

Cedar Grove School District

Cedar Grove, NJ

2016 | **Mathematics**
Grade 5

Approved by the Cedar Grove Board of Education
November 15, 2016

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Mathematics

Grade 5

In Grade 5, instructional time should 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.

1. 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.)
2. 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.
3. 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.

**This curriculum was written in accordance with the
NEW JERSEY STUDENT LEARNING STANDARDS
for Mathematics**

The standards can be viewed at

<http://www.state.nj.us/education/cccs/2016/math/standards.pdf>

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.

Grade 5 - Scope and Sequence

Unit 1	September – October
Unit 2	November – January
Unit 3	January – February
Unit 4	March – April
Unit 5	April – June

Mathematics - Grade 5

Unit 1: Understanding the Place Value System

21st Century Themes

E-Encouraged, T-Taught, or A-Assessed in this unit

Creativity and Innovation

Critical Thinking and Problem Solving

Communication

Collaboration

Unit 1 Learning Targets

Students will be able to...

- Evaluate numerical expressions with parentheses, brackets or braces
- Write numerical expressions when given a word problem or a scenario in words and use words to interpret numerical expressions
- Explain the “ten times” or $1/10$ relationships for place values in multi-digit numbers moving right
- Use 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. For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product
- 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
- 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
- Read, write, and compare decimals to thousandths.
- Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
- Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons
- Use place value understanding to round decimals to any place

#	Student Learning Objectives	NJSLS	Learning Activity
1	Evaluate numerical expressions with parentheses, brackets or braces.	5.OA.1	<ul style="list-style-type: none"> • Discuss why the order of operations is important when solving $3 + 9 \times 7 + 8$
2	Write numerical expressions when given a word problem or a scenario in words and use words to interpret	5.OA.2	<ul style="list-style-type: none"> • Identify key words that represent each operation • Translate real world situations

	numerical expressions.		into numerical expressions
3	Explain the “ten times” or 1/10 relationships for place values in multi-digit numbers moving right or left across the places.	5.NBT.1	<ul style="list-style-type: none"> Use base ten blocks and the place value chart to show the relationship between place values moving to the left and to the right of the place
4	Recognize and explain patterns of the number of zeros and the placement of the decimal point in a product or quotient when a number is multiplied or divided by powers of 10.	5.NBT.2	<ul style="list-style-type: none"> Find and discuss patterns after having solved using the standard algorithm Apply patterns to multiplication and division questions
5	Compare decimals to thousandths based on the value of the digits in each place using the symbols $>$, $=$, $<$ when presented as base ten numerals, number names, or expanded form.	5.NBT.3	<ul style="list-style-type: none"> Compare decimals by lining up the place values vertically Use base ten blocks to show the size of each number
6	Round a decimal to any place.	5.NBT.4	<ul style="list-style-type: none"> Underline the place value that is being rounded, circle the number to the right of it, and determine whether to round a number up or down
7	Use the standard algorithm to multiply 3-digit whole numbers by 1-digit whole numbers.	5.NBT.5	<ul style="list-style-type: none"> Use area models and the distributive property to break down the number Use the standard algorithm to multiply

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.

SLO #2 Explain the correspondences between expressions represented in word problems or scenarios and numerical expressions.

2. Reason abstractly and quantitatively.

SLO #1 Know and flexibly apply the properties of operations to evaluate numerical expressions with parentheses, brackets and braces.

SLO #2 Understand and make sense of quantities and their relationships to one another in numerical expressions and numerical expressions represented in word problems.

SLO #3 Understand and make sense of the relationships of place values and the quantities they represent.

SLO #4 Understand and make sense of the quantities of zeros and the placement of the decimal point in a product or quotient when a number is multiplied or divided by a power of 10.

SLO #5 Understand and make sense of the relationship of decimals to the thousandths and the quantities they represent.

SLO #6 Understand and make sense of the quantity when rounding decimals to any place.

SLO #8 Use quantitative reasoning that entails creating a coherent representation of division problems using 4-digit dividends and 2-digit divisors in equations.

3. Construct viable arguments and critique the reasoning of others.

SLO #3 Justify and explain conclusions made about place value relationships in multi-digit numbers.

SLO #4 Make conjectures and build logical statements involving the patterns of the number of zeros and the placement of the decimal point when a number is multiplied or divided by a power of 10.

SLO #8 Explain and justify conclusions (in the form of equations, arrays, and models) made about dividing 4-digit dividends and 2-digit divisors.

4. Model with mathematics.

SLO #2 Apply previously learned concepts about numerical expressions and word problems in order to solve problems that involve both.

5. Use appropriate tools strategically.

6. Attend to precision.

SLO #3 Communicate precisely the place value relationships in multi-digit numbers.

SLO #5 State the meaning of the $<$, $>$, or $=$ symbols when comparing decimals to the thousandths place.

SLO #8 Calculate whole number quotients accurately and efficiently.

7. Look for and make use of structure.

SLO #1 Look for and discern a pattern or structure when evaluating numerical expressions with parentheses, brackets, and braces.

SLO #3 Look for and discern a pattern involving place value (“ten times” or “ $1/10$ ” relationship).

SLO #4 Look for and discern a pattern involving the number of zeros and the placement of the decimal point when a number is divided or multiplied by a power of 10.

SLO #7 Look for and discern a pattern when using the standard algorithm to multiply 3-digit whole numbers by 1-digit whole numbers.

SLO #8 Look for and discern a pattern when dividing 4-digit dividends and 2-digit divisors.

