Math / Grade 5

Unit 1

Course/Subject:	Grade:	Unit 1:	Suggested Timeline:
Math	5	Place Value	**3-4 weeks**

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	**Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included)** Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Place Value of Whole Numbers and Decimals
Unit Summary	The position of the digit in a number defines its value. This is a base-ten system. In a base-ten system, the place value is 10 times as great as the place value immediately to its right and 1/10 as great as the place value to the immediately left. Our number system extends beyond the ones to decimal place values. These numbers represent values that are less than one and show parts of wholes. Numbers can be written in various forms (such as standard form, expanded form, or word form).

Unit Essential Questions:

1. I can show that in a multidigit number each place is 10 times less than the ones to its left and 10 times greater than the one to its right.
2. I can read and write decimals to the thousandths place in word form, base-ten form, and expanded form.
3. I can compare two decimals to thousandths.
4. I can round decimals to any place.

Key Understandings:

1. Digits in different places in a multidigit number have different values. (each place value to the right is ten times smaller and place value to the left is ten times greater)
2. Decimals to the thousandths place can be read and written in word form, base-ten form, and expanded form.
3. Powers of ten help to understand values of numbers.
4. Decimals can be compared to the thousandths.
5. Decimals can be rounded to any place.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.1.5.B.1	Apply place value to show an understanding of operations and rounding as they pertain to whole numbers and decimals.
M.05.A-T.1.1.1	Demonstrate an understanding that in a multi-digit number, a digit in one place represents 1/10 of what it represents in the place to its left.
5.NBT.A.1	Recognize that 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.
M05.A-T.1.1.2	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. Example 1: $4 \times 102 = 400$ Example 2: $0.05 \div 103 = 0.00005$
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.
MO5.A-T.1.1.3	Read and write decimals to thousandths using base-ten numerals, word form, and expanded form. Example: $347.392 = 300 + 40 + 7 + 0.3 + 0.09 + 0.002 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (0.1) + 9 \times (0.01) + 2 \times (0.001)$
5.NBT.3	Read, write, and compare decimals to thousandths.
5.NBT.A.3.A	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
MO5.A-T.1.1.4	Compare two decimals to thousandths based on meanings of the digits in each place using >, =, and > symbols.
5.NBT.A.3.B	Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MO5.A-T.1.1.5	Round decimals to any place (limit rounding to ones, tenths, hundredths, or thousandths place)
5.NBT.4	Use place value understanding to round decimals to any place.

Important Standards Addressed in the Unit:

Misconceptions:	**Proper Conceptions:**
● That a digit's relationship value changes based on where the digit is located in the number. ● The difference between the place and value of a digit in a number. ● Students may think that 0.008 is greater than 0.02 because 8 is greater than 2. Use place value charts to help reinforce the importance of looking at which place a digit is in before deciding its value.	● The digit's value in a multi-digit number is 10 times as much as the digits place value to the right of the digit and 1/10 the value of the digit to the left of the digit. ● The value of the digit is based on where the number is located. ● Students need to line up place values and look at the digits working from the tenths to the thousandths place ● If students are having difficulty with this comparison, ask them to read both numbers (8 thousandths; 2 hundredths). Ask them if 2 hundredths can be renamed as thousandths (20 thousandths). Have them compare 20 thousandths with 8 thousandths.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Understand that each digit's place value is ten times as great as the place to its immediate right, and ten times less than the place to its immediate left ● Understand place value concepts for thousandths to billions. ● Understand that numbers can be represented in many different ways ● Understand how to use the value of the digits to compare numbers ● Understand why one number is larger/smaller than another using manipulatives/models ● Understand the meaning of comparison symbols and how to read them correctly ● Understand that expanded form is represented by each digit being multiplied by its place value and then being added back together	● Multiply and divide numbers by multiples of tens to 1,000,000 ● Model place value relationships showing how a digit in one place value represents ten times what it represents in the place value to its immediate right using manipulatives ● Decompose a number in multiple ways to better understand place value relationships ● Read and write decimals to the thousandths place in word form, base-ten form, and expanded form ● Compare two decimals to the thousandths based on the meaning of the digits in each place (using <, >, =) ● Accurately explain how benchmark numbers can be used to compare decimals ● Use manipulatives to model and compare numbers ● Round numbers to designated places. ● Solve word problems or use problem solving tasks involving comparing numbers with decimals	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Decimal ● Decimal point ● Digit ● Base ● Exponent ● Powers of ten ● Decimal Place Value	● Place value ● Place ● Value ● Tenths ● Hundredths ● Powers of Ten ● Exponents ● Greater than ● Less than	● Thousandth ● Word Form ● Expanded Notation ● Standard Form ● Equal to

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessments
- Tasks

Interdisciplinary Connections:

- Science and Social Studies
  - Values of numbers in context
- Written Responses

Additional Resources:

- Math in Practice, Module 1

Math in Practice Literature Connections
***On Beyond a Million* (David Schwartz)**

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

Tellish, J., O'Connell, S., SanGiovanni, J. (2016). *Math in practice: Teaching fifth-grade math*. Portsmouth, NH: Heinemann

Created By:
Allyson Lang, Jill Jahn, Alicia Hammock

			Math / Grade 5 **Unit 2**
Course/Subject: Math	**Grade:** 5	Unit 2: Multiply Whole Numbers	**Suggested Timeline:** 2 Weeks

Grade Level Summary	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.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) **Unit 2: Multiply Whole Numbers** Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Multiplying Whole Numbers
Unit Summary	Multiplication can be represented by arrays, equal groups, area models, or by equal jumps on a number line. In order to teach the multiplication algorithm with understanding, models must be used to explain the procedure for using the standard algorithm. Use the area model showing partial products to explain the place value concepts of standard algorithm.

Unit Essential Questions:	**Key Understandings:**
1. I can explain the standard algorithm for multiplication of multi-digit numbers. 2. I can use the standard algorithm.	1. Prior understanding of multiplication concepts and partial products bridge to understanding of standard algorithm. 2. Place value understanding supports fluent use of standard algorithm to multiply multi-digit whole numbers.

