

**SAN DIEGO CITY SCHOOLS**

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**Instructional Module to Enhance the Teaching of**

**HARCOURT MATH**

**California Edition**

**GRADE 6**

**Module 3**

**Fraction Concepts and Operations**

## **KEY MATHEMATICAL CONCEPTS FOR GRADE SIX - BIG IDEAS:**

*By the end of grade six, students will:*

- **Master the four arithmetic operations with positive and negative whole numbers, positive fractions, and decimals. They accurately solve problems involving fractions, ratios, proportions, and percentages.**
- Understand the concepts of mean, median and mode of data sets, and how to calculate the range. They analyze data and sampling processes for possible bias and misleading conclusions. They calculate the probabilities for compound events and understand the difference between independent and dependent events.
- Write verbal expressions and sentences as algebraic expressions and equations; **they evaluate algebraic expressions**, solve simple linear equations, and graph and interpret their results. They analyze and use tables, graphs, and rules to solve problems involving rates and proportions.
- Deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems.

### **Key Mathematical Concepts for Module 3**

- The concept of divisibility is used to compare fractions and perform basic operations.
- Every composite number can be represented as a product of primes, which is not affected by the order of factors and can be used to find the LCM and the GCF of two or more numbers.
- Equivalent fractions have the same value but different number and sizes of pieces in the whole.
- Multiplying or dividing both the numerator and the denominator by the same number results in an equivalent fraction because it is the same as multiplying or dividing by one.
- All mixed numbers have equivalent representations as "improper" fractions; both representations are mathematically correct and useful.
- Many concepts and strategies used for estimating, comparing and computing whole numbers and decimals can be used with fractions and mixed numbers.
- The product of reciprocals is always 1.
- The division algorithm for fractions is equivalent to finding the number of times the divisor can be subtracted from the dividend.
- Concepts and strategies used in evaluating expressions and solving equations with whole numbers and decimals can be used in working with expressions and equations involving fractions and mixed numbers.