8. Look for and express regularity in repeated reasoning.

Unit 1 Essential Questions	Unit 1 Enduring Understandings
<ul style="list-style-type: none">● <i>How can you represent a decimal on a place-value chart?</i>● <i>How can you order and compare decimals?</i>● <i>How can you round whole numbers and decimals?</i>● <i>How can you use mental math to multiply by multiples of 10, 100, or 1,000?</i>● <i>How do you multiply by 1-digit numbers?</i>● <i>How do you multiply by 2-digit numbers?</i>● <i>How can you multiply 3 digit</i>	<ul style="list-style-type: none">● <i>Numbers can be used to tell how many. Our number system is based on groups of ten. Whenever ten is in one place, we move to the next greater place value.</i>● <i>Place value can be used to compare and order whole numbers and decimals.</i>● <i>Rounding is a process for finding the multiples of 10, 100, etc., or of 0.1, 0.01, etc., closest to a given number.</i>● <i>Basic facts and place value patterns can be used to find products when one factor is a multiple of 10 or a multiple of</i>

<p><i>numbers by 2 digit numbers?</i></p> <ul style="list-style-type: none"> ● <i>How can you draw a picture to help choose an operation?</i> ● <i>How can you use mental math to divide multiples of 10 and 100?</i> ● <i>How can you use compatible numbers to estimate quotients?</i> ● <i>How can you use models and symbols to understand and record division?</i> ● <i>When you divide a 3-digit number by a 1-digit number, how do you know where to put the first digit in the quotient?</i> ● <i>When do you write a zero in the quotient?</i> ● <i>How can patterns help you divide large multiples of 10?</i> ● <i>How can you use compatible numbers to estimate quotients?</i> ● <i>How can you solve multiple step problems?</i> ● <i>How do you divide by a multiple of ten?</i> 	<p><i>100.</i></p> <ul style="list-style-type: none"> ● <i>The standard multiplication algorithm breaks the calculation into simpler calculations using place value starting with the ones, then the tens, and so on. Operations are done in a numerical expression in an agreed upon order.</i> ● <i>The standard multiplication algorithm breaks the calculation into simpler calculations using place value starting with the ones, then the tens, and so on.</i> ● <i>The standard algorithm for multiplying whole numbers with factors having three or more digits is just an extension of the algorithm for multiplying two digit numbers by two digit numbers to greater place values.</i> ● <i>Information in a problem can often be shown using a diagram and used to solve the problem. Some Basic facts and place value patterns can be used to divide multiples of 10, 100, and so forth by one digit numbers.</i> ● <i>There is more than one way to estimate a quotient. Substituting compatible numbers is an efficient technique for estimating quotients.</i> ● <i>The sharing interpretation of division and money can be used to model the standard division algorithm. Different numerical expressions can have the same value. Or the value of one expression can be less than or greater than the value of another expression.</i> ● <i>The sharing interpretation of division and money can be used to model the standard algorithm.</i> ● <i>The sharing interpretation of division and money can be used to model the standard algorithm.</i> ● <i>Patterns can be used to mentally multiply decimals by 10, 100, and 1000.</i>
<p>Standard Code #</p>	<p>NJ Student Learning Standards</p>
<p>5.OA.1</p>	<p>Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p>

5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.</i>
5.NBT.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.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.3	Read, write, and compare decimals to thousandths. <ul style="list-style-type: none"> 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.
5.NBT.4	Use place value understanding to round decimals to any place.
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
5.NBT.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.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
- Chapter Quiz and Test

Formative Assessment

- Multiplication timed tests
- In-class check-ups
- IXL assessments
- Homework
- Stations based on skill

Instructional Materials and Resources

- Go Math! series
- www.ixl.com
- www.brainpop.com
- Base ten blocks
- Place value chart
- Multiplication chart

- Graph paper

Integration of Technology

- Computers
- SMART Board
- www.ixl.com
- www.brainpop.com
- www.NJSLStoolbox.com
- Think Central

Curriculum Development Resources

- <http://www.state.nj.us/education/cccs/2016/math/standards.pdf>
- <http://www.state.nj.us/education/modelcurriculum/math/2.shtml>
- <http://www.state.nj.us/education/cccs/standards/9/9.pdf>

Mathematics - Grade 5

Unit 2: Geometric Measures and Understanding Volume

21st Century Themes

E-Encouraged, T-Taught, or A-Assessed in this unit

Creativity and Innovation

Critical Thinking and Problem Solving

Communication

Collaboration

Unit 2 Learning Targets

Students will be able to...

- Measure volume by counting the total number of same size cubic units required to fill a figure without gaps or overlaps
- Choose an appropriate cubic unit based on the attributes of the 3-dimensional figure you are measuring
- Show that the volume of a right rectangular prism found by counting all the unit cubes is the same as the formulas $V = l \times w \times h$ or $V = B \times h$
- Explain how both volume formulas relate to counting the cubes in one layer and multiplying that value by the number of layers (height)
- Find the volume of a composite solid figure composed of two non-overlapping right rectangular prisms
- Apply formulas to solve real world and mathematical problems involving volumes of right rectangular prisms and composites of same

#	Student Learning Objectives	NJSLS	Learning Activity
1	Understand and measure volume by counting the total number of same size cubic units required to fill a figure without gaps or overlaps.	5.MD.3b, MD.4	<ul style="list-style-type: none"> • Use cubes to build 3-dimensional figures and calculate the volume by counting the total cubes used
2	Know a cube with a side length of 1 unit is called a "unit cube" and can be used to measure volume. Choose an appropriate cubic unit based on the attributes of the 3-dimensional figure you are measuring.	5.MD.3a, MD.4	<ul style="list-style-type: none"> • Use cubes to build 3-dimensional figures and calculate the volume by counting the total cubes used • Discuss the use of cubic unit based on the object
3	Show that the volume of a right rectangular prism found by counting all the unit cubes is the same as the formulas $V = l \times w \times h$ or $V = B \times h$.	5.MD.5a	<ul style="list-style-type: none"> • Investigate the volume of a rectangular prism by creating a rectangular prism using a net and filling the prism with centimeter cubes • Use cubes to build 3-dimensional figures and calculate the volume by

			counting the total cubes used and discussing how to calculate the volume using a formula
4	Explain how both volume formulas relate to counting the cubes in one layer and multiplying that value by the number of layers (height).	5.MD.5b	<ul style="list-style-type: none"> Use cubes to build 3-dimensional figures and calculate the volume by counting the total cubes used and discussing how to calculate the volume using two variations of the formula
5	Find the volume of a composite solid figure composed of two non-overlapping right rectangular prisms.	5.MD.5c	<ul style="list-style-type: none"> Build composite build 3-dimensional figures and find the volume by breaking apart the two rectangular prisms by adding them together Find the volume of a composite figure by finding the greatest possible volume and subtracting the empty space
6	Apply formulas to solve real world and mathematical problems involving volumes of right rectangular prisms and composites of same.	5.MD.5	<ul style="list-style-type: none"> Find the volume of rectangular prisms found around the classroom by measuring the length, width, and height Look for two pictures of three-dimensional buildings in newspapers and magazines. The buildings should be rectangular prisms. Research dimensions and find the volume.

