ESL
SCIENCE
BUSINESS
BILINGUAL
PRESCHOOL
MATHEMATICS
LIBRARY MEDIA
SOCIAL STUDIES
WORLD LANGUAGES
GIFTED & TALENTED
TECHNOLOGY EDUCATION
ENGLISH LANGUAGE ARTS
FINE & PERFORMING ARTS
FAMILY & CONSUMER SCIENCE
HEALTH & PHYSICAL EDUCATION

RAHWAY PUBLIC SCHOOLS

CURRICULUM & INSTRUCTION

Course: Mathematics

Grade Level: 4

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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Edwina Suarez

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

Subject/Course Title:
Mathematics
Grade 4

Date of Board Adoption:
August 27 , 2024

RAHWAY PUBLIC SCHOOLS CURRICULUM

Mathematics: Grade 4

PACING GUIDE

Unit	Title	Pacing
1	Factors and Multiples	2 weeks
2	Fraction Equivalence and Comparison	4 weeks
3	Extending Operations to Fractions	5 weeks
4	From Hundredths to Hundred-thousands	7 weeks
5	Multiplicative Comparison and Measurement	4 weeks
6	Multiplying and Dividing Multi-digit Numbers	6 weeks
7	Angles and Angle Measurement	4 weeks
8	Properties of Two-dimensional Shapes	3 weeks
9	Putting it All Together	2 weeks

ACCOMMODATIONS

504 Accommodations:

- 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.

IEP Accommodations:

- 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.

Gifted and Talented Accommodations:

- 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.

ELL Accommodations:

- 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 1 Title: Factors and Multiples

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students extend their knowledge of multiplication, division, and the area of a rectangle to deepen their understanding of factors and to learn about multiples.In grade 3, students learned that they can multiply the two side lengths of a rectangle to find its area, and divide the area by one side length to find the other side length. To represent these ideas, they used area diagrams, wrote expressions and equations, and learned the terms "factors" and "products." In this unit, students return to the concept of area to make sense of factors and multiples of numbers. Given a rectangle with a particular area, students find as many pairs of whole-number side lengths as they can. They make sense of those side lengths as factor pairs of the whole-number area, and the area as a multiple of each side length.Students also learn that a number can be classified as prime or composite based on the number of factor pairs it has. Throughout the unit, students encounter various contexts related to school, gatherings, and celebrations which are intended to invite conversations about students' lives and experiences.

Approximate Length of Unit: 2 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics

4.OA.A.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
4.OA.B.4: Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:
- Students apply understanding of multiplication and area to work with factors and multiples.

Unit Essential Questions:
- What are factors and multiples, and how can they be used to identify patterns and relationships between numbers?
- How can multiplication, division, and the area of a rectangle to deepen my understanding of factors help me learn about multiples?
- How can a number be classified as prime or composite based on the number of factor pairs it has?
- How can I find the particular area of a rectangle using as many pairs of whole-number side lengths as I can?

Knowledge and Skills:
Students will know…
- How to gain familiarity with factors and multiples.

Students will be able to...
- Determine if a number is prime or composite.
- Explain what it means to be a factor or a multiple of a whole number.
- Relate the side lengths and area of a rectangle to factors and multiples
- Apply multiplication fluency within 100 and the relationship between multiplication and division to find factor pairs and multiples.

EVIDENCE OF LEARNING

Assessment:
What evidence will be collected and deemed acceptable to show that students truly "understand"?
- Warm ups
- Cool downs
- Section checkpoints

- **Illustrative Math End of Unit Common Assessments** - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 1→ 4.1 Teach → End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

Learning Activities:

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

Standards 4.OA.A3, 4.OA.B4

- Online math games/activities
- Centers
- Math Dialogue
- **Multiples of a Number (Lesson 1)**
  - *"Build Area and Find Rectangles"* - In this lesson, students will find all factor pairs for whole numbers between 1 and 100 and learn to recognize that a whole number is a multiple of each of its factors.
  - *"What Areas Can You Build?"* - Students will explore the possible areas of a rectangle given only one side length. Working in pairs, students will collaborate to answer the given questions.
- **Factor Pairs (Lesson 2)**:
  - *"How Many Rectangles?"* - Working in groups, students will be assigned two numbers as rectangle areas. On grid paper, students draw, label, and cut out all possible rectangles for each area, using each pair of side lengths only once. They will then place the rectangles on posters and display them in a gallery walk.
- **Prime and Composite Numbers (Lesson 3)**:
  - *"Card Sort: Area"* - Give students a set of cards to sort by area. Have them record their sorting results and be ready to explain their choices. For each group of sorted cards, students should think of and name at least one additional rectangle with its length and width, and be prepared to explain their reasoning.
  - *"Prime or Composite?"* - Students will complete a table by determining how many rectangles can be made for each given area.
- **Multiplication Practice (Lesson 4 Checkpoint)**
  - *"Card Sort: Multiplication"* - Students will take turns sorting multiplication expressions into three groups: "know it right away," "can find it quickly," and "don't know it yet." Then, they will practice the expressions and type them into the provided boxes.
- **More Multiples (Lesson 5)**
  - *"Choose the Right Tables"* - Students will determine whether to use tables seating 6 or 8 people to avoid empty seats at an end-of-year party. They will use the given information and explain or show their reasoning.
  - *"Hot Dogs and Buns"* - Students will engage in an activity involving packages of hot dogs and hot dog buns. They'll determine how many packages of hot dogs and buns will be needed for a group of friends hosting a bbq. They will use this information to determine if it's possible to buy the same number of hot dogs and buns, identifying the number if possible, or explaining why not.

- **The Locker Problem (Lesson 6)**
    - *"Questionable Lockers"* - Create a representation to demonstrate the locker problem. Consider how to show the lockers, track which students touch them, and indicate if lockers are open or closed.
    - *"An Open and Shut Case"* - Students will analyze a follow up task related to lockers. The goal is to find out which lockers will be touched after all 20 students take their turn touching lockers. Students will work together to answer and explain their reasoning.
- **Find Factors and Multiples (Lesson 7)**
    - *"Factor and Multiple Statements"* - Students will work together to complete a table with statements using the word "factor" and statements using the word"multiple" for each number.
- **Mondrian's Art (Lesson 8)**
    - *"My Mondrian Outline"* - Students will create an outline for their artwork by drawing lines on graph paper, marking out rectangular areas that will be the basis for their Mondrian-inspired artwork.
    - *"Analyze the Rectangles"* - In groups of 2, students will exchange artwork with their partner. They will then analyze their partner's work, identifying three types of rectangles: those with the same area, those with an area that is a prime number, and those with an area that is a composite number.

RESOURCES

Teacher Resources:

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

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 2 Title: Fraction Equivalence and Comparison

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students extend their prior understanding of equivalent fractions and comparison of fractions. As the unit progresses, students use equivalent fractions and benchmarks such as 12 and 1 to reason about the relative location of fractions on a number line, and to compare and order fractions.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics

4.NF.A.1: Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
4.NF.A.2: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:

- In this unit students generate and reason about equivalent fractions and compare and order fractions with the following denominators: 2, 3, 4, 5, 6, 8,10, 12, and 100.

Unit Essential Questions:

- How do we make sense of fractions with denominators 2, 3, 4, 5, 6, 8, 10, and 12 through physical representations and diagrams?
- How can we reason about the location of fractions on the number line.
- How can I represent an unknown number in a word problem and how do I solve for what the unknown number represents?

Knowledge and Skills:
Students will know…

- How to extend understanding of fraction equivalence and ordering.
- How to build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

Students will be able to...

- Make sense of fractions with denominators 2, 3, 4, 5, 6, 8, 10, and 12 through physical representations and diagrams.
- Reason about the location of fractions on the number line.
- Generate equivalent fractions with the following denominators: 2, 3, 4, 5, 6, 8, 10, 12, and 100.
- Use visual representations to reason about fraction equivalence, including using benchmarks such as 12 and 1.
- Use visual representations or a numerical process to reason about fraction comparison.

EVIDENCE OF LEARNING

Assessment:
What evidence will be collected and deemed acceptable to show that students truly "understand"?

- Warm ups
- Cool downs
- Section checkpoints
- Illustrative Math End of Unit Common Assessments - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 2→ 4.2 → Teach →End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

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

Standards 4.NF.A.1, 4.NF.A.2

- Online math games/activities
- Centers
- Math Dialogue
- **Representations of Fractions (Lesson 1)**
  - *"Fraction Strips"* -Using strips of paper, students will represent halves, fourths and eighths. Students will observe what they notice about the number of parts or the size of the parts and make at least two observation
  - *"Fractions, Represented?"* - Students will explore what each shaded part of a whole bar diagram represents.
- **Representations of Fractions (Part 2 - Lesson 2)**:
  - *"A Diagram for Each Fraction"* - With a full diagram represented, students will match each fraction to a diagram whose shaded parts represent it. Then students will create a representation for the two fractions not represented.
  - "*Diagrams for Some Other Fractions*" - Students will identify the shaded parts and what they represent.
- **Same Denominator or Numerator (Lesson 3)**:
  - *"Fractions with the Same Denominator"* - Students will use the given diagram which shows a set of fraction strips. They will label each rectangle with the fraction it represents and circle the greater fraction within the pairs.
  - *"Fractions with the Same Numerator"* - Students will use the given diagram which shows a set of fraction strips. They will circle the greater fraction in each of the following pairs.
- **Same Size, Related Sizes (Lesson 4)**
  - *"Same Size, Different Numbers"* **-** Using a diagram, students will label tenths and twelfths. They will also label the parts and show their reasoning.

- "*Fractions on Number Lines*" Students will locate and label fractions on one of the number lines**.**

- **Fractions on Number Lines (Lesson 5)**
  - *"All Lined Up"* **-** Students will analyze the number lines with different tick marks. Working in partners, they will then explain why the tick marks can be labeled with fractions having different numbers.
  - "*How Far to Run?*" - Students will determine how far of a distance will be run in a word problem using fractions and working together in pairs.
- **Relate Fractions to Benchmarks (Lesson 6)**
  - *"Greater Than or Less Than 1?"* - Using a diagram, students will name a fraction that a point represents and ask if that fraction is greater than or less than 1 and how far is it from 1?
  - *"Greater Than or Less Than 1/2"* - Using a diagram, students will name a fraction that a point represents and ask if that fraction is greater than or less than half and how far is it from the halfway point?
- **Equivalent Fractions (Lesson 7)**
  - *"Two or More Fractions"* - Students will work in pairs to find at least two fractions to describe the shaded part of each diagram, and two fractions for the point on each number line.
  - "*Equivalent for Sure*" - This task requires students to find two equivalent fractions for each fraction listed under A or B, and then convince their partner that your fractions are equivalent.
- **Equivalent Fractions on the Number Line (Lesson 8)**
  - *"Handy Number Lines"* - In this activity, students examine number lines that have been partitioned into smaller and smaller parts. They see that this strategy can be used to generate many equivalent fractions and to verify if two fractions are equivalent.
  - "*Can it Be Done?*" - In this activity, students continue to use the idea of partitioning a number line into smaller increments to reason about and generate equivalent fractions. Through repeated reasoning, students begin to see regularity in how the process of decomposing parts on a number line produces the numbers in the equivalent fractions.
- **Explain Equivalence (Lesson 9)**
  - *"Pointed Discussion"* - In this activity, students look closely at the relationships of fractions with denominator 5, 10, and 100. They use their observations and understanding to identify equivalent fractions and to explain why two fractions are or are not equivalent.
  - "How Do You Know?" - This activity gives students opportunities to practice explaining or showing whether two fractions are equivalent. Students may do so using a visual representation, by reasoning about the number and size of the fractional parts in each fraction, or by thinking about multiplicative relationships between the numbers in the given fractions. Students participate in a gallery walk in which they generate equivalent fractions for the numbers on the posters.
- **Use Multiples to Find Equivalent Fractions (Lesson 10)**
  - *"Elena's Way"* - In this activity, students connect action to a numerical process—one that involves multiplying both the numerator and denominator by the same factor. When students notice that they can multiply the numerator and denominator of a fraction by any whole number to get an equivalent fraction they observe regularity in repeated reasoning.
  - "*Equivalence Hunting*" - Students identify equivalent fractions. In the first problem, they use the numerical strategy they learned earlier to determine if two fractions are equivalent. In the second problem, they can use any strategy in their toolkit—which now includes a numerical method—to identify equivalent fractions.