#### **Chapter 7: Number Theory**

Lesson 1: Divisibility

Lesson 2: Prime Factorization

Lesson 3: LCM and GCF

Lesson 4: Problem Solving Strategy: *Make an Organized List*

#### **Chapter 8: Fraction Concepts**

Lesson 1: Equivalent Fractions and Simplest Form

Lesson 2: Mixed Numbers and Fractions

Lesson 3: Compare and Order Fractions

Lesson 4: Explore Fractions and Decimals

Lesson 5: Fractions, Decimals and Percent

#### **Chapter 9: Add and Subtract Fractions and Mixed Numbers**

Lesson 1: Estimate Sums and Differences

Lesson 2: Model Addition and Subtraction

Lesson 3: Add and Subtract Fractions

Lesson 4: Add and Subtract Mixed Numbers

Lesson 5: Rename to Subtract

Lesson 6: Subtract Mixed Numbers

Lesson 7: Problem Solving Strategies: *Draw a Diagram*

#### **Chapter 10: Multiply and Divide Fractions and Mixed Numbers**

Lesson 1: Estimate Products and Quotients

Lesson 2: Multiply Fractions

Lesson 3: Multiply Mixed Numbers

Lesson 4: Division of Fractions

Lesson 5: Fractions and Mixed Numbers

Lesson 6: Problem Solving Skill: *Choose an Operation*

Lesson 7: Algebra: Fraction Expressions and Equations

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 1 - LESSON: 7.1

<b>LESSON FOCUS:</b>	Divisibility
<b>CA STANDARD:</b>	<b>NS 2.0 Key Standard; MR 1.1 Key Standard; (MR 2.2; MR 3.0)</b>
<b>Purpose of Lesson:</b> Math Background: TE p. 146A	At the end of the lesson students will know and be able to apply divisibility rules to solve problems.
<b>Warm-up/ Routine(s):</b>  NUMBER OF THE DAY 7.1 TE p. 146A  MATH LAB Activity: p. 146 Hundreds Chart: TR 5	<ul style="list-style-type: none"> <li>• <b>NUMBER OF THE DAY 7.1:</b> TE p. 146A</li> <li>• <b>MATH LAB Activity:</b> p. 146 (Books Closed.) "Start with 0; Go by ____." (Skip count on the Hundreds Chart.)             <ul style="list-style-type: none"> <li>• Have the students predict the pattern for 2's, and use dot to mark 2's.</li> <li>• Predict the pattern for 3's and the relationship to 2's.</li> <li>• "What do you think will happen when we go by 6's?" (Circle multiples of 6)</li> <li>• "Why would a number that is divisible by both 2 and 3 also be divisible by 6?"</li> <li>• "How do you know if a number is divisible by 5? By 10?"</li> </ul> </li> </ul>
<b>LAUNCH:</b> Guided Instruction: TE p. 146  ADDITIONAL EXAMPLE: TE p. 146  TE p. 144	<ul style="list-style-type: none"> <li>• <b>Guided Instruction:</b> TE p. 146             <ul style="list-style-type: none"> <li>• <b>Shared reading</b> or partner read chart on <b>page 146.</b></li> <li>• <b>Discuss</b> the divisibility rules on the chart and the examples under the chart.</li> </ul> </li> <li>• <b>ADDITIONAL EXAMPLE:</b> TE p. 146 (Students refer to the chart.)</li> <li>• <b>INTRODUCING THE CHAPTER and USING DATA:</b> TE p. 144.             <ul style="list-style-type: none"> <li>• <b>USING DATA:</b> Students use the chart to explore divisibility in terms of packages of marbles with no remainder.</li> </ul> </li> </ul>
<b>EXPLORE:</b> ALTERNATIVE TEACHING STRATEGY: TE p. 146B. <u>Materials:</u> Centimeter cubes  P. 147; OR CHALLENGE 7.1; TE p. 147	<p><b>ALTERNATIVE TEACHING STRATEGY:</b> TE p. 146B. <i>Provides opportunities to make sense of divisibility.</i></p> <ul style="list-style-type: none"> <li>• <b>p. 147; #1, 13, 14, 15 OR CHALLENGE 7.1;</b> TE p. 147.             <ul style="list-style-type: none"> <li>• Partners verify solution with group.</li> <li>• Communicate their reasoning orally.</li> </ul> </li> </ul>
<b>Practice:</b>	See EXPLORE options and select according to student needs.
<b>SUMMARIZE/Closure</b>	<ul style="list-style-type: none"> <li>• <b>Explain</b> divisibility rules to a partner.</li> <li>• <b>WRTIE:</b> "What does it mean if a number is divisible by another number?"</li> </ul> <p><b>Assess:</b> Lesson Quiz: 7.1; #2 and 4: TE p. 147. Complete independently.</p> <ul style="list-style-type: none"> <li>• <i>Justify solution:</i> Example: "I knew it was divisible by 6 because it was divisible by both 2 and 3."</li> </ul>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• <b>p. 147; #19, 21, 28</b></li> <li>• <b>Lesson Quiz: 7.1; #3 and 5:</b> TE p. 147. <i>Justify use of divisibility rules.</i></li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 2 - LESSON: 7.2

