



San Diego Unified School District

Instructional Module to Enhance the Teaching of

H A R C O U R T

Math

California Edition

Grade 4

Module 5–Revised

Fractions and Decimals

–WORK IN PROGRESS–

MODULE 5 – FRACTIONS AND DECIMALS

Modules represent individual units of study that lead to the essential learnings

THREADS THROUGHOUT THE YEAR:

The threads represent ongoing learning opportunities in which students should be actively engaged throughout all units of inquiry during the entire school year. These items should not be isolated to any one particular unit of inquiry.

Students will:

- Develop understanding of numbers and the number system and use their understanding to solve problems and recognize reasonable results.
- Develop understanding of and fluency in basic computation and procedural skills.
- Use mathematical reasoning to solve problems.
- Communicate their mathematical thinking by using words, numbers, symbols, graphs and charts and translate between different representations.
- Use equations and variables to express generalizations of patterns and relationships.
- Develop logical thinking to analyze evidence and build arguments to support or refute a hypothesis.
- Make connections among mathematical ideas and between other disciplines.
- Develop and use strategies, skills, and concepts to solve problems.
- Use appropriate tools, including technology, as vehicles to learn mathematical concepts.

These are essential learnings that represent bigger ideas/concepts:

- Students understand that equivalent fractions describe the same amount using fractional parts of different sizes. The more fractional parts used to make a whole, the smaller the parts.
- Students use different models to represent fractions: set models, models of length, and area models.
- Students understand that decimals are another way of writing fractions using the base-ten-system, which extends infinitely in two directions. The decimal point is used to indicate the units.
- Addition and subtraction of decimals are based on adding and subtracting with whole numbers—adding and subtracting the numbers in like position value.

These are essential questions that learners ask themselves in order to achieve the essential learnings:

- How do I explain and use the different interpretations of fractions?
- How do I use my understanding of place value to order and compare whole numbers and decimals?
- How do I model, and record equivalent fraction and decimal representations (tenths, hundredths, halves and fourths) and position them on a number line?
- How do I determine and explain the position of fractions, mixed numbers and decimals (to hundredths) on a number line?
- How do I find and record equivalent fractions using fraction bars, drawings and multiplication or division by a fraction equivalent to 1?
- How do I use base-10 materials and my understanding of addition and subtraction of whole numbers to add and subtract decimals efficiently
- How do I use my understanding of rounding and estimation with whole numbers to check the reasonableness of answers in addition and subtraction of decimals?

* Presented in previous grade(s)

Resources: Van de Walle: Chapters 15 & 17 (pp. 242-261 & 280-288); *Mathematics Sourcebook: Fractions & Decimals* (pp. 59-70 & 71-78)

UNIT 6: FRACTIONS AND DECIMALS

Key Mathematical Concepts:

- Understand and use place value to order and compare whole numbers and decimals (to two decimal places.)
- Understand and use different interpretations of fractions (parts of a whole/set, and division of whole numbers by whole numbers).
- Write tenths/hundredths in decimal and fraction notations and know fraction/decimal equivalents for halves and fourths.
- Interpret and represent fractions using drawings; connect fractions to decimals on a number line.
- Identify the relative position of positive fractions, mixed numbers, and decimals to two decimal places on a number line.
- Estimate decimal sums and differences; accurately and efficiently add and subtract decimals (tenths and hundredths).
- Use a variety of strategies, such as words, numbers, symbols, charts, graphs, and diagrams to explain/show mathematical reasoning.
- Express solutions clearly and logically by using appropriate mathematical notation, terms, and clear language; support solutions with evidence in verbal and symbolic work.

<p>Chapter 17: Understand Fractions Lesson 17.1: Read and Write Fractions Lesson 17.2: Hands On: Equivalent Fractions Lesson 17.3: Equivalent Fractions Lesson 17.4: Compare and Order Fractions Lesson 17.5: Problem Solving Strategy: Make a Model Lesson 17.6: Mixed Numbers</p>	<p>Chapter 19: Understand Decimals Lesson 19.1: Relate Fractions and Decimals Lesson 19.2: Decimals Greater Than 1 Lesson 19.3: Hands On: Equivalent Decimals Lesson 19.4: Compare and Order Decimals Lesson 19.5: Problem Solving Strategy: Use Logical Reasoning Lesson 19.6: Relate Mixed Numbers and Decimals</p>
<p>Chapter 20: Add and Subtract Decimals Lesson 20.1: Round Decimals Lesson 20.2: Estimate Sums and Differences Lesson 20.3: Add Decimals Lesson 20.4: Subtract Decimals Lesson 20.5: Add and Subtract Decimals Lesson 20.6: Problem Solving Skill: Evaluate Reasonableness of Answers</p>	

Note: Chapter 18 is taught later in the school year.