Focus Standards Addressed in the Unit:

*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*

CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
M05.A-T.2.1.1	Multiply multi-digit whole numbers (not to exceed three-digit by three-digit).
5.NBT.B.5	Fluently multiply multi-digit whole numbers using the standard algorithm.

Important Standards Addressed in the Unit:	
CC.2.1.5.B.1	CC.2.1.5.B.1 Apply place-value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.
5.NBT.A.1	Recognize that 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.

Misconceptions:	**Proper Conceptions:**
● Students will multiply without thinking about the value of the numbers and not evaluate reasonableness.	● It is important to highlight the value and meaning of each digit in the factor and how it influences the magnitude of the product.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand why the standard algorithm works based on place value ideas ● Understand place value to 1,000,000	● Multiply multi-digit numbers using the standard algorithm ● Explain the steps in the standard algorithm, showing a place value understanding of why the strategy works ● Solve word problems or use problem solving tasks that involve multiplication of multi-digit numbers ● Decide if an answer is reasonable using mental math, estimation and/or rounding	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Standard algorithm ● Multiply ● Product ● Factor ● Partial product	● Estimate ● Area Model	

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessments
- Summative Assessments

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be multiplied
- Written Responses

Additional Resources:

- Math in Practice, Module 3

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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			Math / Grade 5 **Unit 3**
Course/Subject: Math	**Grade:** 5	**Unit 3:** Divide Whole Numbers	**Suggested Timeline:** **2-3 week**

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers **Unit 3: Divide Whole Numbers** Unit 4: Numerical Expressions,Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Division of Whole Numbers
Unit Summary	Dividing whole numbers with up to 4-digit dividends and 2-digit divisors using place value strategies and inverse operations while explaining computation.

Unit Essential Questions:	**Key Understandings:**
1. How do we divide a 4-digit dividend by a 2-digit divisor using place value strategies and inverse operations? 2. How do we model and explain the division process? 3. How do we understand remainders?	1. Whole numbers with up to 4 digits can be divided by whole numbers up to 2 digits using place value strategies. 2. Multiplication and division are inverse operations. 3. Models help to explain the division process. 4. Remainders represent the amount left after a quantity is equally divided.

Focus Standards Addressed in the Unit:

*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*

CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
MO5.A-T.2.1.2	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.
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.

Important Standards Addressed in the Unit:	
M05.A-T.2.1.1	Multiply multi-digit whole numbers (not to exceed three-digit by three-digit).
5.NBT.B.5	Fluently multiply multi-digit whole numbers using the standard algorithm.

Misconceptions:	**Proper Conceptions:**
● The student is unable to explain how to use an area model to find the quotient. ● When transitioning from partial quotient model to standard algorithm students try to pull out too many groups with incorrect regrouping.	● The student will be able to use area models to find the quotient. ● Students will understand that they are calculating the total number of groups of a specific size out of the total value of the dividend.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand the concept of division ● Understand that division can be partitive and quotative ● Understand the inverse relationship between multiplication and division ● Understand there are multiple ways to divide multi-digit numbers ● Understand the role of place value in division strategies ● Understand how to interpret the remainder in a division problem based on the context of the problem	● Use multiple strategies to solve multi-digit division problems ● Represent multi-digit division with manipulatives, pictures and equations ● Accurately explain the selected division strategy ● Decide if an answer is reasonable using mental math, estimation and/or rounding ● Solve real-world problems or use problem solving tasks involving multi-digit division ● Apply known strategies to larger numbers	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision

		• Collaboration by building understanding together in small group discussion

Academic Vocabulary:

• Area model/Rectangle model • Dividend • Divisor	• Partial quotients • Quotient	

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be divided
- Written Responses

Additional Resources:

- Math in Practice, Module 4

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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			Math / Grade 5 **Unit 4**
Course/Subject: Math	**Grade:** 5	**Unit 4:** Numerical Expressions	**Suggested Timeline:** **3 weeks**

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers **Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns** Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Numerical Expressions, Order of Operations, and Patterning
Unit Summary	Expressions and equations (including more than one operation and grouping symbols) are evaluated and solved using understanding of order of operations. Variables are used to represent unknown values. Expressions, equations, and inequalities are written to represent situations.

Unit Essential Questions:	**Key Understandings:**
1. How can I interpret math expressions and equations? 2. How do I simplify expressions using order of operations? 3. How do I compare two expressions by evaluating them?	1. Math expressions can be interpreted 2. Mathematical situations can be written using expressions. 3. Expressions can be simplified using order of operations. 4. Two expressions can be compared without evaluating them

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.2.5.A.1	Interpret and evaluate numerical expressions using order of operations

M05.B-O.1.1.1	Use multiple grouping symbols (parentheses, brackets, braces) in numerical expressions and evaluate expressions containing these symbols.
M05.B-O.1.1.2	Write simple expressions that model calculations with numbers and interpret numerical expressions without evaluating them. Example 1: Express the calculation “add 8 and 7, then multiply by 2” as 2 × (8 + 7). Example 2: Recognize that 3 × (18,932 + 921) is three times as large as 18,932 + 921 without having to calculate the indicated sum or product.
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 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.
CC.2.2.5.A.4	Analyze patterns and relationships using two patterns.
M05.B-O.2.1.1	Generate two numerical patterns using two given rules. 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.
M05.B-O.2.1.2	Identify apparent relationships between corresponding terms of two patterns with the same starting numbers that follow different rules. Example: Given two patterns in which the first pattern follows the rule “add 8” and the second pattern follows the rule “add 2,” observe that the terms in the first pattern are 4 times the size of the terms in the second pattern.
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.

Important Standards Addressed in the Unit:	
CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
M.05.A-T.1.1.1	Demonstrate an understanding that in a multi-digit number, a digit in one place represents 1/10 of what it represents in the place to its left.