- **Use Factors to Find Equivalent Fractions (Lesson 11)**
    - *"The Other Way Around"* - Students will see that they can find equivalent fractions by dividing the numerator and denominator by a common factor. They connect this strategy to the process of grouping unit fractions on a number line into larger equal-size parts.
    - "*How Would You Find Them*?" - In this activity, students generate equivalent fractions by applying the numerical strategies they learned. Depending on the given fractions, students need to decide whether it makes sense to multiply or divide the numerator and denominator by a common number.
- **Ways to Compare Fractions (Lesson 12)**
    - *"The Greatest of Them All"* - In this activity, students use that understanding to compare a large set of fractions that are arranged into rows and columns. The fractions in each row share the same numerator and those in each column share the same denominator.
    - "*Relative to ½ and 1*" - students apply previous reasoning about the size of fractions and their knowledge about fractions that are equivalent to ½ to classify and compare fractions. Along the way, students have opportunities to make new observations about the structure of fractions that are less than ½ , greater than ½ but less than 1, and greater than 1.
- **Use Equivalent Fractions to Compare (Lesson 13)**
    - *"Pairs to Compare"* - In this activity, students are presented with fractions that are in the same group (for example, both less than 12 , or both greater than 12 but less than 1), so they need to reason in other ways to make comparisons. Students can reason in a number of ways—by thinking about size and number of parts, drawing a diagram or number line, or reasoning numerically, but in most cases, they need to also rely on the idea of equivalence.
    - "*New Pairs to Compare*" - In all pairs of fractions given here, one denominator is a factor or a multiple of the other, which encourages students to convert one into an equivalent fraction with the same denominator as the other fraction. On repeated reasoning, students see that writing an equivalent fraction can facilitate the comparison (though in some cases, students may still find it efficient to reason in other ways).
- **Fraction ComparisonProblems (Lesson 14)**
    - *"Mystery Fractions"* - Students are given several sets of fractions and some clues about the size of a particular fraction in each set. To identify a fraction that meets certain size requirements or falls within a specified range, students need to use multiple comparison strategies they have learned.
    - "*Distances on Foot*" - This activity has two purposes: to give students an opportunity to solve fraction comparison problems in context, and to reinforce the idea that two fractions can be compared only if they refer to the same whole. To serve the former, students compare fractional distance measurements. To serve the latter, they investigate fractional measurements in two different units of distance: Chinese "li" and kilometer.
- **Common Denominators to Compare (Lesson 15)**
    - *"Tricky Fractions?"* - In this activity, students see that—although it's still possible to compare the fractions—this particular strategy doesn't work if neither of the denominators of the two fractions is a factor or multiple of each other. Students learn that in such a case, both fractions can be expressed as equivalent fractions with a common denominator, and the denominator is a different number that is a multiple of both of the original denominators.
    - "*Use a Common Denominator, or Not*" - Students will work in pairs to find equivalent fractions. Students have opportunities to choose an approach strategically, rather than writing equivalent fractions each time. This activity serves two main goals: to prompt students to rewrite pairs of fractions into equivalent fractions with a common

denominator, and to consider this newly developed skill as a possible way to compare fractions.

- **Compare and Order Fractions (Lesson 16)**
    - *"Compare Fractions Game"* - This activity allows students to practice comparing fractions and apply the comparison strategies they learned through a game. Students use fraction cards from an earlier lesson to play a game in groups of 2, 3, or 4.
    - "*Fractions in Order"* - This activity prompts students to compare multiple fractions and put them in order by size. The work gives students opportunities to look for and make use of structure in each set of fractions and make comparisons strategically.
- **Paper Clip Games (Lesson 17)**
    - *"Paper Clip Tossing Game"* - In this activity, students use their understanding of benchmark fractions and equivalent fractions to play a game that involves fractions on the number line. They toss paper clips on a game board that is a number line, and then write fractions to label the locations where the paper clips land.
    - "*Field Test*" - The purpose of this activity is for students to share their games with their classmates. This provides pairs the opportunity to articulate their rules and check to see if they are clear to their audience.

RESOURCES

Teacher Resources:

- Place Value Assessment Tool: PVAT
- IM Centers Navigation Tool: Centers Navigation Tool
- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 2
- IM Student Work Book
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 3 Title: Extending Operations to Fractions

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students deepen their understanding of how fractions can be composed and decomposed, and learn about operations on fractions. Students will multiply fractions by whole numbers, add and subtract fractions with the same denominator, and add tenths and hundredths. They rely on familiar concepts and representations to do so. For instance, students had represented multiplication on a tape diagram, with equal-size groups and a whole number in each group. Here, they use a tape diagram that shows a fraction in each group.

Approximate Length of Unit: 5 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics

4.NF.A. 1: Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions

4.NF.A.2: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

4.NF.B.3: Understand a fraction a/b with a > 1 as a sum of fractions 1/b.

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

4.NF.C.5: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100.

4.DL.B.5: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. . For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

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

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

Unit Understandings:

- In this unit, students learn that a fraction is a product of a whole number and a unit fraction *a*/*b* X 1/b, or a X 1/b, and that n X a/b = (n x a) / b. Students learn to add and subtract fractions with like denominators, and to add and subtract tenths and hundredths.

Unit Essential Questions:

- What does it mean for two fractions to be equivalent?
- How can we use visual fraction models to show that two fractions are equivalent?
- How can you compare two fractions that have different numerators and denominators?
- What strategies can you use to find common denominators or numerators when comparing fractions?
- How can benchmark fractions, such as 1/2, help you compare other fractions?
- How does understanding a fraction as a sum of unit fractions help in adding and subtracting fractions?

Knowledge and Skills:
Students will know…

- How to extend understanding of fraction equivalence and ordering.
- How to build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- How to understand decimal notation for fractions, and compare decimal fractions.
- How to represent and interpret data.

Students will be able to...

- Interpret and relate descriptions, drawings, and expressions that represent situations involving equal groups of fractions.
- Interpret diagrams and expressions that represent multiplication of a whole number and a unit fraction.

- Use diagrams and expressions to represent and find the product of a whole number and a unit fraction.
- Evaluate multiplication expressions and recognize that n×1b=nb
- Recognize that $n \times a/b = n \times a$
- Use diagrams to represent and evaluate the product of a whole number and a non-unit fraction.
- Write equivalent expressions for the multiplication of a fraction by a whole number and explain or show that the expressions are equivalent.
- Represent and solve problems involving multiplication of a fraction by a whole number.

EVIDENCE OF LEARNING

Assessment:
What evidence will be collected and deemed acceptable to show that students truly "understand"?

- Warm ups
- Cool downs
- Section checkpoints
- **Illustrative Math End of Unit Common Assessments** - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 3→ Teach →4.3 End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

Learning Activities:
What differentiated learning experiences and instruction will enable all students to achieve the desired results?
Standards 4.NF.A.1, 4.NF.A.2, 4.NF.B.3, 4.NF.C.5, 4.DL.B.5

- Online math games/activities
- Centers
- Math Dialogue
- **Equal Groups of Unit Fractions (Lesson 1)**
    - *"Crackers, Kiwis, and More"* - Students write expressions to represent the number of groups and the size of each group. They reason about the quantity in each situation in any way that makes sense to them. Although images of the food items are given, students may choose to create other diagrams, such as equal-group diagrams used in grade 3, when they learned to multiply whole numbers.
    - *"Activity: What Could It Mean?"* - In this activity, students start with given multiplication expressions and consider situations or diagrams that they could represent. Situating the expressions in context encourages students to think of the whole number in the expression as the number of groups and the fractional amount as the size of each group, which helps them reason about the value of the expression.

- **Representations of Equal Groups of Fractions (Lesson 2)**
    - *"Card Sort: Expressions and Diagrams"* - In this activity, students interpret multiplication expressions and diagrams as the number of groups and amount in each group and match representations of the same quantity. They then use their insight from the matching activity to generate diagrams for expressions without a match and to find their values
    - *"Activity 2"* - This activity prompts students to use their earlier observations to generate a diagram or expression that represents equal groups of unit fractions when one or the other is given.
- **Patterns in Multiplication (Lesson 3)**
    - *"Describe the Pattern"* - In this activity, they formalize that observation.Students reason repeatedly about the product of a whole number and a unit fraction, observe regularity in the value of the product, and generalize that the numerator in the product is the same as the whole-number factor
    - *"What's Missing? "* - The activity uses a "carousel" structure in which students complete a rotation of steps. Each student writes a non-unit fraction for their group mates to represent in terms of equal groups, using a diagram, and as a multiplication expression. The author of each fraction then verifies that the representations by others indeed show the written fraction. As students discuss and justify their decisions they create viable arguments and critique one another's reasoning
- **Equal Groups of Non-Unit Fractions (Lesson 4)**
    - *"Jars of Jam"* - Students reason about a situation that involves finding the product of a whole number and a non-unit fraction. The goal is to elicit different strategies and help students see the connections between strategies and with their earlier work.
    - *"How Do We Multiply?"* - In groups of 2, students will represent some other products of a whole number and a fraction and find their values.
- **Equivalent Multiplication Expressions (Lesson 5)**
    - *"Complete the Equations"* - The purpose of this activity is for students to think of different ways of using multiplication expressions to represent a non-unit fraction.
    - Students informally use the associative property as they work towards generalizing.
    - *"Fractions and Matching Expressions"* - In this activity, students analyze multiplication expressions, match each to one of a given set of fractions, and explain how they know that certain expressions represent the same fraction.
- **Problems with Equal Groups of Fractions (Lesson 6)**
    - *"Banana Bread Recipe"* - Students use what they know to find a product given the factors and find the factors when given the product. This reinforces the idea that any fraction a/b is a multiple of 1/b.
    - *"How Much Milk Was Used?"* - In this activity, students are presented with descriptions of situations and equivalent multiplication expressions. They match each description to an expression that could represent the situation and see that more than one expression can be used, depending on how they interpret the situation. Likewise, students find that one expression can be used to represent different descriptions
- **Fractions as Sums (Lesson 7)**
    - *"Barley Soup"* - This activity prompts students to think about non-unit fractions as being sums of other fractions. The given context—about measuring fractional amounts using

measuring cups of certain sizes—allows students to continue thinking in terms of equal groups, but also invites them to consider a fractional quantity as a sum of two or more fractions with the same denominator.

    - *"Sums in Fifths and Thirds"* -In this activity, students will record such decompositions as equations. The last question prompts students to consider whether any fraction can be written as a sum of smaller fractions with the same denominator. Students see that only non-unit fractions (with a numerator greater than 1) can be decomposed that way.

