



ESL
SCIENCE
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FINE & PERFORMING ARTS
FAMILY & CONSUMER SCIENCE
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RAHWAY PUBLIC SCHOOLS

CURRICULUM & INSTRUCTION

Course: Mathematics

Grade Level: 5

This curriculum is part of the Educational Program of Studies of the Rahway Public Schools.

ACKNOWLEDGMENTS

Anjanette Highsmith, Program Supervisor of K-6 Math, Science, and Instructional Technology

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Elizabeth DeSantis

Dr. Tiffany A. Beer, Director of Curriculum and Instruction

Subject/Course Title:
Mathematics
Grade 5

Date of Board Adoption:
August 27, 2024

RAHWAY PUBLIC SCHOOLS CURRICULUM

Mathematics: Grade 5

PACING GUIDE

Unit	Title	Pacing
1	<u>Finding Volume</u>	4 weeks
2	<u>Fractions as Quotients and Fraction Multiplication</u>	6 weeks
3	<u>Multiplying and Dividing Fractions</u>	6 weeks
4	<u>Wrapping Up Multiplication and Division with Multi-digit Numbers</u>	7 weeks
5	<u>Place Value Patterns & Decimal Operations</u>	4 weeks
6	<u>More Decimal & Fraction Operations</u>	5 weeks
7	<u>Shapes on the Coordinate Plane</u>	4 weeks
8	<u>Putting it All Together</u>	5 weeks

ACCOMMODATIONS

<p>504 Accommodations:</p> <ul style="list-style-type: none"> ● Provide scaffolded vocabulary and vocabulary lists. ● Provide extra visual and verbal cues and prompts. ● Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials. ● Provide links to audio files and utilize video clips. ● Provide graphic organizers and/or checklists. ● Provide modified rubrics. ● Provide a copy of teaching notes, especially any key terms, in advance. ● Allow additional time to complete assignments and/or assessments. ● Provide shorter writing assignments. ● Provide sentence starters. ● Utilize small group instruction. ● Utilize Think-Pair-Share structure. ● Check for understanding frequently. ● Have student restate information. ● Support auditory presentations with visuals. ● Weekly home-school communication tools (notebook, daily log, phone calls or email messages). ● Provide study sheets and teacher outlines prior to assessments. ● Quiet corner or room to calm down and relax when anxious. ● Reduction of distractions. ● Permit answers to be dictated. ● Hands-on activities. ● Use of manipulatives. ● Assign preferential seating. ● No penalty for spelling errors or sloppy handwriting. ● Follow a routine/schedule. ● Provide student with rest breaks. ● Use verbal and visual cues regarding directions and staying on task. ● Assist in maintaining agenda book. 	<p>IEP Accommodations:</p> <ul style="list-style-type: none"> ● Provide scaffolded vocabulary and vocabulary lists. ● Differentiate reading levels of texts (e.g., Newsela). ● Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials. ● Provide extra visual and verbal cues and prompts. ● Provide links to audio files and utilize video clips. ● Provide graphic organizers and/or checklists. ● Provide modified rubrics. ● Provide a copy of teaching notes, especially any key terms, in advance. ● Provide students with additional information to supplement notes. ● Modify questioning techniques and provide a reduced number of questions or items on tests. ● Allow additional time to complete assignments and/or assessments. ● Provide shorter writing assignments. ● Provide sentence starters. ● Utilize small group instruction. ● Utilize Think-Pair-Share structure. ● Check for understanding frequently. ● Have student restate information. ● Support auditory presentations with visuals. ● Provide study sheets and teacher outlines prior to assessments. ● Use of manipulatives. ● Have students work with partners or in groups for reading, presentations, assignments, and analyses. ● Assign appropriate roles in collaborative work. ● Assign preferential seating. ● Follow a routine/schedule.
<p>Gifted and Talented Accommodations:</p> <ul style="list-style-type: none"> ● Differentiate reading levels of texts (e.g., Newsela). ● Offer students additional texts with higher lexile levels. ● Provide more challenging and/or more supplemental readings and/or activities to deepen understanding. ● Allow for independent reading, research, and projects. ● Accelerate or compact the curriculum. ● Offer higher-level thinking questions for deeper analysis. ● Offer more rigorous materials/tasks/prompts. ● Increase number and complexity of sources. ● Assign group research and presentations to teach the class. ● Assign/allow for leadership roles during collaborative work and in other learning activities. 	<p>ELL Accommodations:</p> <ul style="list-style-type: none"> ● Provide extended time. ● Assign preferential seating. ● Assign peer buddy who the student can work with. ● Check for understanding frequently. ● Provide language feedback often (such as grammar errors, tenses, subject-verb agreements, etc...). ● Have student repeat directions. ● Make vocabulary words available during classwork and exams. ● Use study guides/checklists to organize information. ● Repeat directions. ● Increase one-on-one conferencing. ● Allow student to listen to an audio version of the text. ● Give directions in small, distinct steps. ● Allow copying from paper/book. ● Give student a copy of the class notes.

- Provide written and oral instructions.
- Differentiate reading levels of texts (e.g., Newsela).
- Shorten assignments.
- Read directions aloud to student.
- Give oral clues or prompts.
- Record or type assignments.
- Adapt worksheets/packets.
- Create alternate assignments.
- Have student enter written assignments in criterion, where they can use the planning maps to help get them started and receive feedback after it is submitted.
- Allow student to resubmit assignments.
- Use small group instruction.
- Simplify language.
- Provide scaffolded vocabulary and vocabulary lists.
- Demonstrate concepts possibly through the use of visuals.
- Use manipulatives.
- Emphasize critical information by highlighting it for the student.
- Use graphic organizers.
- Pre-teach or pre-view vocabulary.
- Provide student with a list of prompts or sentence starters that they can use when completing a written assignment.
- Provide audio versions of the textbooks.
- Highlight textbooks/study guides.
- Use supplementary materials.
- Give assistance in note taking
- Use adapted/modified textbooks.
- Allow use of computer/word processor.
- Allow student to answer orally, give extended time (time-and-a-half).
- Allow tests to be given in a separate location (with the ESL teacher).
- Allow additional time to complete assignments and/or assessments.
- Read question to student to clarify.
- Provide a definition or synonym for words on a test that do not impact the validity of the exam.
- Modify the format of assessments.
- Shorten test length or require only selected test items.
- Create alternative assessments.
- On an exam other than a spelling test, don't take points off for spelling errors.

