http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/
- Finding Volume Using Open Box Patterns - http://illuminations.nctm.org/activitydetail.aspx?id=6

15 Minute Math:

- Order of operations & Expressions
- Number Sense Skills
- Volume

Unit 2: Place Value, Powers of Ten, and Decimals

Why Is This Unit Important?

In this unit, students will define their understanding of place value. Students' understanding of place value in our number structure, including decimal values, will be the foundation upon which their numerical operation efficiency will be built.

Big ideas imbedded in this unit are:

- Numeric reasoning involves fluency and facility with numbers
- Algebra provides language through which we communicate the patterns in mathematics.

Enduring Understandings:

- Understand the base-ten relationship in place value and digit position within a number
- Understand the patterns in the number of zeros and the relationship of the product or quotient to powers of 10
- Understand the meaning behind place values of whole numbers and decimals
- Understand how there are several ways to represent and interpret numerical expressions that can be separate from evaluating them

Essential Questions:

- How does a digit within a number relate to the digit to its right? To its left? How about two digits to it right? Two digits to its left? Three digits?
- With numbers represented in decimals, what is the value of each digit?
- How can you compare decimals?

Acquired Knowledge:

- The place value and base-ten relationship between digits
- The identity, representation of, interpretation of, and evaluation of numerical expressions

Acquired Skills:

- 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 known multiplication/division combinations to find products related by place value (e.g., 3 x 6 = 18; 3 x 60 = 180)
- Using base-ten numerals, read and write decimals to the thousandths
- Compare two decimals to thousandths based on the meanings of the digits in each place
- Explain the meaning behind place values of whole numbers and decimals
- Compare and order whole number and decimal amounts
- Using parentheses, brackets or braces in numerical expressions, and evaluate expressions with these symbols
- Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them; *i.e., express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 +7)*

Instructional Materials:

- Quarter 2 Math Module
- Chart Paper
- Markers
- Dice
  - 6-Sided
  - 10-Side
- Communicators with Dry Erase Markers
- Digit Cards
- Decimal Cards
- Two-Color Counters
- Playing Cards
- Family Support Videos, Grade 5, Quarter 2
- Investigations in Numbers, Data and Space:
  - Grade 5, Unit 2
  - Grade 5, Unit 3
  - Grade 5, Unit 6

Suggested Learning Activities:

Supplements:

- Review of factors/multiples

Enrichments:

- Complex number puzzles
- Estimation and number sense: Closest Estimate (T71)

Assessments:

Formative Assessment:

- Do now questions
- Group discussions/presentations:
  - Propose higher order questions
  - Present information to students and ask a question
  - Have students discuss their answers with their peers at their table and discuss together as a group
- Homework

Summative Assessment:

- Comparison of whole numbers and decimals using place value
- ECR: *Place Value*

Benchmark:

- Decimal Concepts Assessment
- Decimal Addition & Subtraction Assessment
- Second Quarter Mathematics Assessment

Alternative Assessment:

- Modified Tests and Quizzes
- Modified project requirements and rubrics

NJSLS Standards:

- NJSLS.5.NBT.1-4, 7
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

- Whole Number Place Value
- Decimals to Tenths and Hundredths
- Decimals to Thousandths
- Decimal Forms
- Comparing Decimals
- Decimals on the Number Line
- Rounding Decimals
- Decimal Addition
- Decimal Subtraction
- Decimal Place Value
- Multiplication Review
- Decimal Multiplication
- Division Review
- Decimal Division

Technology:

- Decimals-various links for decimal work: http://classroom.jc-schools.net/basic/math-decim.html

15 Minute Math:

- Fraction Concepts
- Number Sense Skills
- Review: Volume
- Review: Order of Operations & Numerical Expressions

Unit 3: Fractions

Why Is This Unit Important?

This unit is important because the students will 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 will develop fluency in calculating sums and differences of fractions and make reasonable estimates of them.

Students will 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 dividing fractions make sense.

The big ideas embedded in this unit are:

- A fraction is not meaningful without knowing what the whole is.
- Renaming fractions is often the key to comparing them or computing with them. Every fraction can be renamed in an infinite number of ways.
- Operations with fractions have the same meanings as operations with whole numbers, even though the algorithms differ.

Enduring Understandings:

- Understand that a fraction's meaning is defined by its 'whole'.
- Understand how fractions can represent parts of regions, parts of sets, parts of measures, division, ratio or numbers.
- Understand how equivalent fractions name the same amount by using different-sized fractional parts.
- Understand how renaming fractions is often the key to comparing them or computing with them. Every fraction can be renamed in an infinite number of ways.
- Understand how multiplication with fractions is similar to multiplication with whole numbers in that you are often finding the product of groups of items. They are different in that you can multiply with fractions to find parts of an amount.
- Understand how division with fractions is similar to division with whole numbers in that you are often finding the size of a set number of groups or the number of groups of a set size. They are different in that you can divide with fractions to find portions of an amount.