Grade 4

Unit 6: Fractions and Decimals

MODULE 5 NOTES**Chapter 17, Lesson 17.5:** Problem-Solving Strategy, Make a Model:

This is a strong lesson focusing on using a number line. Students will have used number lines throughout this chapter and continue to do so throughout the year in other units.

Chapter 19, Lesson 19.5: Problem-Solving Strategy, Use Logical Reasoning:

This is a good lesson. This particular problem-solving strategy is a challenging strategy to understand in a single lesson.

Some of the lessons in **Chapter 20: *Add and Subtract Decimals***: can be combined if students can add and subtract whole numbers.

For Example: Lessons 2, 3, and 4 focus on estimating, adding, and subtracting decimals and introduce only a few new skills.

California Connections, Pgs. 400-401: Can be used for applying problem-solving skills, with the exception of the second problem, which involves computation with fractions and mixed numbers. No “module” lesson for California Connections.

Chapter 18: *Add and Subtract Fractions and Mixed Numbers*: Delayed until later in the school year. These skills are not included as part of the California Standards for Grade 4.

NOTE: The *Problem of the Day* does not always fit the purpose of the module lesson. Feel free to adjust it or remove it to fit the days' purpose. These problems could serve as a review during your routine time.

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<p><u>Day 1</u> CHAPTER 17: Fractions and Decimals</p> <p>Lesson 17.1: Read and Write Fractions</p>	<p><u>Day 2</u></p> <p>Lesson 17.2: Hands On: Equivalent Fractions</p>	<p><u>Day 3</u></p> <p>Lesson 17.3: Equivalent Fractions</p>	<p><u>Day 4</u></p> <p>Lesson 17.4: Compare and Order Fractions</p>	<p><u>Day 5</u></p> <p>Lesson 17.5: Problem Solving Strategy: Make a Model</p>
<p><u>Day 6</u></p> <p>Lesson 17.6: Mixed Numbers</p>	<p><u>Day 7</u> CHAPTER 19: <i>Understand Decimals</i></p> <p>Lesson 19.1: Relate Fractions and Decimals</p>	<p><u>Day 8</u></p> <p>Lesson 19.2: Decimals Greater Than 1</p>	<p><u>Day 9</u></p> <p>Lesson 19.3 Hands On: Equivalent Decimals</p>	<p><u>Day 10</u></p> <p>Lesson 19.4: Compare and Order Decimals</p>
<p><u>Day 11</u></p> <p>Lesson 19.5: Problem Solving Strategy: Use Logical Reasoning</p>	<p><u>Day 12</u></p> <p>Lesson 19.6: Relate Mixed Numbers and Decimals</p>	<p><u>Day 13</u> CHAPTER 20 <i>Add and Subtract Decimals</i></p> <p>Lesson 20.1: Round Decimals</p>	<p><u>Day 14</u></p> <p>Lesson 20.2: Estimate Sums and Differences</p>	<p><u>Day 15</u></p> <p>Lesson 20.3: Add Decimals</p>
<p><u>Day 16</u></p> <p>Lesson 20.4: Subtract Decimals</p>	<p><u>Day 17</u></p> <p>Lesson 20.5: Add and Subtract Decimals</p>	<p><u>Day 18</u></p> <p>Lesson 20.6: Problem Solving Skill: Evaluate Reasonableness of Answers.</p>	<p><u>Day 19</u></p> <p>California Connections</p>	<p><u>Day 20</u></p> <p>Unit Review and Assessment</p>

DAY: 1
 Unit 6: FRACTIONS AND DECIMALS
 Chapter 17: Understand Fractions
 LESSON 17.1, pp. 316-17