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Finding Volume

Target Course/Grade Level: 5

Unit Summary: This unit introduces students to the concept of volume by building on their understanding of area and multiplication. 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 (length \times width \times height), or by multiplying the area of the base and its height (area of the base \times 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. Then, 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 progress from using cubes to using standard units to measure volume.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

5.M.B.2 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.M.B.3 Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and non-standard units.

5.M.B.4 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.

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.

Interdisciplinary Connections and Standards:

English Language Arts:

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

SL.AS.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

Students will understand....

- How to find the volume of right rectangular prisms and solid figures composed of two right rectangular prisms.

Unit Essential Questions:

- What is the meaning of volume of a solid?
- Where do the formulas for volume come from?
- How is volume related to multiplication and addition?
- How can the area of a shape help find the volume of a shape?
- How are customary units related?
- How are metric units related?
- Why is it important to convert measurement units in a given measurement system?

Knowledge and Skills:

Students will

- Understand concepts of volume and relate volume to multiplication and to addition.

Students will be able to...

- 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 $V = l \times w \times h$ or $V = \text{area of } b \times h$
- Find volume using $V = l \times w \times h$ or $V = \text{area of } b \times h$
- Find the volume of a figure composed of rectangular prisms.

<i>EVIDENCE OF LEARNING</i>

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 1 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.1 Lessons 1-12

Standard 5.M.B.2:

- **Activity 1:** Provide students with unit cubes and various solid figures (e.g., rectangular prisms, pyramids, cones). Ask them to pack the unit cubes inside each solid figure without gaps or overlaps. Then, count the number of unit cubes used to measure the volume of each figure. Discuss the concept of "one cubic unit" and how it relates to the unit cube.
- **Activity 2:** Show students different arrangements of unit cubes (e.g., $2 \times 3 \times 2$, $1 \times 6 \times 2$). Ask them to determine the total number of unit cubes in each arrangement. Then, relate the number of cubes to the volume of a rectangular prism with corresponding side lengths.

Standard 5.M.B.3:

- **Activity 1:** Use containers of different shapes and sizes (e.g., shoeboxes, cereal boxes) filled with small objects like beans or beads. Students can estimate and then measure the volume of the container using unit cubes, cubic centimeters (cm³), cubic inches (in³), or cubic feet (ft³).
- **Activity 2:** Provide students with various objects of irregular shapes (e.g., rocks, toys). Challenge them to find ways to estimate the volume of these objects using non-standard units like counting cups, marbles, or blocks. Encourage them to explain their reasoning and compare their estimations with classmates.

Standard 5.M.B.4:

- **Activity 1:** Present students with rectangular prisms made from unit cubes. Guide them to build layers of cubes with different base areas and the same height. Then, count the total number of cubes in each prism and compare them. This helps them understand the connection between volume and the area of the base multiplied by the height.
- **Activity 2:** Divide students into groups and provide them with real-world contexts like designing a fish tank or building a box. Each group can be given the dimensions of the object and asked to calculate the volume using the formula $V = l \times w \times h$ (length \times width \times height). Encourage them to interpret the volume in the context of the problem (e.g., how many liters of water the tank can hold).

Standards 5.OA.A.1 and 5.OA.A.2:

- **Activity 1:** Present real-world scenarios involving volume calculations, like finding the total amount of juice needed to fill several glasses or the space occupied by books on a shelf. Students can write expressions to represent the volume using parentheses and brackets, considering the order of operations.
- **Activity 2:** Play a game where students take turns creating and solving word problems involving volume. They can write simple expressions to represent the calculations without evaluating them and explain their reasoning.

RESOURCES

Teacher Resources:

- Place Value Assessment Tool (PVAT)
- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 1
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebook

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Fractions as Quotients and Fraction Multiplication

Target Course/Grade Level: 5

Unit Summary: 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. 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 one that is 6 units by $\frac{2}{3}$ unit.

Approximate Length of Unit: 6 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

- 5.NF.B.3** Interpret a fraction as division of the numerator by the denominator (i.e. $a/b = a \div b$,). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
- 5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- a.** Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.
- 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.
- 5.OA.A.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.

Interdisciplinary Connections and Standards:

English Language Arts:

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

SL.AS.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

Students will ...

- Develop an understanding of fractions as the division of the numerator by the denominator, that is $a \div b = a/b$
- Solve problems that involve the multiplication of a whole number and a fraction, including fractions greater than 1.

Unit Essential Questions:

- What is the relationship between division and fractions?
- How can we solve problems involving division that result in fractional answers?
- How is division connected to multiplying by a fraction (both unit and non-unit)?
- How does multiplication relate to division?
- How can we find the area of a rectangle when one side length is a whole number and the other is a fraction or mixed number?
- How do we solve problems involving multiplying a whole number by a fraction or mixed number?
- How can we represent, interpret, and evaluate expressions involving multiplication of a whole number by a fraction or mixed number?

- How can we explore the connections between division, fractions, and multiplication through real-world problems and various representations?
- How can understanding division and fractions help us solve problems in different contexts?
- How does building fluency with these concepts build a foundation for further mathematical understanding?

Knowledge and Skills:

Students will know...

- How to use equivalent fractions as a strategy to add and subtract fractions.
- How to apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Students will be able to...

- 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.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 2 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.2 Lessons 1-17

5.NF.B.3:

- **Activity 1: Pizza Party:** Divide a whole pizza (represented by a circle) into equal slices using different fraction models (fraction strips, circles). Discuss how each slice represents a fraction of the whole pizza (numerator/denominator). Pose word problems like "If there are 8 slices of pizza and you eat 3 slices, what fraction of the pizza did you eat?" Encourage students to represent the problem visually with fraction models and write equations (e.g., $\frac{3}{8}$).