- **Addition of Fractions (Lesson 8)**
    - *"Sum of Jumps"* - This activity prompts students to use number lines to illustrate the decomposition of a fraction into sums of other fractions, reinforcing their work from an earlier lesson.
    - *"What is the Sum?"* - In this activity, students use number lines to represent addition of two fractions and to find the value of the sum. The addends include fractions greater than 1, which can be expressed as a sum of a whole number and a fraction. Students practice constructing a logical argument and critiquing the reasoning of others when they explain which of the strategies they agree with and why.
- **Differences of Fractions (Lesson 9)**
    - *" Jump to Subtract"* - In this activity, students reason about differences of fractions on a number line and write equations for number line diagrams that represent subtraction. They subtract a fraction from another fraction, as well as a whole number from a fraction, applying what they know about equivalence of whole numbers and fractions to facilitate their reasoning.
    - *"What's the Difference?"* - In this activity, students use number lines to represent subtraction of a fraction by another fraction with the same denominator—including a mixed number—and by a whole number. Locating a fraction greater than 1 on the number line prompts students to decompose the fraction mentally into a whole number and a fractional part, rather than to rely on counting tick marks.
- **The Numbers in Subtraction (Lesson 10)**
    - *"What's Left?"* - Students use any strategy that makes sense to them to reason about subtraction of a fraction from a whole number. They begin by using an image to support their reasoning. Later, when no image is given, students may use a variety of ways to find differences. In the synthesis students share, explain, and relate different strategies for solving the problem.
    - *"Card Sort: Twelfths"* - Students sort a set of cards (with a number or an expression) into two groups and justify the categories. Each card has a value equivalent to either 1–5/12 or 2– 5/12.
- **Subtract Fractions Flexibly (Lesson 11)**
    - *"Friendship Bracelets"* - In this activity, students solve contextual problems that involve subtracting fractions in which at least one value is a mixed number and it is necessary to decompose one or both numbers. Students find differences in any way that makes sense to them. They may use number line diagrams, reason in terms of addition, or perform repeated partial subtractions (without necessarily writing expressions or equations).
    - *"Multiple Ways to Subtract"* - This activity formalizes and makes explicit how such differences can be found by writing equivalent fractions and decomposing a whole number or a mixed number. When students share their responses with a partner and revise them based on the feedback they receive, they construct viable arguments and critique the reasoning of others

- **Sums and Differences of Fractions (Lesson 12)**
  - " *Make It True*" - In this activity, students find the number that makes addition and subtraction equations with mixed numbers true without a context.
  - "*To Decompose or Not to Decompose*" - In this activity, students analyze a set of addition and subtraction expressions and consider whether it is helpful or necessary to decompose a number in order to find the value of the expressions.
- **Fractional Measurements on Line Plots (Lesson 13)**
  - " *Measure to the Nearest 1/4 and 1/8 Inch*" - In this activity, students first measure colored pencils to the nearest ¼ inch, collect a set of data in a table, and then plot them on a line plot. Then, they measure the colored pencils again, but this time to the nearest 1/8 inch. They plot their data on a new number line and attend to a greater level of precision as they do so.
  - "*Colored-pencil Measurements*" - In this activity, students create a line plot using measurements to the nearest 1/4 and 1/8 inch. This task prompts students to use their understanding fraction equivalence to plot and partition the horizontal axis.
- **Problems about Fractional Measurement Data (Lesson 14)**
  - "*Shoe Lengths*" - Students plot fractional measurements on a line plot, interpret the data, and find sums or differences of fractions to solve problems in context. To find the difference between the longest and shortest shoe lengths, students can reason in a number of ways, using visual representations or more abstract reasoning.
  - " *Larger Shoes, Anyone?*" - In this activity, students analyze a line plot that is incomplete. They relate the list of given fractions to the data on the line plot and use their understanding of equivalence to determine the missing data points.
- **An Assortment of Fractions (Lesson 15)**
  - "*All the Way to the Top*" - In this activity, they reason about problems that involve combining or removing fractional amounts with different denominators—2, 4, and 8—in the context of stacking playing bricks.
  - "*Stacks of Blocks*" - Previously, students used their knowledge of equivalence to reason about the sums and differences of fractions with denominators 2, 4, or 8. In this activity, they do the same with fractions with denominators 2, 3, and 6
- **Tenths and Hundredths, Together (Lesson 16)**
  - "*Tenths and Hundredths*" - Students are given fractions in tenths and are to write equivalent fractions in hundredths, and vice versa. In one case, they encounter a fraction in hundredths that cannot be written as tenths and consider why this might be.
  - "*Walk, Stop, and Sip*" - In this activity, students use jumps on number lines to visualize addition of tenths and hundredths and find the values of such sums. Using diagrams helps to reinforce the relative sizes of tenths and hundredths.
- **Sums of Tenths and Hundredths (Lesson 17)**
  - "*Less Than, Equal to, or Greater Than 1?*" - This sorting task gives students opportunities to analyze representations, statements, and structures closely and make connections. They decide whether it is necessary to write equivalent fractions, and if so, whether to use tenths or hundredths.
  - "*What's Missing?*" - In this activity, students complete addition equations to make them true. To do so, they rely on a range of understandings and skills: how to write equivalent fractions, how to add fractions, and how to decompose a fraction into a sum.
- **Lots of Fractions to Add (Lesson 18)**
  - "*Stack Centavos and Pesos*" - Given information about the thickness of some Mexican coins, students compare the heights of different combinations of stacked coins. To complete the task, students need to write equivalent fractions, add tenths and hundredths, and compare fractions.

    - "*More Than Two Fractions*" - Working in pairs, examine at least three of six posters (or as many as time permits). The last three expressions include one or more mixed numbers. In the last expression, the fractional parts add up to a sum greater than 1, which would need to be decomposed into a mixed number and a fraction before being added to the whole number.

- **Flexible with Fractions (Lesson 19)**
    - "*Sticky-Note Designs*" - Students determine which of the three designs they saw in the warm-up would fit on a folder that is 9 inches wide and 12 inches tall. To do so, they find the heights and widths of each design using addition, subtraction, multiplication, or a combination of operations.
    - "*Hiking Trails*" -Students examine the measurements on the map and use them to answer questions. Next, they interpret given expressions and consider what the expressions might represent in the situation. Finally, they write a new problem based on the given quantities and information.
- **Sticky Notes (Lesson 20)**
    - "*Estimation Exploration: Sticky Notes*" - In this activity, students estimate how many sticky notes are needed to make a row or column along a piece of paper.
    - "*Design Your Initial*" - In this activity, students use their understanding of multiplication of fractions to make an original design with sticky notes.

RESOURCES

Teacher Resources:

- Place Value Assessment Tool: PVAT
- IM Centers Navigation Tool: Centers Navigation Tool
- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 3
- IM Student Work Book
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 4 Title: From Hundredths to Hundred-Thousands

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students learn to express both small and large numbers in base ten, extending their understanding to include numbers from hundredths to hundred-thousands. In previous units, students compared, added, subtracted, and wrote equivalent fractions for tenths and hundredths. Here, they take a closer look at the relationship between tenths and hundredths and learn to express them in decimal notation. Students analyze and represent fractions on square grids of 100 where the entire grid represents 1. They reason about the size of tenths and hundredths written as decimals, locate decimals on a number line, and compare and order them. Students then explore large numbers. They begin by using base-ten blocks and diagrams to build, read, write, and represent whole numbers beyond 1,000. Students see that ten-thousands are related to thousands in the same way that thousands are related to hundreds, and hundreds are to tens, and tens are to ones. As they make sense of this structure, students see that the value of the digit in a place represents ten times the value of the same digit in the place to its right. Students then reason about the size of multi-digit numbers and locate them on number lines. To do so, they need to consider the value of the digits. They also compare, round, and order numbers through 1,000,000. They also use place-value reasoning to add and subtract numbers within 1,000,000 using the standard algorithm. Throughout the unit, students relate these concepts to real-world contexts and use what they have learned to determine the reasonableness of their responses.

Approximate Length of Unit: 7 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics

4.NBT.A.1: Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.

4.NBT.A.2: Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

4.NBT.A.3: Use place value understanding to round multi-digit whole numbers to any place.

4.NBT.B.4: With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm.

4.NF.B.3: Understand a fraction a/b with a > 1 as a sum of fractions 1/b.

4.NF.C.5: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and

use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100.
4.NF.C.6 - Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.
4.NF.C.7 - Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:
- In this unit, students read, write and compare numbers in decimal notation. They also extend place value understanding for multi-digit whole numbers and add and subtract within 1,000,000.

Unit Essential Questions:
- How does the place value of a digit change as you move from one place to another in a multi-digit number?
- How do you read and write multi-digit numbers in base-ten numerals, number names, and expanded form?
- How can you compare two multi-digit numbers and record your results using the symbols >, =, or <?
- What is the process for rounding multi-digit numbers to a specific place value?
- Why is understanding place value important when rounding numbers?
- How can a fraction a/b be represented as a sum of unit fractions 1/b?
- How can you write a fraction with a denominator of 10 or 100 as a decimal?
- How can you compare two decimals to the hundredths place and record the results?
- Why is it important that two decimals refer to the same whole when comparing them?

Knowledge and Skills:

Students will know…

- How to generalize place value understanding for multi-digit whole numbers.
- How to use place value understanding and properties of operations to perform multi-digit arithmetic.
- How to extend understanding of fraction equivalence and ordering.
- How to build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- How to understand decimal notation for fractions, and compare decimal fractions.

Students will be able to…

- Interpret and relate descriptions, drawings, and expressions that represent situations involving equal groups of fractions.
- Interpret diagrams and expressions that represent multiplication of a whole number and a unit fraction.
- Use diagrams and expressions to represent and find the product of a whole number and a unit fraction.
- Evaluate multiplication expressions and recognize that $n \times 1/b = n/b$
- Recognize that $n \times a/b = n \times a/b$
- Use diagrams to represent and evaluate the product of a whole number and a non-unit fraction.
- Write equivalent expressions for the multiplication of a fraction by a whole number and explain or show that the expressions are equivalent.
- Represent and solve problems involving multiplication of a fraction by a whole number.
- Recognize that a fraction can be decomposed into a sum of fractions with the same denominator.
- Write equations to represent fraction decomposition.
- Decompose fractions greater than 1 into a sum of a whole number and a fraction less than 1.
- Reason about addition of fractions with the same denominator using a number line.
- Reason about subtraction of fractions with the same denominator using a number line.
- Subtract a fraction from a whole number by decomposing the whole number and reasoning about equivalence.
- Subtract fractions and mixed numbers by decomposing numbers and reasoning about equivalence.
- Add and subtract fractions (including mixed numbers) with the same denominator.
- Analyze strategies for reasoning about sums and differences of fractions with the same denominator.
- Analyze and interpret fractional measurement data on line plots.
- Organize measurement data in fractions of a unit onto line plots.
- Use information on line plots to solve problems involving addition and subtraction of fractions and mixed numbers.
- Use equivalence to reason about addition and subtraction problems.
- Use equivalent fractions to add tenths and hundredths, up to a sum of 1.
- Use equivalent fractions to add tenths and hundredths, where the sum is greater than 1.
- Find the sum of three or more tenths and hundredths, using the commutative and associative properties strategically.

EVIDENCE OF LEARNING

Assessment:
What evidence will be collected and deemed acceptable to show that students truly "understand"?