Essential Questions:

- How do you find an equivalent fraction?
- How do you calculate sums and differences with unlike denominators?
- How do you multiply and divide fractions by whole numbers or fractions?
- How can you interpret the product when multiplying a fraction by a whole number or another fraction less than 1?

Acquired Knowledge:

- Fraction constructs
- The role the structure of a fraction plays in the fraction construct
- How equivalence can be utilized in determining sums and differences
- Visual modeling as a tool in operations with fractions
- The role that benchmark fractions can play

Acquired Skills:

- Find equivalent fractions
- Use equivalent fractions as a strategy to add and subtract fractions with unlike denominators
- Solve word problems involving addition and subtraction of fractions referring to the same whole, including unlike denominators by using visual fraction models or equalities to represent the problem by using visual fraction models or equalities to represent the problem
- Multiply fractions by whole numbers or fractions and interpret the product
- Interpret multiplication as scaling (resizing)
- Divide unit fractions by whole numbers or fractions
- Divide whole numbers by unit fractions
- Solve real world problems involving multiplication and division of fractions and mixed numbers by using models or equations to represent the problem
- Use benchmark fractions and number sense to estimate mentally and assess the reasonableness of an answer
- Use the meaning and relationship of fractions to understand and explain the procedures for multiplication and division
- Compare 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
- Interpret division of a unit fraction by a non-zero whole number

Instructional Materials:

- Quarter 3 Math Module
- Chart Paper
- Markers
- Communicators with Dry Erase Markers
- Fraction Cards
- Two-Color Counters
- Family Support Videos, Grade 5, Quarter 3
- Investigations in Numbers, Data and Space:
    - Grade 5; Unit 4

Suggested Learning Activities:

Enrichments:

- In Between Game

Supplements:

- Fraction Cards

Assessments:

Formative Assessment:

- Do now questions
- Group discussions/presentations:
    - Propose higher order questions
    - Present information to students and ask a question
    - Have students discuss their answers with their peers at their table and discuss together as a group
- Homework

Summative Assessment:

- The Structure and Meaning of Fractions
- Multiplication of Fractions using Visual Modeling
- Division of Fractions using Visual Modeling
- ECR: *Visual Modeling of Operations with Fractions*

Benchmark Assessment:

- Addition and Subtraction of Fractions Assessment
- Multiplication of Fractions Assessment
- Division of Fractions Assessment
- Third Quarter Mathematics Assessment

Alternative Assessment:

- Modified Tests and Quizzes
- Modified project requirements and rubrics

List of Applicable Common Core Standards for Mathematics Covered In This Unit:

- NJSLS.5.NF.1-7
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

- Fractions on a Number Line
- Addition and Subtractions of Fractions on a Number Line
- Exploring Equivalent Fractions Through Patterns
- Addition and Subtraction of Fractions Using Equivalent Fractions
- Multiplication of Fractions by Whole Numbers: Bar Models
- Multiplication of Fractions by Whole Numbers: Array Models
- Reasoning with Multiplication of Fractions: Larger or Smaller?
- Division of Fractions: Dividing a Whole Number by a Fraction
- Division of Fractions: Dividing a Fraction by a Whole Number
- Division of Fractions: Problem Solving
- Interpreting fractions as Division

Technology:

- Equivalent Fraction review of procedures/questions available http://www.mathsisfun.com/equivalent_fractions.html
- Soccer Shootout (Addition/Subtraction/Multiplication/Division of fractions) http://www.funbrain.com/fractop/index.html
- Jeopardy Game (Addition/Subtraction/Multiplication/Division of fractions) http://www.math-play.com/Fractions-Jeopardy/fractions-jeopardy.html
- Word Problems http://www.mathplayground.com/wpdatabase/Fractions1_1.htm

15 Minute Math:

- Measurement Conversions
- Data: Line Plots
- Review: Volume
- Review: Place Value/Decimals
- Review: Operations with Whole Numbers
- Review: Operations with Decimals
- Review: Order of Operations & Expressions

Unit 4: Measurement and Geometry

Why Is This Unit Important?