Misconceptions:	**Proper Conceptions:**
● Students will sometimes write an expression the way that they read them. ● Students may forget to continue using order of operations inside of groupings	● Students should think about the situation before choosing an operation or expression to match it. ● Review the groupings and exponents.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand that a numeric expression represents the value of a number ● Understand that an equation describes a relationship between two expressions	● Use an expression to show a calculation described verbally. ● Write simple expressions that describe word problems or scenarios ● Write a given expression in words	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique

● Understand that a variable is a quantity that can change or vary, and can be represented with a letter/symbol ● Understand that parentheses indicate which operation to perform first	● Evaluate a numerical expression without evaluating (solving) ● Use numbers and symbols appropriately in simple expressions (variables, parentheses, etc…) ● Extend understanding of simple expressions to more complex expressions ● Write a word problem/scenario for a given expression	● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Parenthesis ● Evaluate ● Grouping	● Bracket ● Variable ● Braces	● Equation ● Expression ● Order of operations

Evidence: Assessments and Performance Task(s)

- Performance Task
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Expressions can be written to represent real world situations
- Written Responses

Additional Resources:

- Math in Practice, Module 2

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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			Math / Grade 5 **Unit 5**
Course/Subject: Math	**Grade:** 5	**Unit 5:** Add & Subtract Decimals	**Suggested Timeline:** 2 Weeks

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns **Unit 5: Add and Subtract Decimals** Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Adding and Subtracting Decimals
Unit Summary	Add and subtract 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.

Unit Essential Questions:	**Key Understandings:**
1. How do you estimate the sum or difference when adding and subtracting decimals? 2. How do you use estimates to check the reasonableness of my computations? 3. How do you use my understanding of place value to add and subtract decimals? 4. How do you identify the similarities and differences between adding and subtracting decimals and adding and subtracting whole numbers? 5. How do you add and subtract with decimals to the hundredths?	1. Decimals to the hundredths can be added using place value understanding. 2. Decimals to the hundredths can be subtracted using place value understanding. 3. Connections exist between the procedures for whole number computations and decimals computations. 4. Decimal understanding can be used to estimate sums and differences and determine the reasonableness of answers.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
M05.A-T.2.1.3	Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).
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.

Important Standards Addressed in the Unit:	
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 to the place to its left.
5.NBT.3	Read, write, and compare decimals to thousandths.
5.NBT.4	Use place value understanding to round decimals to any place.
MO5.A-T.1.1.1	Demonstrate an understanding that in a multi-digit number, a digit in one place represents 1/10 of what it represents in the place to its left.
MO5.A-T.1.1.5	Round decimals to any place (limit rounding to ones, tenths, hundredths, or thousandths place).
MO5.A-T.1.1.3	Read and write decimals to thousandths using base-ten numerals, word form, and expanded form.
MO5.A-T.1.1.4	Compare two decimals to thousandths based on meanings of the digits in each place using >,=, and > symbols.

Misconceptions:	**Proper Conceptions:**
● Unreasonable answers occur when students do not attend to place value.	● Have students first estimate sums or differences so they can later compare their answer to their estimate to see if it is reasonable.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand place value concepts ● Understand properties of operations including commutative, associative, and distributive ● Understand the inverse relationship of addition/subtraction ● Understand whole number computation for addition, subtraction	● Add, subtract, decimals to the hundredths ● Explain decimal computation and the role place value plays in the computation ● Recognize and use the patterns in decimal computation for use with larger numbers ● Explain the connections between whole number computation and decimal computation ● Accurately explain the critical role of estimation in decimal computation	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate

	● Solve real-world problems or use problem solving tasks involving decimal computation	● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● digits ● Estimate ● hundredths	● Place value ● Tenths ● addend	● sum

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be added and subtracted
- Written Responses

Additional Resources:

- Math in Practice, Module 5

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

Tellish, J., O'Connell, S., SanGiovanni, J. (2016). *Math in practice: Teaching fifth-grade math*. Portsmouth, NH: Heinemann

Created By:
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			Math / Grade 5 **Unit 6**
Course/Subject: Math	**Grade:** 5	**Unit 6:** Multiply & Divide Decimals	**Suggested Timeline:** 2-3 Weeks

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals **Unit 6: Multiply and Divide Decimals** Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Multiplying and Dividing Decimals
Unit Summary	When multiplying decimals, connect student understanding to fractions. So when multiplying .3 x .4, you are multiplying 3/10 x 4/10 which equals 12/100. This helps students make sense that .3 x .4 = .12. Students need to understand that when multiplying two numbers less than one, the product may be smaller than both the factors. We can think of this type of multiplication as finding part of, this helps them make sense that the product will be smaller. Often times students try to apply a misunderstanding that when you multiply, the answer "gets bigger". This is true in whole numbers but does not apply to fractions and decimals. We apply this same thinking to division of decimals. When dividing two decimals less than one (such as 0.5 ÷ 0.1) the quotient will be greater than either decimal. So the quotient will be 5. Students may be confused by this if they are under the misconception that when you divide the quotient will be smaller.

Unit Essential Questions:	**Key Understandings:**
1. How do you multiply and divide decimals to hundredths using concrete models, drawings, and place value models. 2. How do you estimate an answer, and explain the placement of the decimal point, when multiplying or dividing decimals.	1. Decimals can be multiplied by a whole number and a decimal by a decimal. 2. Whole numbers can be divided by whole numbers or decimals, and decimals can be divided by whole numbers or decimals.

	3. The placement of the decimal point is significant in multiplying and dividing decimals.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
M05.A-T.2.1.3	Add, subtract, multiply, and divide decimals to hundredths (no divisors with decimals).
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.6	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.

Important Standards Addressed in the Unit:	
CC.2.1.5.B.1	Apply place-value concepts to show an understanding of operations and rounding as they pertain to whole numbers and decimals.
5.NBT.A.1	Recognize that 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.4	Use place value understanding to round decimals to any place.