- Warm ups
- Cool downs
- Section checkpoints
- Illustrative Math End of Unit Common Assessments - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 4→ 4.4 → Teach→ End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

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

Standards 4.NBT.A.1, 4.NBT.A.2, 4.NBT.A.3, 4.NBT.B.4, 4.NF.B.3, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7

- Online math games/activities
- Centers
- Math Dialogue
- **Decimal Numbers (Lesson 1)**
  - *"Shady Fractions"* - In this activity, students use a square grid of 100 to revisit the meaning of tenths and hundredths and to make sense of the decimal notation for these fractions.
  - *"Ways to Express a Number"* - In this activity, students practice representing and writing decimals given another representation (fraction notation or a diagram).
- **Equivalent Decimals (Lesson 2)**
  - *"Card Sort: Diagrams of Fractions and Decimals"* - In this activity, students reinforce their understanding of equivalent fractions and decimals by sorting a set of cards by their value.
  - *"True or Not True?"* - In this activity, students apply their understanding of equivalent fractions and decimals more formally, by analyzing equations and correcting the ones that are false.
- **Decimals on Number Lines (Lesson 3)**
  - *"Points on Number Lines"* - In this activity, students reason about the relative size of decimals by locating them on a number line. As in a previous activity, they rely on their experience of locating fractions on a number line and the relationship of the decimal values relative to 0 and 1.
  - *"Decimals Compared"* - In this activity, students continue to compare decimals to hundredths. They begin by reasoning with a number line and work toward generalizing their observations.

- **Compare and Order Decimals (Lesson 4)**
    - *"All in Order"* - This activity prompts students to apply what they know about tenths and hundredths and decimal notation to arrange two sets of numbers in order, first from least to greatest, and then the other way around. A number line is given here, but students are likely to start seeing its limits as a tool for comparing and ordering decimals.
    - *"400-Meter Dash in a Flash"* - In this activity, students compare and order decimals in the context of running times.
- **Compare and Order Decimals and Fractions (Lesson 5)**
    - *"Order Once, Order Twice"* - In this activity, students encounter both fraction and decimal notation for tenths and hundredths and are asked to arrange them in order by size.
    - *"Long Jumps"* - In this activity, students compare and order decimals and fractions to solve problems about distances. As they do so, they practice reasoning about tenths and hundredths expressed in different notations. Some of the distances are written to the tenths of a meter and others are written to the hundredths, prompting students to attend to the size of the decimals.
- **How Much is 10,000? (Lesson 6)**
    - *"Build Numbers"* - Students arrange digit cards to create multi-digit numbers, and use base-ten blocks to represent each number.
    - *"What is 10,000?"* - Students learn that the 10-by-10 grid that represented 1 whole in a previous section now represents 100 in this activity. (It is important to establish that in these representations, each small square in the grid represents 1).
    - Students begin by organizing grids of 100 into groups of 1,000.
- **Numbers Within 100,000 (Lesson 7)**
    - *"Count and Write Numbers"* - In this activity, students approach 10,000 by counting up in different ways. Each count ends by reaching 10,000. Students count by different amounts and describe patterns and relationships between numbers.
    - *"Many Thousands"* - In this activity, students work within 100,000 and determine how many thousands and ten-thousands are in each number.
- **Beyond 100,000 (Lesson 8)**
    - *"Lin's Representation"* - In this activity, students use base-ten blocks or base-ten diagrams to represent large numbers in the ten-thousands and hundred-thousands.
    - *"What Number is Represented?"* - In this activity, students interpret a collection of blocks in which a small cube represents different values. They notice a pattern in the value of the digits when the small cube represents 1 and then represents 10.
- **Same Digit, Different Value (Lesson 9)**
    - *"Card Sort: Large Numbers"* - In this activity, students sort a set of multi-digit numbers and describe the place-value relationships they notice in the sorted numbers. They analyze numbers that have the same digits and write the numbers in expanded form, highlighting the value of each digit. Students then describe relationships they see between the digits in each number.
    - *"Expand Large Numbers"* - In this activity, students read, write, and analyze multi-digit numbers and use expanded form to describe the relationship between the digits. The numbers in the activity are designed to highlight common errors in reading and writing large numbers. Students encounter numbers with the digit zero in the ten-thousands place and think about how to represent this in expanded and word forms.
- **Ten Times As Much (Lesson 10)**
    - *"Alike but Not the Same"* - In this activity, students make sense of the relationships between the values of the same digit in different numbers, and write multiplication and division equations to represent these relationships.

- *"More and More Money"* - In this activity, students use the context of money to deepen their understanding of the relationship between the value of digits in different places—by counting equal groups of tens, hundreds, thousands, and ten-thousands. Writing the value of each stack of bills reinforces the "ten times" relationship between the place values, which in turns supports students in writing multiplication and division equations.

- **Numbers on a Number Line (Lesson 11)**
  - *" Locate Large Numbers"* - Students place four related numbers on a number line and consider relationships between digits to determine how to partition a number line.
  - *"Many Numbers, So Little Line"* - In this activity, students place a set of numbers that are each ten times as much the one before it on the same number line.
- **Compare Multi-digit Numbers (Lesson 12)**
  - *"Which is Greater?"* - In this activity, students compare pairs of numbers with the same number of digits and the same set of digits (for example, 278 and 872, or 1,356 and 3,156).
  - *"Incomplete Numbers"* - In this activity, students deepen that understanding by comparing pairs of numbers with a missing digit. The missing digit is the same for each pair but may not be in the same place in the two numbers.
- **Order Multi-digit Numbers (Lesson 13)**
  - *"Ways to Compare"* - Students solidify their awareness that looking only at the first digit is not a definitive way of comparing numbers. They also practice constructing a logical argument and critiquing the reasoning of others when they explain why the strategy of analyzing only one digit is not reliable.
  - *"Video Game Scores"* - In this activity, students apply their understanding of place value to order multi-digit whole numbers and solve problems in context. They also reason about the range of numbers whose values are between two given numbers.
- **Multiples of 10,000 and 100,000 (Lesson 14)**
  - *"On Which Line Do They Belong?"* - In this activity, students locate five- and six-digit numbers on a series of number lines. The endpoints of each number line are multiples of 100,000, and the space between them is partitioned into ten equal intervals. As they locate the numbers, students recognize each tick mark as a multiple of 10,000
  - *"Closer to Some Multiple"* - In this activity, students identify the nearest multiples of 10,000 and 100,000 for the six-digit numbers they saw in the first activity.
- **The Nearest Multiples of 1,000, 10,000, and 100,000 (Lesson 15)**
  - *"Closer to This or That?"* - Students identify the nearest multiples of 10, 100, 1,000, 10,000 and 100,000 for a series of related numbers—16, 816, 3,816, 73,816, and 573,816—and use number lines to support their thinking as needed. Tables are used to highlight the idea that a given number can be closest to a smaller number or a greater number depending on the place attended to.
  - *"Closer to Which Number?"* - Students may use number lines to support their reasoning, but the number lines are unlabeled.
- **Round Numbers (Lesson 16)**
  - *"Round to What?"* - In this activity, students connect the idea of "nearest multiple" to rounding. They are reminded that to round to the nearest 1,000, 10,000, or 100,000 is to find the nearest multiples of these values.
  - *"Some Numbers to Round"* - In this activity, students round numbers to various place values. Here they encounter for the first time a number that rounds to 1,000,000 and some that round to 0.
- **Apply Rounding (Lesson 17)**
  - *"Apart in the Air"* - In this activity, students make sense of a situation and decide how to round the quantities in it.

- *"Safe or Unsafe?"* - Students think about why rounding the altitudes to the nearest 1,000 may make it appear that two planes are a safe distance apart while the exact altitudes may show otherwise. As they consider different ways and consequences of rounding in this situation, students practice reasoning quantitatively and abstractly.

RESOURCES

Teacher Resources:

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

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 5 Title: Multiplicative Comparison and Measurement

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students make sense of multiplication as a way to compare quantities. They use this understanding to solve problems about measurement. In earlier grades, students related two quantities and made additive comparisons, where the key question was "How many more?" Here, they make multiplicative comparisons, in which the underlying question is "How many times as many?" Students use the idea and language of multiplicative relationships to learn about various units of length, mass, capacity, and time, and to convert from larger units to smaller units within the same system of measurement. For example, they describe 1 kilometer as 1,000 times as long as a meter. Students then use their new knowledge to solve measurement problems.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics

4.OA.A.1: Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

4.OA.A.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

4.OA.A.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

4.NBT.B.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

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

4.NF.B.3: Understand a fraction a/b with $a > 1$ as a sum of fractions 1/b.

4.M.A.1: Know relative sizes of measurement units within one system of units including km, m, cm. mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...

4.M.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4.M.A.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.
4.DL.B.B: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:
- In this unit, students read, write and compare numbers in decimal notation. They also extend place value understanding for multi-digit whole numbers and add and subtract within 1,000,000.

Unit Essential Questions:
- How does the place value of a digit change as you move from one place to another in a multi-digit number?
- How do you read and write multi-digit numbers in base-ten numerals, number names, and expanded form?
- How can you compare two multi-digit numbers and record your results using the symbols >, =, or <?
- What is the process for rounding multi-digit numbers to a specific place value?
- Why is understanding place value important when rounding numbers?
- How can a fraction a/b be represented as a sum of unit fractions 1/b?
- How can you write a fraction with a denominator of 10 or 100 as a decimal?
- How can you compare two decimals to the hundredths place and record the results?

- Why is it important that two decimals refer to the same whole when comparing them?

Knowledge and Skills:

Students will know…

- How to generalize place value understanding for multi-digit whole numbers.
- How to use place value understanding and properties of operations to perform multi-digit arithmetic.
- How to extend understanding of fraction equivalence and ordering.
- How to build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- How to understand decimal notation for fractions, and compare decimal fractions.

Students will be able to…

- Interpret and relate descriptions, drawings, and expressions that represent situations involving equal groups of fractions.
- Interpret diagrams and expressions that represent multiplication of a whole number and a unit fraction.
- Use diagrams and expressions to represent and find the product of a whole number and a unit fraction.
- Evaluate multiplication expressions and recognize that $n \times 1/b = n/b$
- Recognize that $n \times a/b = n \times a/b$
- Use diagrams to represent and evaluate the product of a whole number and a non-unit fraction.
- Write equivalent expressions for the multiplication of a fraction by a whole number and explain or show that the expressions are equivalent.
- Represent and solve problems involving multiplication of a fraction by a whole number.
- Recognize that a fraction can be decomposed into a sum of fractions with the same denominator.
- Write equations to represent fraction decomposition.
- Decompose fractions greater than 1 into a sum of a whole number and a fraction less than 1.
- Reason about addition of fractions with the same denominator using a number line.
- Reason about subtraction of fractions with the same denominator using a number line.
- Subtract a fraction from a whole number by decomposing the whole number and reasoning about equivalence.
- Subtract fractions and mixed numbers by decomposing numbers and reasoning about equivalence.
- Add and subtract fractions (including mixed numbers) with the same denominator.
- Analyze strategies for reasoning about sums and differences of fractions with the same denominator.
- Analyze and interpret fractional measurement data on line plots.
- Organize measurement data in fractions of a unit onto line plots.
- Use information on line plots to solve problems involving addition and subtraction of fractions and mixed numbers.
- Use equivalence to reason about addition and subtraction problems.
- Use equivalent fractions to add tenths and hundredths, up to a sum of 1.
- Use equivalent fractions to add tenths and hundredths, where the sum is greater than 1.
- Find the sum of three or more tenths and hundredths, using the commutative and associative properties strategically.