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.

SLO #2 Choose the appropriate cubic unit based on the figures attributes and ensure that the measurement is valid.

SLO #7 Explain the correspondences between expressions represented in word problems or scenarios and numerical expressions.

2. Reason abstractly and quantitatively.

SLO #1 Understand and make sense of volume quantities.

SLO #1 Use quantitative reasoning to create a coherent representation of volume.

SLO #4 Use quantitative reasoning to create a coherent representation of both volume formulas.

SLO #7 Understand and make sense of quantities and their relationships to one another in numerical expressions and numerical expressions represented in word

problems.

3. Construct viable arguments and critique the reasoning of others.

SLO #4 Understand assumptions and definitions regarding volume to explain attributes of volume.

SLO #4 Explain and justify conclusions made about volume.

4. Model with mathematics.

SLO #3 Map the relationship between counting all the cubes and using the volume formula.

SLO #6 Apply previously learned concepts about multiplication and volume to solve real world volume problems.

SLO #7 Apply previously learned concepts about numerical expressions and word problems in order to solve problems that involve both.

5. Use appropriate tools strategically.

6. Attend to precision.

SLO #4 Communicate and explain precisely how both volume formulas relate to counting cubes in one layer and multiplying the value by the number of layers.

7. Look for and make use of structure.

SLO #5 Look for and discern patterns when finding the volume of a composite solid figure composed to two right rectangular prisms.

8. Look for and express regularity in repeated reasoning.

Unit 2 Essential Questions

- *How do you find the volume of a rectangular prism?*
- *How can you find the area of an irregular shape?*
- *How can you use a simpler problem to solve another problem?*
- *Why is it important to know the different types of volume measurement?*
- *How does the area of a composite figure related to the contest of volume?*
- *How can you relate volume to the operations of multiplication and addition?*
- *When do we use geometric measurement of three (3) dimensional figures in a real world setting?*

Unit 2 Enduring Understandings

- *Volume is a measure of the amount of space inside a solid figure. Volume can be measured by counting the number of cubic units needed to fill a three dimensional object.*
- *The area of some irregular shapes and the volume of some irregular solids can be found or estimated by breaking apart the shape or solid into shapes of solids for which the area and volume can be found.*
- *Some problems can be solved by breaking apart or changing the problem into simpler ones, solving the simpler ones first, and using the solutions to solve the original problem.*
- *Unit cubes are one way to represent the measurement of volume.*
- *Volume can be related to the operations of multiplication and division by filling rectangular prisms with cubes and looking at the relationship between the total volume and area of the base. Knowing that a cube is one unit by one unit by one unit (cubic unit), students can then develop their understanding of volume.*
- *Models of cubes in inches, centimeters,*

and feet are helpful for students to develop images.

Standard Code #	NJ Student Learning Standards
5.OA.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 $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. <ol style="list-style-type: none"> 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.
5.MD.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft and improvised units.
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. <ol style="list-style-type: none"> 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 it 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. Apply the formula $V = l \times w \times h$ 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.
Evidence of Learning	
Summative Assessment	
<ul style="list-style-type: none"> ● Model Curriculum Assessment ● Chapter Quiz and Test 	
Formative Assessment	
<ul style="list-style-type: none"> ● In-class check-ups ● IXL assessments ● Homework ● Stations based on skill 	
Instructional Materials and Resources	
<ul style="list-style-type: none"> ● Go Math! series ● www.ixl.com ● www.brainpop.com ● Centimeter cubes ● Real-life rectangular prisms ● Rulers 	

- Nets of 3-dimensional shapes
- Graph paper

Integration of Technology

- Computers
- SMART Board
- www.ixl.com
- www.brainpop.com
- www.NJSLStoolbox.com
- Think Central

Curriculum Development Resources

- <http://www.state.nj.us/education/cccs/2016/math/standards.pdf>
- <http://www.state.nj.us/education/modelcurriculum/math/2.shtml>
- <http://www.state.nj.us/education/cccs/standards/9/9.pdf>

Mathematics - Grade 5

Unit 3: Operations with Multi-Digit Whole Numbers and Decimals

Unit 3 Summary:

21st Century Themes

E-Encouraged, T-Taught, or A-Assessed in this unit

Creativity and Innovation

Critical Thinking and Problem Solving

Communication

Collaboration

Unit 3 Learning Targets

Students will be able to...

- Describe the place value of numeral digits relative to both the place to the right and the place to the left (decimal to hundredths and whole numbers to billions)
- 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; and, explain the reasoning used
- Convert standard measurement units within the same system (e.g., centimeters to meters) to solve multi-step problems)
- Multiply multi-digit whole numbers using the standard algorithm. (no calculators)
- 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.

