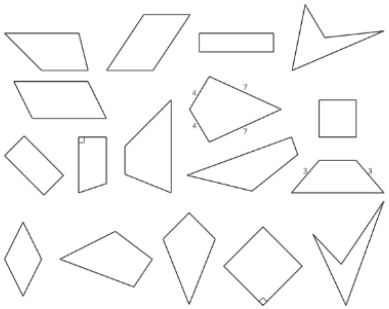
5th GRADE MATH CURRICULUM

1. Play a round of Guess Which One.

   Partner A: Select one of the quadrilaterals. Do not reveal your choice to your partner.

   Partner B: Ask "yes" or "no" questions to guess which shape your partner picked. After each question, cross out or remove quadrilaterals based on your partner's answers.

   Use the space to record your questions for this round.



Grade Level(s): 5th Grade

Curriculum Author(s): Taryn Fernandez, Jennifer Schnitzer, Alicia Schiavo
(Curriculum content aligns with the CT State Model Math Curriculum and is based on the Illustrative Math program used in grades K-9)

Course Description: The big ideas in grade 5 include: developing fluency with addition and subtraction of fractions, developing understanding of multiplication and division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions), extending division to two-digit divisors, developing understanding of operations with decimals to hundredths, developing fluency with whole number and decimal operations, and developing understanding of volume.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Finding Volume	How does the area of rectangles relate to the volume of rectangular prisms?	Volume can be found by repeatedly adding the area of the base or by multiplying all three dimensions.	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)
Fractions as Quotients and Fraction Multiplication	What is the meaning of the fraction bar?	Fractions can be interpreted as division	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)
Multiplying and Dividing Fractions	Does a number get bigger or smaller when we multiply it by a fraction? Does dividing a fraction by a whole number result in a smaller number or a larger number? What about the other way around?	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. Dividing a whole number by a unit fraction can be thought of as finding how many of the unit fraction it takes to make a whole, and multiplying the result by the whole number	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)
Wrapping Up Multiplication and Division with Multi-Digit Numbers	How can we apply our understanding of one or two-digit multiplication and division to three or more digit multiplication and division?	Standard algorithms can be used to solve multiplication and division problems	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)
Place Value Patterns and Decimal Operations	How do patterns in the number system help you understand quantity?	In a multi-digit number, a digit in the ones place represents 10 times as much as it represents in the place to	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)

		its right and 1/10 of what it represents in the place to its left.	
More Decimal and Fraction Operations	What is the importance of being able to convert measurements from smaller units to larger units and vice-versa?	Being able to convert measurements from smaller units to larger units and vice-versa helps us explain patterns in the placement of the decimal point when a decimal is divided by a power of 10 or multiplied by a power of 10.	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)
Shapes on the Coordinate Plane	Why is it important to use precise language and mathematical tools in the study of 2-dimensional?	Two-dimensional geometric figures are composed of various parts that are described with precise vocabulary.	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)
Putting it All Together	How can we utilize our learning to develop strategies that get us ready to practice and apply our math skills?	We can create our own strategies for math warm-ups that will help us prepare for lessons by using our prior knowledge.	TCC4(3-5); CCE1(3-5); CCE2(3-5); CCE3(3-5); CCE4(3-5); DE1(3-5); TI2(3-5); TI3(3-5); P2(3-5); AA1(3-5); AA2(3-5); AA4(3-5)

Unit 1 - Finding Volume

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 5.MD.C.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.MD.C.3.b: A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
- 5.MD.C.4: Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
- 5.MD.C.5.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.
- 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.
- 5.MD.C.5.b: 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.
- 5.OA.A.1: Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
- 5.MD.C.5: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- 5.MD.C.5.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.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I’ve learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.

- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...

- Real-world mathematical situations can be represented using concrete models or drawings.
- Volume can be found by repeatedly adding the area of the base or by multiplying all three dimensions.
- The volume of a solid is the same whether considering the whole or the sum of the volume and its parts. A solid can thus be broken apart strategically and the volume of its parts measured and then added to make measuring its total volume easier.
- Volume is an attribute of a three-dimensional solid figure that is measured in cubic units.

Essential Questions:

- What models or pictures could aid in understanding a mathematical or real-world problem and the relationships among the quantities?
- How does the area of rectangles relate to the volume of rectangular prisms?
- Why is volume measured in cubic units?
- Can you change the volume of something by breaking it apart?

Students will know...

- There are different algorithms that can be used to multiply.
- Patterns and structures can be generalized when multiplying whole numbers
- The cubic unit can be written with an exponent (e.g., in3 , m3)
- Area and how to calculate it.
- Dimensions of rectangular prism (length, width and height)
- Methods for finding volume include counting cubes, decomposing a solid into parts, adding layers together and applying a formula.
- Volume can be measured (or determined) by finding the total number of cubic units required to fill the space without gaps or overlaps.

Students will be able to...

- Estimate the solution of a multiplication situation.
- Connect a standard algorithm to an efficient strategy.
- Explain and justify the reasoning used in a standard algorithm.
- Analyze other students' use of a standard algorithm, and explain any errors.
- Use an efficient standard algorithm accurately and flexibly.
- Explore number relationships and look for patterns.
- Use visual representations such as area models and arrays to draw connections to equations.
- Determine reasonableness of a solution and compare to initial estimation with multiplication.
- Explore and explain mathematical operations in context of real-world problems.

• The area of a Base of a rectangular prism is found by multiplying the length by width (B = ℓ × w). • In a right rectangular prism, any two parallel faces can be the Bases. • The volume of a rectangular prism can be found by multiplying the length by width by height (ℓ × w × h) or by multiplying the area of the Base by height (B x h). • The volume of a solid is the same as the sum of the volume of its layers, which is related to the formula: Volume = Base x Height. • A figure composed of rectangular prisms may be decomposed into two non overlapping rectangular prisms whose volumes may be added to find the volume of the figure • Volume is additive. • Multiple rectangular prisms can have the same volume. • Volume can be used to solve a variety of real life problems.	• Use concrete models or drawings to relate strategies • Define volume as the measurement of the space inside a solid three-dimensional figure. • Identify and describe unit cubes as representing 1 cubic unit of volume, and how they are used to measure volume of three-dimensional shapes. • Model how a solid figure is packed with unit without gaps or overlaps to measure volume. • Measure volumes by counting cubes first with manipulatives and then by pictures using cubic cm, cubic in, cubic ft, and improvised units. • Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. • Apply the formula to find volumes of right rectangular prisms with whole number edge lengths in real world and mathematical problems. • 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. • Find the volume of rectangular prisms (boxes) with whole number and fractional side lengths using a variety of methods including a formula. • Model and justify the formula for volume of a rectangular prism. • Use appropriate units (cubic cm, cubic in, cubic ft, and improvised units). • Decompose a prism built from cubes into layers. • Develop a connection between building layers from the base to applying formulas for finding volume.
Key Vocabulary: Estimation, Model, Area, Attribute, Base, Dimension, Formula, Solid figure, Unit, area model, Array, Equation, Factor, Multiple, Multiplication/Multiply, Place Value, Product, Properties Of Operations, Area Array, Area Of Base, Associative Property, Cube, Cubic Unit, Edge, Lengths, Height, Length, Rectangular Prism, Right Rectangular Prism, Unit Cube, Volume, Width	
Assessment Evidence	
Performance Tasks:	**Other Evidence:**