<p>MATERIALS:</p>	<p>Small bags of counters or color tiles for each group; Two color counters Routines: Materials to make Fraction Kits: For each student: seven or eight 2" strips of construction paper, scissors and 1 envelope</p>
<p>LESSON FOCUS:</p>	<p>Read and Write Fractions</p>
<p>CALIFORNIA STANDARDS:</p>	<p>Number Sense. 1.5: Explain different interpretations of fractions; for example; parts of a whole/set, and division of whole numbers; explain fraction equivalents. 1.7: Write fractions represented by a drawing of parts of a figure; represent given fractions by using drawings; relate fractions to simple decimals on a number line. Mathematical Reasoning: 2.3, 2.4</p>
<p>PURPOSE OF LESSON:</p>	<p>Read and write fractions as parts of whole/group. Understand that a fraction is a positive <i>rational number</i> written as a/b where b is not zero. Understand that the denominator represents the number of equal parts in the whole and the numerator indicates the number of parts.</p>
<p>LAUNCH: Introduce students to concepts. Paper for each student.</p>	<p>Guiding Questions:</p> <ul style="list-style-type: none"> • <i>What is a fraction?</i> Generate/record class list. • <i>If we talk about <u>half</u> of the class, how many students is that and how might we represent that amount?</i> Discuss strategies. Use models/representations. • Ask students to draw 2 small squares of the same size on your paper. Ask students to shade one half of them. Discuss the different ways students may have shaded to represent one half (one full square; half of each square; three quarters of one and one quarter of the other). • Emphasize that all are correct according to what they were asked to do and all represent the same amount of area. • Write $1/2$ and one-half on board/overhead. <p>Discuss: What the 1 represents (numerator/number represented) and what the 2 represents (denominator/number of equal parts to make the whole).</p> <ul style="list-style-type: none"> • Ask students to draw 4 small squares of the same size and shade 3 of them. Ask students if they know what fraction the shaded portion represents. • Write $3/4$ on board/overhead and ask what each number means. Emphasize that in this case the fraction represents the number (amount) or part of a <u>group</u>. • Ask students to shade the last (fourth) square and tell how that changes the fraction that describes the shaded portion. Connect $4/4$ to one whole. <p>Note: Fractions can represent part of a <u>group</u> or part of a <u>whole</u>. Alternative Teaching Strategy, TE p. 316B.</p>

<p>EXPLORE: Work with the concept. Focus on students “doing mathematics.”</p> <p>Bags of color tiles/counters for each group</p>	<p>Guiding Questions:</p> <ul style="list-style-type: none"> • <i>If you needed to make half of a recipe that uses 1 cup of milk, how much milk should you use? Discuss and record.</i> • <i>What if you decided to make 1/3 of the recipe? How much milk would you use?</i> • <i>Use counters/color tiles to model: If you have 8 doggie treats and give your dog 2, what fraction of the treats do you give him?</i> • <i>Discuss and record (2/8). What fraction do you still have? Discuss and record (6/8).</i> • <i>When you put 2/8 and 6/8 together, what does that equal? Have kids explore and discuss.</i> • <i>Repeat using 12 treats, giving 3 to the dog -What fraction is represents the number of treats given to the dog out of the whole? What fraction of the whole do you still have?</i> <p>Teach, p. 316, Reasoning bullet for application. Practice & Problem Solving, p. 317 #6, 7, 10, 11. Discuss.</p>
<p>PRACTICE: Focus on Communication and Representation.</p>	<p>Practice & Problem Solving, Pg. 317 #14, 15, 21. Students sketch each problem and explain fraction to a partner. Then students do #26 – 31 with partner. Discuss and share reasoning.</p>
<p>SUMMARIZE: Connect purpose to activities.</p>	<p>ASSESS, TE p. 317: DISCUSS. Share responses with class.</p>
<p>HOMEWORK:</p>	<p>Mixed Review, Pg. 317</p>

ROUTINES:

Fraction Kits: Make with students.
See Teacher’s Resource Book: Pg. 19 for model.

Cut 2” strips of construction paper. Students fold and cut strips to create “common fractions” and use a reference for making equivalent fractions.