5.NF.B.4:

- **Activity 1: Fraction Tetris:** Provide students with square tiles of various sizes representing unit fractions ($\frac{1}{2}$, $\frac{1}{3}$, etc.). Challenge them to build rectangles of different sizes using these tiles. Have them calculate the area of each rectangle by counting the unit squares and multiplying the side lengths (both in fractions).

5.OA.A.1 and 5.OA.A.2:

- **Activity 1: Mystery Expressions:** Write simple expressions involving multiplication of fractions and whole numbers with parentheses (e.g., $(2 \times \frac{1}{2}) \times 3$). Give students clues about the answer (e.g., it's greater than 2 but less than 3) and have them solve the expression using order of operations and explain their steps.

RESOURCES

Teacher Resources:

- iReady Teacher Toolbox
- Common Assessment: Illustrative Math (IM) Unit 2 Assessment
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Multiplying and Dividing Fractions

Target Course/Grade Level: 5

Unit Summary: Students extend multiplication and division of whole numbers to multiply fractions by fractions and divide a whole number and a unit fraction. Students will notice regularity in the value of the product. Through repeated calculations, students will see a pattern in the product's value. Students will make sense of division that involves a whole number and a unit fraction. They recall that division can be understood in terms of finding the number of equal-sized groups or finding the size of each group. Finally students will apply what they have learned to solve problems. The relationship between multiplication and division will be reinforced when they notice that both operations can be used to solve the same problem.

Approximate Length of Unit: 6 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

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

- a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.
- 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.

- a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
- b. Interpret division of whole number by a unit fraction, and compute such quotients.

Interdisciplinary Connections and Standards:

English Language Arts:

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

SL.AS.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

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

Unit Essential Questions:

- How can we understand the meaning of multiplying fractions through different representations (models, equations, etc.)?
- Why does the rule " $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$ " work for multiplying any two fractions?
- How does the multiplication of fractions connect with the concept of area?
- How are dividing a unit fraction by a whole number and dividing a whole number by a unit fraction related to whole number division?
- How can we solve problems involving division by using our understanding of whole number division and fractions?
- What strategies can we use to solve real-world problems involving multiplication and division of fractions?

Knowledge and Skills:

Students will know...

- How to use equivalent fractions as a strategy to add and subtract fractions.
- How to apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Students will be able to...

- Recognize that $a/b \times c/d = a \times c / b \times d$ 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.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 3 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.3 Lessons 1-20

5.NF.B.4:

- **Activity 1: Fraction Partitioning:** Provide students with fraction strips or manipulatives (circles, squares) divided into equal parts. Ask them to represent the product (e.g., $1/2 \times 3/4$) by dividing a whole (represented by the manipulative) into 3 equal parts (the denominator of the second fraction) and then shading $1/2$ of each part (the numerator of the first fraction). Discuss how this visually represents "parts of a whole" and connect it to the multiplication operation.
- **Activity 2: Tiling Rectangles:** Give students grids with unit squares and rectangles with fractional side lengths (e.g., $1/3 \times 2/3$). Challenge them to tile the rectangle with unit squares that match the fractional side length (e.g., squares divided into 3 rows and 3 columns). Ask them to count the total number of unit squares used and compare it to the product of the fractional side lengths ($1/3 \times 2/3 = 2/9$). This helps solidify the understanding of area and multiplication of fractions.

5.NF.B.6:

- **Activity 1: Shopping Spree:** Create a scenario where students have a limited budget (e.g., \$10) and need to buy various items with fractional prices (e.g., \$1/4 for a candy bar). Ask them to write expressions (e.g., $10 \times 1/4$) to determine how many items they can buy and interpret the product as the total cost. This activity promotes using multiplication of fractions in context.

5.NF.B.7:

- **Activity 1: Sharing Pizzas:** Use manipulatives like fraction circles or draw pizzas divided into slices. Pose scenarios like "Share $1/3$ of a pizza among 4 friends." Students can act out the scenario by dividing the pizza and then dividing each slice again ($1/3 \div 4$). Discuss how dividing a unit fraction by a whole number results in a smaller fraction and connect it to the concept of "sharing from a part."
- **Activity 2: Speed Challenge:** Present scenarios involving rates or ratios expressed as fractions (e.g., a runner travels 2 miles in $1/2$ hour). Ask students to write expressions (e.g., $2 \div 1/2$) to find the speed (distance divided by time). This activity helps them understand dividing by unit fractions and interpreting the result in the context of the problem.

<i>RESOURCES</i>

Teacher Resources:

- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 3
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Wrapping Up Multiplication and Division with Multi-digit Numbers

Target Course/Grade Level: 5

Unit Summary: 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. Students build on those strategies to make sense of the standard algorithm for multiplication that is also based on place value but records the partial products in a condensed way. Students solve problems about area and volume and reinforce their understanding of these concepts.

Approximate Length of Unit: 7 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

5.NBT.B.5. With accuracy and efficiency, 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.NF.B.3 Interpret a fraction as division of the numerator by the denominator (i.e. $a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

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

a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.

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.7** Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
- Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for $(1/3) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(1/3) \div 4 = 1/12$ because $(1/12) \times 4 = 1/3$.
 - Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for $4 \div (1/5)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$.
 - 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?
- 5.M.B.2.1** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.M.B.4.1.** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- 5.OA.A.2.** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that it is three times as large without having to calculate the indicated sum or product.

Interdisciplinary Connections and Standards:

English Language Arts:

- SL.PE.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others’ ideas and expressing their own clearly.
- SL.AS.5.6** Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

- 9.4.5.CT.1:** Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
- 9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4:** Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
- 9.4.5.CI.3:** Participate in a brainstorming session with individuals with diverse perspectives to expand one’s thinking about a topic of curiosity.

Science & Engineering Practices:

- Asking Questions and Defining Problems
- Analyzing and Interpreting Data
- Developing and Using Models
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

Students will understand ...

- How to use the standard algorithm to multiply multi-digit whole numbers.
- How place value and properties of operations can be used as strategies for dividing whole numbers up to four-digits by two-digits divisors.