Students identify different ways to find the volume of a rectangular prism, including: multiplying length, width, and height decomposing into layers that are one cube thick and multiplying the number of cubes in one layer by the number of layers choosing a face as the base and multiplying its area and the corresponding height. Students find the volume of a figure. Students select different ways to fill a rectangular prism with centimeter cubes. Students find the volume of rectangular prisms given their side lengths. Students find the volume of a figure composed of two rectangular prisms. Students see a rectangular prism that is partly filled with unit cubes, without gaps or overlaps, where the cubes do not, and cannot, fill the container exactly. Students identify that in this situation they cannot calculate the volume exactly, but they can say that it is at least the number of cubes that fit completely inside the prism. Students design a composite prism to meet certain criteria.	Various checkpoints throughout the unit for the following: ● Describe volume as the space taken up by a solid object. ● Measure the volume of a rectangular prism by finding the number of unit cubes needed to fill it. ● Use the layered structure in a rectangular prism to find volume. ● Describe the calculations from the previous section as length×width×height or area of the base×height ● Find volume using length×width×height or area of the base×height ● Find the volume of a figure composed of rectangular prisms.

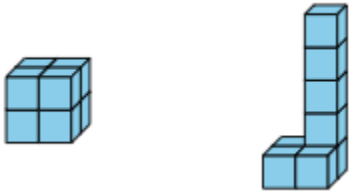
Learning Plan

- TCC4(3-5): I can use what I've learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

    - ***Students find the volume of right rectangular prisms and solid figures composed of two right rectangular prisms.***

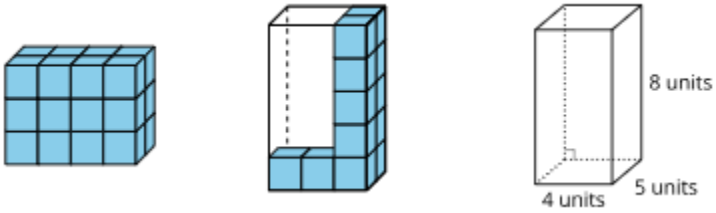
This unit introduces students to the concept of volume by building on their understanding of area and multiplication.

In grade 3, students learned that the area of a two-dimensional figure is the number of square units that cover it without gaps or overlaps. They first found areas by counting squares and began to intuit that area is additive. Later, they recognized the area of a rectangle as a product of its side lengths and found the area of more-complex figures composed of rectangles.



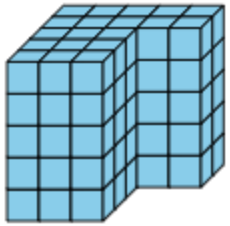
Here, students learn that the volume of a solid figure is the number of unit cubes that fill it without gaps or overlaps. First, they measure volume by counting unit cubes and observe its additive nature. They also learn that different solid figures can have the same volume.

Next, they shift their focus to right rectangular prisms: building them using unit cubes, analyzing their structure, and finding their volume. They write numerical expressions to represent their reasoning strategies and work with increasingly abstract representations of prisms.



Later, students generalize that the volume of a rectangular prism can be found by multiplying its side measurements (), or by multiplying the area of the base and its height (). As they analyze, write, and evaluate different expressions that represent the volume of the same prism, students revisit familiar properties of operations from earlier grades.

Later in the unit, students apply these understandings to find the volume of solid figures composed of two non-overlapping rectangular prisms and solve real-world problems involving such figures. In doing so, they also progress from using cubes to using standard units to measure volume.



Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 2 - Fractions as Quotients and Fraction Multiplication

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 5.NF.B.3.: Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
- 5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 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.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.
- 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.
- 5.OA.A.1: Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I've learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...	**Essential Questions:**
• Fractions can be interpreted as division • Equations, partial quotients, rectangular arrays and/or area models can be used to illustrate and explain division.	• What is the meaning of the fraction bar? • What models or strategies are helpful when solving real world multiplication/division problems?
Students will know...	**Students will be able to...**
• The relationship between division and fractions • The relationship between multiplication and division • Division can be connected to multiplication of a whole number by a unit fraction. • We can decompose a rectangle to find its area. • The decomposition of a rectangle can be represented with diagrams and expressions.	• Interpret and represent contexts relating division and fractions in a way that makes sense to them. • Represent the relationship between division and fractions with diagrams and expressions. • Represent the relationship between division and fractions with equations. • Solve problems involving division of whole numbers leading to answers in the form of fractions. • Connect division to multiplication of a whole number by a unit fraction.

	• Connect division to multiplication of a whole number by a non-unit fraction. • Find the area of a rectangle with a unit fraction side length in a way that makes sense to them. • Find the area of a rectangle with one non-unit fractional side length. • Find the area of a rectangle with one fractional side length greater than 1 in a way that makes sense to them. • Represent the area of a rectangle with a multiplication expression. • Solve problems involving the multiplication of a whole number by a fraction, including fractions greater than 1. • Multiply whole numbers and fractions using the properties of operations.
Key Vocabulary: Equivalent, Unit Fraction, Denominator, Difference, Divide, Dividend, Divisor, Fraction, Mixed Number, Numerator, Product, Quotient, Unit Fraction, Area model, Array	
Assessment Evidence	
Performance Tasks: Students find the area of a rectangle with one side of integer length and the other side of fractional length. Students identify expressions that represent a shaded area with one fractional side length and one whole number side length. Students solve a problem involving a product of a whole number and a fraction. Students represent the result of division of two whole numbers in multiple ways: a fraction, a mixed number, and a division expression. Students multiply a whole number by a fraction to solve a story problem. Students multiply a whole number by a fraction with no context. Students solve a problem about area.	**Other Evidence:** Various checkpoints throughout the unit for the following: • Represent and explain the relationship between division and fractions. • Solve problems involving division of whole numbers leading to answers that are fractions. • Connect division to multiplication of a whole number by a non-unit fraction. • Connect division to multiplication of a whole number by a unit fraction. • Explore the relationship between multiplication and division. • Find the area of a rectangle when one side length is a whole number and the other side length is a fraction or mixed number. • Represent and solve problems involving the multiplication of a whole number by a fraction or mixed number.