EVIDENCE OF LEARNING

Assessment:

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

- Warm ups
- Cool downs
- Section checkpoints
- Illustrative Math End of Unit Common Assessment**s** - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 5→ 4.5→Teach → End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

Learning Activities:

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

Standards 4.OA.A.1, 4.OA.A.2, 4.OA.A.3, 4.NBT.B.5, 4.NF.B.4, 4.NF.B.3, 4.M.A.1, 4.M.A.2, 4.M.A.3, 4.DL.B.5

- Online math games/activities
- Centers
- Math Dialogue
- **Times as Many (Lesson 1)**
  - *"Twice as Many"* - In this activity, students are encouraged to represent the situation in a way that makes sense to them, though discrete representations (cubes or drawings) are the focus of the activity synthesis.
  - *"Times as Many"* - The purpose of this activity is to extend the intuitive idea of representing "twice as many" to represent "4, 6, and 8 times as many." Although students are prompted to draw to represent each situation, keep the connecting cubes accessible for students to use as needed.
- **Interpret Representations of Multiplicative Comparison (Lesson 2)**
  - *"Represent 'Times as Many'"* - Students generate ideas for how to use a multiplication equation to represent the comparison.
  - *"Diagrams to Solve Multiplicative Comparison Problems"* - Students explain how the diagrams and equations represent the situation. In order to match situations, diagrams, and equations, students reason abstractly and quantitatively
- **Solve Multiplicative Comparison Problems (Lesson 3)**
  - *"A Book Drive"* - In this activity, students are provided a discrete tape diagram to represent the first problem in which the multiplier (the quantity indicating *n* times as many) is unknown. They also rely on what they know about the relationship between multiplication and division to represent and solve each problem.
  - *"Represent a Missing Amount"* - Students use the relationship between multiplication and division to write equations to represent multiplicative comparisons.

- **Solve Multiplicative Comparison Problems with Large Numbers (Lesson 4)**
    - *"A New Kind of Diagram"* - Students interpret tape diagrams that label each box with a value, which is different from the discrete diagrams from previous lessons. They also write equations to represent the situations and explain how the equations connect to the tape diagrams.
    - *"Who Read More?"* - The purpose of this activity is for students to represent multiplicative comparison situations and solve for an unknown factor or unknown product. In the synthesis, students make connections between the description, their diagram, and multiplication equations that represent the situation
- **One- and Two-step Comparison Problems (Lesson 5)**
    - *"The Book Fair"* - The purpose of this activity is for students to represent and solve problems in context involving multiplicative comparison. The first 2 questions only require one operation, and the last one requires 2 operations. Students must interpret what values are unknown and make a plan for how to represent these values.
    - *"More Book Fair Purchases"* - The purpose of this activity is for students to apply what they learned about interpreting and representing multiplicative comparison to solve multi-step problems. They also make connections between strategies for solving problems.
- **Ten Times as Many (Lesson 6)**
    - *"Ten Times as Many"* - In this activity, students are given a diagram that shows two quantities, one of which is 10 times as much as the other. They identify possible values and possible equations that the diagram could represent.
    - *"What Remains the Same?"* - In this activity, students analyze situations in which one quantity is ten times as much as another quantity.
- **Meters and Centimeters (Lesson 7)**
    - *"How Long is One Meter?"* - Students build a 1-meter long strip out of centimeter grid paper. They use this tool to identify objects or distances that are about 1 meter long.
    - *"activity"* -
- **In and Around the School (Lesson 8)**
    - *"How Long is One Kilometer?"* - Since building a kilometer is impractical, here students relate 1 kilometer to the length of other objects that may be more familiar.
    - *"Meters and Kilometers"* - The purpose of this activity is for students to convert measurements from kilometers into meters and reason the other way around.
- **Grams and Kilograms, Liters and Milliliters (Lesson 9)**
    - *" Whole Lot of Paper Clips"* - Students learn that 1 kilogram is 1,000 times as heavy as 1 gram. Students convert quantities from kilograms to grams and compare quantities given in different unit.
    - *"Liters and Milliliters"* - In this activity, they develop their sense of 1 milliliter, 1 liter, and the relationship between them. They do so by observing the number of times a smaller container with 1, 20, or 100 milliliters of liquid needs to be filled to make a larger amount, up to 1 liter.
- **Multi-step Measurement Problems (Lesson 10)**
    - *"Long Hikes, Short Hikes"* - In this activity, students apply their knowledge of centimeters, meters, and kilometers, perform unit conversions, and reason multiplicatively to compare and order distances. Students have the opportunity to decide which unit to use for making comparisons (that is, whether to convert all distances to meters, to centimeters, or to kilometers).
    - *"Big Bottles, Little Bottles"* - This activity invites students to apply their knowledge of liters and milliliters and multiplicative reasoning to solve a problem about water bottles in different sizes. Students are prompted to express all the quantities in milliliters, so no

decisions are needed in terms of the unit to use, but students do need to reason deductively or logically to solve the problem.

- **Pounds and Ounces (Lesson 11)**
  - *"Pounds and Ounces"* - Students use labels on food packaging to reason about how pounds and ounces are related, and then use what they learn to convert pounds to ounces. Students reason abstractly and quantitatively when they determine the relationship between ounces and pounds from food labels.
  - *"Party Prep"* - In the first activity, students learned that one pound is 16 times as heavy as 1 ounce. Here they apply this knowledge to convert quantities into ounces and to solve multi-step problems. The quantities include a fractional number of pounds and one expressed in a combination of pounds and ounces.
- **Hours, Minutes, and Seconds (Lesson 12)**
  - *" Mai's School Day"* - This activity develops students' understanding of hours and minutes as units of time and helps them to see 1 hour as 60 times as long as 1 minute. In converting hours into minutes, students may reason additively when the time in hours is a low single-digit number, but are likely to reason multiplicatively when converting, say, 8 or 10 hours into minutes.
  - *"Precious Minutes and Seconds"* - In this activity, students reason about the number of seconds in given time in minutes. Students see that 1 minute is 60 times as long as 1 second.
- **Multi-step Measurement Problems with Fractions (Lesson 13)**
  - *"Info Gap: Noah's School Day (Part 1)"* - Tell students that first, a demonstration will be conducted with the whole class, in which they are playing the role of the person with the problem card. Explain to students that it is the job of the person with the problem card (in this case, the whole class) to think about what information they need to answer the question. For each question that is asked, students are expected to explain what they will do with the information, by responding to the question, "Why do you need to know (that piece of information)?" If the problem card person asks for information that is not on the data card (including the answer!), then the data card person must respond with, "I don't have that information." Once the students have enough information to solve the problem, they solve the problem independently.
  - *"Info Gap: Noah's School Day (Part 2)"* - This Info Gap activity prompts students to compare lengths of time given in different units. To make comparisons, students need to convert one unit into another or otherwise reason about equivalent amounts. They also need to relate quantities in multiplicative terms—to think of a quantity as a certain number of times as much as another quantity.
- **Weight and Capacity Measurements (Lesson 14)**
  - *"Milk and Mango Lassi"* - In this activity, students work with customary units of capacity for liquids (gallon, quart, and cup).
  - *"Clay for Art Class"* - In this activity, students convert units of weight measurements—pounds and ounces—and use multiplicative reasoning to solve problems about weight.
- **Length Measurements (Lesson 15)**
  - *"Frisbee Throws"* - In this activity, students analyze length measurements, perform multiplication, and convert distances from yards to feet in order to compare and order them.
  - *"Stone Towers"* - In this activity, students apply their knowledge of multiplicative comparison and ability to convert feet and inches to solve a logic puzzle. They use several given clues to determine the heights of four objects. As they use the clues to

reason about the heights of the towers and who built them, students reason abstractly and quantitatively

- **Compare Perimeters of Rectangles (Lesson 16)**
    - *"Pipe-Cleaner Perimeters"* - In this activity, students consider possible side lengths for a rectangle with a perimeter of 12 inches and visualize each rectangle.
    - *"Perimeter Predictions"* - In this activity, students build rectangles with a perimeter of 12 inches and varied side lengths.
- **More Perimeter Problems (Lesson 17)**
    - *"Along the Walls in Tiny Steps"* - In this activity, students use their knowledge of feet and inches and the perimeter of a rectangle to solve problems in context.
    - *"Missing Measurements"* - This activity allows students to consolidate their learning from the past few units to solve problems about length measurements in a mathematical context. First, students find the perimeter or missing side length of various quadrilaterals.
- **Two Truths and a Lie (Lesson 18)**
    - *"Two Truths and a Lie"*-In this activity students use comparisons and measurement comparisons to create true and false statements about animals.
    - *"Gallery Walk"* -Students decide if their peer's statements from the previous activity are true or false.

RESOURCES

Teacher Resources:

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

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 6 Title: Multiplying and Dividing Multi-digit Numbers

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students extend their knowledge of multiplication and division to find products and quotients of multi-digit numbers. In grade 3, students learned that they could find the value of a product by decomposing one factor into smaller parts, finding partial products, and then combining them. To support this reasoning, they used base-ten diagrams (decomposing two-digit factors into tens and ones) and area diagrams (decomposing one side length into smaller numbers). Here, students use those understandings to multiply up to four digits by single-digit numbers, and to multiply a pair of two-digit numbers. Students begin by describing features of geometric and numerical patterns using ideas and language related to multiplication and multiplicative relationships (such as factors, multiples, double, and triple). Next, students reason about products of multi-digit numbers. They transition from using diagrams to using algorithms to record partial products. Students learn that they can multiply the factors by place value, one digit at a time, and then organize the partial products vertically. Here are two ways to show partial products for 3,419×8. Later, students divide dividends up to four-digit by single-digit divisors. Students see that it helps to decompose a dividend into smaller numbers and find partial quotients, just as it helped to decompose factors and find partial products. They also recognize that sometimes it is most productive to decompose a dividend by place value. For instance, to find 465÷5, we can divide each 400, 60, and 5 by 5. Students encounter various ways to record the division process, including an algorithm that records partial quotients in a vertical arrangement. At the end of the unit, students apply their expanded knowledge of operations to solve multi-step problems about measurement in various contexts—calendar days, distance, and population.

Approximate Length of Unit: 6 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics
4.OA.A.2 : Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
4.OA.A.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
4.OA.B.4: Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1– 100 is a multiple of a

given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
4.OA.C.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.
4.NBT.B..4: With accuracy and efficiency add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B5- Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6: Find whole-number quotients and remainders with up to four-digit dividends and one-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.
4.M.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4.M.A.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:

- In this unit, students multiply and divide multi-digit whole numbers using partial products and partial quotients strategies, and apply this understanding to solve multi-step problems using the four operations.

Unit Essential Questions:

- How can we generate a number or shape pattern that follows a given rule, such as "Add 3," and identify apparent features of the pattern that were not explicit in the rule itself?
- What strategies can we use to multiply a whole number of up to four digits by a one-digit whole number, or multiply two two-digit numbers, based on place value and the properties of operations?
- How can we illustrate and explain these calculations using equations, rectangular arrays, and/or area models?
- How do we fluently add and subtract multi-digit whole numbers using the standard algorithm?
- Can we apply these skills to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals?
- In what ways can we apply the area and perimeter formulas for rectangles in real-world and mathematical problems?
- How can we find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division?
- How can we illustrate and explain these calculations using equations, rectangular arrays, and/or area models?

Knowledge and Skills:

Students will know…

- How to use the four operations with whole numbers to solve problems.
- How to gain familiarity with factors and multiples.
- How to generate and analyze patterns.
- How to generalize place value understanding for multi-digit whole numbers.
- How to use place value understanding and properties of operations to perform multi-digit arithmetic.
- How to solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
- How to represent and interpret data.
- How to geometric measurement: understand concepts of angle and measure
- angles.

