Grade 5
(August, September)

Unit 1: Whole Number Computation and Application

Desired Outcomes

Standard(s):

Perform operations with multi-digit whole numbers and with decimals to hundredths.
5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm.
5.NBT.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division, illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Write and interpret numerical expressions.
5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Transfer:

Students will apply concepts and procedures of multiplication and division to solve real world problems.

Example: The parking garage has 4,224 parked on 6 levels, each of which have a blue, a green, a yellow and a red section. If each section has the same amount of cars, how many cars are in each section?

Understandings: *Students will understand that …*

- Parentheses, brackets, and braces are used to guide the order of operations when simplifying expressions.
- A standard algorithm is used to fluently multiply multi-digit whole numbers.
- A variety of different strategies can be used to divide multi-digit numbers, *visual models (rectangular array, equations, and/or area model) and strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.*

Essential Questions:

- How do parentheses, brackets, and braces affect the way you simplify expressions?
- How do you multiply multi-digit numbers using a standard algorithm?
- How do you choose different division strategies to divide multi-digit numbers?

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

1. **Make sense of problems and persevere in solving them.** Students persevere in solving problems to represent and solve in a range of contexts by selecting appropriate strategies.
2. **Reason abstractly and quantitatively.** Students reason abstractly by choosing strategies to represent situations.
* 3. **Construct viable arguments and critique the reasoning of others.** Students explain calculations using models, properties of operations, and rules that generate patterns when they talk and write about the steps they take to solve problems. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like How did you get that? and Why is that true? They explain their thinking to others and respond to others' thinking.
4. **Model with mathematics.** Students make diagrams and equations to represent the multiplication and division situations.
5. **Use appropriate tools strategically.** Use manipulatives to model division (e.g. base- ten materials, Cuisenaire Rods, Digi/blocks).
6. **Attend to precision.**
7. **Look for and make use of structure.** Students will look for the place value structure of numbers to aide in efficient calculation.
* 8. **Look for and express regularity in repeated reasoning.** Students use repeated reasoning to understand algorithms and make generalizations about patterns when multiplying and dividing multi-digit numbers. Students connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers.

Prerequisite Skills/Concepts:

Students should already be able to…

- Multiply 4-digit by 1-digit numbers and 2-digit by 2-digit numbers.
- Divide whole numbers with up to four-digit dividends and one-digit divisors.
- Solve problems with the different problem solving structures using the four operations.

Advanced Skills/Concepts:

Some students may be ready to…

- Divide multi-digit whole numbers by multi-digit whole numbers by using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.
- Evaluate more complex numerical expressions

Knowledge: *Students will know…*

- How to illustrate and explain division (up to 4-digit whole numbers by up to 2-digit whole numbers) calculations by using a visual model (rectangular array, equations, and/or area model) (5.NBT.6).

Skills: *Students will be able to …*

- Fluently multiply multi-digit whole numbers. (5.NBT.5)
- Divide up to 4-digit whole numbers by up to 2-digit whole numbers by using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. (5.NBT.6)
- Use parentheses, brackets, and braces in numerical expressions. And evaluate those expressions.(5.OA.1)

WIDA Standard:

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

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
Expressions Parentheses Brackets Braces	Dividend Divisor Quotient Remainder Array Area model Equation

Assessment

Summative Assessments

Multiplication Area Model
Multi-Digit Multiplication Summative
Multi-Digit Division Summative

Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Place Value Understanding • Using Area Models for Multi-Digit Multiplication • Division-Subtraction Relationship • Division-Multiplication Relationship	• Review Cards • Partial Product Multiplication • Area Model Pairs Check • Dividing with Base-Ten Blocks • Base Ten Assessment • Column Division vs. Partial Quotients • Area/Array Model Division	• Division Self-Assessment

Grade 5 **Unit 2: Volume**

(September, October)

Desired Outcomes

Standard(s):

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

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

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

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

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

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

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

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

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

Understand the place value system.

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

Transfer: Solving real-world problems involving volume (e.g., given the dimensions, determining the volume of concrete needed to build a step).

Understandings: *Students will understand that…*

- Measurement problems can be solved by using appropriate tools.
- Volume of three-dimensional figures is measured in cubic units.
- Volume is additive.
- Multiple rectangular prisms can have the same volume.
- Volume can be found by repeatedly adding the area of the base or by multiplying all three dimensions.
- Volume can be used to solve a variety of real life problems.