	• Write, interpret and evaluate numerical expressions that represent multiplication of a whole number by a fraction or mixed number.

Learning Plan

- TCC4(3-5): I can use what I've learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
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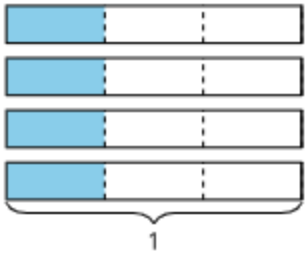
    - ***Students develop an understanding of fractions as the division of the numerator by the denominator, that is*** $a \div b = \frac{a}{b}$***, and solve problems that involve the multiplication of a whole number and a fraction, including fractions greater than 1.***

In this unit, students learn to interpret a fraction as a quotient and extend their understanding of multiplication of a whole number and a fraction.

In grade 3, students made sense of multiplication and division of whole numbers in terms of equal-size groups. In grade 4, they used multiplication to represent equal-size groups with a fractional amount in each group and to express comparison.

For instance, $4 \times \frac{1}{3}$ can represent "4 groups of $\frac{1}{3}$" or "4 times as much as $\frac{1}{3}$."

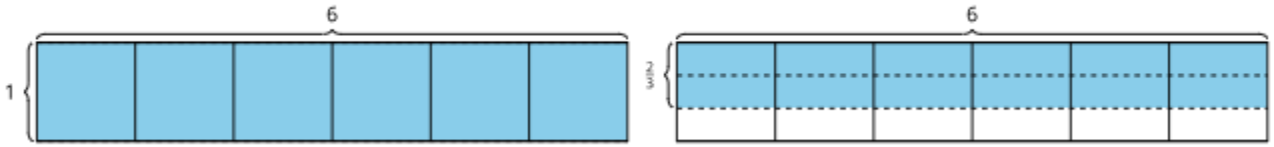
The amount in both situations can be represented by the shaded parts of a diagram like this:



Here, students learn that a fraction like $\frac{4}{3}$ can also represent:

- a division situation, where 4 objects are being shared by 3 people, or $4 \div 3$
- a fraction of a group, in this case, $\frac{1}{3}$ of a group of 4 objects, or $\frac{1}{3} \times 4$

Students also interpret the product of a whole number and a fraction in terms of the side lengths of a rectangle. The expression 6×1 represents the area of a rectangle that is 6 units by 1 unit. In the same way, $6 \times \frac{2}{3}$ represents on that is 6 units by $\frac{2}{3}$ unit.



The commutative and associative properties become evident as students connect different expressions to the same diagram. The distributive property comes into play as students multiply a whole number and a fraction written as a mixed number, for instance:
$2 \times 3\frac{2}{5} = (2 \times 3) + \left(2 \times \frac{2}{5}\right)$

Throughout this unit, it is assumed that the sharing is always equal sharing, whether explicitly stated or not. For example, in the situation above, 4 objects are being shared equally by 3 people.

Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 3 - Multiplying and Dividing Fractions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 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.
- 5.NF.B.6: Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
- 5.NF.B.7: Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
- 5.NF.B.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.B.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.B.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?

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I’ve learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
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- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...

- Arrays, number lines, fraction strips, or sets can be used to find the solution to multiplying a whole number by a fraction.
- 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.
- Dividing a whole number by a unit fraction can be thought of as finding how many of the unit fraction it takes to make a whole, and multiplying the result by the whole number
- Dividing a unit fraction by a whole number can be thought of a partitioning the unit fraction into a number if smaller parts equal to the whole number

Essential Questions:

- What models or pictures can be used when solving a mathematical or real-world problem to help decide which operation to use?
- Does a number get bigger or smaller when we multiply it by a fraction?
- How is scaling a real world application of multiplying fractions?
- Does dividing a fraction by a whole number result in a smaller number or a larger number? What about the other way around?

Students will know...

- Fractions are division models.
- The denominator describes what number of equal parts a whole has been divided into.
- The numerator describes how many of the parts are considered.
- The numerator is a multiplier
- Scaling is a form of multiplication.
- Informal methods for dividing a unit fraction by a whole number and dividing a whole number by a unit fraction

Students will be able to...

- Represent and interpret a unit fraction of a unit fraction in ways that make sense to them.
- Represent multiplication of unit fractions with diagrams and expressions.
- Find the product of 2 unit fractions.
- Represent and solve problems involving multiplication of a unit fraction and a non-unit fraction.
- Find the product of a unit fraction and a non-unit fraction.

	• Represent multiplication of two non-unit fractions with expressions. • Generalize to find the product of any 2 fractions. • Solve problems involving multiplication of fractions. • Divide a whole number by a unit fraction in context, in a way that makes sense to them. • Divide a whole number by a unit fraction. • Relate diagrams, situations and expressions that represent division of a whole number by a unit fraction. • Write situations and solve problems involving dividing a unit fraction and a whole number. • Assess the reasonableness of quotients. • Divide unit fractions and whole numbers. • Solve problems involving multiplication and division with fractions. • Represent situations involving fractions with both multiplication and division equations. • Multiply and divide with fractions.
Key Vocabulary: Denominator, Difference, Equivalent, Factor, Fraction, Mixed Number, Multiplication/Multiply, Numerator, Product, Sum, Unit Fraction, Whole Number, divide, dividend, quotient, divisor	
Assessment Evidence	
Performance Tasks: Students examine an area diagram showing a product of two non-unit fractions. Students identify expressions representing a tape diagram using both multiplication and division. Students match quotients of a whole number and a unit fraction with their values. Students divide a whole number by a unit fraction in a “how many in one group” situation. Students find products of non-unit fractions and mixed numbers with no context. Students find the product of non-unit fractions within a context. Students solve a multi-step problem involving area.	**Other Evidence:** Various checkpoints throughout the unit for the following: • Recognize that $\frac{a}{b} \times \frac{c}{d} = \frac{(a \times c)}{(b \times d)}$ and use this generalization to multiply fractions numerically. • Represent and describe multiplication of a fraction by a fraction using area concepts. • Divide a unit fraction by a whole number using whole-number division concepts. • Divide a whole number by a unit fraction using whole-number division concepts.