Students will be able to…

- Analyze and describe number and shape patterns.
- Analyze, describe, and generate patterns that follow a given rule.
- Analyze patterns represented visually and numerically.
- Use numbers, words, and the idea of factors and multiples to describe and extend patterns in the features of rectangles.
- Multiply two-digit by one-digit whole numbers in ways that make sense to them.
- Multiply two-digit and one-digit whole numbers using place value understanding and properties of operations.
- Multiply multi-digit whole numbers by one-digit numbers using an algorithm that uses partial products.
- Identify similarities and differences between algorithms that use partial-products and the standard algorithm for multiplication.

- Make sense of the standard algorithm for multiplication.
- Reason about division of two- and three-digit numbers in situations involving area of rectangles.
- Divide two- and three-digit by one-digit numbers using base-ten diagrams.
- Interpret products, quotients, and remainders in terms of a situation.
- Solve multi-step problems in ways that make sense to students.

EVIDENCE OF LEARNING

Assessment:
What evidence will be collected and deemed acceptable to show that students truly "understand"?

- Warm ups
- Cool downs
- Section checkpoints
- Illustrative Math End of Unit Common Assessments - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 6→ 4.6 →Teach →End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

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

Standards 4.OA.A.2, 4.OA.A.3, 4.OA.B.4, 4.OA.C.5, 4.NBT.B.4, 4.NBT.B.5, 4.NBT.B.6, 4.M.A.2, 4.M.A.3

- Online math games/activities
- Centers
- Math Dialogue
- **Patterns that Grow (Lesson 1)**
  - *"Bottle Cap Patterns"* - This activity invites students to look for structure in visual diagrams and describe possible patterns in them.
  - *"Taller and Taller"* - In this activity, students analyze a new visual pattern, describe its features, and make predictions about what they would see if the pattern continues.
- **Patterns that Repeat (Lesson 2)**
  - *"Patterns that Repeat"* - In this activity, students analyze a pattern with repeating shapes and look for as many features of the pattern as they can find. They then extend the pattern based on their observations.
  - *"Numbered Patterns"* - In this activity, students number the shapes in the pattern from the first activity, examine and use features of the numerical patterns to predict the shapes in particular spots.
- **From Visual Patterns to Numerical Patterns (Lesson 3)**
  - *"Growing Rectangles"* - Students begin by analyzing claims about how the rectangles are growing and work to make the claims clearer and more precise.

    - *"More Growing Rectangles"* - This optional activity gives students an additional opportunity to reason about patterns in the side lengths, area, and perimeter of rectangles that follow a rule.
- **Numerical Patterns (Lesson 4)**
    - *"Count by 10 and by 9"* - Students use what they know about the place value and operations to explain the patterns in these multiples.
    - *"Count by 99"* - In this activity, students continue to analyze patterns in numbers. This time, they look at the relationship between multiples of 100 and multiples of 99.
- **Products Beyond 100 (Lesson 5)**
    - *"Elena's Sticky Gift"* - Students are not asked to find the answer, but instead share their strategies for doing so.
    - *"More and More Stickers"* - In this activity, students use strategies and representations that make sense to them to find products beyond 100. As before, the context of stickers lends itself to be represented with an array.
- **Multiply Two-digit Numbers and One-digit Numbers (Lesson 6)**
    - *"Tyler's Diagrams"* - This activity prompts students to make sense of base-ten diagrams for representing multiplication.
    - *"Two Kinds of Diagrams"* - This activity continues to encourage place value reasoning for finding the product of a two-digit factor and a one-digit factor. Students make sense of two representations that show the two-digit factor decomposed by place value: a base-ten diagram and a rectangle.
- **Multiply Three- and Four-digit Numbers by One-digit Numbers (Lesson 7)**
    - *"Larger Numbers to Multiply"* - In this activity, students use rectangular diagrams to represent multiplication of three-digit and one-digit numbers.
    - *"Jada's Errors"* - This activity extends students' work with multiplication to include a factor with up to four digits.
- **Multiply 2 Two-digit Numbers (Lesson 8)**
    - *"Two by Two"* - In this activity, students use rectangular diagrams and similar reasoning as in earlier activities to represent the multiplication of 2 two-digit numbers.
    - *"Number Talk: Extra Groups"* - This Number Talk encourages students to use multiples of 10 to mentally multiply two-digit numbers that are close to multiples of 10.
- **Recording Partial Products: One-digit and Three- or Four-digit Factors (Lesson 9)**
    - *"An Algorithm for Noah"* - Students will interpret and make sense of Noah's work, they construct viable arguments and critique the reasoning of others
    - *"Try an Algorithm with Partial Products"* - In this activity, students continue to analyze an algorithm that uses partial products and learn that there are different ways to write the partial products.
- **Using Algorithms with Partial Products: 2 Two-digit Numbers (Lesson 10)**
    - *"Partial Products, Recorded"* - In this activity, students analyze multiplication involving 2 two-digit factors.
    - *"Han's Multiplication Mishap"* - In this activity, students analyze this error and also look at the commutativity of multiplication when finding partial products.
- **Partial Products and the Standard Algorithm (Lesson 11)**
    - *"Two Algorithms to Multiply"* - This activity introduces students to the standard algorithm for multiplication. Students make sense of it by comparing and contrasting it to an algorithm that uses partial products for multiplying three- and four-digit numbers by one-digit numbers where no regrouping is necessary.
    - *"Algorithm Comparison"* - The purpose of this activity is for students to compare the standard algorithm for multiplication and an algorithm that uses partial products.
- **Solve Problems Involving Multiplication (Lesson 12)**

    - *"Time Flies When We Leap Years"* - In this activity, students use what they learned about multiplication of multi-digit numbers and unit conversion to solve problems involving measurements.
    - *"Coin Collection"* - This activity offers students more practice with using multiplication to solve contextual problems (MP2), including situations in which at least one factor is four digits long, and to generate a new problem according to some parameters.
- **Situations Involving Equal-size Groups (Lesson 13)**
    - *"Paletas for a Class Party"* - Students are invited to consider treats that they enjoy in their homes or neighborhoods, and given an opportunity to co-craft mathematical questions based on a situation before answering a question based on a division equation.
    - *"More Snacks for a Class Party"* - In this activity, students continue to use any strategy to solve division problems in context and to recall the two interpretations of division.
- **Situations Involving Factors and Multiples (Lesson 14)**
    - *"Write Multiples"* - This activity prompts students to use the relationship between multiplication and division and their understanding of factors and multiples to solve problems about an unknown factor.
    - *"Jada's Mystery Number"* - In this activity, students continue to use the relationship between multiplication and division to reason about situations that involve division.
- **Situations Involving Area (Lesson 15)**
    - *"Elena's Mural"* - In this activity, students find the length of one side of a rectangle given the length of the other side and the area of the rectangle.
    - *"Tyler's Mural"* - This activity continues the work in the first activity. It uses a similar context and prompts students to reason about division, but the result of the division has a remainder, which students will need to interpret.
- **Base-ten Blocks to Divide (Lesson 16)**
    - *"Blocks to Divide"* - Students solve two problems, one where decomposing a hundred or ten is not necessary and one where it is. Students use base-ten blocks to represent the problem and find the quotient, then they work in small groups to create a visual display of how they used the base-ten blocks.
    - *"Show Us Your Blocks"* - The purpose of this activity is for students to find quotients and represent their thinking with base-ten blocks. The numbers in the expressions are designed to encourage students to think about when the base-ten blocks may be helpful and when they become cumbersome.
- **Base-ten Diagrams to Represent Division (Lesson 17)**
    - *"Divide with Diagrams or Blocks"* - In this activity, students use base-ten diagrams to find quotients of two-digit dividends and single-digit divisors.
    - *"Help Noah Get Unstuck"* - In this activity, students continue to use base-ten representations and to reason about equal-size groups to find whole-number quotients. The work reinforces the idea of decomposing a hundred into 10 tens as needed to perform division.
- **Divide with Partial Quotients (Lesson 18)**
    - *"Decompose Dividends"* - In this activity, students encounter a way to divide a multi-digit number by using partial quotients and writing equations for them. They analyze and interpret the equations and consider how it is like and unlike finding quotients using base-ten representations.
    - *"Tyler's Method"* - In this activity, students are introduced to an algorithm that uses partial quotients, a vertical method of recording partial quotients. They compare and contrast this approach with other ways of dividing numbers using partial quotients and try using it to divide multi-digit numbers.

- **Division With and Without Remainders (Lesson 19)**
    - *"A Stack of Partial Quotients"* - This activity develops students' understanding of the vertical method of recording partial quotients and their ability to use it to perform division.
    - *"Andre and Elena's Work"* - In this activity, students apply their understanding of partial quotients and the vertical recording method to divide four-digit numbers. They also identify some errors that are common when finding quotients this way.
- **Interpret Remainders in Division Situations (Lesson 20)**
    - *"Muffins and Seats"* - This activity encourages students to interpret the quantities in situations, represent them mathematically, use their representations to find solutions, and then interpret their solutions in context.
    - *"Save for a Garden"* - In this activity, students continue to solve contextual problems that involve division.. Here, the dividends extend to four-digit numbers and the problems demand a greater lift.
- **Different Ways to Solve Problems (Lesson 21)**
    - *"Going on a Field Trip"* - In this activity, students encounter a multiplication problem that can be reasoned in a number of ways.
    - *"A Trip to the Movies"* - This activity prompts students to use what they know about multiplication, division, factors, and multiples to solve problems. The problem does not have a question, so students will need to make sense of the context and generate potential questions that might be answered.
- **Problems About Perimeter and Area (Lesson 22)**
    - *"Create a Class Banner"* - In this activity, students solve geometric problems by reasoning about length and area, decomposing and recomposing of rectangles, considering units of measurements, and performing operations.
    - *"Replace the Classroom Carpet"* - In this activity, students perform operations on multi-digit numbers to solve situations about perimeter and area.
- **Solve Problems with Many Operations (Lesson 23)**
    - *"Back and Forth"* - This activity prompts students to interpret and represent situations about distances and use multiple operations to solve problems.
    - *"Back and Forth"* - Students will work together to come up with different equations when 1 mile is equal to 5,280 feet.
- **Assess the Reasonableness of Solutions (Lesson 24)**
    - *"Do You Speak Navajo?"* - The purpose of this activity is for students to practice using estimation and using the standard algorithm for addition and subtraction to solve problems involving large numbers.
    - *"Languages in Philadelphia and Chicago"* - In this activity, students continue to analyze population data and to use addition and subtraction skills to solve problems.
- **Paper Flower Decorations (Lesson 25)**
    - *"Paper Flower Construction"* - The purpose of this activity is for students to make paper flowers, use them to create patterns, and describe the patterns.
    - *"Quinceañera Decorations"* - In this activity, students use the context of paper flowers to analyze patterns and solve multi-step problems.

RESOURCES

Teacher Resources:

- Place Value Assessment Tool: PVAT
- IM Centers Navigation Tool: Centers Navigation Tool
- iReady Teacher Toolbox
- Illustrative Math (IM) Unit 6
- IM Student Work Book
- IM Blackline Masters
- Online District Approved Digital Resources

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 7 Title: Angles and Angle Measurement

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students deepen their understanding of geometric figures and measurement. Students formalize their intuitive knowledge about geometric features and draw them. They identify and define some building blocks of geometry (points, lines, rays, and line segments), and develop concepts and language to more precisely describe and reason about other geometric figures.Students analyze cases where lines intersect and where they don't, as in the case of parallel lines. They learn that an angle as a figure composed of two rays that share an endpoint.

Later, students compare the size of angles and consider ways to quantify it. They learn that angles can be measured in terms of the amount of turn one ray makes relative to another ray that shares the same vertex. Students come to see that a 1-degree angle is of a full turn or full circle and can be used to measure angles. They use a protractor to measure angles in whole-number degrees.