Misconceptions:	**Proper Conceptions:**
● When you multiply the product is larger than either factor. ● When you divide the quotient will be smaller than the dividend. ● When students compare their estimation to the precise answer they sometimes assume their estimation is wrong/not reasonable.	● When we multiply whole numbers the product will increase. This is not the case when we multiply by fractions and decimals less than one. ● When dividing two decimals less than one (such as $0.5 \div 0.1$) the quotient will be greater than either decimal. ● The goal for estimation is for students to see it as a tool to gauge the reasonableness of an answer, not to predict the exact answer.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand place value concepts ● Understand properties of operations including commutative, associative and distributive	● Multiply, and divide decimals to the hundredths ● Division of decimals should be limited to simple situations that do	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique

● Understand the inverse relationship of multiplication/division ● Understand whole number computation for multiplication and division ● Understand patterns in decimal computation (i.e. when multiplying two numbers less than one, a product may result that is less than either factor)	not require the standard algorithm (i.e. 12÷.5, .5÷.1, etc) ● Explain decimal computation and the role place value plays in the computation ● Recognize and use the patterns in decimal computation for use with larger numbers ● Explain the connections between whole number computation and decimal computation ● Accurately explain the critical role of estimation in decimal computation ● Solve real-world problems or use problem solving tasks involving decimal computation	● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Decimal point ● Dividend ● Divisor ● Estimate ● Factors	● Partial product ● Partial quotient ● Product ● Quotient ● Decimal	● Tenth ● Hundredth ● Whole number

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be multiplied or divided
- Written Responses

Additional Resources:

- Math in Practice, Module 6

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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Created By:

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Math / Grade 5

Unit 7

Course/Subject:	Grade:	Unit 7:	Suggested Timeline:
Math	5	Volume	2 Weeks

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals **Unit 7: Volume** Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Exploring Volume Concepts for Rectangular Prisms
Unit Summary	Volume is foundational measurement and an attribute of solid figures. It is an extension of finding area and perimeter concepts in previous grades. It has obvious and endless real-world applications. Student understanding begins with the conceptual meaning of volume that leads to the procedural finding of volume. Volume can be used to illustrate properties of multiplication.

Unit Essential Questions:

1. I can explain what it means to find the volume of a solid figure and how volume is measured.
2. I can find the volume of a complex figure.
3. I can solve math problems using my understanding of volume using the volume formula.

Key Understandings:

1. Volume is the amount of space inside a figure, and can be measured by counting the number of cubes it takes to fill the figure.
2. Volume is measured in cubic units.
3. The volume of rectangular prisms helps to make connections between volume and area.
4. There is a formula for determining the volume of a rectangular prism.
5. Problems can be solved involving volume.
6. Volume is additive and complex figures can be decomposed to find the total volume.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.4.5.A.5	Apply concepts of volume to solve problems and relate volume to multiplication and to addition.
M05.D-M.3.1.1	Apply the formulas V = l × w × h and V = B × 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. Formulas will be provided.
M05.D-M.3.1.2	Find volumes of solid figures composed of two non-overlapping right rectangular prisms.
5.MD.C.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
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.

Important Standards Addressed in the Unit:	
CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
(5.NBT.B.5)	Fluently multiply multi-digit whole numbers using the standard algorithm.

Misconceptions:	**Proper Conceptions:**
● Students my select incorrect units to label answers. ● Some students may multiply all the given numbers together (5 x 4 x 10 x 8 x 20) for volume of a complex figure instead of finding the volume of each separate rectangular prism and adding together. .	● It is important to highlight that volume is measured in three dimensional cubic units shaped like cubes. Units represent the length, width, and height thus must be cubic. ● Students need to identify each rectangular prism they intend to find the volume of. They then need to identify the dimensions of each independent prism to calculate the volume subtotals. Subtotals will then be added together. Ask students to explain why they made their calculations.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand volume as an attribute of a solid figure ● Understand that volume can be measured in cubic units ● Understand that a unit cube with side length of one is made up of six identical square faces and used to measure volume ● Understand that unit cubes fill a container without gaps or overlaps to measure volume ● Understand that a cubic unit can be in inches, centimeters, feet, etc..)	● Identify volume as an attribute of a solid figure ● Recognize that a cube with a 1 unit side length is "one cubic unit" of volume ● Find volume by counting cubic units ● Explain how to find volume of a figure ● Measure the volume of a solid figure by filling it with cubes and counting the number of cubes ● Count units in three-dimensional pictures using different measures to find volume	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics.

● Understand that volume can be found by multiplying the dimensions of a figure ● Understand the associative property ● Understand the mathematical operation for determining volume in a right rectangular prism using whole numbers ● Understand real-world situations by recognizing that volume is the number of cubic units needed to fill a solid figure ● Understand the volume of two or more solid figures added together equals the composite volume of the complete figure	● Use unit cubes to determine the volume of a rectangular prism ● Explain why multiplying the area of the base times the height will result in the volume ● Write and solve an equation(s) that will determine the volume of a figure ● Relate finding the product of three numbers to finding volume and explain how it is related to the associative property ● Use a formula for finding the volume of a rectangular prism ● Decompose irregular figures into rectangular prisms	● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Volume ● Unit cube ● Cubic units ● Unit ● Cube	● Rectangular prism ● Additive ● Length ● Width ● Height	● Base ● Composite figure ● Dimensions ● Layer

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be used to determine volume
- Written Responses

Additional Resources:

- Math in Practice, Module 13

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

Tellish, J., O'Connell, S., SanGiovanni, J. (2016). *Math in practice: Teaching fifth-grade math*. Portsmouth, NH: Heinemann

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			Math / Grade 5 **Unit 8**
Course/Subject: Math	**Grade:** 5	**Unit 8:** Add & Subtract Fractions	**Suggested Timeline:** 3 Weeks