Essential Questions:

- What is volume and how is it used in real life?
- How does the area of rectangles relate to the volume of rectangular prisms?
- Why is volume measured in cubic units?

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

1. **Make sense of problems and persevere in solving them.** Students make sense of volume by describing how it relates to area. Students will demonstrate their perseverance by using a variety of strategies to find volume of rectangular prisms.
2. * **Reason abstractly and quantitatively.** They demonstrate quantitative reasoning by applying the volume formula to solve problems and explaining their process.
3. **Construct viable arguments and critique the reasoning of others.** They will be able to use examples and counter examples to support their calculations and representations. Given another student's work, students will be able to state why they agree or disagree.
4. * **Model with mathematics.** Students will use unit cubes to model the concept of volume and how it relates to area. They build layers of unit cubes to "build" the concept of volume.
5. * **Use appropriate tools strategically.** Students demonstrate their ability to use unit cubes, rulers and calculators strategically to solve volume problems.
6. **Attend to precision.** They will use precision in their labeling of units correctly.
7. * **Look for and make use of structure.** They will also look for and use the structure of 3-dimensional figures when modeling and solving volume problems with rectangular prisms. They can use their knowledge of the structure of operations (repetitive addition of layers) to understand volume as well. In addition, students consider structure when examining the patterns in the number of zeros when multiplying by powers of 10.
8. **Look for express regularity in repeated reasoning.** When students can transfer repetitive addition to the volume formula (V=lwh), they demonstrate repeated reasoning. They also demonstrate repeated reasoning when explaining why figures are classified in the same categories.

Prerequisite Skills/Concepts:	**Advanced Skills/Concepts:**
Students should already be able to…	*Some students may be ready to…*
• Find area. • Find liquid volume.	• Given volume, compute the possible dimensions of a right rectangular prism.

Knowledge: *Students will know…*	**Skills**: *Students will be able to …*
• That volume of three-dimensional figures is measured in cubic units. • The cubic unit can be written with an exponent (e.g., in^3, m^3) • The formula for volume and when and how to use it.	• Define volume as the measurement of the space inside a solid three-dimensional figure. (5.MD.3) • Identify and describe unit cubes as representing 1 cubic unit of volume, and how they are used to measure volume of three-dimensional shapes. (5.MD.3) • Model how a solid figure is packed with unit without gaps or overlaps to measure volume. (5.MD.3) • Use the term "cubic units" to describe units of volume measurement. (5.MD.3) • Measure volumes by counting cubes first with manipulatives and then by pictures using cubic cm, cubic in, cubic ft, and improvised units. (5.MD.4) • Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. (5.MD.5) • ***Prerequisite: Find the volume of a right rectangular prism by finding the area of the base and using repetitive addition to add the layers of height.*** • Find the volume of a right rectangular prism by finding the area of the base and multiplying by the number of layers in the prism (height). (5.MD.5) • Show that the volume is the same as it would be if volume were found by multiplying the edge lengths. (5.MD.5) • Build a right rectangular prism model to represent a 3 factor multiplication expression. (5.MD.5) • Apply the formula to find volumes of right rectangular prisms with whole number edge lengths in real world and mathematical problems. (5.MD.5) • Find the volume of composite rectangular prisms by adding the volumes of the non-overlapping parts and applying the technique to solve real world problems. (5.MD.5)

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Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
Unit cube (as a manipulative) Volume Cubic unit Right rectangular prism	Area Gap Overlap Solid figure Attribute Edge lengths

Assessment		
Summative Assessments Finding Volume of Containers Pt. 1 – Packing Cubes Finding Volume of Containers Pt. 2 – cm paper Finding Volume of Containers Pt. 3 –Measuring & Using Equations Problem Solving Cards Skyscraper Assessment Zeroes and Exponents		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Area Pre-Assessment	• Solid Construction • Finding Volume of Containers Pt. 1 – Packing Cubes • Finding Volume of Containers Pt. 2 – cm paper • Finding Volume of Containers Pt. 3 – Measuring & Using Equations • Build a Tower Practice • Building Powers	• Problem Solving Cards

Grade 5
(October, November, December)

Unit 3: Fraction Computation and Applications

Desired Outcomes

Standard(s):

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

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 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*

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

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. *For example, interpret ¾ as the result of dividing 3 by 4, noting that ¾ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size ¾. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product (a/b) x q as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a x q ÷b*. *For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd.*
b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5.NF.5 Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n x a)/(n x b) to the effect of multiplying a/b by 1.