#	Student Learning Objectives	NJSLS	Learning Activity
1	Describe the place value of numeral digits relative to both the place to the right and the place to the left (decimal to hundredths and whole number to billions)	5.NBT.1	<ul style="list-style-type: none"> • Use base ten blocks and the place value chart to show the relationship between place values moving to the left and to the right of the place • Convert metric units and relate to the place value chart and Science
2	Fluently multiply multi-digit whole numbers using the standard algorithm.	5.NBT.5	<ul style="list-style-type: none"> • Model various ways to complete multiplication of whole numbers, including partial products, area models, base ten blocks, and the standard algorithm

			<ul style="list-style-type: none"> ● Use estimation to check that the product is reasonable
3	Calculate whole number quotients with 4-digit dividends and 2-digit divisors and explain answers with equations, rectangular arrays, and area models.	5.NBT.6	<ul style="list-style-type: none"> ● Use area models and the distributive property to break down the number ● Estimate using compatible numbers to place the first digit ● Model various ways to complete long division, including partial quotients, pictures, base ten blocks, and the standard algorithm ● Interpret the remainder of real-life situations to decide whether to use the remainder, add 1 to the quotient, ignore the remainder, or write the remainder as a fraction
4	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 reason used	5.NBT.7	<ul style="list-style-type: none"> ● Model various ways to complete all decimal operations, including pictures, base ten blocks, and the standard algorithm ● Show and discuss regrouping of base ten blocks for addition, subtraction, multiplication and division
5	Convert standard measurement units within the same system (e.g., centimeters to meters) to solve multi-step problems	5.MD.1	<ul style="list-style-type: none"> ● Use a bar model to represent breaking up units of measurement ● Utilize rulers to measure items around the classroom and convert the items to other units ● Utilize milk containers to represent units of capacity and convert to other units ● Relate customary units of weight to real life representations ● Use clocks to convert time and calculate elapsed time

Selected Opportunities for Connection to Mathematical Practices			
<p>1. Make sense of problems and persevere in solving them. SLO #4 Explain correspondences between equations involving multiplication of fractions by whole numbers. SLO #5 Analyze the givens and relationships of an area model with fractional side lengths.</p> <p>2. Reason abstractly and quantitatively. SLO #3 Understand and make sense of fraction quotients, including mixed numbers. SLO #4 Use quantitative reasoning to create a coherent representation of multiplication of fractions by whole numbers, and understand their quantities and the quotients quantities. SLO #6 Understand and make sense of the factor and product quantities involved in multiplication.</p> <p>3. Construct viable arguments and critique the reasoning of others. SLO #6 Analyze the factors and products of multiplication problems by separating them into cases.</p> <p>4. Model with mathematics. SLO #5 Apply previously learned concepts about area to solve area problems with fractional side length. SLO #5 Map the relationships in area problems with fractional sides using diagrams and other tools.</p> <p>5. Use appropriate tools strategically. SLO #2 Consider and use available tools, such as diagrams and drawings, when solving addition or subtraction word problems involving fractions with unlike denominators.</p> <p>6. Attend to precision. SLO #3 Communicate and explain how a product is related to the magnitude of the factors.</p> <p>7. Look for and make use of structure. SLO #4 Look for and discern a pattern in equations that involve multiplication of fractions by whole numbers. SLO #7 Look for and discern a pattern when using the standard algorithm to multiply multi-digit whole numbers.</p> <p>8. Look for and express regularity in repeated reasoning. SLO #2 With problems involving addition and subtraction of fractions; continually evaluate the reasonableness of the answers.</p>			
Unit 3 Essential Questions		Unit 3 Enduring Understandings	
<ul style="list-style-type: none"> ● <i>Why is it important to have students communicate precisely using decimals and fractions?</i> ● <i>How can models help you to understand the conversion of different sized standard measurement units in the real world?</i> ● <i>Why is understanding the place value system important in accurately</i> 		<ul style="list-style-type: none"> ● <i>Mathematical real world situations require that people proficiently apply the skills of decimals and fractions to correctly formulate answers to problems.</i> ● <i>Models enable a learner to discover and extend their understanding to real world situations.</i> ● <i>Developing fluency in place value system is essential for accurately</i> 	

1. Make sense of problems and persevere in solving them.

SLO #4 Explain correspondences between equations involving multiplication of fractions by whole numbers.

SLO #5 Analyze the givens and relationships of an area model with fractional side lengths.

2. Reason abstractly and quantitatively.

SLO #3 Understand and make sense of fraction quotients, including mixed numbers.

SLO #4 Use quantitative reasoning to create a coherent representation of multiplication of fractions by whole numbers, and understand their quantities and the quotients quantities.

SLO #6 Understand and make sense of the factor and product quantities involved in multiplication.

3. Construct viable arguments and critique the reasoning of others.

SLO #6 Analyze the factors and products of multiplication problems by separating them into cases.

4. Model with mathematics.

SLO #5 Apply previously learned concepts about area to solve area problems with fractional side length.

SLO #5 Map the relationships in area problems with fractional sides using diagrams and other tools.

5. Use appropriate tools strategically.

SLO #2 Consider and use available tools, such as diagrams and drawings, when solving addition or subtraction word problems involving fractions with unlike denominators.

6. Attend to precision.

SLO #3 Communicate and explain how a product is related to the magnitude of the factors.

7. Look for and make use of structure.

SLO #4 Look for and discern a pattern in equations that involve multiplication of fractions by whole numbers.

SLO #7 Look for and discern a pattern when using the standard algorithm to multiply multi-digit whole numbers.

8. Look for and express regularity in repeated reasoning.

SLO #2 With problems involving addition and subtraction of fractions; continually evaluate the reasonableness of the answers.

Unit 3 Essential Questions

- *Why is it important to have students communicate precisely using decimals and fractions?*
- *How can models help you to understand the conversion of different sized standard measurement units in the real world?*
- *Why is understanding the place value system important in accurately*

Unit 3 Enduring Understandings

- *Mathematical real world situations require that people proficiently apply the skills of decimals and fractions to correctly formulate answers to problems.*
- *Models enable a learner to discover and extend their understanding to real world situations.*
- *Developing fluency in place value system is essential for accurately*

<p><i>multiplying multi-digit numbers?</i></p> <ul style="list-style-type: none"> • <i>What different models and strategies can show the relationship of adding, subtracting, multiplying and dividing decimals to the hundredths?</i> • <i>What makes an estimation reasonable?</i> • <i>What types of real world math problems require the operations of addition and subtraction of fractions to find a solution?</i> • <i>What are the steps for dividing by 2-digit numbers?</i> 	<p><i>multiplying multi-digit numbers.</i></p> <ul style="list-style-type: none"> • <i>Various models and strategies, such as working backwards, drawing diagrams, using manipulatives, help connect student's learning to real life situations.</i> • <i>Estimation is an important concept for real life in making quick, accurate decisions; estimation in math helps students reason and make sense of quantities.</i> • <i>Approaches to real world math problems are a skill requiring addition and subtraction of fractions.</i>
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Benchmark Standards