Note: Students do not need to make all the different fractions – sevenths, ninths and elevenths can be eliminated.

DAY: 2
 Unit 6: FRACTIONS AND DECIMALS
 Chapter 17: Understand Fractions
 LESSON 17.2, pp. 318-19

MATERIALS:	2" x 12" unlined strip of paper for each student; Fraction bars for each small group;
LESSON FOCUS:	Hands On: Equivalent Fractions
CALIFORNIA STANDARDS:	Number Sense 1.7 1.5: Explain different interpretations of fractions; for example; parts of a whole/set, and division of whole numbers; explain fraction equivalents. 1.9: On a number line, identify the relative position of fraction, mixed numbers, and positive decimals to two decimal places. Mathematical Reasoning: 2.3, 2.4
PURPOSE OF LESSON:	Use fraction bars and number lines to show/identify equivalent fractions. Understand that two fractions are equivalent if they represent the same amount or quantity.
LAUNCH: Introduce students to concepts. 2' X 12" strip of paper for each student	<ul style="list-style-type: none"> • Make a number line: Each student needs 2" by 12" strip of paper. Make a point at the top left end, label it 0, make a point at the top right, and label it 1 (demonstrate). Fold strip in half, crease fold <u>lightly</u>. <p>Discussion:</p> <ul style="list-style-type: none"> • Ask students to find the crease and make one point. Ask students what they might label this point? Discuss why it should be labeled 1/2. <p>Note that the fraction that might label the right endpoint (1) could be 2/2. Model writing 2/2 below the 1.</p> <ul style="list-style-type: none"> • Ask students to refold paper again to make fourths and make points on the creases. • Ask students how they might label the new point between 0 and _ and explain how they know that it is 1/4? Continue to discuss labeling of the points at _ (2/4) and _. • <i>How can you label 1 and 2/2?</i> Discuss labeling 4/4 - write below 2/2. Discuss the meaning of 4/4. Generate other fractions of the whole and record/list on board. • Ask students to fold their number line again to make eighths. Discuss how to label. Label all points, using eighths. • Emphasize: Points on number line with more than one fraction represent/name <u>equivalent</u> fractions. Generate list the equivalent fractions shown on the number line. <p>SAVE number lines for other lessons throughout this chapter.</p>
EXPLORE: Work with the concept. Focus on students "doing mathematics."	<p>Discussion Questions:</p> <ul style="list-style-type: none"> • Ask students to use fraction bars to make: 2/4. Students show/explain that 2/4 is equivalent to _. • Repeat for 4/8 and 3/6. Emphasize strategies for finding equivalent fractions – generate a list of fractions that are equivalent to 1/2. Discuss the "patterns" in the list of fractions and note the meaning of each fraction, e.g., 10/20 = the numerator represents 10 of the 20 (denominator) equal parts needed to make one whole. <p>Connect, p. 319. Discuss with students. See Common Error Alert, top margin, TE p. 319.</p>

<p>PRACTICE: Focus on Communication and Representation.</p> <p>Fraction Bars for small group work</p>	<p>Practice, Pg. 319: #11-14. Students work with partners/individually. Discuss. Practice, Pg. 319: #15: Discuss with students.</p>
<p>SUMMARIZE: Connect purpose to activities.</p>	<p>ASSESS, TE p. 319: DISCUSS • Students write two fractions equivalent to 6/12 and 8/16.</p>
<p>HOMEWORK:</p>	<p>Practice, Pg. 319: #s: 4-7 Mixed Review and Test Prep., p. 319 #17, 18, 21 • Write 2 pairs of equivalent fractions and be able to explain or show that they are equivalent. (This can be used for launch for lesson 17.3)</p>

ROUTINES:

“Finding N”

Students work with partners/small groups.

Say problems such as the following:

$8 + n = 15$

$28 \div n = 4$

$36 \div n = 4$

$4 \times n = 12$

$n \times 8 = 72$

$3 \times n = 27$

$56 - n = 50$

$45 - 35 = n$

$10 \times n = 70$

$3 \times n = 24$

$n - 5 = 2$

$80 \div n = 10$

Discuss strategies for solving these types of problems.