Students also learn that angles are additive. When an angle is composed of multiple non-overlapping parts, the measure of the whole is the sum of the angle measures of the parts. These insights enable students to classify angles (as acute, obtuse, right, or straight) and to solve problems about missing angle measurements in concrete and abstract contexts.

Approximate Length of Unit: 4 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics
4.NBT.B.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6: Find whole-number quotients and remainders with up to four-digit dividends and one-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.
4.M.B.4: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement
4.M.B.5: : Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
4.M.B.6: : Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the

angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
4.G.A.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.A.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:
- In this unit, students learn to draw and identify points, rays, segments, angles, and lines, including parallel and perpendicular lines. Students also learn how to use a protractor to measure angles and draw angles of given measurements, and identify acute, obtuse, right, and straight angles in two-dimensional figures.

Unit Essential Questions:
- How would you multiply 2,458 by 3 using place value strategies?
- How do you find the quotient and remainder when dividing 3,678 by 5?
- What is an angle and how is it formed?
- How do you measure an angle of 50 degrees using a protractor?
- If an angle is decomposed into two parts, one measuring 40 degrees and the other 35 degrees, what is the measure of the whole angle?
- How do you classify a quadrilateral based on the presence or absence of parallel or perpendicular lines?

Knowledge and Skills:
Students will know…

- How to generalize place value understanding for multi-digit whole numbers.
- How to use place value understanding and properties of operations to perform multi-digit arithmetic
- How to solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
- How to represent and interpret data.
- Geometric measurement: understand concepts of angle and measure angles.
- How to draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Students will be able to…

- Draw and identify points, lines, rays, segments, and parallel and intersecting lines in geometric figures.
- Recognize that angles are formed wherever two rays share a common endpoint and identify angles in two-dimensional figures.
- Recognize that angles can be measured in degrees, and can be found using addition and subtraction.
- Use a protractor to measure and draw angles, and recognize that perpendicular lines meet or cross at a right angle.
- Draw and identify acute, obtuse, right, and straight angles in two-dimensional figures.
- Write equations to represent angle relationships and reason about and find unknown measurements.

EVIDENCE OF LEARNING

Assessment:
What evidence will be collected and deemed acceptable to show that students truly "understand"?

- Warm ups
- Cool downs
- Section checkpoints
- Illustrative Math End of Unit Common Assessments - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 7→ 4.7→Teach →End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

Learning Activities:

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

Standards 4.NBT.B.5, 4.NBT.B.6, 4.M.B.4, 4.M.B.5, 4.M.B.6, 4.G.A.1, 4.G.A.2

- Online math games/activities
- Centers
- Math Dialogue
- **How Would You Describe These Figures (Lesson 1)**
  - *"Do You See What I See?"* -Students work with a partner to replicate given geometric images—one partner describes the images and the other draws them solely based on the verbal descriptions from their partner.
  - *"Lines and Line Segments"* - Students are asked to draw multiple lines and to notice shapes that intersecting lines might have created
- **Points, Lines, Rays, and Segments (Lesson 2)**
  - *"Card Sort: Who Am I?"* - In this activity, students are given cards that contain illustrations, definitions, and descriptions of points, lines, rays, and segments.
  - *"Make Some Shapes"* - The purpose of this activity is for students to use line segments and rays to draw familiar two-dimensional figures, letters, and numerals.
- **Two or More Lines (Lesson 3)**
  - *"Four Lines"* - The purpose of this activity is to draw students' attention to intersecting lines and parallel lines.
  - *"Cross or Not to Cross"* - In this activity, students are prompted to draw intersecting and parallel lines, and to explain how they know a pair of parallel lines would never intersect.
- **Points and Lines All Around (Lesson 4)**
  - *"Spot Lines and Line Segments"* - In this activity, students practice identifying line segments and both intersecting and parallel lines.
  - *"Draw and Design with Lines"* - In this activity, students look for parallel and intersecting lines in their environment and record them in a drawing.
- **What is an Angle? (Lesson 5)**
  - *"Tricky Figures"* - In this activity, students work with a partner to replicate images of angles. One partner describes the figure and the other draws based on the verbal descriptions.
  - *"Angles or Not Angles?"* - In this activity, they identify angles within geometric figures and explain their reasoning.
- **Compare and Describe Angles (Lesson 6)**
  - *"Card Sort: Angles"* - As students look for ways to sort the cards into different categories, they have a reason to look for and describe the parts of the angles that make them different.
  - *"Order Angles"* - Students are asked to sort the angles from smallest to largest.
- **The Size of Angles on a Clock (Lesson 7)**
  - *"Activity: Draw Angles Andre's Way"* - In this activity, students use the features of an analog clock (minute hand, hour hand, and position of numbers) to explain how to draw a given angle.
  - *"Compare Angles on the Clock"* - In this activity, students compare the size of angles by thinking in terms of a turn from one ray from the other ray.
- **The Size of Angles in Degrees (Lesson 8)**
  - *"A Full Turn"* - This activity introduces students to degree as a unit of measure.
  - *"Make a Measuring Tool"* - In this activity, students construct a protractor-like tool that shows some benchmark angles.
- **Use a Protractor to Measure Angles (Lesson 9)**

    - *"How Large is a 1° Angle?"* - In this activity, students learn that a 1 degree angle is 1/360 of a full turn and that an angle that is composed of n 1° angles has a measurement of n°.
    - *"Use a Protractor"* - In this activity, students learn how to use a protractor. They align a protractor to the vertex and a ray of an angle so that its measurement can be read.
- **Angle Measurement and Perpendicular Lines (Lesson 10)**
    - *"Angles Here, There, Everywhere"* - In this activity, students practice using a protractor to measure angles. They decide where to place the tool, how to align it with the vertex and rays of the angle, and which set of numbers on the protractor to use.
    - *"A Folding Challenge"* - In this activity, students fold paper to form right angles and learn that intersecting lines that form 90 degree angles are perpendicular lines.
- **Use a Protractor to Draw Angles (Lesson 11)**
    - *"Draw These Angles"* - In this activity, students follow directions for drawing lines, rays, and angles.
    - *"Angles Made to Order"* - In the first activity, students drew angles with some scaffolding in place: a line and a point were given, each step was described, and the vertex and measurements of each angle were specified.
- **Types of Angles (Lesson 12)**
    - *"Sorting Angles"* - In this activity, students revisit the angles they drew in the preceding lesson and sort them into two groups based on the features of the angles.
    - *"What is It, Really?"* - In this activity, students classify a 180° angle as a straight angle and further develop their understanding of acute and obtuse angles.
- **Find Angle Measurements (Lesson 13)**
    - *"How Big Are These Angles?"* - In this activity, students use their knowledge of 90°
    - , 180°, and 360°, and paper cutouts of some acute angles to determine the measurements of those angles.
    - *"Angles in a Kite"* - In this activity, students find the size of angles created by folding paper several times and reasoning about the resulting angles.
- **Reasoning about Angles - Part 1 (Lesson 14)**
    - *"Draw a Clock"* - In this activity, they apply their ability to measure and draw angles with a protractor to create a reasonably accurate clock face.
    - *"Tick Tock"* - In this activity, students build on those understandings to solve problems about angles formed by the hands of a clock.
- **Reasoning About Angles - Part 2 (Lesson 15)**
    - *"Shaded and Unshaded Angles"* - In this activity, students consolidate various skills and understandings gained in the unit and apply them to solve problems that are more abstract and complex.
    - *"Info Gap: A Whole Bunch of Angles"* - In this Info Gap activity, students solve abstract multi-step problems involving an arrangement of angles with several unknown measurements.
- **Guess the Figure (Lesson 16)**
    - *"Make a Change"* - In this activity, students select a two-dimensional figure and draw it in their workbook while making one change.
    - *"Guess My Figure"* - Students draw two-dimensional figures and then describe it to their partner.

RESOURCES

Teacher Resources:

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

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 8 Title: Properties of Two-dimensional Shapes

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students deepen their understanding of the attributes and measurement of two-dimensional shapes. Prior to this unit, students learned about some building blocks of geometry—points, lines, rays, segments, and angles. They identified parallel and intersecting lines, measured angles, and classified angles based on their measurement. Here, they apply those insights to describe and reason about characteristics of shapes. In the first half of the unit, students analyze and categorize two-dimensional shapes—triangles and quadrilaterals—by their attributes. They classify two-dimensional shapes based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Students also learn about symmetry. They identify line-symmetric figures and draw lines of symmetry. The second half of the unit gives students opportunities to apply their understanding of geometric attributes to solve problems about measurements (side lengths, perimeters, and angles). Included in this unit are three optional lessons that offer opportunities for students to strengthen and extend their understanding of symmetry and other attributes of two-dimensional shapes.

Approximate Length of Unit: 3 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics
4.G.A.1 : Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.A.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
4.G.A.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
4.M.A.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
4.M.B.6: Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
4.NBT.B.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain

the calculation by using equations, rectangular arrays, and/or area models.
4.NF.B.3d: Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem
4.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

Interdisciplinary Connections and Standards:
English Language Arts:
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:

- In this unit, students classify triangles and quadrilaterals based on the properties of their side lengths and angles, and learn about lines of symmetry in two-dimensional figures. They use their understanding of these attributes to solve problems, including problems involving perimeter and area.

Unit Essential Questions:

- How do you find the quotient and remainder when dividing?
- What defines an angle, and how is it formed?
- How do you measure an angle using a protractor
- How do you classify a quadrilateral based on the presence or absence of parallel or perpendicular lines?
- How can you determine if a figure is symmetric?
- How do you find the area and perimeter of a rectangle?
- How can you express an improper fraction as a sum of fractions with the same denominator?

Knowledge and Skills:
Students will know…

- How to generalize place value understanding for multi-digit whole numbers.
- How to use place value understanding and properties of operations to perform multi-digit arithmetic
- How to solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
- How to represent and interpret data.

- Geometric measurement: understand concepts of angle and measure angles.
- How to draw and identify lines and angles, and classify shapes by properties of their lines and angles.
- How to extend understanding of fraction equivalence and ordering.
- How to build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- How to understand decimal notation for fractions, and compare decimal fractions.

Students will be able to…

- Classify triangles (including right triangles), parallelograms, rectangles, rhombuses, and squares based on the properties of their side lengths and angles.
- Identify and draw lines of symmetry in two-dimensional figures.
- Solve problems involving unknown side lengths, perimeter, area, and angle measurements using the known attributes and properties of two-dimensional shapes.

EVIDENCE OF LEARNING

Assessment:

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

- Warm ups
- Cool downs
- Section checkpoints
- Illustrative Math End of Unit Common Assessments - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 8→ 4.8→ Teach → End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

Learning Activities:

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

Standards 4.G.A.1, 4.G.A.2, 4.G.A.3, 4.M.A.3, 4.M.B.6, 4.NBT.B.5, 4.NF.B.3d, 4.NF.B.4

- Online math games/activities
- Centers
- Math Dialogue
- **Ways to Look at Figures (Lesson 1)**
    - *"Card Sort: Shapes"* - In this activity, students analyze a set of 36 two-dimensional shapes, choose an attribute for classifying the shapes, and then sort them into several categories.
    - *"Guess the Category"* - In the first activity, students sorted a given set of shapes based on one or more attributes. In this activity, they continue that work in groups of two.