Standard Code #	NJ Student Learning Standards
5.NBT.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.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
5.NBT.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.
5.NBT.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.
5.MD.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.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
- Chapter Quiz and Test

Formative Assessment

- In-class check-ups
- IXL assessments
- Homework
- Stations based on skill

Instructional Materials and Resources

- Go Math! series
- www.ixl.com
- www.brainpop.com
- Graph paper
- Base ten blocks
- Number lines

Integration of Technology

- Computers
- SMART Board
- www.ixl.com
- www.brainpop.com
- www.NJSLStoolbox.com
- Think Central

Curriculum Development Resources

- <http://www.state.nj.us/education/cccs/2016/math/standards.pdf>
- <http://www.state.nj.us/education/modelcurriculum/math/2.shtml>
- <http://www.state.nj.us/education/cccs/standards/9/9.pdf>

Mathematics - Grade 5

Unit 4: Operations with Fractions

21st Century Themes

E-Encouraged, T-Taught, or A-Assessed in this unit

Creativity and Innovation

Critical Thinking and Problem Solving

Communication

Collaboration

Unit 4 Learning Targets

Students will be able to...

- Add and subtract fractions (including mixed numbers) with unlike denominators
- Solve word problems involving adding or subtracting fractions including unlike denominators, and determine if the answer to the word problem is reasonable, using estimations with benchmark fractions
- Interpret a fraction as a division of the numerator by the denominator; solve word problems where division of whole numbers leads to fractional or mixed number answers
- Multiply fractions by whole numbers and draw visual models or create story contexts. Interpret the product $(a/b) \times q$ as a parts of a whole partitioned into b equal parts added q times. In general, if q is a fraction c/d , then $(a/b) \times (c/d) = a(1/b) \times c(1/d) = ac \times (1/b)(1/d) = ac(1/bd) = ac/bd$
- Find the area of a rectangle with fractional side lengths by tiling unit squares and multiplying side lengths
- Explain how a product is related to the magnitude of the factors
- Solve real world problems involving multiplication of fractions (including mixed numbers), using visual fraction models or equations to represent the problem
- Divide a unit fraction by a non-zero whole number and interpret by creating a story context or visual fraction model
- Divide a whole number by a unit fraction and interpret by creating a story context or visual fraction model
- Solve real world problems involving division of unit fractions by whole numbers or whole numbers by unit fractions

#	Student Learning Objectives	NJSLS	Learning Activity
1	Add and subtract fractions (including mixed numbers) with unlike denominators by replacing the given fractions with equivalent fractions having like denominators.	5.NF.1	<ul style="list-style-type: none"> • Use fraction tiles and pattern blocks to model fraction addition and subtraction by creating equivalent fractions • Relate models to the standard algorithm to create common denominators to add and subtract fractions with unlike denominators

2	Solve word problems involving adding or subtracting fractions including unlike denominators, and determine if the answer to the word problem is reasonable, using estimations with benchmark fractions.	5.NF.2	<ul style="list-style-type: none"> ● Use fraction number lines to estimate whether the fraction is closer to 0, $\frac{1}{2}$, or 1 ● Use fraction number lines to understand the magnitude of each number to assist in calculating the sum or difference of a number ● Use fraction lines to show that two numbers less than $\frac{1}{2}$ will result in a sum less than 1; two numbers greater than $\frac{1}{2}$ will result in a sum greater than 1 ● Use recipes to double or triple the ingredients
4	Interpret a fraction as a division of the numerator by the denominator; solve word problems where division of whole numbers leads to fractional or mixed number answers.	5.NF.3	<ul style="list-style-type: none"> ● Use models and real-life scenarios to show that the numerator/denominator relationship relates to the division of the numerator and denominator
5	Multiply fractions by whole numbers and draw visual models or create story contexts. Interpret the product $(\frac{a}{b}) \times q$ as a parts of a whole partitioned into b equal parts added q times. In general, if q is a fraction $\frac{c}{d}$, then $(\frac{a}{b}) \times (\frac{c}{d}) = a(\frac{1}{b}) \times c(\frac{1}{d}) = ac \times (\frac{1}{b})(\frac{1}{d}) = ac(\frac{1}{bd}) = \frac{ac}{bd}$.	5.NF.4a	<ul style="list-style-type: none"> ● Use counters and bar diagrams to find a part of a number ($\frac{2}{3}$ of 27) ● Model fraction multiplication using fraction tiles, repeated addition, shaded arrays, and number lines ● Multiply fractions using the standard algorithm
6	Find the area of a rectangle with fractional side lengths by tiling unit squares and multiplying side lengths.	5.NF.4b	<ul style="list-style-type: none"> ● Investigate the use of unit tiles to find the area of a rectangle ● Use grid paper to find the area of a rectangle
7	Explain how a product is related to the magnitude of the factors.	5.NF.5a, b	<ul style="list-style-type: none"> ● Use models, diagrams, and number lines to show and discuss the relationship between the products when a fraction is multiplied or scaled by a number
8	Divide a whole number by a unit fraction and interpret by creating a story context or visual fraction	5.NF.7b	<ul style="list-style-type: none"> ● Use paper strips, models, and bar diagrams to model division

	model.		of a whole number by a unit fraction and division of a unit fraction by a whole number
9	Solve real world problems involving division of unit fractions by whole numbers or whole numbers by unit fractions.	5.NF.7c	<ul style="list-style-type: none"> • Use fraction division to divide a recipe in half or thirds • Draw bar models to represent word problems in division of fractions

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.

SLO #2 Use concrete objects or pictures to help conceptualize adding, subtracting, multiplying, or dividing by decimals to the hundredths.

SLO #4 Explain correspondences between real world problems and equations involving multiplication of fractions.

