Unit 3: Domain: Numbers and Operations - Fractions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Marking Period 3**
Length: **8-9 Weeks**
Status: **Published**

Unit Overview

In this unit, students will develop an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.

Standards

MA.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.
MA.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.
MA.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.
MA.4.NF.B.3a	Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
MA.4.NF.B.3b	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.
MA.4.NF.B.3c	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.
MA.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.
MA.4.NF.B.4a	Understand a fraction a/b as a multiple of $1/b$.
MA.4.NF.B.4b	Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number.
MA.4.NF.B.4c	Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.
MA.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.
MA.4.NF.C.6	Use decimal notation for fractions with denominators 10 or 100.

MA.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.
MA.4.MD.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.

Essential Questions

- How are numbers that represent fractional parts modeled, compared, and ordered?
- How can your understanding of fractions and mixed numbers help you add and subtract?
- How do the models that represent one whole, one tenth, and one hundredth relate to each other?

Application of Knowledge and Skills...

Students will know that...

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value
- Numbers can be used for different purposed, and numbers can be classified and represented in different ways
- Numbers, expressions, measures, and objects can be compared and related to other numbers, expressions, measures, and objects in different ways
- The base-ten numeration system is a scheme for recording numbers using 0-9, groups of ten, and place value
- The set of real numbers is infinite and ordered. Whole numbers, integers, and fractions are real numbers. Each real number can be associated with a unique point on the number lines
- There are multiple interpretations of addition, subtraction, multiplication, and division of rational numbers, and each operation is related to other operations

Students will be skilled at...

- Decomposing fractions and representing them as compositions of fractions in a variety of ways
- Finding the multiples of a number
- Identifying and writing mixed numbers as improper fractions and improper fractions as mixed numbers
- Learning how to factor whole numbers
- Learning to identify prime and composite numbers

- Locating and naming fractions and decimals on a number line
- Multiplying a fraction by a whole number using models
- Multiplying a whole number and a fraction to solve problems
- Understanding how to use equivalent fractions to write fractions as decimals
- Understanding how to write fractions as decimals and decimals as fractions
- Using a number line to identify and write equivalent fractions
- Using benchmark fractions to compare fractions with unlike denominators
- Using common denominators and equivalent fractions to order fractions with unlike denominators
- Using computational procedures to add fractions with like denominators and solve problems
- Using computational procedures to subtract fractions with like denominators and solve problems
- Using models and computation to show equivalent fractions
- Using models and computational procedures to add mixed numbers
- Using models and computational procedures to subtract mixed numbers
- Using models and place-value charts to represent decimals to hundredths. They will read and write decimals in expanded, standard, and word form
- Using models to add and subtract mixed numbers
- Using models to add fractions with like denominators
- Using models to subtract fractions with like denominators
- Using the number line to add and subtract fractions with like denominators
- Using unit fractions and multiplication to describe fractions that are multiples of the unit fractions

Assessments

- Basic Facts Timed Tests
- Benchmark Test
- End of Year Test (administered after completing program)
- Placement Test (administered prior to beginning program)
- Task Cards
- Topic Math Projects
- Topic Quick Check
- Topic Tests

Activities

Problem of the Day-Present a daily problem that serves as a review from the previous day's lesson.

Vocabulary- Have students create a chart for each new vocabulary word that includes the word's meaning and an example or use vocabulary cards as flash card game

Station activities- Each section has center activities to reinforce skill (leveled) - please see Domain 1 unit for individual directions for each station activity

- **Display the Digits**
- **Toss and Talk**
- **Clip and Cover**
- **Think Together**
- **Teamwork**
- **Display the Digits**
- **Quick Questions**

STEM - Certain sections have Going Digital integrating technology and the use of calculators

Interactive Learning - Problem-Based Interactive learning activities at the beginning of each topic

Projects - There is a math project for each topic (See Cross-Disciplinary Instruction for projects and page numbers)

Practice work - Communicator practice can be done using Independent work and problem- solving practice problems in each section.

- Play SCOOT for certain sections or review for topic tests
- Task cards and use answer sheets for assessment

Ticket to Leave - Quick Checks on each sections

Activities to Differentiate Instruction

General strategies for modification of this curriculum for students with special needs, ELL, and gifted learners:

- **General strategies:**
  - preferential seating
  - manipulatives
  - modified workbook pages
  - practice or enrich homework pages
- **Center activities** - There are leveled center activities for each section. There is a separate activity for "Intervention", and then "On-Level" and "Advanced" are in spiral book.
- **Leveled practice pages** - There are three leveled (Reteaching, Practice, and Enrichment) sheets that can be used for practice or homework.

- **Math Concept Readers:** These readers allow the student to read the story at different levels- above level, on level, and below level. (also available on line with audio) Complete the Think and Respond and Write Math questions at the conclusion of each book.
- **Assessment**- Using Quick Check Review can determine differentiated instruction levels using sample answers and using the rubric at the Close/ Assess and Differentiate section in the teacher edition.