In this unit students will be able to convert measurements. Students will represent data in an organized way. They will analyze their findings based on the structure of the graphs. They will incorporate addition and subtraction understandings to create graphs. They will locate places on a coordinate grid. They will generate numerical patterns using given rules and identify relationships between corresponding terms. Students will develop their understanding of classification of polygons. They will be able to differentiate between the various types of triangles and quadrilaterals. They will work with angles in this unit to develop common known measures to find the measures of other angles.

The big ideas embedded throughout this unit are:

- Measurement is a tool to quantify a variety of phenomena
- Spatial sense and geometric relationships are a means to solve problems and make sense of a variety of phenomena
- Reading, understanding, interpreting, and communicating data are critical in modeling a variety of real-world situations, drawing appropriate inferences, making informed decisions, and justifying those decisions
- Spatial sense and geometric relationships are a means to solve problems and make sense of a variety of phenomena

Enduring Understandings:

- Understand the uses and roles of measurement units
- Understand 2-dimensional and 3-dimensional concepts of space and relating volume, area and length to multiplication and to addition
- Understand how equations describe patterns
- Understand how a line plot shows the relationship between two variables
- Understand how a Cartesian coordinate system is a two dimensional matrix that allows us to visually map out a relationship between two variables
- Understand how real-world problems can be visually modeled, represented and interpreted using coordinate values Understand how geometric shapes and figures have properties and characteristics which identify them
- Understand how geometric shapes and figures can be related with common properties based on similar characteristics
- Understand how common characteristics can be used to not only relate geometric shapes and figures but can also be used to classify them into group hierarchies, which in turn share inclusive properties

Essential Questions:

- How can we organize data on a line plot?
- What conclusions can we draw about our data based on the line plot?
- How can we organize the x-axis and y-axis to graph our data?
- Where does a given point lie on the coordinate plane?
- What are the coordinates (ordered pairs) for a set of given points?
- How can you apply rules to find new points?
- What type of triangle do you see?
- Is this polygon regular?
- How can we classify this quadrilateral?

Acquired Knowledge:

- Know standardized measurement units
- Know measurement unit conversions
- Know the Cartesian coordinate system
- Know how a line plot describes a relationship between two variables
- Know how a line plot can be used to predict unknown values for a variable, including likely future events/values
- Know defining characteristics of 2-dimensional shapes
- Know the attributes and properties of categories of 2-dimensional shapes
- Know the classification hierarchy of 2-dimensional shapes

Acquired Skills:

- Convert like measurement units within a given measurement system
- Convert different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step, real world problems
- How to describe/analyze the data shown on the line plot
- How to use axes to construct a coordinate plane
- How to plot points on a coordinate plane
- Identify ordered pairs of coordinates on a graph
- Using a line plot to represent ordered, numerical data
- Using a rule, predict the next location of a point
- Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$)
- Show how to take a set of data and create a line plot
- Show how to describe/analyze the data shown on the line plot
- Describe data in terms of clusters, outliers, frequency
- How to identify and classify polygons based on attributes
- Using known angles to find the measure of other angles
- Identify equilateral, isosceles, scalene, acute, right, obtuse triangles
- Use attributes to describes and compare quadrilaterals, including parallelograms, rectangles, rhombi, trapezoids and squares
- Use attributes to classify two-dimensional figures in a hierarchy based on properties

Instructional Materials:

- Quarter 4 Math Module
- Chart Paper
- Markers
- Graph Paper
- Communicators with Dry Erase Markers
- Rulers
- Playing Cards
- Fraction Bars
- Connecting Cubes
- Family Support Videos, Grade 5, Quarter 4
- Investigations in Numbers, Data and Space:
    - Grade 5; Unit 1
    - Grade 5; Unit 2
    - Grade 5; Unit 5
    - Grade 5; Unit 6
    - Grade 5; Unit 8
    - Grade 5; Unit 9

Suggested Learning Activities:

Enrichments:

- Use of four quadrant coordinate graphing
- Find the distance between locations on a coordinate plane
- Logopaths Activity: Angle and Turn Game
- Define the terms 'regular' and 'convex' to apply to the group of polygons
- While using Logopaths, challenge students to draw other types of triangles, such as scalene, isosceles, right, obtuse or acute

Supplements:

- Define terms needed based on data (height, growth, rate, steady, etc.)
- Use of practice coloring grid pictures to get the idea of the x-axis and y-axis
- Use of Shape Cards to locate figures with a given property
- Chart of rules that describe shapes

Assessments:

Formative Assessment:

- Do now questions
- Group discussions/presentations:
  - Propose higher order questions
  - Present information to students and ask a question
  - Have students discuss their answers with their peers at their table and discuss together as a group
- Homework

Summative Assessment:

- Unit Conversion
- Describe major features of a set of data represented in a line plot, and quantify the description using fractional parts of the data
- Draw conclusions about how two groups compare based on summarizing the data for each group
- Locate points on a coordinate plane
- List ordered pairs for points of a figure on a coordinate plane
- Investigations Unit 9: End-of-Unit Assessment (Add-on lesson 1.6A and pages C113-C116)
- ECR: Interpreting Data with Line Plots
- Identify different quadrilaterals by attribute, and know that some quadrilaterals can be classified in more than one way
- Use known angle sizes to determine the sizes of other angles
- ECR: *Shape Hierarchies*

Benchmark Assessment:

- Measuring Assessment
- Geometry Assessment
- Fourth Quarter Mathematics Assessment

Alternative Assessment:

- Modified Tests and Quizzes
- Modified project requirements and rubrics

List of Applicable Common Core Standards for Mathematics Covered In This Unit:

- NJSLS.5.G.1-4
- NJSLS.5.MD.1-2
- NJSLS.5.NBT.7
- NJSLS.5.NF.4,6
- NJSLS.5.OA.3
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

- Graphing on the Coordinate Plane
- Interpreting a Graph
- Graphing with Numerical Patterns
- Properties of Geometric Figures
- Graphing Shapes
- Classifying Shapes
- Converting Measurements
- Using Measurements to Represent Relationships
- Line Plots
- Comparing Data
- Fractions on a Line Plot
- Using Line Plots to Solve Problems
- Data Collecting and Line Plots
- Using Line Plots to Represent Fractions
- Solving Problems Using Decimals
- Solving Problems Using Volume

Technology:

- Reading linear measurements (centimeters and inches only) www.funbrain.com/measure
- Manipulating Volume of Rectangular Prism - http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/
- Finding Volume Using Open Box Patterns - http://illuminations.nctm.org/activitydetail.aspx?id=6
- Coordinate Graphing - http://www.shodor.org/interactivate/activities/SimpleCoordinates/
- Coordinate Graphing - http://www.funbrain.com/cgi-bin/co.cgi?A1=c&A2=0&A3=1&A4=1&A5=OisAgP&A6=[4][4]
- http://www.mathwire.com/geometry/coordgeom.html
- Use of Logopaths software in computer lab
- Shape Sorter game: http://illuminations.nctm.org/ActivityDetail.aspx?ID=34
- Interactive Triangles: http://www.mathsisfun.com/geometry/triangles-interactive.html

15 Minute Math:

- Review: Volume
- Review: Place Value/Decimals
- Review: Operations with Whole Numbers
- Review: Operations with Decimals
- Review: Operations with Fractions
- Review: Order of Operations & Expressions

Sample Standards Integration

21st Century Skills & Career Readiness Practices

CRP4. Communicate clearly and effectively and with reason.

For example in Unit 1, students will have to Identify and justify the use of the mathematical processes in their math learning.

CRP6. Demonstrate creativity and innovation.

For example in Unit 2, students will be tasked with modifying strategies for multiplying whole numbers to multiplying numbers with decimals to the thousandths.

CRP7. Employ valid and reliable research strategies.

For example in Unit 4, students make observations and take measurements to determine trends in data.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

For example in Unit 3, students will investigate why multiplying and dividing by fractions end up with quantities greater or smaller in an inverse relationship to what is found when multiplying and dividing by whole numbers.

CRP12. Work productively in teams while using cultural global competence.
For example in Unit 1, students will work productively in teams to design strategies for finding volume, for specific tasks, while changing the dimensions on their packaging.

8.1 Educational Technology
All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

For example in Unit 4, students will access, manage, evaluate, and synthesize information to develop models for geometric shapes and their manipulation.

Interdisciplinary Connections

NJSLS.RI.5.1. Quote accurately from a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
NJSLS.RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.
NJSLS.SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.

- Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
- Follow agreed-upon rules for discussions and carry out assigned roles.
- Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

NJSLS.SL.5.2. Summarize a written text read aloud or information presented in diverse media and formats (e.g., visually, quantitatively, and orally).
NJSLS.SL.5.3. Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
NJSLS.L.5.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- Interpret figurative language, including similes and metaphors, in context.
- Recognize and explain the meaning of common idioms, adages, and proverbs.
- Use the relationship between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

NJSLS.L.5.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., *however, although, nevertheless, similarly, moreover, in addition*).

These standards are met throughout the course, for example in Unit 4, students will be tasked with 'Boxing Boxes' students have to designing charts with instructions for employees outlining packaging instructions for the various merchandise shipped by the company. Along with this they have to submit a report to their boss explaining how to read and use the instructions.