SLO #5 Explain correspondences between story contexts and visual fraction models when dividing a unit fraction by a whole number.

SLO #6 Explain correspondences between story contexts and visual fraction models when a whole number by a unit fraction.

2. Reason abstractly and quantitatively.

SLO #1 Understand and make sense of quantities as they relate to place value of numeral digits.

SLO #2 Understand and make sense of quantities and their relationships when adding, subtracting, multiplying, or dividing by decimals to the hundredths.

SLO #3 Understand and make sense of quantities when converting measurements within a system.

SLO #5 Understand and make sense of the quantities and relationships when dividing unit fractions by whole numbers.

SLO #5 Use quantitative reasoning to create a coherent representation and understand the quantities when dividing unit fractions by whole numbers.

SLO #6 Understand and make sense of the quantities and relationships when dividing whole numbers by unit fractions.

SLO #6 Use quantitative reasoning to create a coherent representation and understand the quantities when dividing whole numbers by unit fractions.

3. Construct viable arguments and critique the Model with mathematics.

SLO #1 Understand and use stated assumptions, definitions, and previous results to describe place value of numeral digits.

SLO #2 Explain and justify the reasoning, based on models, drawings, or strategies, used to add, subtract, multiply, and divide by decimals.

4. Model with mathematics.

SLO #4 Apply previously learned concepts about multiplication of fractions in order to solve real world problems.

SLO #4 Map the relationship, using tools, between real world problems involving multiplication of fractions, and the models and equations that represent them.

SLO #7 Apply previously learned concepts about division of unit fractions and whole numbers to solve real world problems.

5. Use appropriate tools strategically.

SLO #1 Consider available tools, such as visual models and story contexts, when

multiplying fractions by whole numbers.

SLO #2 Consider and use available tools, such as models and drawings, when solving addition, subtraction, multiplication, or division problems involving decimals.

SLO #4 Consider available tools, such as visual models and equations, when solving real world problems that involve multiplication of fractions.

SLO #5 Consider and use available tools, such as visual models and story contexts, when solving division problems involving unit fractions by whole numbers.

SLO #5 Consider and use available tools, such as visual models and story contexts, when solving division problems involving whole numbers by unit fractions.

6. Attend to precision.

SLO #1 Communicate and describe precisely quantities of numbers and how they relate to place value.

7. Look for and make use of structure.

SLO #1 Look for and discern a pattern when changing place value of numeral digits.

SLO #2 Look for and discern a pattern when adding, subtracting, multiplying, or dividing by decimals.

SLO #3 Look for and discern a pattern when converting standard measurement units within a system.

8. Look for and express regularity in repeated reasoning.

Unit 4 Essential Questions	Unit 4 Enduring Understandings
<ul style="list-style-type: none">● <i>How can you multiply fractions and whole numbers?</i>● <i>How can you multiply fractions?</i>● <i>How can you multiply mixed numbers?</i>● <i>How do you divide a whole number by a fraction?</i>● <i>Where would you use multiplication of fractions in real world situations?</i>● <i>How can models be used to demonstrate multiplication of fractions by fractions?</i>● <i>How can you compare sizes of one product to another help to understand the relationship between two types of problems?</i>● <i>Why would you need to know how to solve real world problems involving multiplication of fractions and mixed numbers?</i>● <i>What is the relationship between multiplying and dividing fractions?</i>● <i>What makes an estimation reasonable?</i>	<ul style="list-style-type: none">● <i>The product of a whole number and a fraction can be interpreted in different ways. One interpretation is repeated addition. Multiplying a whole number by a fraction involves division as well as multiplication. The product is a fraction of the whole number.</i>● <i>A unit square can be used to show the area meaning of fraction multiplication. When you multiply two fractions that are both less than 1, the product is smaller than either fraction. To multiply fractions, write the product of the numerators over the product of the denominators.</i>● <i>One way to find the product of mixed numbers is to change the calculation to an equivalent one involving improper fractions.</i>● <i>One way to find the quotient of mixed numbers is to change the calculation to an equivalent one involving multiplication of improper fractions.</i>● <i>Multiplication is a necessary math skill to communicate precisely and accurately to others in real world situations.</i>● <i>Models are an essential tool especially for differentiating instruction to meet the</i>

	<p><i>needs of all students; they can help student interpret mathematical results in the context.</i></p> <ul style="list-style-type: none"> • <i>Multiplication of fractions and mixed numbers are found in many careers and knowledge of how to calculate them efficiently will help ensure a life-long skill.</i> • <i>Sufficient familiarity of relationships of fractions will help students develop good number sense and be proficient in calculating products and quotients. Estimation is an important concept for real life in making quick, accurate decisions; practice estimation in math helps students reason and make sense of quantities.</i>
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Standard Code #	NJ Student Learning Standards
5.NF.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, $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. (In general, $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$.)
5.NF.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 $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, by observing that $\frac{3}{7} < \frac{1}{2}$.
5.NF.3	Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$). Solve word problems involving the 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. <i>For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3 and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. 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?</i>
5.NF.4a	Interpret the product $(\frac{a}{b}) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. <i>For example, use a visual fraction model to show $(\frac{2}{3}) \times 4 = \frac{8}{3}$ and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general $(\frac{a}{b}) \times (\frac{c}{d}) = \frac{ac}{bd}$.)</i>
5.NF.4b	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 it 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.5a	Interpret multiplication as scaling (resizing) by 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.
5.NF.5b	Interpret multiplication as scaling (resizing) by 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 as a familiar case); explaining why multiplying a given number 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.
5.NF.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.7a	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.
5.NF.7b	Interpret division of a whole number by a unit fraction, and compute such quotients. <i>For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.</i>
5.NF.7c	Solve real world <i>problems</i> 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. <i>For example, how much chocolate will each person get if 3 people share $1/2$ pound of chocolate equally? How many $1/3$ cup servings are in 2 cups of raisins?</i>
Evidence of Learning	
Summative Assessment	
<ul style="list-style-type: none"> ● Model Curriculum Unit Assessment ● Chapter Quiz and Test 	
Formative Assessment	
<ul style="list-style-type: none"> ● In-class check-ups ● IXL assessments ● Homework ● Stations based on skill 	
Instructional Materials and Resources	
<ul style="list-style-type: none"> ● Computers ● SMART Board 	