Unit Essential Questions:

- How do we efficiently use the standard algorithm to multiply multi-digit whole numbers?
- How can we break down large numbers into place values to simplify the multiplication process?
- What strategies can we use to estimate products of multi-digit numbers and check the reasonableness of our answers?
- How can we leverage place value, properties of operations, and the connection between multiplication and division to effectively divide multi-digit whole numbers?
- What are different strategies we can use for division (e.g., estimation, partial quotients) and when are they appropriate?
- How can we interpret remainders in the context of the division problem?
- How can we connect multiplication and division to solve real-world problems involving area and volume?
- How can we translate real-world scenarios into mathematical expressions involving multiplication and division?
- How can we analyze and solve problems by choosing the appropriate operation (multiplication or division) and interpreting the results in the context of the problem?

Knowledge and Skills:

Students will know...

- How to use their understanding of the place value system to solve problems.
- How to perform operations with multi-digit whole numbers and with decimals to hundredths.

Students will be able to...

- 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.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 4 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.4 Lessons 1-21

5.NBT.B.5

- **Hands-On Manipulatives:** Provide concrete manipulatives like base-ten blocks or place value disks to represent multi-digit numbers. Students can physically group and manipulate these objects to understand the process of multiplication.
- **Visual Models:** Use area models or arrays to visually represent the multiplication process. This helps students visualize how multi-digit numbers are decomposed into smaller units and then multiplied.
- **Interactive Digital Tools:** Utilize interactive multiplication games or online simulations that provide immediate feedback. These tools engage students and allow them to practice multiplication in a fun and interactive way.
- **Differentiated Problem Sets:** Offer multiplication problems at varying levels of difficulty to cater to different learning needs. Provide scaffolded support for struggling learners while offering extension activities for advanced students.

5.NBT.B.6

- **Cuisenaire Rods:** Use Cuisenaire rods to represent division problems visually. Students can explore how these rods can be grouped to model division and develop a deeper understanding of the concept.
- **Step-by-Step Guides:** Provide step-by-step guides for long division, breaking down the process into manageable steps. Include visual aids and examples to support students as they learn to divide multi-digit numbers.
- **Peer Tutoring:** Pair students with varying levels of proficiency in division to work together. This allows stronger students to reinforce their understanding by teaching others, while struggling students receive personalized support and explanations.
- **Real-World Division Problems:** Incorporate real-world division problems that students can relate to, such as dividing a certain number of items among a group of people or calculating the cost per item when buying in bulk. This contextualizes division and makes it more meaningful for students.

5.M.B.2

- **Exploration with Manipulatives:** Provide physical models of solid figures and unit cubes for students to explore. Allow them to build different shapes and count the number of unit cubes to understand volume as the amount of space occupied by a solid figure.
- **Interactive Simulations:** Use virtual simulations or apps that allow students to manipulate three-dimensional shapes and visualize volume. These interactive tools provide a dynamic way for students to explore volume concepts.
- **Real-World Volume Problems:** Present students with real-world scenarios that require volume calculations, such as filling a container with liquid or determining the capacity of a storage bin. This application of volume concepts helps students see the relevance of what they are learning.

5.M.B.4

- **Modeling with Area and Volume:** Use visual models to demonstrate how volume can be calculated by multiplying the area of the base by the height. This helps students understand the relationship between volume, multiplication, and addition.
- **Problem-Based Learning:** Engage students in problem-solving tasks that require them to apply volume formulas to real-world situations. Provide opportunities for students to work collaboratively to solve these problems, fostering critical thinking and communication skills.
- **Mathematical Discourse:** Encourage students to explain their reasoning and justify their solutions when solving volume problems. Facilitate class discussions where students can share different strategies and approaches to solving problems.

5.NF.B.3

- **Visual Fraction Models:** Use visual representations such as fraction bars or circles to help students conceptualize fractions as division. This visual approach helps students see the relationship between the numerator, denominator, and division operation.
- **Word Problem Practice:** Provide word problems that require students to divide whole numbers and interpret the quotient as a fraction or mixed number. Scaffold the problems by starting with simpler scenarios and gradually increasing complexity.
- **Peer Collaboration:** Pair students to solve fraction division problems together. This allows students to discuss their thinking, compare strategies, and support each other in understanding the concept of fraction division.

5.NF.B.4

- **Concrete Manipulatives:** Use fraction tiles or other manipulatives to represent multiplication of fractions concretely. This hands-on approach helps students understand the concept of multiplying fractions as finding a fraction of a fraction.
- **Visual Representations:** Illustrate fraction multiplication problems using area models or arrays. This visual representation helps students visualize the process of multiplying fractions and understand how the parts combine to form the product.
- **Real-World Contexts:** Present students with real-world scenarios where they need to multiply fractions, such as calculating ingredients for a recipe or determining distances on a map. This application of fraction multiplication makes the concept more meaningful and relevant to students.

5.NF.B.7

- **Word Problems:** Provide word problems that require students to divide unit fractions by whole numbers and whole numbers by unit fractions in real-world contexts. Encourage students to use models or diagrams to solve the problems and justify their answers.

- **Differentiated Practice:** Offer a variety of division problems at different levels of difficulty to accommodate students' varying abilities. Provide support for struggling learners through guided practice and additional examples.

5.OA.A.2

- **Expression Writing:** Provide students with verbal expressions and ask them to write corresponding numerical expressions. For example, "three times the sum of 7 and 4" can be written as $3 \times (7+4)$ or $3(7+4)$
- **Expression Interpretation:** Present students with numerical expressions and ask them to interpret the meaning without evaluating them. For example, students can recognize that 8×5 , 8×5 means "eight groups of five" without actually performing the multiplication.
- **Real-Life Scenarios:** Connect numerical expressions to real-life scenarios where students encounter similar situations. For instance, relate the expression $2 \times (6-3)$, $2 \times (6-3)$ to the idea of doubling the difference between two numbers.

RESOURCES

Teacher Resources:

- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 4
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Place Value Patterns and Decimal Operations

Target Course/Grade Level: 5

Unit Summary: 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. Students 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.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

5.NBT.A.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.,

$$347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times \left(\frac{1}{10}\right) + 9 \times \left(\frac{1}{100}\right) + 2 \times \left(\frac{1}{1000}\right)$$

- 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.5 With accuracy and efficiency, multiply multi-digit whole numbers using the standard algorithm.