<b>LESSON FOCUS:</b>	Prime Factorization
<b>CA STANDARD:</b>	<b>NS 2.0 Key Standard;</b> (MR 1.0; MR 2.2; MR 2.5)
<b>Purpose of Lesson:</b> Math Background: TE p. 148A	At the end of the lesson students will be able to write a composite number as the product of two prime factors. <i>If this is review material, students should move directly onto Lesson 7.3; Greatest Common Factor.</i>
<b>Warm-up/ Routine(s):</b>	<b>Evaluate numerical expressions mentally:</b> <ul style="list-style-type: none"> <li>• <math>4 \times (6 + 2)</math> and <math>4 \times 6 + 2</math></li> <li>• <math>24/6 - 2</math> and <math>24/(6-2)</math></li> </ul>
<b>LAUNCH:</b> NUMBER OR PROBLEM OF THE DAY 7.2: TE p. 148A  Hundreds Chart TR 5 Guided Instruction: TE p. 146	<ul style="list-style-type: none"> <li>• <b>NUMBER OR PROBLEM OF THE DAY 7.2: TE p. 148A</b></li> <li>• <b>Factor Tree: (Books Closed)</b> <ul style="list-style-type: none"> <li>• <i>Record</i> the start of the first factor tree for <b>156</b> on the board. (EXAMPLE 2 on p. 148.) Students complete it.</li> <li>• <i>Questions: Guided Instruction: TE p. 148.</i></li> <li>• <i>Record</i> the prime factorization and the prime factorization in exponent form under the factor tree. (EXAMPLE 2; p. 148.)</li> <li>• Make the first two "branches", but do not include all of the factors for the second factor tree of 156. Partners/ Groups complete the "tree" and write the prime factorization.</li> <li>• <i>Questions: Guided Instruction: TE p. 148.</i></li> </ul> </li> </ul>
<b>EXPLORE:</b>  Example 1; p. 148	<b>Factoring with Division (Books closed.)</b> <ul style="list-style-type: none"> <li>• Repeat the process using division: <b>EXAMPLE 1, p. 148.</b></li> <li>• <i>Record</i> EXAMPLE 1, p. 148 on the board.</li> <li>• Partners complete <b>prime factorization</b> of 156 using division.</li> <li>• <i>Record</i> "division" <b>prime factorization</b> of 156 next to the Factor Tree model of 156.</li> <li>• <i>Discuss</i> similarity of the two methods.</li> <li>• Use both procedures to find the <b>prime factorization</b> of 56; and for p. 149, #23-25.</li> </ul>
<b>Practice:</b>	<b>ALTERNATIVE TEACHING STRATEGY: TE p. 148B.</b> <ul style="list-style-type: none"> <li>• Each group member copies one number from the board to start.</li> </ul>
<b>SUMMARIZE/Closure</b>	<ul style="list-style-type: none"> <li>• <i>Discuss</i> the meaning of <b>prime factorization</b>, from the group game.</li> <li>• <b>Assess: DISCUSS: TE p. 149 and p. 149, #26.</b></li> </ul> <p><b>Assess: Lesson Quiz: 7.2; #4 and 5: TE p. 149. Explain how you decided.</b></p>
<b>Homework:</b>	p. 147; #26-29. Include explanation of your solution for #28 and #29.

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 3 - LESSON: 7.3

<b>LESSON FOCUS:</b>	Least Common Multiple and Greatest Common Factor
<b>CA STANDARD:</b>	NS 2.4 Key Standard; (MR 3.2; MR 3.3)
<b>Purpose of Lesson:</b> Math Background: TE p. 150A	At the end of the lesson students will be able to find the least common multiple and the greatest common factor of numbers and use them to solve problems.
<b>Warm-up/ Routine(s):</b>	<ul style="list-style-type: none"> <li>• "How many ways can you start a factor tree to find the prime factorization of 100 using different starting "branches".</li> <li>• "What do you notice about the numbers that start the factor trees for 100? Can you predict all of the numbers that can start factor trees for 24?...for 8?...for 25?..."</li> </ul>
<b>LAUNCH:</b> TE p. 150  EXAMPLE #3; p. 151  ALTERNATIVE TEACHING STRATEGY; TE p. 150B	<ul style="list-style-type: none"> <li>• <b>Introduction: Strategies for finding the LCM and GCF:</b> <ul style="list-style-type: none"> <li>• <b>Guided Instruction:</b> TE p. 150. (Skip EXAMPLES 2 and 4 if you use the ALTERNATIVE TEACHING STRATEGY; TE p. 150B, for Prime Factorization and/ or students need extra scaffolding.)</li> </ul> </li> <li>• <b>EXAMPLE #3; p. 151.</b> <ul style="list-style-type: none"> <li>• <b>Questions:</b> Guided Instruction: TE pp. 151-152.</li> </ul> </li> <li>• <b>ALTERNATIVE TEACHING STRATEGY; TE p. 150B</b> <ul style="list-style-type: none"> <li>• <b>Question:</b> "What is the difference between the LCM and the GCF and how are they related?"</li> </ul> </li> </ul>
<b>EXPLORE:</b> TE p. 150	<b>ADDITIONAL EXAMPLE: TE p. 150.</b> <ul style="list-style-type: none"> <li>• Students <i>record</i> strategies on the board and <i>discuss</i>.</li> <li>• pp. 152-153; #40-43.</li> </ul>
<b>Practice:</b>	P. 152; #27, 31, 35, 39.
<b>SUMMARIZE/Closure</b>	<b>Assess: DISCUSS and/ or WRITE; TE p. 153.</b>  <b>Assess: Lesson Quiz: 7.3; TE p. 153; #1 and 5.</b>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• p. 152; #28, 37, 39, 40.</li> <li>• <b>MIXED REVIEW AND TEST PREP; p. 153; #44-48</b></li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 4 - LESSON: 7.4