- Fraction tiles
- Fraction paper strips
- Pattern blocks
- Counters
- Base ten blocks
- Graph paper

Integration of Technology

- Computers
- SMART Board
- www.ixl.com
- www.brainpop.com
- www.NJSLStoolbox.com
- Think Central

Curriculum Development Resources

- <http://www.state.nj.us/education/cccs/2016/math/standards.pdf>
- <http://www.state.nj.us/education/modelcurriculum/math/2.shtml>
- <http://www.state.nj.us/education/cccs/standards/9/9.pdf>

Mathematics - Grade 5

Unit 5: Shape and Coordinate Geometry

21st Century Themes

E-Encouraged, T-Taught, or A-Assessed in this unit

Creativity and Innovation

Critical Thinking and Problem Solving

Communication

Collaboration

Unit 5 Learning Targets

Students will be able to...

- *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*
- *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*
- *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*
- *Be able to add, subtract, multiply, and divide decimals to hundredths*
- *Be able to use a pair of perpendicular number lines, called axes, to define a coordinate system, with 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*
- *Be able to 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*
- *Be able to 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*
- *Be able to identify attributes of a two-dimensional shape and place them in categories.*
- *Be able to classify two- dimensional figures in a hierarchy based on properties*
- *Be able to make a line plot to display a data set of measurements in fractions of a unit, and use operations to solve problems involving information presented in line plots*
- *Be able to fluently multiply multi-digit whole numbers using the standard algorithm*

#

Student Learning Objectives

NJSLS

Learning Activity

1	Use a pair of perpendicular number lines (axes) to define a coordinate system, with the intersection of the lines (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 (coordinates).	5.G.1	<ul style="list-style-type: none"> ● Graph pictures on a coordinate grid for various holidays ● Arrange desks to represent a coordinate grid and practice locations on the grid
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.2	<ul style="list-style-type: none"> ● Graph pictures on a coordinate grid for various holidays ● Arrange desks to represent a coordinate grid and practice locations on the grid
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. <i>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.</i> Explain informally why this is so.	5.OA.3	<ul style="list-style-type: none"> ● Look at patterns to find the rule and the next number in the sequence ● Use toothpicks to create a pattern of shapes and determine the next shape in the pattern ● Graph patterns on a number line and find unknown terms
4	Identify attributes of a two-dimensional shape based on attributes of the groups and categories in which the shape belongs.	5.G.3	<ul style="list-style-type: none"> ● Use string to construct polygons and discuss attributes ● Identify and draw polygons based on attributes
5	Classify two-dimensional figures in a hierarchy based on properties.	5.G.4	<ul style="list-style-type: none"> ● Identify and draw polygons based on attributes ● Classify quadrilaterals in as many ways as possible
6	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. <i>For example, given different measurements of</i>	5.MD.2	<ul style="list-style-type: none"> ● Create line plots using data (represented as fractions) and analyze results ● Collect data to create line plots and analyze results

	<i>liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</i>		
7	Fluently multiply multi-digit whole numbers using the standard algorithm.	5.NBT.5	<ul style="list-style-type: none"> • Calculate perimeters, areas, and volume using whole numbers, decimals, and fractions

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.

SLO #1 Use concrete objects or pictures to add, subtract, multiply, and divide decimals to the hundredths place.

SLO #4 Analyze givens, constraints, and relationships when generating numeric patterns based on two given rules.

SLO #7 Draw diagrams of important features, graph points from a dataset in order to solve problems involving the information in the graphs and diagrams.

2. Reason abstractly and quantitatively.

SLO #1 Know and flexibly apply the properties of operations to add, subtract, multiply, and divide decimals.

SLO #4 Understand and make sense of quantities when generating number patterns based on two given rules.

SLO #5 Know and flexibly use different properties of objects in order to identify and categorize attributes of two-dimensional shapes.

SLO #6 Know and flexibly use different properties of objects in order to classify two-dimensional shapes based on properties.

SLO #7 Know and flexibly use different properties of operations in order to solve problems involving fractions of a unit.

3. Construct viable arguments and critique the reasoning of others.

SLO #4 Make conjectures, and build a logical progression of statements about number patterns given two predetermined rules.

SLO #5 Understand assumptions and definitions in order to identify and categorize two-dimensional shapes based on their attributes.

SLO #6 Understand assumptions and definitions in order to classify two-dimensional figures based on their properties.

SLO #7 Reason inductively about the graph data, and be able to make plausible arguments based on the line plots.

4. Model with mathematics.

SLO #3 Apply previously learned concepts to solve real world problems involving graphing points on the coordinate plane.

SLO #4 Using tools map the relationship between number patterns based on the two given rules.

SLO #7 Apply previously learned concepts about fractions and line plots to solve problems that involve both.

5. Use appropriate tools strategically.

SLO #1 Consider and use available tools, such as models and drawings, when adding, subtracting, multiplying, or dividing decimals.

6. Attend to precision.

SLO #2 Specify units of measurement and label axes to define a coordinate system.

SLO #3 Specify units of measurement and label axes when working within a coordinate plane.

SLO #4 Specify units of measurement and label axes when graphing ordered pairs on a coordinate plane.

SLO #7 Specify units of measurement and label axes when making line plots to display a dataset.

7. Look for and make use of structure.

SLO #1 Look for and discern patterns when adding, subtracting, multiplying, or dividing decimals.

SLO #4 Look for and discern patterns given two mathematical rules.

SLO #5 Look for and discern a structure based on attributes of two-dimensional shapes.

SLO #6 Look for and discern a structure based on properties of two dimensional shapes.

SLO #8 Look for and discern patterns when using the standard algorithm to multiply multi-digit whole numbers.