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.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 $(\frac{1}{3}) \div 4$, and use a visual fraction model to show the quotient.

- b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for $4 \div (\frac{1}{5})$, and use a visual fraction model to show the quotient.
- 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 $\frac{1}{2}$ lb. of chocolate equally? How many $\frac{1}{3}$ cup servings are in 2 cups of raisins?

Interdisciplinary Connections and Standards:

English Language Arts:

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

SL.AS.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

Students will understand that...

- Place value extends to assist them to read, write, compare, and round decimals to the thousandths and assists in performing operations on decimals to the hundredth.

Unit Essential Questions:

- How do we read and write decimals to the thousandths place?
- What are the similarities and differences between whole numbers and decimals in terms of place value?
- How do we compare and order decimals to the thousandths place?
- Why is it important to understand place value when working with decimals?
- What strategies can we use to round decimals to the nearest thousandth?
- How do we perform addition and subtraction operations on decimals to the hundredths place?

- How do we perform multiplication and division operations involving decimals?
- What real-world scenarios require the use of decimals, and how can we apply our knowledge of decimals to solve them?
- How can we use estimation to quickly approximate decimal calculations?
- What connections can we make between fractions, decimals, and percentages?

Knowledge and Skills:

Students will know...

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

Students will be able to...

- 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.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 5 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.5 Lessons 1-26

5.NBT.A.3 and 5.NBT.A.4:

- **Interactive Activities:** Engage students in games or online activities where they practice reading, writing, comparing, and rounding decimals to thousandths. Provide feedback and support as needed.
- **Differentiated Worksheets:** Offer worksheets with varying levels of difficulty to cater to different learning levels. Include problems that require comparing decimals, writing them in different forms, and rounding them to various place values.
- **Peer Collaboration:** Facilitate peer collaboration through partner or group activities where students can discuss their approaches to reading, writing, comparing, and rounding decimals, fostering a deeper understanding through dialogue.

5.NBT.B.5 and 5.NBT.B.7:

- **Concrete Models and Drawings:** Use manipulatives or drawing representations to demonstrate the standard algorithm for multiplying multi-digit whole numbers and decimals. Allow students to explore different strategies based on place value.
- **Step-by-step Guidance:** Break down the standard algorithms for multiplication and division of decimals into smaller steps, providing clear explanations and opportunities for guided practice.
- **Application Tasks:** Present word problems or real-world scenarios that require multiplying and dividing decimals, encouraging students to apply their understanding of operations in context.

5.NF.B.7

- **Fraction Manipulative Stations:** Set up stations with various fraction manipulatives like fraction bars, circles, or tiles. At each station, provide tasks where students divide unit fractions by whole numbers or whole numbers by unit fractions using the manipulatives. Students rotate through the stations, practicing division with different visual aids.
- **Real-World Problem Solving:** Present students with real-world scenarios involving division of unit fractions by whole numbers or whole numbers by unit fractions. Examples could include dividing ingredients in a recipe or dividing a distance into equal parts. Allow students to work in pairs or small groups to solve these problems, encouraging them to use visual models or diagrams to represent the division.

RESOURCES

Teacher Resources:

- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 5
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: More Decimal and Fraction Operations

Target Course/Grade Level: 5

Unit Summary: 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. Next, students turn their attention to fractions. 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. They reason about the size of a product of fractions and that of the factors, as well as the products of a whole number and a fraction without finding the value of each product. Students use diagrams and expressions to support their reasoning.

Approximate Length of Unit: 5 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics

- 5.M.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.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, $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$. [In general, $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$.]
- 5.NF.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 $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$, by observing that $\frac{3}{7} < \frac{1}{2}$.
- 5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- a.** Interpret the product $(\frac{a}{b}) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $(\frac{2}{3}) \times 4 = \frac{8}{3}$, and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general, $(\frac{a}{b}) \times (\frac{c}{d}) = \frac{ac}{bd}$.)
- 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.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 $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

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.OA.A Write and interpret numerical expressions

5.DL.5 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.

Interdisciplinary Connections and Standards:

English Language Arts:

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

SL.AS.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

8.1.5.DA.4: Organize and present climate change data visually to highlight relationships or support a claim.

8.1.5.DA.5: Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Unit Understandings:

Students will understand ...

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

Unit Essential Questions:

- How do we understand and apply place value concepts in multi-digit numbers?
- How can we convert between different units of measurement?
- What strategies can we use to add and subtract fractions with unlike denominators?
- Why is finding a common denominator important when adding and subtracting fractions?
- How can we represent and interpret data displayed on line plots?
- How do we reason about the size of products involving fractions?
- What strategies can we use to multiply a whole number by a fraction?
- How can diagrams and expressions help us understand and solve fraction multiplication problems?
- How do multiplicative comparisons help us understand relationships between quantities?
- How does understanding fractions help us solve real-world problems involving measurement and comparison?

Knowledge and Skills:

Students will know...

- How to perform operations with multi-digit whole numbers and with decimals to hundredths.
- How to use equivalent fractions as a strategy to add and subtract fractions.
- How to apply and extend previous understandings of multiplication and division to multiply and divide fractions.
- How to understand and analyze data visualizations.

Students will be able to...

- 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 fraction operations.
- Interpret multiplication as scaling (resizing).
- Make generalizations about multiplying a whole number by a fraction greater than, less than and equal to 1.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 6 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.6 Lessons 1-21

5.M.A.1

- **Measurement Conversion Stations:** Set up stations around the classroom with different measurement conversion tasks, such as converting between centimeters and meters, or between liters and milliliters. Provide conversion charts and tools like rulers, measuring cups, and scales at each station. Students rotate through the stations, practicing measurement conversions and solving real-world problems at each station.
- **Real-World Measurement Scenarios:** Present students with real-world scenarios that require measurement conversions, such as converting distances for a road trip or converting volumes for a recipe. Encourage students to identify the given units, determine the conversion factor, and apply the appropriate conversion to solve the problem.