	• Solve problems involving fraction multiplication and division.

Learning Plan

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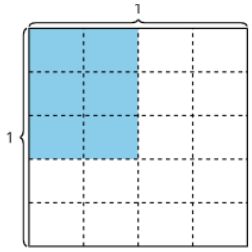
    - ***Students extend multiplication and division of whole numbers to multiply fractions by fractions and divide a whole number and a unit fraction.***

In this unit, students find the product of two fractions, divide a whole number by a unit fraction, and divide a unit fraction by a whole number.

Previously, students made sense of multiplication of a whole number and a fraction in terms of the side lengths and area of a rectangle. Here, they make sense of multiplication of two fractions the same way. Students interpret area diagrams with two unit fractions for their side lengths, then a unit fraction and a non-unit fraction, and then two non-unit fractions.

Through repeated reasoning, students notice regularity in the value of the product (MP8). They generalize that it can be found by multiplying the numerators and multiplying the denominators of the factors:

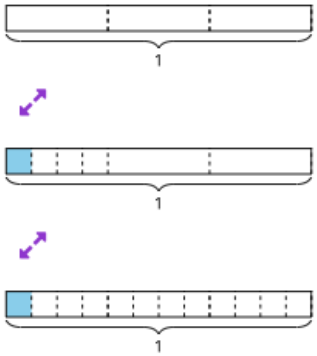
$\frac{a}{b} \times \frac{c}{d} = \frac{(a \times c)}{(b \times d)}$



For example, $\frac{2}{4} \times \frac{3}{5}$ is $\frac{2 \times 3}{4 \times 5}$ because there are 4 x 5 equal parts in the whole square and 2 x 3 parts are shaded.

Next, students make sense of division situations and expressions that involve a whole number and a unit fraction. They recall that division can be understood in terms of finding the number of equal-size groups or finding the size of each group.

For instance, students interpret $\frac{1}{3} \div 4$ to mean finding the size of one part if $\frac{1}{3}$ is split into 4 equal parts, and $4 \div \frac{1}{3}$ to mean finding how many $\frac{1}{3}$s are in 4. Students consider how changing the dividend or the divisor changes the value of the quotients and look for patterns (MP8). They use tape diagrams to represent and reason about division situations and expressions.



Later in the unit, students apply what they learned to solve problems. The relationship between multiplication and division is reinforced when they notice that both operations can be used to solve the same problem.

Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 4 - Wrapping Up Multiplication and Division with Multi-Digit Numbers

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 5.MD.C.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.MD.C.5: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- 5.NBT.B.5: Fluently multiply multi-digit whole numbers using the standard algorithm.
- 5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 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.
- 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.NF.B.3: Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I’ve learned and apply it to new experiences.
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- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.

- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...	**Essential Questions:**
• Standard algorithms can be used to solve multiplication and division problems	• How can we apply our understanding of one or two-digit multiplication and division to three or more digit multiplication and division?
Students will know...	**Students will be able to...**
• More than one way to solve multiplication and division problems • Area and volume problems can be solved using the relationship between multiplication and division • Place value understanding is essential to multiplication and division of multi-digit numbers	• Multiply multi-digit numbers in a way that makes sense to them. • Interpret partial products diagrams. • Multiply a three-digit number and a two-digit number. • Represent a partial products algorithm. • Use the standard algorithm to multiply up to five-digit numbers by one-digit factors, including composing new units. • Use the standard algorithm to find products with any number of newly composed units. • Use the standard algorithm to multiply multi-digit numbers and compose more than one new unit. • Solve problems that involve the multiplication of multi-digit numbers. • Divide multi-digit whole numbers in a way that makes sense to them. • Divide multi-digit whole numbers using place value understanding and the relationship between multiplication and division. • Make sense of an algorithm using partial quotients. • Divide four-digit dividends by two-digit divisors using an algorithm using partial quotients.

	• Solve problems involving area and volume using the relationship between multiplication and division. • Solve problems that involve the division of multi-digit numbers. • Estimate products and quotients of whole numbers. • Use multiplication to solve problems about the area of the Great Garbage Patch. • Estimate and calculate products and quotients of whole numbers.
Key Vocabulary: algorithm, product, dividend, quotient, divisor, whole number, multi-digit number, place value, multiplication, division, solve, interpret, represent, partial products, partial quotients, estimate	
Assessment Evidence	
Performance Tasks: Students multiply a 3-digit number and a 2-digit number using a method of their choice. Students select equations that represent different ways of expressing the value of a product. Students estimate the value of a quotient. Students find a quotient of a four-digit number by a two-digit number using a method of their choice. Students find a quotient of a four-digit number by a two-digit number with a context using a method of their choice. Students perform multiplication and division with an area and volume context.	**Other Evidence:** Various checkpoints throughout the unit for the following: • Multiply multi-digit whole numbers using the standard algorithm. • Divide multi-digit whole numbers using strategies based on place value, properties of operations, and the relationship between multiplication and division. • Multiply and divide to solve real-world and mathematical problems involving area and volume.
Learning Plan	
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- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
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    - ***Students use the standard algorithm to multiply multi-digit whole numbers. They divide whole numbers up to four-digits by two-digits divisors using strategies based on place value and properties of operations.***

In this unit, students multiply multi-digit whole numbers using the standard algorithm and begin working toward end-of-grade expectation for fluency. They also find whole-number quotients with up to four-digit dividends and two-digit divisors.

In grade 4, students used strategies based on place value and properties of operations to multiply a one-digit whole number and a whole number of up to four digits, and to multiply a pair of two-digit numbers. They decomposed the factors by place value, and used diagrams and algorithms using partial products to record their reasoning.

Here, students build on those strategies to make sense of the standard algorithm for multiplication. They recognize that it is also based on place value but records the partial products in a condensed way.

Han and Elena used different algorithms to find the value of 3×318.

Han

$$\begin{array}{r} 318 \\ \times \quad 3 \\ \hline 24 \\ 30 \\ +\ 900 \\ \hline 954 \end{array}$$

Elena

$$\begin{array}{r} {\scriptstyle 2} \\ 318 \\ \times \quad 3 \\ \hline 954 \end{array}$$

Explain to your partner what Han and Elena did. What does the 2 represent in Elena's algorithm?