Grade Level Summary	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.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume **Unit 8: Adding and Subtracting Fractions** Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Adding and Subtracting Fractions with Unlike Denominators
Unit Summary	In order to add and subtract two fractions with unlike denominators, students must understand how to find equivalent fractions. They need to know that the same fraction can be named in many different ways. Understanding equivalent fractions is an important concept when adding and subtracting fractions. Equivalent fractions are fractions that represent equal value. They are numerals that name the same fractional number. When we say that fractions are equivalent there is an underlying assumption that the wholes are the same size. Students need to understand this concept. A focus question should be "Are the wholes the same size?" Fraction manipulatives should be used when first introducing the concept of equivalency. Students should explore, using fraction strips, fraction squares or circles, pattern blocks, and number lines to discover which fractions are equivalent before moving to a procedure to find equivalent fractions. When students discover the numerical process of multiplying (or dividing) the numerator and denominator by the same number, they should understand how that connects to the identity property of multiplication and division. Although not a specifically taught term, "simplify" can be used when discussing equivalent fractions. **"Reducing" should not be used** as it implies something getting smaller, which is not the case with equivalent fractions: they represent the same value. Furthermore, **it is possible to over-emphasize the importance of simplifying fractions. There is no mathematical reason why fractions must be written in simplified form, although it may be convenient to do so in some cases.**

Unit Essential Questions:	**Key Understandings:**
1. How do you find common denominators. 2. How do you create equivalent fractions with common denominators. 3. How do you add and subtract fractions, including mixed numbers.	1. Common denominators can be generated and used to find equivalent fractions 2. Strategies, including common denominators, can be used to add and subtract fractions, including mixed numbers.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.1.5.C.1	Use the understanding of equivalency to add and subtract fractions
MO5.A-F.1.1.1	Add and subtract fractions (including mixed numbers) with unlike denominators. (May include multiple methods and representations.) Example: 2/3 + 5/4 = 8/12 + 15/12 = 23/12.
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, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (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 ⅖+1/2 = 3/7, by observing that 3/7 < 1/2.

Important Standards Addressed in the Unit:

Misconceptions:	**Proper Conceptions:**
● Some students may subtract from the bottom up: ¾ - 2/4 =¼. Have students create models of 6 2/4 and 4 ¾ and tell you what they are doing as they subtract to find the difference. Can they identify their error when look at the model?	● Students will understand that subtracting fractions happens from the top down.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand factors and multiples ● Understand how to find equivalent fractions ● Understand how to convert mixed numbers to improper fractions and improper fractions to mixed numbers ● Understand that denominators tell the size of the parts and having same size	● Use models/manipulatives to represent conversions (between mixed and improper), equivalent fractions, and computation ● Create equivalent fractions with common denominators ● Add and subtract fractions including mixed numbers	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns

parts makes adding and subtracting fractions easier ● Understand that when adding and subtracting fractions, there is an underlying assumption that the wholes are the same size	● Use estimation and compare to actual computations ● Flexibly manipulate numbers to make situations true (i.e. use specific digits to form fractions with a specific sum) ● Solve real-world problems or use problem solving tasks involving addition and subtraction of fractions	NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Area Model ● Common Denominator	● Equivalent Fractions ● Mixed Number	● Rename

Evidence: Assessments and Performance Task(s)

- Performance Task
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be added and subtracted
- Written Responses

Additional Resources:

- Math in Practice, Module 7

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standar ds initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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			Math / Grade 5 **Unit 9**
Course/Subject: Math	**Grade:** 5	**Unit 9:** Fractions as Division	**Suggested Timeline:** **1-2 weeks**

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions **Unit 9: Fractions as Division** Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Fractions as Division
Unit Summary	When fractions represent division, the denominator acts as the divisor and the numerator is the multiplier. This means that 3/4 is three times what you get when you divide a whole into four parts. So if you were to divide 3 pancakes among 4 people (3 ÷ 4), each person would get 3 pieces or 3/4 of a pancake. Students need to understand that the numerator is the same as the dividend and the denominator is the same as the divisor.

Unit Essential Questions:	**Key Understandings:**
1. How do you model fractions as division and explain how fractions represent divisors.	1. Fractions can represent division

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.1.5.C.2	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

M05.A-F.2.1.1	Solve word problems involving division of whole numbers leading to answers in the form of fractions (including mixed numbers).
5.NF.3	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

Important Standards Addressed in the Unit:	
MO5.A.A-F.2.1.4	Divide unit fractions by whole numbers and whole numbers by unit fractions
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
5.NF.7.A	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients
5.NF.7.B	Interpret division of a whole number by a unit fraction, and compute such quotients.
5.NF.7.C	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions

Misconceptions:	**Proper Conceptions:**
● Students can confuse which number is the numerator and which is the denominator, in a fraction greater than 1. For 5 pounds of pasta shared by 3 children, they may write ⅗ rather than the correct representation of 5/3	● The students need to understand that the denominator is divided into the numerator.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand that a fraction represents the division of one whole number by another whole number ● Understand that the numerator is the same as the dividend and the denominator is the same as the divisor	● Represent a fraction as division using visual models ● Explain how fractions represent division ● Write a remainder as a fraction ● Solve real-world word problems that involve division of whole numbers and interpret the quotient in the context of the problems	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Denominator ● Dividend ● Divisor ● Numerator		

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessments
- Summative Assessments

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be added and subtracted
- Written Responses

Additional Resources:

- Math in Practice, Module 8

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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			Math / Grade 5 **Unit 10**
Course/Subject: Math	**Grade:** 5	**Unit 10:** Multiply Fractions and Mixed Numbers	**Suggested Timeline:** 2 Weeks

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division **Unit 10: Multiply Fractions and Mixed Numbers** Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Multiplying Fractions by Fractions and Mixed Numbers
Unit Summary	Understanding what multiplication of fractions means is a critical component of understanding multiplication of fractions. Multiplication with fractions can be represented in different ways to enable students to visualize and solve varied problems.

Unit Essential Questions:	**Key Understandings:**
1. How do you multiply a fraction by a whole number or fraction? 2. How do you create story contexts for problems involving multiplication of fractions and whole numbers or fractions? 3. How do you multiply fractional side lengths to find the areas of rectangles?	1. Fractions, including mixed numbers, can be multiplied by a whole number or fraction. 2. Multiplying fractions and making sense of the product. 3. Models show multiplication of fractions 4. Problems can be solved that involve multiplying fractions and whole numbers

Focus Standards Addressed in the Unit:

*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.1.5.C.2	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
M05.A-F.2.1.2	Multiply a fraction (including mixed numbers) by a fraction.
M05.A-F.2.1.3	Demonstrate and understanding of multiplication as scaling (resizing)
5.NF.5	Interpret multiplication as scaling (resizing), by:
5.NF.5.A	Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
5.NF.5.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 1results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n × a)/(n × b) to the effect of multiplying a/b by 1.
5.NF.B.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
5.NF.B.4.A	Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = (ac)/(bd).
5.NF.B.4.B	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

Important Standards Addressed in the Unit:	
5.NBT.B.5	Fluently multiply multi-digit whole numbers using the standard algorithm.