5.NF.A.1

- **Fraction Equivalence Practice:** Provide opportunities for students to practice finding equivalent fractions for fractions with unlike denominators. Use visual aids like fraction circles or diagrams to illustrate how fractions can be decomposed and recomposed to have like denominators.
- **Algorithm Practice:** Teach students strategies for adding and subtracting fractions with unlike denominators, such as finding a common denominator or using the least common multiple. Provide guided practice exercises where students use these strategies to solve problems step-by-step.

5.NF.A.2

- **Estimation and Mental Math:** Teach students to use benchmark fractions and number sense to estimate the sum or difference of fractions mentally. Provide opportunities for students to practice estimating and assessing the reasonableness of their answers in word problems.
- **Real-World Problem Solving:** Present students with word problems that involve adding and subtracting fractions referring to the same whole in real-life contexts. Guide students through the process of identifying the relevant information, choosing the appropriate operation, and solving the problem using fraction addition or subtraction.

5.NF.B.4

- **Real-World Application:** Present students with real-world scenarios that require multiplying fractions, such as calculating the area of a rectangular garden or finding a fraction of a set of objects. Encourage students to apply their understanding of fraction multiplication to solve these practical problems.
- **Differentiated Practice:** Offer practice problems with varying levels of difficulty, allowing students to choose problems that match their skill level. Provide support and scaffolding for struggling learners while offering extension activities for advanced students.

5.NF.B.5

- **Comparing Products:** Provide pairs of multiplication problems where one factor is constant while the other factor varies. Encourage students to compare the size of the products relative to the size of the varying factor, without performing the multiplication.
- **Real-Life Scaling Scenarios:** Present students with real-life scenarios that involve scaling or resizing objects, such as enlarging or reducing a recipe or resizing a map. Guide students through the process of understanding how multiplication can be used for scaling and resizing.

5.NBT.A.1

- **Place Value Games:** Engage students in interactive games or activities that reinforce the concept of place value. Provide games where students must identify the value of digits in different places within multi-digit numbers. Offer games at varying levels of difficulty to accommodate different skill levels.
- **Comparative Discussions:** Facilitate discussions where students compare the value of digits in different places within multi-digit numbers. Prompt students to explain why a digit in a certain place represents 10 times as much or $\frac{1}{10}$ of what it represents in adjacent places.

5.NBT.A.2

- **Interactive Demonstrations:** Use interactive demonstrations or simulations to illustrate the patterns that emerge when multiplying or dividing by powers of 10. Show students how the number of zeros in the product changes based on the number of factors of 10 in the multiplication problem.
- **Number Talks:** Conduct number talks where students discuss and analyze patterns in the placement of the decimal point when multiplying or dividing decimals by powers of 10. Encourage students to articulate their observations and reasoning, fostering a deeper understanding of the patterns involved.

5.OA.A

- **Expression Writing Practice:** Provide practice opportunities for students to write numerical expressions based on verbal or written descriptions. Offer a variety of scenarios and contexts for writing expressions to ensure students can apply their understanding in different situations.
- **Expression Interpretation Activities:** Present students with numerical expressions and ask them to interpret the meaning without evaluating them. Encourage students to explain the meaning of the expressions in their own words, emphasizing the operations involved and the relationship between the numbers.

5.DL.5

- **Data Collection Projects:** Assign students to collect data on topics relevant to their interests or curriculum. Encourage them to organize the data into tables or graphs with up to three categories, such as bar graphs or pictographs.
- **Interpretation Exercises:** Provide students with graphs or charts representing data and ask them to interpret the information. Guide students in asking and answering questions about the total number of data points, distribution among categories, and comparisons between categories.

RESOURCES

Teacher Resources:

- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 6
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Shapes on the Coordinate Plane

Target Course/Grade Level: 5

Unit Summary: In this unit, 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.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

- 5.G.A.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x -axis and x -coordinate, y -axis and y -coordinate).
- 5.G.A.2.** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
- 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.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.

Interdisciplinary Connections and Standards:

English Language Arts:

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

SL.AS.5.6 Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

Students will understand ...

- How to plot coordinate pairs on a coordinate grid and classify triangles and quadrilaterals in a hierarchy based on properties of side length and angle measure.
- How to 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.

Unit Essential Questions:

- How can we use coordinates to locate points on a coordinate grid and solve real-world problems?
- What are the properties of different types of two-dimensional figures, and how can we classify them accordingly?
- How do the measurements of angles and side lengths help us classify triangles and quadrilaterals into hierarchies?
- What rules govern the generation of patterns, and how can we use these rules to identify corresponding terms and graph relationships?
- In what ways can we represent real-world and mathematical problems on a coordinate grid, and how do we interpret the information presented in these representations?

Knowledge and Skills:

Students will know...

- How to graph points on the coordinate plane to solve real-world and mathematical problems.
- How to classify two-dimensional figures into categories based on their properties.

Students will be able to...

- 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.

EVIDENCE OF LEARNING

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: Illustrative Math End-of-Unit 7 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.7 Lessons 1-13

5.G.A.1

- **Treasure Map Coordinates** (Geography Integration)
Provide students with a blank coordinate grid representing a map. Assign each student or group a set of latitude and longitude coordinates corresponding to hidden treasures. Students graph the points on the coordinate grid. Students exchange their maps with classmates, who must use the coordinates to locate the treasures. Discussion and reflection on the accuracy of plotted points and strategies used.
- **Coordinate Battleship**
Provide each student or pair of students with a coordinate grid and a set of ships of varying lengths. Students take turns calling out coordinates to try to "hit" their opponent's ships. After each turn, students mark their guesses on their grids. The game continues until one player successfully sinks all of their opponent's ships. Discussion on strategies used and reflection on the importance of accurate coordinate plotting.

5.G.A.2

- **Shape Sort**

Provide students with a variety of geometric shapes (e.g., triangles, quadrilaterals, pentagons) on cards or as manipulatives. Students work individually or in groups to sort the shapes into categories based on properties such as the number of sides, angles, and symmetry. After sorting, students discuss their reasoning for classification and compare their results with classmates.

Extension: Have students create their own criteria for sorting and justify their classifications.