5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

a. Interpret division of a unit fraction by a non-zero whole number and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.*
b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 x (1/5) = 4.*
c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3 –cup servings are in 2 cups of raisins?*

Convert the measurement units within a given measurement system.

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

Represent and interpret data.

5.MD.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 distributed equally.*

Transfer: Students will apply concepts and procedures of adding, subtracting, and multiplying fractions.
Example: Mrs. Herron's class is working on a class project. They will be making rice dishes as part of their project for open house. If every ***four*** classmates share a 9-pound bag of rice to be used for cooking, how many pounds of rice will each student receive?
Example: When adding 5/6 + 3/8, Jacob writes 40/48 + 18/48. Show why 5/6 + 3/8 and 40/48 + 18/48 are equivalent. Write two more addition problems that are equivalent.
Example: Mrs. Smith is planning a field trip to the zoo. 2/3 of her students want to see the Wild Cats exhibit first. Of those who want to see the Wild Cats, 3/5 prefer the lions. What fraction of the class prefers to see the lions first when they arrive at the zoo?
Example: A bakery orders sugar in a bulk package that contains 20 cups of sugar. If a recipe for cookies calls for ¼ c. of sugar per batch, how many batches can be made with the bulk package of sugar?

Understandings: *Students will understand that …*
Benchmark fractions and other strategies aid in estimating the reasonableness of results of operations with fractions.
The use of area models, fraction strips, and number lines, are effective strategies to model sums, differences, products, and quotients.
Equivalent fractions are critical when adding and subtracting fractions with unlike denominators.
Fractions are division models.
Multiplication can be interpreted as scaling/resizing (multiplying a given number by a fraction greater than 1 results in a product greater than the given number and multiplying a given number by a fraction less than 1 results in a product smaller than the given number).
Use your knowledge of fractions and equivalence of fractions to develop algorithms for adding, subtracting, multiplying, and dividing fractions.

Essential Questions:
What is a reasonable estimate for the answer?
How do operations with fractions relate to operations with whole numbers?
What do equivalent fractions represent and why are they useful when solving equations with fractions?
What models or pictures could aid in understanding a mathematical or real-world problem and the relationships among the quantities?
What models or pictures can be used when solving a mathematical or real-world problem to help decide which operation to use?
What are the effects of multiplying by quantities greater than 1 compared to the effects of multiplying by quantities less than 1?

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

Make sense of problems and persevere in solving them. Students will be able to represent problems with fractions in various modalities in order to solve problems and explain the relationship between their representations.

Reason abstractly and quantitatively. Fifth graders should recognize that a number represents a specific quantity. They connect quantities to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions.

Construct viable arguments and critique the reasoning of others. Students will explain their thought processes for developing representations of fractions and fraction operations. Students will ask and answer questions with their peers about their representations and problem solution processes.

Model with mathematics. Students will use various models and manipulatives to represent fractions and fraction expressions. (Including color tiles, fraction tiles, fraction bars, area models, etc.)

Use appropriate tools strategically. Students demonstrate their ability to pick and/or use an appropriate model such as number lines, fraction tiles, paper/pencil models, or graph paper to solve problems using fraction operations.

Attend to precision. Students will demonstrate precision by using correct terminology of fractions and their components.

Look for and make use of structure. Students will identify the structure of a fraction and know what the parts represent. Students also can see and apply operations within the structure of word problems involving fractions (adding to, taking from, putting together, taking apart, comparing for addition and subtraction; groups, area/array, multiplicative comparison for multiplication and division).