8. Look for and express regularity in repeated reasoning.

Unit 5 Essential Questions	Unit 5 Enduring Understandings
<ul style="list-style-type: none">• <i>What types of models, drawing, or strategies are used to demonstrate the four operations as they relate to decimals?</i>• <i>Why is it important to be fluent in solving mathematical operations with multi-digit whole numbers?</i>• <i>How does the number line relate to the coordinate plane?</i>• <i>Why is the coordinate plane important in understanding real world math concepts?</i>• <i>How could you communicate the attributes of the coordinate plane?</i>• <i>When would you use the coordinate plane in a career?</i>• <i>How can you construct geometric figures in the first quadrant of a coordinate plane?</i>• <i>What types of data would best be shown on a line plot?</i>• <i>How can you find missing points in a geometric figure on a coordinate grid?</i>• <i>How can you describe the location of a point on a coordinate plane?</i>• <i>How can you find the distance between integers on the number line?</i>• <i>How do you make and interpret a</i>	<ul style="list-style-type: none">• <i>Kinesthetic learners find models extremely helpful in understanding math concepts; grids, fraction bars, pie charts, and number lines help students see the structure of the operations.</i>• <i>Multi-digit number operations are found in many careers and everyday life, and proficient knowledge of how to calculate them efficiently will help ensure a life-long skill.</i>• <i>Number line awareness helps student's perception as it relates to numbers on the coordinate plane in Quadrant I</i>• <i>Real world math problems including traveling from one point to another can be calculated on a coordinate plane.</i>• <i>Coordinate planes are utilized to represent data on a graph through ordered pairs.</i>• <i>Information on a graph or coordinate plane can be interpreted and analyzed in real life situations</i>• <i>Knowing the geometric shapes and their attributes, students can then identify missing points on a graph.</i>• <i>The standard algorithm for multiplying whole numbers with factors having</i>

<i>double bar graph?</i>	<p><i>three or more digits is just an extension of the algorithm for multiplying two digit numbers by two digit numbers to greater place values.</i></p> <ul style="list-style-type: none"> • <i>Information in a problem can often be shown using a diagram and used to solve the problem. Some problems can be solved by writing and completing a number sentence or equation.</i>
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Standard Code #	NJ Student Learning Standards
5.OA.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. <i>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.</i>
5.NBT.7	Add, <i>subtract</i> , 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 ... (repeated for fluency) .
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
5.G.1	Use a pair of <i>perpendicular</i> 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., <i>x</i> -axis and <i>x</i> -coordinate, <i>y</i> -axis and <i>y</i> -coordinate).
5.G.2	<i>Represent</i> 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.3	<i>Understand</i> 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.4	Classify two-dimensional figures in a hierarchy based on properties.
5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. <i>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</i>

equally.

Evidence of Learning

Summative Assessment

- Model Curriculum Unit Assessment
- Chapter Quiz and Test

Formative Assessment

- In-class check-ups
- IXL assessments
- Homework
- Stations based on skill

Instructional Materials and Resources

- Computers
- SMART Board
- www.ixl.com
- www.brainpop.com
- www.NJSLStoolbox.com
- Think Central

Integration of Technology

- Computers
- SMART Board
- www.ixl.com
- www.brainpop.com
- www.NJSLStoolbox.com
- Think Central

Curriculum Development Resources

- <http://www.state.nj.us/education/cccs/2016/math/standards.pdf>
- <http://www.state.nj.us/education/modelcurriculum/math/2.shtml>
- <http://www.state.nj.us/education/cccs/standards/9/9.pdf>

NJ Student Learning Standards for Mathematics Grade 5

Operations & Algebraic Thinking

Standards in this domain:

NJSLS.MATH.CONTENT.5.OA.A.1

NJSLS.MATH.CONTENT.5.OA.A.2

NJSLS.MATH.CONTENT.5.OA.B.3

Write and interpret numerical expressions.

5.OA.A.1

Use parentheses, 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 calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.*

Analyze patterns and relationships.

5.OA.B.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 & Operations in Base Ten

Standards in this domain:

NJSLS.MATH.CONTENT.5.NBT.A.1

NJSLS.MATH.CONTENT.5.NBT.A.2

NJSLS.MATH.CONTENT.5.NBT.A.3

NJSLS.MATH.CONTENT.5.NBT.A.4

NJSLS.MATH.CONTENT.5.NBT.B.5

NJSLS.MATH.CONTENT.5.NBT.B.6

Understand the place value system.

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.

- Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
- 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.

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

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 by 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.

Number & Operations—Fractions¹

Standards in this domain:

NJSLS.MATH.CONTENT.5.NF.A.1

NJSLS.MATH.CONTENT.5.NF.A.2

NJSLS.MATH.CONTENT.5.NF.B.3

NJSLS.MATH.CONTENT.5.NF.B.4

NJSLS.MATH.CONTENT.5.NF.B.5

NJSLS.MATH.CONTENT.5.NF.B.6

NJSLS.MATH.CONTENT.5.NF.B.7

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

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 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.

5.NF.B.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?*

5.NF.B.4

Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

- 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 $(2/3) \times 4 = 8/3$, and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$. (In general, $(a/b) \times (c/d) = ac/bd$.)*
- 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:

- 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.

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.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 $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.*
- b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.*
- 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?*

¹ Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.

Measurement & Data

Standards in this domain:

[NJSLs.MATH.CONTENT.5.MD.A.1](#)

[NJSLs.MATH.CONTENT.5.MD.B.2](#)

[NJSLs.MATH.CONTENT.5.MD.C.3](#)

[NJSLs.MATH.CONTENT.5.MD.C.4](#)

[NJSLs.MATH.CONTENT.5.MD.C.5](#)

Convert like measurement units within a given measurement system.

5.MD.A.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.

5.MD.B.2

Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). 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.

5.MD.C.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.

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. 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

Standards in this domain:

NJSLS.MATH.CONTENT.5.G.A.1

NJSLS.MATH.CONTENT.5.G.A.2

NJSLS.MATH.CONTENT.5.G.B.3

NJSLS.MATH.CONTENT.5.G.B.4

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

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 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).

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

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 in a hierarchy based on properties.