Misconceptions:	**Proper Conceptions:**
● Not understanding why, when one factor is a fraction, the product is smaller. ● Cannot accurately represent the fractional part	● When we multiply whole numbers the product will increase. This is not the case when we multiply by fractions and decimals less than one. ● Remind to consider a whole when answering.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand the concept of multiplication and how it can apply to fractions ● Understand that when multiplying fractions, the product is not always greater than the factors ● Understand that an equation such as ¼ x 8 is said as one-fourth of eight or interpreted as ¼ of 8 pies ● Understand the area model for multiplication	● Multiply a fraction by a whole number ● Multiply a fraction by a fraction ● Multiply fractional side lengths to find areas of rectangles ● Use a model to show a fraction multiplied by a fraction ● Represent the problem in multiple ways	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate

● Understand estimation of products ● Understand area as tiling with unit squares of equal fraction and or whole measure ● Understand the formula for area	● Decide if an answer is reasonable using mental math, estimation and/or rounding ● Use a model to show multiplication of fractions and fraction by a whole number ● Create story contexts for problems involving multiplication of fractions and whole numbers or multiplication of two fractions	● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Area model ● Factors	● Product ● Scaling	● Multiplier

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be multiplied
- Written Responses

Additional Resources:

- Math in Practice, Module 9

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

Tellish, J., O'Connell, S., SanGiovanni, J. (2016). *Math in practice: Teaching fifth-grade math*. Portsmouth, NH: Heinemann

Created By:
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			Math / Grade 5 **Unit 11**
Course/Subject: Math	**Grade:** 5	**Unit 11:** Divide Fractions	**Suggested Timeline:** 1-2 Weeks

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers **Unit 11: Divide Fractions** Unit 12: Represent and Interpret Data Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Dividing whole numbers and unit fractions
Unit Summary	Students are posed two different types of division problems: whole number divided by a unit fraction and a unit fraction divided by a whole number. Fractions are limited to unit fractions in order to allow students to gain a deeper understanding before working with more complex fractions.

Unit Essential Questions:	**Key Understandings:**
1. How do you divide a unit fraction by a whole number and explain what it means? 2. How do you divide a whole number by a unit fraction and explain what it means? 3. How do you solve problems involving division with whole numbers and unit fractions?	1. A unit fraction can be divided by a whole number. 2. A whole number can be divided by a unit fraction. 3. Models can help to solve problems involving division with fractions.

Focus Standards Addressed in the Unit:

*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*

CC.2.1.5.C.2	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
M05.A-F.2.1.4	Divide unit fractions by whole numbers and whole numbers by unit fractions
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
5.NF.7.A	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.
5.NF.7.B	Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.
5.NF.7.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?

Important Standards Addressed in the Unit:	

Misconceptions:	**Proper Conceptions:**
● Difficulty understanding that the quotient is larger than the dividend.	● Use fraction models

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand that multiplication and division are inverse operations ● Understand the connection between whole number division and division involving fractions in that it involves grouping (quotative model) or fair share (partitive model) ● Understand properties of operations (commutative, associative, identity, etc..)	● Create story contexts for problems involving division of a fraction by a whole number and division of a whole number by a fraction ● Solve problems involving division of fractions ● Explain and represent a whole number divided by a fraction and a fraction divided by a whole number using models, drawings, and equations	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision

		• Collaboration by building understanding together in small group discussion

Academic Vocabulary:

• Dividend • Quotient	• Divisor • Unit fraction	• partition

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessments
- Summative Assessments

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be divided
- Written Responses

Additional Resources:

- Math in Practice, Module 10

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

Tellish, J., O'Connell, S., SanGiovanni, J. (2016). *Math in practice: Teaching fifth-grade math*. Portsmouth, NH: Heinemann

Created By:
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			Math / Grade 5 **Unit 12**
Course/Subject: Math	**Grade:** 5	**Unit 12:** Represent and Interpret Data	**Suggested Timeline:** 1 Week

Grade Level Summary	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; (3) developing understanding of volume; and (4) Geometry and coordinate systems.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Divide Fractions **Unit 12: Represent and Interpret Data** Unit 13: Measurement Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Representing and Interpreting Data
Unit Summary	Line plots visually display data. This can be useful with measurement data. This standard builds on ideas of line plots from earlier grades while connecting to concepts of fractions

Unit Essential Questions:	**Key Understandings:**
1. How do you create a line plot to show fractional parts to eighths? 2. How do you use data on a line plot to solve problems?	1. Line plots can be made with units in halves, fourths, and eights. 2. Multi-step problems about data can be shown on the line plot.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.4.5.A.2	Represent and interpret data using appropriate scale.

CC.2.4.5.A.4	Solve problems involving computation of fractions using information provided in a line plot.
M05.D-M.2.1.1	Solve problems involving computation of fractions by using information presented in line plots.
M05.D-M.2.1.2	Display and interpret data shown in tallies, tables, charts, pictographs, bar graphs, and line graphs, and use a title, appropriate scale, and labels. A grid will be provided to display data on bar graphs or line graphs.
5.MD.B.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally*.

Important Standards Addressed in the Unit:	
CC.2.1.5.C.2	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
5.NF.A.	Use equivalent fractions as a strategy to add and subtract fractions
CC.2.1.5.C.1	Use the understanding of equivalency to add and subtract fractions.
(5.NF.B.)	Apply and extend previous understanding of multiplication and division.