DAY 3
 Unit 6: FRACTIONS AND DECIMALS
 Chapter 17: Understand Fractions
 LESSON 17.3, pp. 320-23

MATERIALS:	Fraction number lines from Lesson 17.2; *Fraction Kits; color tiles/counters for pairs/small groups.
LESSON FOCUS:	Equivalent Fractions
CALIFORNIA STANDARDS:	<p>Number Sense: 1.5: Explain different interpretations of fractions; for example; parts of a whole/set, and division of whole numbers; explain fraction equivalents. 1.7: Write fractions represented by a drawing of parts of a figure; represent given fractions by using drawings; and relate fractions to simple decimals on a number line.</p> <p>Mathematical Reasoning: 2.3, 2.4</p>
PURPOSE OF LESSON:	Understand how to find equivalent fractions. Use strategies such as multiply or divide by c/c (or 1) to find equivalent fractions or simplify them.
<p>LAUNCH: Introduce students to concepts.</p> <p>Fractions bars for small group work</p>	<p>HW: Discuss and compare sets of equivalent fractions.</p> <p>Problem of the Day, p. 320A (Have students try to use equivalent fractions when solving this.)</p> <p>Learn, p. 320, Pampered Pup. Write problem on board/overhead. Teach, p. 320, Guided Instruction questions to guide discussion.</p> <ul style="list-style-type: none"> • Discuss different strategies and make the connection to multiplication as a strategy for expressing $1/3$ as $2/6$. Model using fraction bars or sketch a model on board/overhead. See “Another Way” bottom SE p. 320. Emphasize that multiplying by $2/2$ is the same as multiplying the fraction by 1—the value of the fraction has not changed. Discuss what has changed by multiplying by $2/2$ (the number of parts the whole is divided into and the number of parts named in the numerator.) <p>Multiply or Divide, top p. 321. See bullets, top margin, TE p. 321 to guide discussion.</p> <ul style="list-style-type: none"> • Use students’ strategies to find other equivalent fractions. • <i>Find equivalent fractions for $1/8$? For $2/3$?</i> • Students show/explain their work on the board/overhead.
<p>EXPLORE: Work with the concept. Focus on students “doing mathematics.”</p> <p>*Use Fraction Kit pieces to model.</p>	<ul style="list-style-type: none"> • Discuss process/strategies for finding fractions equivalent to $6/8$? For $8/10$? Students explain/show process or strategy. • Compare $6/8$ to $3/4$ - discuss/model how the two fractions represent the same amount/quantity. • Compare $4/5$ to $8/10$ - discuss/model how the two fractions represent the same amount/quantity. • Emphasize that $3/4$ and $4/5$ are in <u>simplest form</u>. <p>Ask and Discuss: that the fractions are equivalent but fractions in simplest form are those where the only number that can evenly divide both numbers (numerator & denominator) is one.</p>

<p>PRACTICE: Focus on Communication and Representation.</p> <p>Bags of color tiles for pair/groups</p>	<p>Check, Pg. 321 #1 with students. Practice & Problem Solving, Pg. 322: #50-53. Discuss with students. Practice & Problem Solving, Pg. 322: #25-28, 43-47. Students work with partners or individually. Discuss and share solutions.</p>
<p>SUMMARIZE: Connect purpose to activities.</p>	<ul style="list-style-type: none"> • Students explain how to express $\frac{8}{16}$ in simplest form. Students write 2 fractions that can be simplified and simplify them. • Share and explain work. <p>ASSESS, TE p. 323: WRITE: Share & discuss.</p>
<p>HOMEWORK:</p>	<p>Practice & Problem Solving, Pg. 322 #19-24, 40-42 Link Up to Music, p. 323</p>

ROUTINES:***Multiply or Divide***

Say problems like the following. Students decide/explain if the problem can be solved using multiplication or division. Students make up and share similar problems for the class to solve.

There are 5 chairs in each row and 15 chairs in all. How many rows of chairs?

There are some bags of candy with 6 candies in each bag. There are 8 bags of candy. How many pieces of candy?

There are some books in 8 equal stacks. There are 40 books in all. How many books are in each stack?

There are 8 children in each line and 64 children in all. How many lines are there?

The teacher has 4 boxes of pencils with 12 pencils in each box. How many pencils are there?