In grade 4, students also found whole-number quotients using place-value strategies and the relationship between multiplication and division. They decomposed dividends in various ways and found partial quotients. The numbers they encountered then were limited to four-digit dividends and one-digit divisors. In this unit, they extend that work to include two-digit divisors.

As they build their facility with multi-digit multiplication and division, students solve problems about area and volume and reinforce their understanding of these concepts.
Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 5 - Place Value Patterns and Decimal Operations

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 5.NBT.A.1: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- 5.NBT.A.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 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000).
- 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.
- 5.NBT.A.4: Use place value understanding to round decimals to any place.
- 5.NBT.B.7: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
- 5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 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.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

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Understandings: Students will understand that...

- Decimal place value is an extension of whole number place value.
- The value of a digit in our number system is determined by its place value position.
- The reasonableness of answers using mental computation and estimation strategies including rounding.
- In a multi-digit number, a digit in the ones 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.
- There are different models and strategies that show the relationships between operations with decimals.
- Real-world mathematical situations can be represented using concrete models or drawings.

Essential Questions:

- How do patterns in the number system help you understand quantity?
- When is it appropriate to round/estimate and/or add and subtract decimals?
- What models or pictures can be used when solving a mathematical or real-world problem to help decide which operation to use?

Students will know...

- In the base-ten system, the value of each place is 10 times the value of the place to the immediate right and 1/10 of the value to its immediate left.
- There are patterns in the number of zeros when multiplying a number by a power of ten.
- Each period of three digits separated by commas is read as hundreds, tens, and ones, followed (when appropriate) by the name of the period, e.g., 123,456 is read as one hundred twenty-three thousand, four hundred fifty-six.
- In a decimal number, digits to the right of the decimal point are named by the appropriate unit: tenths, hundredths, thousandths.

Students will be able to...

- Relate multiplication and division to place value.
- Explore using place value, multiplication, or division with whole numbers and/or decimal numbers
- Explore and explain why multiplying by a power of 10 changes the value of the number.
- Use whole number exponents to denote powers of 10.
- Represent, read, and write decimals to the thousandths in various forms (standard, word, expanded).
- Use patterns in the place value system to read and write numbers.

• Decimals can be expressed in standard form, word form, and expanded form. • Two decimals can be compared using the symbols >, =, and <. • Patterns and structures can be generalized when adding and decimals.	• Create numbers given specific criteria, e.g., Create a number that has 3 in the thousandths place, 5 in the hundredths place, 7 in the ones place, etc. • Compare numbers based on place-value understanding • Connect the mathematical language to the use of symbols >, =, and < when describing the relationship between the numbers. • Write two true inequality statements using symbols and words for a pair of decimals, e.g., 3.012 < 3.102 and 3.102 > 3.012. • Compare the value of a numeral in a number to the same numeral in a different place in a different number, e.g. Given 3.42 and 4.32, compare the value of 3. • Explore rounding by using the location of a given number on a model, e.g., number line, number chart, etc. • Round numbers based on place-value understanding. • Explain reasoning when rounding. • Develop and generalize rounding rules for decimals. • Identify or create numbers that will round to a chosen number, e.g., Create a number that will round to 1.05. • Explore the purposes of rounding. • Estimate solutions when solving problems with decimals before computing. • Illustrate and explain calculations with decimals through the use of concrete models, drawings, or strategies based on place value. • Estimate solutions when solving problems with decimals before computing. • Explore and explain mathematical operations in context of real-world problems. • Use concrete models or drawings to relate strategies
Key Vocabulary: Compare, Digit, Equal to, Equivalent, Estimate, Expression, Greater than, Less than, Rounding, Value, Base ten numerals, Decimal, Exponent, Hundredths, Place value, Powers of 10, Tenths, Thousandths, Whole numbers, Word form	
Assessment Evidence	
Performance Tasks:	**Other Evidence:**

Students compare decimal numbers. Students identify different ways to write a decimal number, including expanded form and word form. Students round a decimal number to the nearest hundredth, tenth, and one. Students add and subtract decimal numbers to the hundredth. Students use their understanding of place value to identify the value of digits in different numbers. Students find sums, differences, and products of decimals. Students find products and quotients involving decimal numbers. Students apply all 4 operations to complex decimal numbers.	Various checkpoints throughout the unit for the following: • Compare, round and order decimals through the thousandths place based on the value of the digits in each place. • Read, write, and represent decimals to the thousandths place, including in expanded form. • Add and subtract decimals to the hundredths using strategies based on place value. • Multiply decimals with products resulting in the hundredths using place value reasoning and properties of operations. • Divide decimals with quotients resulting in the hundredths using place value reasoning and properties of operations.

Learning Plan

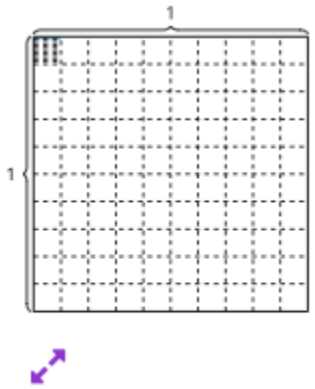
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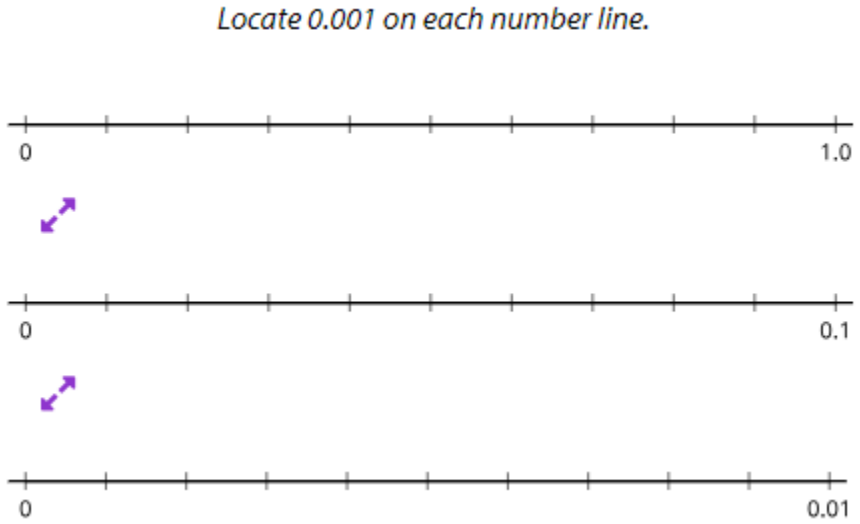
- ***Students build from place value understanding in grade 4 to recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and*** $\frac{1}{10}$ ***of what it represents in the place to its left. They use this place value understanding to round, compare, order, add, subtract, multiply, and divide decimals.***

In this unit, students expand their knowledge of decimals to read, write, compare, and round decimals to the thousandths. They also extend their understanding of place value and numbers in base ten by performing operations on decimals to the hundredth.