Misconceptions:	**Proper Conceptions:**
● Mislabeling lines ● Misinterpretation of what the X represents on the number line. ● Inclusive and exclusive language when identifying a set of data. (ie all points less that ½, would not include the data set located at ½)	● Students need to carefully attend to line plot units and precisely create appropriate number lines with equal spacing and labels. ● Students need a clear understanding that each X on the line plot represents one quantity of data at that place on the line plot. ● Language in math is precise and explicit. Language can include or exclude certain portions of a data set.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand how to measure lengths including fractional increments ● Understand the purpose of a line plot ● Understand computation of fractions	● Measure lengths including fractional increments ● Create line plots with fraction measurements ● Interpret graphs to solve multi-step problems using data from line plots ● Recognize and explain the relationship between line plots and number lines ● Using technology, research real-world examples of lgraphs in use	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics.

		● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Line plot ● Redistribution of data ● Data set	● Mean ● Median ● Mode ● Average	

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Data in context can be graphed and analyzed
- Written Responses

Additional Resources:

- Math in Practice, Module 12

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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Created By:
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			Math / Grade 5 **Unit 13**
Course/Subject: Math	**Grade:** 5	**Unit 13:** Measurement	**Suggested Timeline:** 2 Weeks

Grade Level Summary	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.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data **Unit 13: Measurement** Unit 14: Coordinate Grids Unit 15: 2D Figures

Unit Title	Converting Like Measurement Units
Unit Summary	Converting between units is more than a procedural undertaking. Students should begin with seeing the relationship between the units being converted and apply the relationship to function tables and/or tape diagrams. After this fundamental understanding is in place, students can begin to work with procedural computations.

Unit Essential Questions:	**Key Understandings:**
1. How do you convert from one unit of measurement to another in the same system? 2. How do you solve problems that require me to convert measurement units?	1. Different units can be converted within the same measurement system (e.g., meters to centimeters, grams to kilograms, or feet to inches). 2. Conversions can be used to solve multistep word problems.

Focus Standards Addressed in the Unit:
*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*

CC.2.4.5.A.1	Solve problems using conversions within a given measurement system
M05.D-M.1.1.1	Convert between different-sized measurement units within a given measurement system. A table of equivalences will be provided. Example: Convert 5 cm to meters.
5.MD.A.1	Convert among different-sized measurement units within a given measurement system.

Important Standards Addressed in the Unit:	
CC.2.1.5.B.2	Extend an understanding of operations with whole numbers to perform operations including decimals.
5.NBT.B.6	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.

Misconceptions:	**Proper Conceptions:**
● Students may have difficulty understanding that we multiply when converting from larger to smaller units and divide when converting from smaller to larger units ● Students often stop when they have answered one part of a multistep word problem	● Use a context for the process, like thinking about converting liters to dekaliters, so they are better able to make sense of it. ● Remind them to check the original problem to make sure they have answered what was asked.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand the relative sizes of measurement units within a system ● Understand the relationship between the units being converted	● Write and solve an equation to show conversion of units ● Make reasonable estimates when converting ● Explain how measurement units are similar and different (for example: How are a meter and yard alike? How are they different?) ● Represent the relationship between units in a function table and/or tape diagram ● Use tools, models and symbols to accurately convert from one unit of measure to another ● Solve problems and tasks using measurement conversions	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Centimeter ● Liter ● Conversion ● Convert ● Customary ● Decimeter ● Pound ● Quart	● Foot ● Gallon ● Gram ● Inch ● Kilogram ● Kiloliter ● Kilometer ● Yard	● Liter ● Meter ● Metric ● Mile ● Milligram ● Milliliter ● Ounce ● Pint

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Measurement in context can be analyzed
- Written Responses

Additional Resources:

- Math in Practice, Module 11

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

Tellish, J., O'Connell, S., SanGiovanni, J. (2016). *Math in practice: Teaching fifth-grade math*. Portsmouth, NH: Heinemann

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Math / Grade 5

Unit 14

Course/Subject:	Grade:	Unit 14:	Suggested Timeline:
Math	5	Coordinate Grids	2 Weeks

Grade Level Summary	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.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiply Whole Numbers Unit 3: Divide Whole Numbers Unit 4: Numerical Expressions, Order of Operations, & 2-Step Patterns Unit 5: Add and Subtract Decimals Unit 6: Multiply and Divide Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as Division Unit 10: Multiply Fractions and Mixed Numbers Unit 11: Dividing Fractions Unit 12: Represent and Interpret Data Unit 13: Measurement **Unit 14: Coordinate Grids** Unit 15: 2D Figures

Unit Title	Coordinate grids
Unit Summary	Coordinate grids can be used in a variety of ways to make sense of mathematics. Grids are commonly used for maps. They can also be used to visualize equations. Students will have to locate points, name coordinates, move around, and make shapes on the coordinate grid, using the first quadrant only.

Unit Essential Questions:	**Key Understandings:**
1. How do you recognize the x-axis and y-axis on a coordinate grid? 2. How do you identify an ordered pair and graph the point on a coordinate plane? 3. How do you solve problems involving ordered pairs?	1. Points can be located and graphed in the first quadrant of the coordinate plane. 2. Problems can be solved by graphing points. 3. Ordered pairs can be formed, graphed, and used to identify relationships to other ordered pairs.

Focus Standards Addressed in the Unit:

*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.3.5.A.1	Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems.
M05.C-G.1.1.1	Identify parts of the coordinate plane (x-axis, y-axis, and the origin) and the ordered pair (x-coordinate and y-coordinate). Limit the coordinate plane to quadrant I.
M05.C-G.1.1.2	Represent real-world and mathematical problems by plotting points in quadrant I of the coordinate plane and interpret coordinate values of points in the context of the situation.
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.

Important Standards Addressed in the Unit:	
CC.2.2.5.A.4	Analyze patterns and relationships using two rules.
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*.
CC.2.3.5.A.2	Classify two-dimensional figures into categories based on an understanding of 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.