Look for and express regularity in repeated reasoning. Students will be able to solve a given problem by identifying a pattern of unit fractions or related operation or strategy. (Example, 1/5 + 1/5 + 1/5 + 1/5 is the same as 4 x 1/5)

Prerequisite Skills/Concepts: *Students should already be able to…* Compare and make equivalent fractions with and without visual models. Compose and decompose fractions into unit fractions. Add and subtract fractions with like denominators. Locate halves, quarters, and eighths on a number line.	**Advanced Skills/Concepts:** *Some students may be ready to…* Divide fractions by fractions using visual, manipulative, and symbolic representations.
Knowledge: *Students will know…*	**Skills**: *Students will be able to …* Add fractions with unlike denominators by replacing given fractions with equivalent fractions. (5.NF.1) Add mixed numbers with unlike denominators by replacing given fractions with equivalent fractions. (5.NF.1) Subtract fractions with unlike denominators by replacing given fractions with equivalent fractions. (5.NF.1) Subtract mixed numbers with unlike denominators by replacing given fractions with equivalent fractions (5.NF.1)

	Solve word problems involving addition of fractions referring to the same whole, including cases of unlike denominators using visual fraction models and/or equations. (5.NF.2) Solve word problems involving subtraction of fractions referring to the same whole, including cases of unlike denominators using visual fraction models and/or equations. (5.NF.2) Use benchmark fractions and number sense to estimate mentally and assess reasonableness of answers. (5.NF.2) Interpret a fraction as division of the numerator by the denominator. (5.NF.3) Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers using visual fraction models or equations. (5.NF.3) Multiply a fraction by a whole number. (5.NF.4) Use visual fraction models and/or language to interpret multiplication of a fraction by a whole number as multiplying the numerator by the whole and dividing by the denominator. (5.NF.4) Multiply a fraction by a fraction. (5.NF.4) Use visual fraction models and/or language to interpret multiplication of fractions as multiplying numerators and multiplying denominators. (5.NF.4) 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. (5.NF.4) Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. (5.NF.4) Use language and visuals to explain how multiplication of fractions represents scaling (resizing). (5.NF.5) Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication using visuals, real-life situations and/or language. (5.NF.5) Explain why multiplying a number by a fraction less than 1, results in a smaller product using visuals, equations, language and real-life examples (5.NF.5) Explain why multiplying a number by a fraction equal to 1, results in the same product using visuals, equations, language and real-life examples (5.NF.5) Explain why multiplying a number by a fraction greater than 1, results in a larger product using visuals, equations, language and real-life examples (5.NF.5) Solve real world problems involving multiplication of fractions using visual fraction models and equations. (5.NF.6) Solve real world problems involving multiplication of mixed numbers using visual fraction models and equations. (5.NF.6) Divide a unit fraction by a non-zero whole number using manipulatives, pictures, equations, real life examples and language. (5.NF.7) Divide a non-zero whole number by a unit fraction using manipulatives, pictures, equations, real life examples and language. (5.NF.7) Solve real world problems involving division of a unit fraction by a non-zero whole number and division of a non-zero whole number by a unit fraction using visual models and equations to represent the problem. (5.NF.7) Convert measurements within the metric system to solve multi-step, real world problems. (100cm = 1 meter) (5.MD.1) Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8) (5.MD.2) Use addition, subtraction, multiplication, and division of fractions to solve problems involving information presented in line plots. (5.MD.2)

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English language learners benefit from:

A preview of critical vocabulary terms before instruction.

The use of visuals to make explicit connections between the vocabulary and the content being learned.

Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
scaling (drawing to scale)	factor
like/unlike denominators	product
equivalent/equal units	equivalence
estimate	factor
benchmark fractions	multiple
fraction	numerator
mixed number	denominator
fractional side lengths	operations
U.S. customary measurement	multiplication/multiply
Conversion/convert	division/divide
	product
	quotient
	unit fraction
	area
	side lengths
	comparing

Assessment		
Summative Assessments Adding and Subtracting Fractions Scaling Multiplying Fractions and Mixed Numbers Field Trip Caring for Conan Real-World Problems Area of Rectangles		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Fraction Equivalence • Adding and Subtracting Fractions with Like Denominators • Multiplying Fractions and Whole Numbers	• Critique Subtraction • Mural Painting • Cast Party • Discovering Fraction Operation Patterns • Expression/Fraction Matching Cards • Cookie Bars • Scaling • Scaling Sort • Multiplying Fractions • Multiplying Mixed Numbers • Fraction Multiplication Scavenger Hunt • Domino Multiplication War • Domino Multiplication War Critique • Two Truths and A Lie • Fraction Kit and Table • Measurement Problem Solving • Customary Conversions Scavenger Hunt • Analyzing Measurement Relationships • Think-Pair-Critique Gallery Walk	• Cast Party • Discovering Fraction Operation Patterns

Grade 5 **Unit 4: Decimal Computation and Applications**

(January, February, March)

Desired Outcomes

Standard(s):

Understand the place value system

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

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

5.NBT.3 Read, write and compare decimals to thousandths.