- **Polygon Properties Gallery Walk**

Display posters around the classroom, each featuring a different polygon (e.g., triangle, rectangle, hexagon) with its properties listed. Students rotate around the room, examining each poster and noting the properties of the polygons. After the gallery walk, students discuss commonalities and differences among the polygons and identify patterns in their properties. Students create a reference guide summarizing the properties of different polygons based on their observations.

5.G.B.3

- **Attribute Matching Game**

Prepare cards with attributes (e.g., "four right angles," "two pairs of parallel sides," "all sides equal") and cards with figures (e.g., square, rectangle, rhombus). Shuffle the cards and place them face down. Students take turns flipping over two cards—one with an attribute and one with a figure—and determine if they match. If the attribute matches the figure, the student keeps the pair and gets another turn. If not, the cards are returned to their original positions. The game continues until all matches are made. Discussion and reflection on the relationships between attributes and figures.

- **Attribute Venn Diagram**

Provide students with a blank Venn diagram with two circles—one representing the category of rectangles and the other representing the category of squares. As a class, brainstorm attributes of rectangles and squares and list them in the appropriate sections of the diagram. Students independently or collaboratively fill in the remaining attributes in the overlapping section of the diagram, representing attributes shared by both rectangles and squares. Discussion and reflection on the relationships between attributes and categories.

5.G.B.4

- **Hierarchy Sort**

Provide students with a variety of geometric figures (e.g., triangles, quadrilaterals, parallelograms) on cards or as manipulatives. Students work individually or in groups to sort the figures into categories based on properties such as the number of sides, angles, and symmetry. After sorting, students discuss their reasoning for classification and compare their results with classmates. Extension: Have students create their own hierarchy of two-dimensional figures and justify their classifications.

- **Geometric Family Tree**

Provide students with a blank chart or graphic organizer labeled with categories such as "quadrilaterals," "triangles," and "polygons." Students research and identify properties of various two-dimensional figures and place them in the appropriate categories on the chart. Students use arrows or lines to connect related figures, indicating their hierarchical relationships based on shared properties. Discussion and reflection on the hierarchical structure of two-dimensional figures and the reasoning behind their classifications.

5.OA.B.3

- **Pattern Block Patterns**

Provide students with pattern blocks and a rule for creating a pattern (e.g., "Add two blocks each time," "Alternate colors," "Double the number of blocks each time"). Students use the rule to create two patterns using pattern blocks, labeling each term. Students graph the patterns on a coordinate grid, with the x-axis representing the term number and the y-axis representing the number of blocks. Students identify and discuss the relationships between corresponding terms in the two patterns. Extension: Have students create their own rules and patterns for classmates to graph and analyze.

- **Function Machine Challenge**

Create function machines with input and output slots labeled A and B, respectively. Provide students with input values for machine A (e.g., 1, 2, 3, 4) and challenge them to determine the corresponding output values for machine B based on a given rule. Students record their input-output pairs and graph them on a coordinate grid. Students analyze the relationships between the input-output pairs and identify the pattern rule. Discussion and reflection on the patterns observed and the strategies used to identify the relationships.

RESOURCES

Teacher Resources:

- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 7
- IM Student Work
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Approved
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit Title: Putting it All Together

Target Course/Grade Level: 5

Unit Summary: 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. 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.

Approximate Length of Unit: 5 weeks

LEARNING TARGETS

NJ Student Learning Standards:

Mathematics:

5.NBT.B.5 With accuracy and efficiency, multiply multi-digit whole numbers using the standard algorithm.

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

5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

5.M.B.4 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.
- 5.NFA.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.
- 5.NF.B.3** Interpret a fraction as division of the numerator by the denominator (i.e., $a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
- 5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- a. Interpret the product $[a/b] \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. For example, use a visual fraction model to show $[\frac{2}{3}] \times 4 = \frac{8}{3}$, and create a story context for this equation.
- 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.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.

Interdisciplinary Connections and Standards:

English Language Arts:

- SL.PE.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- SL.AS.5.6** Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.

Career Readiness, Life Literacies, and Key Skills:

- 9.4.5.CT.1:** Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
- 9.4.5.CT.3:** Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4:** Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).
- 9.4.5.CI.3:** Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.

Science & Engineering Practices:

1. Asking Questions and Defining Problems
2. Analyzing and Interpreting Data
3. Developing and Using Models
4. Constructing Explanations and Designing Solutions
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking

Technology:

8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.

Unit Understandings:

- 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.

Unit Essential Questions:

- How can we use the standard algorithm for multiplication to efficiently find the value of products?
- What strategies can we employ to solve multiplication problems mentally?
- How do algorithms using partial quotients help us divide whole numbers?
- In what real-world situations might we need to calculate volume, and how can we use mathematics to model these situations?
- How do we perform operations involving decimals and fractions, and how can we apply these operations in practical scenarios?
- What are some effective strategies for mentally calculating with decimals and fractions?
- How can we create warm-up activities using the formats of Notice and Wonder, Estimation Exploration, Number Talk, True or False, and Which One Doesn't Belong?

Knowledge and Skills:

Students will know...

- How to perform operations with multi-digit whole numbers and with decimals to hundredths.
- Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
- How to perform operations with multi-digit whole numbers and with decimals to hundredths.
- How to apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Students will be able to...

- Divide multi-digit whole numbers using place value strategies and the properties of operations.
- With accuracy and efficiency multiply multi-digit whole numbers using the standard algorithm.
- Solve multi-step problems involving volume
- Operate with fractions and decimals.

<i>EVIDENCE OF LEARNING</i>

Assessment:

What evidence will be collected and deemed acceptable to show that students truly “understand”?

- Cool-downs
- Section Checkpoints
- Common Assessment: End-of-Unit 8 Assessment
- Daily Exit Slips
- Standards Mastery Assessment (iReady)

Learning Activities:

What differentiated learning experiences and instruction will enable all students to achieve the desired results?