Misconceptions:	**Proper Conceptions:**
● Coordinates can be listed in any order. ● When counting units on a grid you must count vertically then horizontally.	● Coordinates must be named with the x-coordinate first. ● We always put numbers in (x, y) order so we know which number is which, but when we are moving between points, we can move in either direction first.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand that coordinate grids can be used for maps ● Understand that a coordinate grid is composed of perpendicular lines that create an x-axis and y-axis ● Understand that the horizontal axis is the x-axis and that the vertical axis is the y-axis ● Understand horizontal and vertical number lines	● Construct a coordinate system and recognize the origin ● Recognize the x-axis and y-axis ● Identify an ordered pair ● Explain the relationship of an ordered pair and the location on the coordinate plane ● Interpret and label the x and y-axis in relationship to the problem/task being solved	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns

● Understand that an ordered pair is a set of numbers that indicate direction and length of movement ● Understand the location and ordered pair (0,0) associated with the origin ● Understand how coordinate grids are used to solve real-world problems ● Understand that an ordered pair is a set of numbers that represent a mathematical problem/equation	● Graph points in the first quadrant of a coordinate plane that represents real-world data ● Make ordered pairs with the corresponding terms in a pattern ● Solve problems and tasks involving coordinate grids ● Find the distance between two coordinate points ● Discuss the consequence of enlarging or decreasing coordinates of a specific shape ● Create story problems from a given set of ordered pairs or from a given pattern ● Solve word problems and tasks that involve patterns and ordered pairs ● Use models of a coordinate plane to extend a pattern	NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:

● Axis ● Coordinate ● Coordinate grid ● Coordinate system ● Quadrant	● Intersect ● Ordered pair ● Origin ● Perpendicular	● X-axis ● Y-axis ● X-coordinate ● Y-coordinate

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Locations can be plotted on a grid
- Written Responses

Additional Resources:

- Math in Practice, Module 14

Math in Practice Literature Connection
***A Fly on the Ceiling* (Julie Glass)**

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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Math / Grade 5

Unit 15

Course/Subject:	Grade:	Unit 15:	Suggested Timeline:
Math	5	Classify 2D Figures	2 Weeks

Grade Level Summary	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.
Grade Level Units	Unit 1: Place Value of Whole Numbers and Decimals (Rounding Included) Unit 2: Multiplying Whole Numbers Unit 3: Division of Whole Numbers Unit 4: Numerical expressions and Order of Operations and 2-Step Pattern Unit 5: Adding and Subtracting Decimals Unit 6: Multiplying and Dividing Decimals Unit 7: Volume Unit 8: Adding and Subtracting Fractions Unit 9: Fractions as division with Fractional concepts Unit 10: Multiplying Fractions and Mixed numbers Unit 11: Dividing Fractions Unit 12: Representing and Interpreting Data Unit 13: Measurement Unit 14: Coordinate Grids **Unit 15: 2D Figures**

Unit Title	Classifying 2D figures
Unit Summary	We classify figures by their attributes. 2 figures may share similar attributes but also have different attributes. These similarities and differences allow us to group figures as subsets of others. For example, rectangles and squares are both quadrilaterals. All squares are rectangles because they are 4 90° vertices. However, all rectangles are not squares because some of them have a set of opposite sides that are not equal to the other set.

Unit Essential Questions:

1. How do you identify shapes that belong in different categories (e.g. quadrilaterals, parallelograms, rectangles, triangles) based on the attributes of the shapes?
2. How do you identify a hierarchy of shapes based on their attributes?

Key Understandings:

1. All attributes that belong to a category of two-dimensional shapes also belong to all subcategories of that category (example: all rectangles have four right angles and squares are rectangles, so they must have four right angles).
2. Two-dimensional figures can be classified in a hierarchy based on the properties of the shapes.

Focus Standards Addressed in the Unit:

*Standards with prefix "CC" and "M05" denote PA Core Standards and eligible content, and standards beginning with "5" denote Common Core Standards.

Standard Number	*Standard Description*
CC.2.3.5.A.2	Classify two-dimensional figures into categories based on an understanding of their properties
M05.C-G.2.1.1	Classify two-dimensional figures in a hierarchy based on properties. Example 1: All polygons have at least three sides, and pentagons are polygons, so all pentagons have at least three sides. Example 2: A rectangle is a parallelogram, which is a quadrilateral, which is a polygon; so, a rectangle can be classified as a parallelogram, as a quadrilateral, and as a polygon.
5.G.B.3	Understanding that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
5.G.4	5.G.4 Classify two-dimensional figures in a hierarchy based on properties.

Important Standards Addressed in the Unit:	

Misconceptions:	**Proper Conceptions:**
● Misunderstanding that a square can also be a rectangle or a rhombus is also a parallelogram.	● Shapes can be sorted into accurate categories

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Understand defining attributes of two-dimensional shapes ● Understand the similarities and differences among two-dimensional figures ● Understand that figures can be sorted into categories with subcategories	● Classify two-dimensional figures by their attributes ● Explain how two-dimensional attributes can belong to several two-dimensional figures ● Identify subcategories using two-dimensional attributes ● Draw or compose figures based on definitions, attributes, or given categories ● Define figures given category titles and decide if additional figures belong	Standards of Mathematical Practice ● SMP 1: Understand and Persevere ● SMP 2: Reason Abstractly and Quantitatively ● SMP 3: Justify and Critique ● SMP 4: Model with Mathematics ● SMP 5: Strategically Use Tools ● SMP 6: Attend to Precision ● SMP 7: Utilize Structure ● SMP 8: Utilize Patterns NYCSD Profile of a Graduate ● Competency by displaying mastery of core content including literacy in mathematics. ● Critical thinking by problem solving, identifying a problem, and brainstorm a solution for solving the problem. ● Conscientious by attending to precision ● Collaboration by building understanding together in small group discussion

Academic Vocabulary:		
● Attribute ● Hierarchy ● Parallelogram	● Polygon ● Property ● Quadrilateral	● Rectangle ● Rhombus ● Square

		● Trapezoid

Evidence: Assessments and Performance Task(s)

- Performance Tasks
- Formative Assessment
- Summative Assessment

Interdisciplinary Connections:

- Science and Social Studies
  - Values in context can be added and subtracted
- Written Responses

Additional Resources:

- Math in Practice, Module 15

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common core state standards initiative: Mathematics standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

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