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

b. Compare two decimals to thousandths based on meaning of the digits in each place, using >, +, and < symbols to record the results of comparisons.

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

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

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.

Convert the measurement within a given measurement system.

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

Transfer: Solve real-world problems involving conversions within a measurement system (e.g. converting milliliters of liquid to liters.)

Understandings: *Students will understand that …*

- In a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- Multiplying by a power of 10 shifts the digits of a whole number or decimal that many places to the left. The exponent not only indicates how many places the decimal point is moving but also that you are multiplying or making the number 10 times greater, three times when you multiply by $10^{3.}$ (e,g 3.4 x 10^3 = 3.4 x (10 x 10 x 10) = 3.4 x 1.000 = 3,400)

Essential Questions:

- What occurs when whole numbers and decimals are multiplied or ordered by 10 or powers of 10?
- What is the place value relationship in whole numbers and decimals?
- How are operations on decimals similar and different from operations on whole numbers and operations on fractions?
- How are metric measurements, decimals and powers of 10 related?

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

a.* **Make sense of problems and persevere in solving them.** Students solve problems related to metric measurement conversions. They persevere by selecting or using various tools.

b. **Reason abstractly and quantitatively.** Students represent and round decimal numbers using place value concepts and perform operations involving decimals.

c. **Construct viable arguments and critique the reasoning of others.**

d.* **Model with mathematics.** Students experiment with representing problem situations involving decimals in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fifth graders should evaluate their results in the context of the situation and whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.

e. **Use appropriate tools strategically.**

f. **Attend to precision.** Students attend to precision by using specific language in word problems to determine strategic processes.

g. **Look for and make use of structure.** Students look for and recognize the structure in the place value system for both whole numbers and decimals.

h. **Look for and express regularity in repeated reasoning.** Students connect place value and their prior work with operations to perform all operations with decimals to hundredths.

Prerequisite Skills/Concepts:	**Advanced Skills/Concepts:**
Students should already be able to…	*Some students may be ready to…*
• Round whole numbers to any place. • Explain the value of the digits in whole numbers.	• Add, subtract, multiply and divide using the standard algorithm.

Knowledge: *Students will know…*	**Skills**: *Students will be able to …*
• That in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • The exponent indicates how many places the decimal point is moving.	• Model and explain that the value of a digit changes as you move to the left (10 times more) or to the right (1/10 less) using manipulatives, pictures, and/or language. (5.NBT.1) • Represent and model the pattern of zeros that occurs when multiplying by powers of 10. (10^3 = 10x10x10=1000) (5.NBT.2) • Represent and explain the patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. (5.NBT.2) • Represent and model the use of a whole number exponent to denote powers of 10. (5NBT.2) • Read decimals to thousandths using number names. (5.NBT.3) • Write decimals to thousandths using base-ten numerals and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 + 3 (1/10) + 9 x (1/100) + 2 x (1/1000).(5.NBT.3) • Compare two decimals to thousandths based on meaning of the digits in each place, using >, =, and < symbols to record the results of comparisons. (5.NBT.3) • Round decimals to any place. (5.NBT.4) • Convert measurements within the metric system to solve multi-step, real world problems. (100cm = 1 meter) (5.MD.1) • Use concrete models, pictorial representations, written symbols, and language to show addition, subtraction, multiplication, and division of decimals to hundredths.(5.NBT.7)

WIDA Standard:

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

English language learners benefit from:

- A preview of critical vocabulary terms before instruction.
- The use of visuals to make explicit connections between the vocabulary and the content being learned.