In grade 4, students wrote fractions with denominators of 10 and 100 as decimals. They recognized that the notations 0.1 and $\frac{1}{10}$ express the same amount and are both called “one tenth.” They used hundredths grids and number lines to represent and compare tenths and hundredths.

Here, students likewise rely on diagrams and their understanding of fractions to make sense of decimals to the thousandths. They see that “one thousandth” refers to the size of one part if a hundredth is partitioned into 10 equal parts, and that its decimal form is 0.001. Diagrams help students visualize the magnitude of each decimal place and compare decimals.





Students then apply their understanding of decimals and of whole-number operations to add, subtract, multiply, and divide decimal numbers to the hundredths, using strategies based on place value and the properties of operations.

They see that the reasoning strategies and algorithms they used to operate on whole numbers are also applicable to decimals. For example, addition and subtraction can be done by attending to the place value of the digits in the numbers, and multiplication and division can still be understood in terms of equal-size groups.

In grade 6, students will build on the work here to reach the expectation to fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 6 - More Decimal and Fraction Operations

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 5.MD.A.1: Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
- 5.NBT.A.1: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
- 5.NBT.A.2: Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
- 5.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.
- 5.NF.A.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)
- 5.NF.A.2: Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.
- 5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 5.NF.B.5: Interpret multiplication as scaling (resizing)
- 5.NF.B.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.B.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 1 results 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.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I’ve learned and apply it to new experiences.

- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...	**Essential Questions:**
• In the base-ten system, the value of each place is 10 times the value of the place to the immediate right and 1/10 of the value to its immediate left. • Being able to convert measurements from smaller units to larger units and vice-versa helps us explain patterns in the placement of the decimal point when a decimal is divided by a power of 10 or multiplied by a power of 10.	• How can patterns help us multiply and divide by powers of 10?. • What is the importance of being able to convert measurements from smaller units to larger units and vice-versa?
Students will know...	**Students will be able to...**
• Place value patterns are important to observe when multiplying and dividing • Whole number exponents can denote powers of 10 • Equivalent expressions are used to add and subtract fractions with unlike denominators • When adding or subtracting fractions with unlike denominators, a common denominator can be found by multiplying the denominators.	• Use whole-number exponents to denote powers of 10. • Convert from larger units to smaller units within a given system of measurement. • Explain patterns in the number of zeros of the product when multiplying a number by powers of 10. • Convert metric lengths from a smaller unit to a larger unit. • Recognize and explain patterns in the placement of the decimal point when a decimal is divided by a power of 10. • Solve multi-step problems involving metric length measurement conversions.

• The product of a fraction and a whole number is less than, equal to, or greater than the whole number when the fraction is correspondingly less than, equal to, or greater than 1.	• Solve multi-step problems involving metric liquid measurement conversions. • Solve multi-step problems involving customary length measurement conversions. • Subtract fractions and mixed numbers. • Solve problems involving addition and subtraction of fractions with unlike denominators. • Add and subtract fractions with unlike denominators. • Create line plots to display fractional measurement data, and use the information to solve problems. • 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. • Explain what happens to a given fraction when multiplied by a fraction greater than or less than 1.
Key Vocabulary: Place value, patterns, multiplication, division, fractions, equivalent expressions, denominators, subtraction, addition, common denominator, product, whole number, less than, equal to, greater than, unlike denominators, measurement, conversions, metric lengths, metric liquid measurements, convert, solve, explain, exponents, powers of 10	
Assessment Evidence	
Performance Tasks: Students find how many millimeters are in a kilometer and express it both as a number and using exponential notation. Students choose a fraction equivalent to a fraction provided. Students compare the value of addition and subtraction expressions with fractions and mixed numbers to the benchmark 1. Students find sums and differences of fractions. Students compare numbers which are given as fractional multiples of the same number. Students solve a problem that requires expressing a volume given in a smaller unit in terms of a larger unit. Students read a line plot of weights given in ounces. Students solve a story problem about distances and reason about how to represent these distances on a diagram resembling a number line.	**Other Evidence:** Various checkpoints throughout the unit for the following: • Explain patterns when multiplying and dividing by powers of 10. • Solve multi-step problems involving measurement conversions. • Add and subtract fractions with unlike denominators. • Create line plots to display fractional measurement data, and use the information to solve problems. • Solve problems involving addition and subtraction of fractions. • Interpret multiplication as scaling (resizing). • Make generalizations about multiplying a whole number by a fraction greater than, less than and equal to 1.

Learning Plan

- TCC4(3-5): I can use what I've learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

    - ***Students solve multi-step problems involving measurement conversions, line plots, and fraction operations, including addition and subtraction of fractions with unlike denominators. They also explain patterns when multiplying and dividing by powers of 10 and interpret multiplication as scaling by comparing products with factors.***

In this unit, students deepen their understanding of place-value relationships of numbers in base ten, unit conversion, operations on fractions with unlike denominators, and multiplicative comparison. The work here builds on several important ideas from grade 4.

In grade 4, students learned the value of each digit in a whole number is 10 times the value of the same digit in a place to its right. Here, they extend that insight to include decimals to the thousandths. Students recognize that the value of each digit in a place (including decimal places) is $\frac{1}{10}$ the value of the same digit in the place to its left.

This idea is highlighted as students perform measurement conversions in metric units.

Previously, students learned to convert from a larger unit to a smaller unit. Here, they learn to convert from a smaller unit to a larger unit. They observe how the digits shift when multiplied or divided by a power of 10 and learn to use exponential notation for powers of 10 to represent large numbers.

L	mL
5	
6.3	
0.95	
10^2	
	800,000
	10^6
	65

Next, students turn their attention to fractions. In earlier grades, students made sense of equivalent fractions, added and subtracted fractions with the same denominator, and added tenths and hundredths. In this unit, they add and subtract fractions with different denominators. They see that the key is to find a common denominator and analyze different techniques for doing so.