- Online math games/activities
- Centers
- Math Dialogue
- Thinking Classrooms
- Illustrative Mathematics (IM) 5.8 Lessons 1-18

5.NBT.B.5

1. **Multiplication Relay Race:** Divide students into teams and provide each team with a set of multi-digit multiplication problems. Each team member takes turns solving a problem using the standard algorithm. Once one team member completes a problem, they pass it to the next team member to solve the next one. The team that completes all the problems correctly and in the shortest amount of time wins the race.
2. **Multiplication Challenge:** Give each student a set of multi-digit multiplication problems of varying difficulty. Challenge them to solve as many problems as they can within a given time limit using the standard algorithm. After the time limit, review the solutions together and discuss any strategies or shortcuts used to improve efficiency.

5.NBT.B.6

1. **Division with Rectangular Arrays:** Provide students with division problems and ask them to represent each problem using rectangular arrays. They should divide the array into equal groups to find the quotient. After finding the quotient visually, they should write the equation to illustrate the calculation.
2. **Division Problem Solving Stations:** Set up different stations around the classroom, each with a division problem displayed along with manipulatives or visual aids. Students rotate through the stations, solving each problem using various strategies such as place value, repeated subtraction, or partial quotients. After solving each problem, they explain their reasoning and solution method to their peers.

5.NBT.B.7

1. **Decimal Operation Puzzles:** Create puzzles where students must solve decimal addition, subtraction, multiplication, and division problems to reveal a hidden picture or message. Provide manipulatives or drawings to help visualize the problems and strategies. After solving the puzzles, students explain how they approached each operation and how they related their strategy to the standard written method.
2. **Decimal Problem-solving Scenarios:** Present real-world scenarios involving decimal operations, such as calculating prices, measurements, or financial transactions. Students work in pairs or small groups to solve the problems using concrete models or drawings, and then translate their solutions into written methods. After solving the scenarios, students discuss how they applied place value and properties of operations to reach their solutions.
- 3.

5.M.B.4:

1. **Volume Exploration Stations:** Set up different stations in the classroom, each with a variety of right rectangular prisms made from different materials or represented with diagrams. At each station, students can explore the concept of volume by packing the prisms with unit cubes. They can then compare the volume obtained by packing with the volume calculated using the formula ($\text{length} \times \text{width} \times \text{height}$). As an extension, students can represent the volume as the product of the height and the area of the base, demonstrating the associative property of multiplication.

2. **Real-World Volume Problems:** Provide students with real-world scenarios that involve calculating volume, such as filling a swimming pool or packing boxes for shipping. Students can work in small groups to identify the relevant dimensions, apply the appropriate formula, and calculate the volume of the given objects. Encourage students to discuss their reasoning and strategies for solving the problems, emphasizing the concept of volume as additive when dealing with composite figures composed of non-overlapping right rectangular prisms.

5.NF.A.1:

1. **Fraction Addition and Subtraction Practice:** Create a set of fraction addition and subtraction problems with unlike denominators, including mixed numbers. Divide students into pairs and provide them with fraction manipulatives or fraction strips. Students can work together to solve the problems by first identifying equivalent fractions with like denominators, performing the addition or subtraction, and then simplifying the results if necessary.
2. **Fraction War Card Game:** Adapt the traditional card game "War" to practice adding and subtracting fractions with unlike denominators. Each player is dealt a set of cards with fractions or mixed numbers. Players take turns drawing cards and adding or subtracting the fractions. The player with the greater (or lesser) result wins the round and collects the cards. This game helps students practice finding equivalent fractions to make the denominators the same before performing addition or subtraction.

5.NF.B.3:

1. **Fraction as Division Exploration:** Provide students with various visual fraction models representing fractions as division (e.g., circles divided into equal parts). Ask them to interpret each model as a division problem. For instance, if they're given a model representing $\frac{3}{4}$, they should recognize it as 3 divided by 4. Then, present word problems where they need to divide whole numbers and express the result as a fraction or mixed number. For example: "If 15 candies are shared equally among 4 children, how many candies does each child receive?" Encourage students to use visual models or equations to solve the problems.
2. **Sharing Equally Real-Life Scenario:** Provide a real-life scenario involving sharing equally among a group, such as the rice sack problem mentioned in the standard. Present a similar scenario and ask students to solve it using fraction division. For example: "If 20 friends want to share 8 pizzas equally, how much pizza does each friend get?" Students should use their understanding of fraction division to solve the problem and determine how much each person receives, expressing the answer as a fraction or mixed number.

5.NF.B.4:

1. **Fraction Multiplication Story Creation:** Have students create story contexts for fraction multiplication problems. Provide them with multiplication equations involving fractions, such as $\frac{2}{3} * \frac{3}{4}$, and ask them to create a story that represents the multiplication. For example, for $\frac{2}{3} * \frac{3}{4}$, a student might create a story about baking where they need to use $\frac{2}{3}$ of a cup of flour, and then use $\frac{3}{4}$ of that amount for a recipe. This activity helps students understand the concept of fraction multiplication as a part of a part.
2. **Area Model Exploration:** Provide students with rectangular shapes divided into fractional parts. Ask them to find the area of each shape by multiplying the fractional side lengths. For example, give them a rectangle divided into halves by length and thirds by width, and ask them to find the area. This hands-on activity helps students visually understand how fractional side lengths can be multiplied to find the area, reinforcing the concept of fraction multiplication.

5.G.B.3 and 5/G/B.3:

1. **Attribute Identification:** Provide students with various two-dimensional figures, such as rectangles, squares, and parallelograms. Ask them to identify and list the attributes of each figure. Then, guide them to understand that attributes belonging to a category of figures also belong to all subcategories. For instance, they should recognize that since all rectangles have four right angles, squares (a subcategory of rectangles) also have four right angles.
2. **Sorting Figures by Attributes:** Give students a set of two-dimensional figures and ask them to classify them into groups based on shared properties. Start with simpler properties like the number of sides or angles, and then move to more complex properties like whether the figure has perpendicular sides. Encourage students to explain their reasoning for classifying figures, helping them understand the hierarchical relationships between different types of figures.

RESOURCES

Teacher Resources:

- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 8
- IM Student Work
- IM Blackline Masters
- OnlineApproved District Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbook
- Student White Boards
- Chart Paper
- Dry Erase Markers
- Chromebooks