- **Ways to Look at Triangles (Lesson 2)**
  - *"Triangle Hunt"* - Students are asked to find all the triangles (from the same set of cards used in the previous lesson) that have specific attributes.
  - *"The Right Kind of Triangle"* - In this activity, students identify right triangles.
- **Ways to Look at Quadrilaterals (Lesson 3)**
  - *"Quadrilateral Hunt"* - In this activity, students analyze the sides and angles of quadrilaterals with attention to the presence of parallel and perpendicular lines.
  - *"What's True about These Quadrilaterals?"* - In this activity, students begin to formalize their understanding of the attributes of some shapes they have worked with since grades 2 and 3.
- **Symmetry in Figures (Lesson 4)**
  - *"Perfect Matches"* - This activity uses the idea of folding to introduce students to line symmetry. Students analyze examples of figures that have a line of symmetry and those that don't, and use their observations to formulate a definition of line of symmetry, which they then refine with their peers.
  - *"In Search of Symmetry"* - In this activity, students practice identifying two-dimensional figures with line symmetry. They sort a set of figures based on the number of lines of symmetry that the figures have.
- **Symmetry in Figures (Lesson 5)**
  - *"Half-Drawn Figures"* - This activity highlights that having two identical halves on each side of a line doesn't necessarily make a figure symmetrical.
  - *"What's the Whole Picture?"* - In this activity, students continue to reason about the missing half of a line-symmetric figure given half of the figure and a line of symmetry.
- **All Kinds of Attributes (Lesson 6)**
  - *"You're Gonna Draw It: It's Symmetric"* - In this activity, students create their own figures that have certain symmetry-based attributes.
  - *"Hidden Shapes"* - In this activity, students apply their understanding of symmetry, parallel and perpendicular lines, and types of quadrilaterals to create shapes with certain attributes on isometric dot paper.
- **Ways to Find Unknown Length (Lesson 7)**
  - *"All the Way Around"* - In this activity, students find the perimeter of several shapes and write expressions that show their reasoning.
  - *"Ponder Perimeter"* - In this activity, only some of the sides are labeled with their length, but students are given some information about the attributes of the shapes (presence or absence of parallel sides and symmetry).
- **Ways to Find Unknown Length (Lesson 8)**
  - *"Unknown Lengths"* - In this activity, students find unknown side lengths given the perimeter, some side lengths, and information about the symmetry of the figures.
  - *"Lin's Design"* - In this activity, students practice completing a geometric drawing given half of the drawing and a line of symmetry, and reasoning about the perimeter of a line-symmetric figure.
- **Symmetry in Action (Lesson 9)**
  - *"Before and After"* - In this activity, students are given the result of folding a shape along one or more lines of symmetry and asked to reason about the original shape.
  - *"Before and After, Perimeter Edition"* - In this activity, they encounter figures that have been folded more than once, each time along a line of symmetry, and reason about the perimeter of the original figure.
- **Ways to Find Angle Measurements (Lesson 10)**
  - *"Before and After, Angle Edition"* - Students continue to practice visualizing and drawing a complete shape given a line of symmetry and one half of the shape.

- *"Angular Fish"* - In this activity, students apply their understanding of symmetry and knowledge of angles to find angle measurements in a more complex line-symmetric figure.

RESOURCES

Teacher Resources:

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

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks

UNIT OVERVIEW

Content Area: Mathematics

Unit 9 Title: Putting it All Together

Target Course/Grade Level: Mathematics, Grade 4

Unit Summary: In this unit, students revisit major work and fluency goals of the grade, applying their learning from the year. In First, students reinforce what they learn about comparing fractions, adding and subtracting fractions, and multiplying fractions and whole numbers. In Section B, they strengthen their ability to add and subtract multi-digit numbers fluently using the standard algorithm. They also multiply and divide numbers by reasoning about place value and practice doing so strategically. Then, students practice making sense of situations and solving problems that involve reasoning with multiplication and division, including multiplicative comparison and interpreting remainders. Finally, 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 (Estimation Exploration, Number Talk, 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: 2 weeks

LEARNING TARGETS

NJ Student Learning Standards Mathematics

4.NF.A.1 : Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

4.NF.A.2: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½ . Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

4.NF.B.3: Understand a fraction a/b with a > 1 as a sum of fractions 1/b.

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.

c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem..
4.NF.B.4: Apply and extend previous understandings of multiplication to multiply a fraction by a whole
4.NF.C.7: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
4.OA.A.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
4.OA.A.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
4.OA.B.4: Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1– 100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
4.OA.C.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.
4.NBT.A.1: Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.

4.NBT.B.4: With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.B.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.B.6: Find whole-number quotients and remainders with up to four-digit dividends and one-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.
4.G.A.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Interdisciplinary Standards and Connections:
English Language Arts:
RI.4.3. Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.4.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Career Readiness, Life Literacies, and Key Skills:
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Science & Engineering Practices:
Asking Questions and Defining Problems
Developing and Using Models
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Using Mathematics and Computational Thinking
Obtaining, Evaluating, and Communicating Information

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

Unit Understandings:

- In this unit, students add, subtract,multiply, and divide multi-digit numbers using place value understanding. Students will solve problems involving measurement comparison and review the major work of the grade by creating and designing instructional routines.

Unit Essential Questions:

- How can you show that one fraction is equivalent to another fraction? Use visual models to explain.
- How can you compare two different fractions?
- How can you add two fractions with the same denominator using a visual model?
- How do you multiply a fraction by a whole number?
- How can you write a fraction with a denominator of 10 as a decimal?
- How can you compare two decimals using a visual model?
- How can you find the factors of a given number?
- How do you classify a quadrilateral based on the presence or absence of parallel or perpendicular lines?
- How would you multiply a multi-digit whole number by a single-digit whole number using place value strategies?
- How do you find the quotient and remainder when dividing a multi-digit whole number by a single-digit whole number?

Knowledge and Skills:
Students will know…

- How to use the four operations with whole numbers to solve problems.
- How to gain familiarity with factors and multiples.
- How to generate and analyze patterns.
- How to generalize place value understanding for multi-digit whole numbers.
- How to use place value understanding and properties of operations to perform multi-digit arithmetic.
- How to extend understanding of fraction equivalence and ordering.
- How to build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- How to understand decimal notation for fractions, and compare decimal fractions.
- How to draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Students will be able to…

- Solve problems involving fraction equivalence and operating with fractions.
- Add, subtract, multiply, and divide multi-digit numbers using place value understanding.
- Solve problems involving measurement comparison.
- Review the major work of the grade by creating and designing instructional routines.

EVIDENCE OF LEARNING

Assessment:

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

- Warm ups
- Cool downs
- Section checkpoints
- **Illustrative Math End of Unit Common Assessments** - To access from IM website go to Illustrative Math homepage → Select Content dropdown menu: Illustrative Math K-5 → Grade 4 → Unit 9→ 4.9 → Teach→End of Unit Assessment
- Daily Exit Slips
- Do Now Assignments
- Written quizzes
- Standards Mastery Assessment (iReady)
- Digital Assignments
- Project Based Learning (PBL)

Learning Activities:

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

Standards 4.NF.A.1, 4.NF.A.2, 4.NF.B.3, 4.NF.B.4, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7, 4.OA.A.2,4.OA.A.3, 4.OA.B.4, 4.OA.C.5, 4.NBT.A.1, 4.NBT.B.4, 4.NBT.B.5, 4.NBT.B.6, 4.G.A.1

- Online math games/activities
- Centers
- Math Dialogue
- **Add, Subtract, and Multiply Fractions (Lesson 1)**
  - *"Let's Make Head Wraps!"* - In this activity, students multiply fractions by whole numbers and compare fractions to solve problems.
  - *"Make 2 Yards of Fabric"* - Students reason about different combinations of fractions to make 2.
- **Sums and Differences of Fractions (Lesson 2)**
  - *"Straws for A Roller Coaster"* - he purpose of this activity is to represent and solve a measurement problem with fractions. Students may approach this activity in multiple ways and are invited to apply what they know about operations with fractions, comparing fractions, and fraction equivalence to make sense of and solve the problems
  - *"Tall Enough for a Ride?"* - In this activity, students practice solving word problems that involve adding and subtracting mixed numbers.
- **Stories with Fractions (Lesson 3)**
  - *"Relay Race at Recess"* - Students use what they know about equivalent fractions and the relationship between 10 and 100 to add tenths and hundredths.

    - *"You Be the Author"* - Students first create stories to match a given value or equation and some given constraints.
- **Another Look at the Standard Algorithm (Lesson 4)**
    - *"Lots of Zeros"* - In this activity, students subtract multi-digit numbers. They do so in two ways: by using the standard algorithm for subtraction and by finding unknown addends.
    - *"Ways of Finding Differences"* - In this activity, students make connections between these two ways of reasoning about differences.
- **Multiplication of Multi-digit Numbers (Lesson 5)**
    - *"Two Methods Revisited"* - In this activity, students revisit two algorithms for multiplying numbers.
    - *"Two by Two"* - In this activity, students compare an algorithm that uses partial products with the standard algorithm for multiplying 2 two-digit numbers.
- **What's the Quotient? (Lesson 6)**
    - *"Unfinished Divisions"* - In this activity, students analyze and connect different ways to divide a multi-digit whole number by a single-digit whole number, and complete calculations to find the value of the quotient.
    - *"Where Do We Begin?"* - Students explain why different initial steps could be equally productive for starting a division process.
- **Solve Multiplicative Comparison Problems (Lesson 7)**
    - *"The Most and Least Expensive"* - This activity prompts students to use multiplicative comparison to determine the cost of different living expenses in Bermuda and in India. Students use these costs to interpret and solve a multi-step problem.
    - *"The Cost of Living"* - In this activity, students continue to solve multiplicative comparison problems in the context of cost of living.
- **Solve Problems with Multiplication and Division (Lesson 8)**
    - *"Two Truths and a Lie, or Two Lies and a Truth?"* - In this activity, students are given three situations and asked to determine which ones could be true and which are not.
    - *"Buses for a Field Trip"* - In this activity, students interpret situations that involve equal groups and require making sense of a remainder.
- **Create Word Problems (Lesson 9)**
    - *"What's the Question?"* - In this activity, students analyze a situation and given solutions and think about what questions were asked.
    - *"What's the Problem?"* - In this task, students create their own word problems that must have a specific answer and follow additional constraints involving the type of operations that could be used to solve the problem or the size of the numbers they can us.
- **Estimation Exploration (Lesson 10)**
    - *"Dental Care"* - In this activity, students use given descriptions and their knowledge of multiplication to make some estimates of the cost and time associated with brushing teeth.
    - *"Get Your Classmates to Estimate"* - In this activity, students create an Estimation Exploration activity that focuses on multi-digit multiplication.
- **Which One Doesn't Belong? (Lesson 11)**
    - *"Add One That Doesn't Belong"* - In this activity, students use their knowledge of numbers in base ten and of geometric figures to complete two Which One Doesn't Belong sets.
    - *"Add Two That Don't Belong"* - In the second round of analysis and design, students use their knowledge of operations and expressions to complete a Which One Doesn't Belong set with two missing items.

- **Number Talk (Lesson 12)**
    - *"Activity: Related Numbers, Related Expressions"* - This activity puts students in the mindset of a Number Talk writer. It prompts students to anticipate some ways that others might decompose, rearrange, and regroup numbers, or to otherwise make use of structure to find the value of expressions.
    - *"Add One New Expression, Then Two"* - In this activity, students use their understanding of place value and knowledge of operations on numbers to write new multiplication and division expressions.

RESOURCES

Teacher Resources:

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

Equipment Needed:

- Manipulatives
- IM Student Workbooks
- Student Whiteboards
- Chart Paper
- Dry Erase Markers
- Chromebooks