Students then solve problems that involve measurement data (in halves, fourths, and eighths) that are displayed on line plots.
In the final section, students reason about the size of a product of fractions and that of the factors. This work builds on the multiplicative comparison work in grade 4, in which students compared a whole number as "_____ times as many (or as much) as" another whole number.

Here, students reason about products of a whole number and a fraction without finding the value of each product. They use diagrams and expressions to support their reasoning.

Write <, >, or = in each blank to make true statements.

$\frac{4}{5} \times 851 ___ 851$ $\quad$ $\frac{99}{8} \times \frac{23}{22} ___ \frac{99}{8}$

$\frac{1}{4} ___ \frac{5}{5} \times \frac{1}{4}$ $\quad$ $\frac{100}{7} \times \frac{9}{13} ___ \frac{9}{13}$

Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 7 - Shapes on the Coordinate Plane

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 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.B.3: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 5.G.B.4: Classify two-dimensional figures in a hierarchy based on properties.
- 5.G.A.2: Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
- 5.NBT.B.7: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
- 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.
- 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.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I’ve learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.

- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...	**Essential Questions:**
• 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	• Why is it important to use precise language and mathematical tools in the study of 2-dimensional? • How can describing, classifying and comparing properties of 2-dimensional shapes be useful in solving problems in our 3-dimensional world?
Students will know...	**Students will be able to...**
• Attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category • Triangles can be named and classified by angle measures (equiangular, acute, right, and obtuse) and/or side lengths (scalene, isosceles, and equilateral). • Triangles can be compared. • Quadrilaterals can be named and classified by angle measures, side lengths, or the presence or absence of parallel and perpendicular lines. • Properties for classifying two-dimensional figures into categories, such as curved vs. straight sides, type of angles, number of sides, and length of sides. • Categories of quadrilaterals are related. (Example: a square is a rectangle but a rectangle is not a square)	• Identify two-dimensional shapes that can be classified into more than one category based on their attributes. • Explain why figures belong in a category or multiple categories. • Classify two-dimensional figures in a hierarchy based on properties • Describe an equilateral triangle as having three equal side lengths. • Describe a scalene triangle as having three different side lengths. • Explore and describe an isosceles triangle as having at least two sides the same length. • Explore and describe an equilateral triangle as a special type of an isosceles triangle. • Identify and describe triangles by the following:

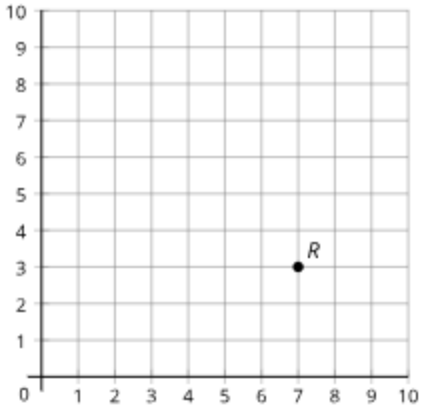
• Hierarchical relationships among two-dimensional figures, such as a square is a type of rectangle, which is a type of quadrilateral, which is a polygon, which is a two-dimensional figure. • Quadrilaterals can be compared.	• side lengths (isosceles, equilateral, scalene) • angle measures (obtuse, acute, right, equiangular) • Sort and compare types of triangles. • Explore and describe squares, rectangles, parallelograms, trapezoids, and rhombuses based on side lengths, angle measures, and the presence or absence of parallel and/or perpendicular sides. • Identify and describe quadrilaterals by the following: • side lengths • angle measures; • the presence or absence of parallel and/or perpendicular lines • the presence or absence of symmetry. • Sort and compare types of quadrilaterals
Key Vocabulary: Attribute, Characteristic, Classify, Hierarchy, Parallel, Perpendicular, Property, Right, Symmetrical, Symmetry, Acute, Area, Equilateral, Isosceles, Line Of Symmetry, Line Segments, Obtuse, Polygon, Quadrilateral, Rectangle, Rhombus, Trapezoid, Triangle, Vertex	
Assessment Evidence	
Performance Tasks: Students analyze statements about the coordinates of points on the coordinate grid. Students describe quadrilaterals in the coordinate plane. Students show understanding of the taxonomy of quadrilaterals by relating different types of quadrilaterals. Students decide if a quadrilateral belongs to different categories based on properties of the quadrilateral. Students classify a quadrilateral given on a coordinate grid. They will need to understand the defining properties of parallelograms, rhombuses, and rectangles in order to appropriately classify the given quadrilateral. Students explain the meaning of the coordinates of two points in terms of the distance from the axes. Students generate patterns, given two rules, and identify relationships between corresponding terms in the two patterns. Students interpret the meaning of points in the coordinate plane in context and plot a point demonstrating understanding of the coordinate plane in context.	**Other Evidence:** Various checkpoints throughout the unit for the following: • Locate points on a coordinate grid. • Classify triangles and quadrilaterals in a hierarchy based on angle measurements and side lengths. • Generate, identify, and graph relationships between corresponding terms in two patterns, given a rule. • Represent and interpret real world and mathematical problems on a coordinate grid.
Learning Plan	

- TCC4(3-5): I can use what I've learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.
- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

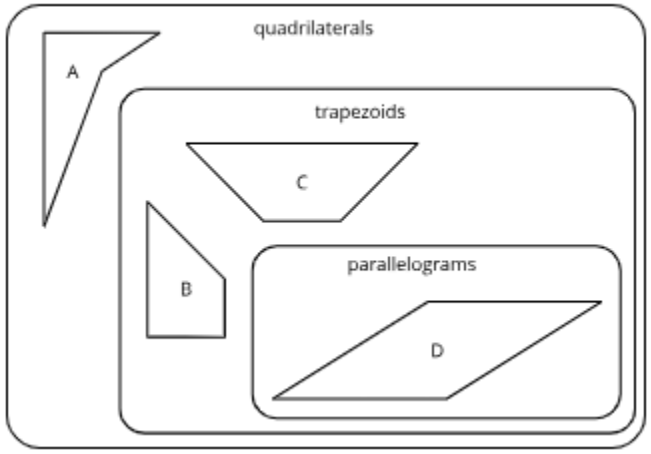
    - ***Students plot coordinate pairs on a coordinate grid and classify triangles and quadrilaterals in a hierarchy based on properties of side length and angle measure. They generate, identify, and graph relationships between corresponding terms in two numeric patterns, given two rules, and represent and interpret real world and mathematical problems on a coordinate grid.***

In this unit, students learn about the coordinate grid, deepen their knowledge of two-dimensional shapes, and use the coordinate grid to study relationships of pairs of numbers in various situations.