Academic Vocabulary:	
Critical Terms:	**Supplemental Terms:**
Tenths	Denote
Hundredths	Aligning
Thousandths	Convert
Exponents	Conversions
Powers of 10	Measurement system
Decimal point	Metric
Expanded notation	Mass
Data set	Kilogram
	Gram
	Liter
	Milliliter
	Meter
	Centimeter
	Kilometer
	Line plot
	Data
	Table of equivalent measures

Assessment		
Summative Assessments Read, Write, Compare and Round Decimal Computation Analyzing Decimal Computation Olympic Swimming Capacity Quandary		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Place Value and Tape Diagrams • Decimal of the Day • Alice and the Shrinking Units	• Decimal of the Day • Arrow Cards and Tape Diagrams • Reading Decimals • Decimal Representation Card Deck Games • Roll On Decimals • Decimals and Number Lines • Critiquing Comparison • Roller Coaster Rounding Game • Decimals and Number Lines • Critiquing Rounding • Models for Adding and Subtracting Decimals • Roll and Add or Subtract • Multiplying and Dividing by Powers of 10 • Models for Multiplying and Dividing Decimals • Roll and Multiply or Divide • Rectangle Hunt • Measurement Conversion • Problem Solving Task Cards	• Arrow Cards and Tape Diagrams • Read, Write, Compare and Round • Decimal Computation • Decimal Self Reflection

Desired Outcomes

Standard(s):

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

5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

5.G.4 Classify two-dimensional figures in a hierarchy based on properties.

Transfer:

A sample of questions that might be posed to students include:

- A parallelogram has 4 sides with both sets of opposite sides parallel. What types of quadrilaterals are parallelograms?
- Regular polygons have all of their sides and angles congruent. Name or draw some regular polygons.
- All rectangles have 4 right angles. Squares have 4 right angles so they are also rectangles. Is this true or false? Explain.
- A trapezoid has 2 sides parallel so it must be a parallelogram. Is this true or false? Explain.

Understandings: *Students will understand that …*

- Two-dimensional geometric figures are composed of various parts that are described with precise vocabulary.
- Two-dimensional geometric figures can be classified based upon their properties.

Essential Questions:

- Why is it important to use precise language and mathematical tools in the study of 2-dimensional and 3-dimensional figures?
- How can describing, classifying and comparing properties of 2-dimesional shapes be useful in solving problems in our 3-dimensional world?

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

a. **Make sense of problems and persevere in solving them.**

b. **Reason abstractly and quantitatively.**

c.* **Construct viable arguments and critique the reasoning of others.** Students will discuss geometric figures using appropriate terminology and explain the reasons for their classification. They will be able to use examples and counter examples to support their classifications. Given another student's work, students will be able to state why they agree or disagree.

d. **Model with mathematics.**

e. **Use appropriate tools strategically.**

f.* **Attend to precision.** Students will use clear and precise language in their discussions with others and in their own reasoning when referring to the characteristics of two-dimensional figures.

g. **Look for and make use of structure.** Students will understand the hierarchical structure used to classify and sort 2-dimensional figures.

h. **Look for express regularity in repeated reasoning.**

Prerequisite Skills/Concepts: *Students should already be able to…* • Points, lines, line segments, rays, right angles, acute angles, obtuse angles, perpendicular lines, parallel lines can be identified within 2-dimensional figures • Classify shapes based on the number and length of sides and number of angles	**Advanced Skills/Concepts:** *Some students may be ready to…* • Draw polygons in the coordinate plane given coordinates for the vertices • Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate
Knowledge: *Students will know…* • Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (5.G.4)	**Skills**: *Students will be able to …* • Identify two-dimensional shapes that can be classified into more than one category based on their attributes. (5.G.3) • Explain why figures belong in a category or multiple categories. (5.G.3) • Classify two-dimensional figures in a hierarchy based on properties (5.G.4)
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Academic Vocabulary:	
Critical Terms: Hierarchy	**Supplemental Terms:** Rhombus Quadrilateral Area Polygon Square Triangle Rectangle Parallelogram Pentagon Hexagon Cube Trapezoid

Assessment		
Summative Assessments		
Analyzing the Sort		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Find It!/ Draw It! • Parallel or Perpendicular • Is It Right? • Composing and Decomposing Angles • What's Your Angle?	• All My Names • Is It a Polygon • Figure Sort	

Desired Outcomes

Standard(s):

Analyze patterns and relationships

5.OA.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *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.*

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

5.G.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.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.