Content specific modification for students with special needs, ELL, and gifted learners:

- **Topic 11:**
  - **Below level students:**
    - To help below level students compare fractions, have them make a fraction comparison model using fraction strips. The red bar represents 1. Have them find the fraction strips that divide the red bar into 2 equal parts. Find the next fraction strips that divide the red bar into thirds and so on until the last row shows 12 equal parts.
    - If students have trouble finding common denominators for equivalent fractions, allow them to use a hundred chart to list multiples for each denominator.
  - **Students with special needs:**
    - Students with special needs may have difficulty understanding when to use estimation. Read these sentences aloud: The cup is about 1/2 full. Nearly 1/2 of the bowl of salad is gone. Almost 1/4 of the wall is painted. The pool is approximately 1/3 full of water.
    - Discuss the word in each sentence that tells students the fraction is an estimate.
  - **ELL**
    - Having students visualize fractions can help them to better understand the fraction concept and be able to describe fractions in detail.
      - Have students outline 12 adjacent squares on a sheet of centimeter grid paper. Students should outline 1 row of 12 squares, 2 rows of 6 squares, r rows of 4 squares, 4 rows of 3 squares, 6 rows of 2 squares, and 12 rows of 1 square. Discuss how each figure is 12 squares. Have students shade 5 squares of each figure. Discuss how each picture shows 5/12 shaded.
      - Have pairs of students draw parts of a region. Have one partner give a description, such as "Tom ate half of a pizza. Dina and Skyler at equal shares of the rest." Have Partner 2 draw a diagram of the situation. Partners should work together to identify the fractions created in the drawing.
  - **Advanced/Gifted:**
    - Encourage advanced students to explain the algorithm for converting a mixed number to an improper fraction in terms of fractions as a form of division.
    - Ask students to explain how to decide whether it is better to find a common denominator or a common numerator when comparing fractions.

- **Topic 12:**
  - **Below level students:**
    - To help below-level students, make a list of steps for adding and subtracting fractions with like denominators: 1. Add or subtract numerators, 2. Rewrite common denominator, 3. Use the greatest common factor to change to simplest form.
    - If students have difficulty solving word problems, encourage them to draw models to represent the problem.
  - **Students with special needs:**
    - Although models are used in only 3 of the lessons in this topic, allow special-needs students to use models for as long as necessary.
    - To help students express fractions in simplest form, allow them to use fraction strips or

a fraction equivalency chart.
- If students have a hard time marking divisions on a number line, allow them to fold and mark fraction strips.

- **ELL**
  - Discuss with students the meaning of the terms common, same, and like. Discuss the general meanings as well as the meanings within the specific context of fractions.
  - **Emerging:** When explaining how to add and subtract fractions, emphasize the fractional parts. For example, say, "To add 1 fifth and 3 fifths, add the numerators. 1 fifth + 3 fifths equals 4 fifths."
  - **Expanding:** Have volunteers explain how to change a fraction into simplest form. Encourage students to use proper vocabulary words such as greatest common factor.
  - **Bridging:** Write two fractions with like denominators on the board. Ask pairs of students to write addition or subtraction word problems involving the fractions shown.

- **Advanced/Gifted:**
  - If students seem proficient adding fractions with like denominators, challenge them to add fractions with like denominators whose sum is great than 1 or to add mixed numbers with like denominators.
  - Discuss with students how you might go about adding and subtracting fractions with unlike denominators.

- **Topic 13:**
  - **Below level students:**
    - Provide below level students with extended practice translating decimal numbers in standard form into extended and word form to bolster their understanding of the relation of the digits to their respective place values.
    - Draw a place-value chart (from hundredths to hundreds) on the board and relate decimal numbers in expanded form to their position in a place-value chart. Have students determine the number of tenths and hundredths in numbers such as 0.4, 0.25, and 1.72. Write these numbers in your place-value chart.
    - Have students sketch hundredths grids to represent three of the numbers in the place-value chart.
  - **Students with special needs:**
    - Some students may benefit from additional support to help accomplish the graphing, ordering, or comparing of decimals and fractions. Allow them to use prepared number lines, hundredths grids, place-value charts, coins, and fraction manipulatives.
    - Emphasize the relationship between decimals and fractions by graphing equivalent fraction-decimal pairs on a number line on the board. Demonstrate how each pair translates into identical hundredths grids.

  - **ELL**
    - Have students say fraction and decimal names aloud. This will emphasize the connection between decimals and fractions.
      - Review the meaning of the words decimal, fraction, and whole number. Connect the meaning to the number representation by showing an example of each written in a place-value chart. Have students read numbers such as 174, 3/10, and .2 aloud.

  - **Advanced/Gifted:**
    - Have advanced students pair off and practice finding fraction and decimal equivalents. One student should state a fraction/decimal for the other student to match with an

equivalent decimal/fraction. Students can use whatever resource they prefer: number line, fraction, manipulatives, coins, and so on. Students should proceed by switching roles.

- Provide students with different improper fractions and have them convert to both mixed and decimal number forms.

Integrated/Cross-Disciplinary Instruction

Reading and Writing: The Math Concept Readers allow the student to read the story at different levels- above level, on level, and below level. Complete the Think and Respond and Write Math questions at the conclusion of each book.

Topic 11: Social Studies: State Flags- using the state flags, write fractions to describe the number of flags that contain stars- pg 253E

Topic 12: Science: animals on Shell Island - voting on favorite animal and comparing the data - 285E

Topic 13: Social Studies: Car Racetracks - researching different racetracks in the U.S., create a posrer with a number line showing the distances - pg 325E

Resources

Topics Categories in book form:

Topic 11: Fraction Equivalence and Ordering

Topic 12: Adding and Subtracting Fractions and Mixed Numbers with Like Denominators

Topic 13: Extending Fraction Concepts

Master Enrichment pages

Master Reteaching pages

Master Practice pages

Student Edition workbook

On line Resources available at www.pearsonrealize.com

- Teacher Edition (TE) Textbook
- Student Edition (SE) Textbook
- Tests on line
- Concepts videos
- Math Tools

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.