Here, students learn about grids that are numbered in two directions. They see that the structure of a coordinate grid allows us to precisely communicate the location of points and shapes.



Students also continue to study two-dimensional shapes and their attributes. In grade 3, they classified triangles and quadrilaterals by the presence of right angles and sides of equal length. In grade 4, they learned about angles and parallel and perpendicular lines, which allowed them to further distinguish shapes. In this unit, students use these insights to make sense of the hierarchy of shapes.



Later in the unit, students analyze and generate numerical patterns based on pairs of rules and graph pairs of numbers on the coordinate grid.

They also interpret points on the coordinate grid in terms of situations, plot points to better understand the relationship between two sets of numbers, and use the coordinate grid to solve problems.

Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits

Unit 8 - Putting it All Together

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 5.G.B.3: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 5.G.B.4: Classify two-dimensional figures in a hierarchy based on properties.
- 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.MD.C.5: Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- 5.NBT.B.7: Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
- 5.NF.A.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)
- 5.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 5.MD.C.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.NF.B.3: Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC4(3-5): I can use what I’ve learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.

- CCE4(3-5): I can effectively share my thinking in a variety of ways, including verbal explanations, drawings, models, or written essays depending on the purpose and audience.
- DE1(3-5): I can listen to my friends and respect their opinions.
- TI2(3-5): I can choose appropriate resources to complete projects or tasks.
- TI3(3-5): I can ask for help after making independent attempts to solve a problem.
- P2(3-5): I can persevere through difficult tasks because I have a growth mindset and understand that mistakes are part of the learning process and present opportunities for growth.
- AA1(3-5): I can consider various strategies and then choose which one works best for me.
- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

Understandings: Students will understand that...	**Essential Questions:**
• We can create our own strategies for math warm-ups that will help us prepare for lessons and assessments by using our prior knowledge.	• How can we utilize our learning to develop strategies that get us ready to practice and apply our math skills?
Students will know...	**Students will be able to...**
• Volume can be measured (or determined) by finding the total number of cubic units required to fill the space without gaps or overlaps. • Informal methods for dividing a unit fraction by a whole number and dividing a whole number by a unit fraction • Equivalent expressions are used to add and subtract fractions with unlike denominators • Properties for classifying two-dimensional figures into categories, such as curved vs. straight sides, type of angles, number of sides, and length of sides.	• Fluently multiply multi-digit whole numbers using the standard algorithm. • 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 the relationship between multiplication and division. • Solve real world and mathematical problems involving volume. • Multiply and divide multi-digit whole numbers. • Add, subtract, multiply, and divide decimals to hundredths. • Multiply a fraction or whole number by a fraction. • Interpret a fraction as division of the numerator by the denominator. • Find quotients of whole numbers multi-digit dividends and divisors without any remainders. • Add and subtract fractions and mixed numbers with unlike denominators.

	• Categorize shapes by their shared attributes.

Key Vocabulary: fluent, multiply, divide, quotient, dividend, divisor, product, place value, remainders, solve, interpret, find, whole numbers, mixed numbers, fraction, properties of operations, algorithm, characteristics, angles, sides

Assessment Evidence

Performance Tasks:
The performance task items focus on major work of the grade, fluencies of the grade, and also include at least one in depth problem that provides a context where students apply key ideas they have learned over the year.

Students select expressions that represent the volume of a rectangular prism.Students find the volume of a composite rectangular prism. Students compare the value of sums and differences of fractions with a given fraction and whole number. Students answer two questions about amounts of water. Students compare two fractions in context where one of the denominators divides the other. Students identify different expressions that have the value of one million. Students find two quotients, both are a 4-digit number divided by a 2-digit number. Students perform all 4 operations with decimal numbers. Students find the product of a fraction and a mixed number in an area context. Students interpret a point on the number line and locate two other numbers, neither of which lies on a tick mark. Students multiply and divide whole numbers and decimals by powers of ten. Students find products of a two-digit and three-digit number using a strategy that makes sense to them. Students plot and interpret points in the coordinate plane representing sets of coins. Students multiply decimal and whole numbers to find a volume.

Other Evidence:
Various checkpoints throughout the unit for the following:

- Divide multi-digit whole numbers using place value strategies and the properties of operations.
- Fluently multiply multi-digit whole numbers using the standard algorithm.
- Solve multi-step problems involving volume.
- Operate with fractions and decimals.
- Review the major work of the grade by creating and designing instructional routines.

Learning Plan

- TCC4(3-5): I can use what I've learned and apply it to new experiences.
- CCE1(3-5): I can demonstrate respectful behavior by actively listening to others and asking questions to get everyone involved.
- CCE2(3-5): I can use feedback to improve my own learning and help others improve their learning.
- CCE3(3-5): I can participate in class by using my active listening skills, offering feedback, asking questions, and supporting my peers.

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- AA2(3-5): I can reflect on my learning and the learning of others to help me choose a successful strategy.
- AA4(3-5): I can be open to other ideas to grow my thinking.

    - ***Students consolidate and solidify their understanding of various concepts and skills related to major work of the grade. They also continue to work toward fluency goals of the grade.***

In this unit, students revisit major work and fluency goals of the grade, applying their learning from the year.

In section A, students deepen their understanding of the standard algorithm for multiplication and practice using it to find the value of products.

They also revisit algorithms that use partial quotients to divide whole numbers. In Section B, students solve real-world problems about volume and have opportunities to model with mathematics.

The base of the Great Pyramid of Egypt is a square.
One side length of the base is 230 meters.
The pyramid is 140 meters tall.

If the pyramid was shaped like a rectangular prism,
what would be the volume of the prism?



Section C focuses on operation with decimals and fractions. In the final section, students review major work of the grade as they create activities in the format of the warm-ups routines they have encountered throughout the year (Notice and Wonder, Estimation Exploration, Number Talk, True or False, and Which One Doesn't Belong?).

The sections in this unit are standalone sections, not required to be completed in order. Within a section, lessons can also be completed selectively and without completing prior lessons. The goal is to offer ample opportunities for students to integrate the knowledge they have gained and to practice skills related to the expected fluencies of the grade.

Teacher Resources: Imagine Learning Classroom, Kendall Hunt Illustrative Math Site, Teacher Resource Books, Center Kits