Write and interpret numerical expressions.

5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7).*

Transfer: Students will represent and solve real world situations and mathematical problems by graphing points in the coordinate plane.

Example: Chad can wrap two presents every hour. Create a graph that shows the relationship between the amount of time Chad spends wrapping presents and how many he wraps. Use the graph to determine how many presents Chad will have wrapped in 5 hours.

Understandings: *Students will understand that …*

- In a coordinate plane, 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.
- The coordinate plane can be used to model and compare numerical patterns and situations.
- Numerical expressions are used to represent real world and mathematical situations.
- Tables and graphs are used to represent real world and mathematical situations.

Essential Questions:

- What is the purpose of a coordinate plane?
- How can graphing points on the coordinate plane help to solve real world and mathematical problems?
- What is the relationship between numerical expressions, tables, graphs, and situations?

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

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.** Students discuss differences between representations of 2 different rules and analyze the models used to represent these rules (tables, expressions, points in the coordinate plane).
3. **Construct viable arguments and critique the reasoning of others.** Students discuss how well tables, graphs and expressions represent real-world and mathematical situations.
4. **Model with mathematics.** Use the first quadrant of the coordinate plane to graph ordered pairs to solve problems. They also use numerical expressions to represent real-world and mathematical situations. Students transfer between and among tables, expressions, plots in the coordinate plane and situations.
5. **Use appropriate tools strategically.**

* 6. **Attend to precision.** Students use and analyze appropriate language in writing and interpreting expressions.

* 7. **Look for and make use of structure.** Students look for and make use of structure in working with the coordinate plane and patterns. They analyze differences between 2 different rules in the coordinate plane. They also interpret the use of parentheses, brackets and braces in the context of real-world and mathematical situations.

* 8. **Look for express regularity in repeated reasoning in comparing patterns.** Students look for patterns in tables, points plotted in the coordinate plane, and real-world, visual, and numerical growth situations. They use numerical expressions to represent generalizations based upon the patterns.

Prerequisite Skills/Concepts:	**Advanced Skills/Concepts:**
Students should already be able to…	*Some students may be ready to…*
• Generate a numeric pattern that follows a given rule.	• Analyze trends from data points represented in the coordinate plane.
Knowledge: *Students will know…*	**Skills:** *Students will be able to …*
	• Generate two numerical patterns using two given rules. (5.OA.3)

• The necessary terminology for working with the coordinate plane (e.g. first quadrant, points, lines, etc). • Which axis is the x-axis and which is the y-axis? • Which is the x-coordinate and which is the y-coordinate?	• Identify numerical relationships between corresponding terms in 2 different expressions. (5.OA.3) • Form ordered pairs from the two patterns. (5.OA.3) • Graph the ordered pairs on the coordinate plane. (5.OA.3) • Graph on the coordinate plane. (5.G.1) • Identify, describe and explain the relationship between the names of the components of the coordinate plane including origin, x- and y- axis and x- and y- coordinates. (5.G.1) • Explain how to plot points on the coordinate plane. (5.G.1) • Graph points from a real-life situation, oral/written language or a written expression on the coordinate plane. (5.G.2) • Explain the relationship or value of the plotted points in the context of the situation. (5.G.2)

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Academic Vocabulary:

Critical Terms:	**Supplemental Terms:**
Coordinate system Coordinate plane First quadrant Points Lines Axis/axes x-axis y-axis Intersection of lines Origin Ordered pairs Coordinates x-coordinate y-coordinate	Horizontal Vertical Perpendicular Parallel Line segment Expressions Calculations Evaluating expressions Equation

Assessments		
Summative Assessments Numerical Expressions Coordinate Plane Vocabulary How Well did they Plot? Walking Tour Comparing Change Patterns		
Pre-Assessments	**Formative Assessments**	**Self-Assessments**
• Generalizing and Analyzing Patterns	• Evaluating Expressions • Writing Expressions • Interpreting Expressions • Writing and Evaluating Expressions in Context • Components of the Coordinate Plane • Plotting Points in the Coordinate Plane • Designing in the Coordinate Plane • Comparing Shape Growth Patterns • Comparing Numerical Change Patterns • Plotting Change Patterns	