<b>LESSON FOCUS:</b>	Problem Solving Strategy: <i>Make an Organized List</i>
<b>CA STANDARD:</b>	NS 2.4 Key Standard; MR 3.2 ( MR 2.0)
<b>Purpose of Lesson:</b> Math Background: TE p. 154A	At the end of the lesson students will be able to solve problems by using the strategy <i>make an organized list</i> .
<b>Warm-up/Routine(s):</b> TR 76-77; and TR 71	<b>Practice Game: Decimal Challenge; TE. p. 146</b>
<b>LAUNCH:</b> TE p. 154	<b>Bicycle Wheel Problem: p. 154</b> • <b>Guided Instruction: TE p. 154.</b>
<b>EXPLORE:</b> TE p. 154A	<b>PROBLEM OF THE DAY 7.4: TE p. 154A</b> Students <i>record</i> strategies on the board and discuss.
<b>Practice:</b> <i>Make a transparency of PRACTICE 7.4</i>	<b>PRACTICE 7.4; TE p. 154.</b> • Assign one problem for everyone to do. • Students choose another. <i>OR</i> • p. 155; #1, 2, 3
<b>SUMMARIZE/Closure</b>	Select students to <i>record</i> their solutions on the board including their <i>path to solution</i> . <i>Discuss</i> .  <b>Assess: Lesson Quiz: 7.4; TE p. 155.</b> Assign one problem. Students <i>explain</i> their reasoning.
<b>Homework:</b>	p. 155; #7, 8, 9. • <i>Solve</i> the three problems. • Choose one to write up with an explanation of reasoning, including any sketches, diagrams, charts and the <i>path to solution</i> .



## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 6 - LESSON: 8.2

<b>LESSON FOCUS:</b>	Mixed Numbers and Fractions
<b>CA STANDARD:</b>	<b>NS 2.4 Key Standard; MR 3.2 ( MR 2.0)</b>
<b>Purpose of Lesson:</b> Math Background: TE p. 164A	At the end of the lesson students will understand equivalent forms of fractions, and be able to write fractions as mixed numbers and mixed numbers as fractions.
<b>Warm-up/Routine(s):</b> Blank Number Line; TR 15	<b>Label 0, then <math>1/2</math> on the first segments of a blank number line.</b> <ul style="list-style-type: none"> <li>• "If each segment is <math>1/2</math>; find <math>3\ 1/2, \dots, 11/2</math>."</li> <li>• Have students go back and write the equivalent fractional representation or mixed number representation above the line.</li> <li>• Use other fractions if time permits. (<math>1/3, 2/5, \dots</math>)</li> </ul>
<b>LAUNCH:</b> <u>Books Closed</u>  p. 164	<b>Teacher sketches a rectangle to represent a whole cake. Sketch <math>5/3</math> cake.</b> <ul style="list-style-type: none"> <li>• Ask students to <b>sketch</b> a number line that shows <math>5/3 = 1\ 2/3</math>.</li> <li>• Students visualize and describe sketch of other fractions to partners, then verify with sketch: <math>6/5, 7/4, 5/3</math>.</li> <li>• "Try to visualize <math>2\ 1/4</math>. How many fourths do you see?"</li> <li>• "I have <math>13/3</math> candy bars. Write an equivalent amount expressed as a mixed number." "How did you decide?"</li> <li>• <b>Solar Eclipse Chart; p. 164.</b> "What is the difference between the length of the solar eclipse in 1963 and 1979?"</li> </ul>
<b>EXPLORE:</b> TE p. 164  p. 165	<b>EXAMPLES 1 and 2; p. 164.</b> <b>Guided Instruction; TE p. 164</b> <ul style="list-style-type: none"> <li>• "How do the procedures shown in <b>EXAMPLES 1 and 2</b> compare to the way you used in visualizing models and using mental math?"</li> </ul> <b>p. 165; #2-11</b> <ul style="list-style-type: none"> <li>• Students take turns determining <b>equivalent mixed number of fraction</b>. <b>Describe reasoning</b> used and the sketch visualized that represents the equivalent form. <i>Emphasize explaining reasoning not quantity of problems completed.</i></li> </ul>
<b>Practice:</b> CHALLENGE 8.2: 1 copy per student. (White out the numbers in squares 5 and 6.)	<b>CHALLENGE 8.2: Fraction Squares</b> <ul style="list-style-type: none"> <li>• Work together on Square 1: "How can you determine if a mixed number is equivalent to <math>2\ 1/2</math>?" "If the denominator is 10, what does the numerator have to be to make a fraction equivalent to <math>2\ 1/2</math>?"</li> <li>• Assign either square 2, 3, or 4 to each group as a starting problem. <u>Optional:</u> Create a new fraction square for #5 and/ or #6.</li> </ul>
<b>SUMMARIZE/Closure</b>	<b>Assess: DISCUSS: 8.2; TE p. 165; Record</b> the numerical path that matches the models that students use. <b>Assess: Lesson Quiz: 8.2; TE p. 165; #2 and 5.</b>
<b>Homework:</b>	<b>P. 165; #22-23 and #33-35.</b> Explain #34 and 35. <u>Optional:</u> Create a new fraction square for square #6 on <b>CHALLENGE 8.2.</b>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 7 - LESSON: 8.3

<b>LESSON FOCUS:</b>	Compare and Order Fractions
<b>CA STANDARD:</b>	NS 1.1 Key Standard; NS 2.4 Key Standard (NS 1.0 Key Standard; MR 1.0; MR 2.4; MR 2.5)
<b>Purpose of Lesson:</b> Math Background: TE p. 166A	At the end of the lesson students will be able to compare and order fractional numbers.
<b>Warm-up/Routine(s):</b>  TR 8	<ul style="list-style-type: none"> <li>• <b>NUMBER OR PROBLEM OF THE DAY 8.3: TE p. 166A</b></li> <li>• Use decimal grid and/ or mental math to solve:  <math>255/1000 + 1.04 =</math>  <math>.09 - 54/1000 =</math></li> <li>• <i>Discuss</i> solutions with partner/ group.</li> </ul>
<b>LAUNCH:</b>  TE p. 166	<p><b>Introduction: Guided Instruction; TE p. 166</b></p> <ul style="list-style-type: none"> <li>• Bring up number line, LCM, &gt;, &lt;, =, 1/2; as some strategies used to compare and order fractions if they do not come up from the students.</li> <li>• Students may bring up other ways: Examples: "1/7 is smaller than 1/5 because the pieces are smaller. 9/10 is bigger than 8/9 since it is missing a smaller piece."</li> <li>• <b>Question:</b> "Why are fractions harder to compare when they have different denominators?"</li> </ul> <p><b>ADDITIONAL EXAMPLE: TE p. 166.</b></p> <ul style="list-style-type: none"> <li>• Partners/ groups determine more than one way to compare the walkers to the bus riders in the problem. (Examples: Compare to 1/2; LCM; sketch a number line with 30 parts and find 3/5 and 1/6 of 30 parts.)</li> </ul>
<b>EXPLORE:</b>  p. 167	<p><b>Use different strategies to compare fractions:</b></p> <ul style="list-style-type: none"> <li>• <b>p. 167;</b> Partner Work: Complete the last problem in each set (#8, 16, 19, 25).</li> <li>• <i>Discuss</i> strategies used.</li> </ul>
<b>Practice:</b>	<p><b>p. 167; #26-27.</b></p> <p><i>When finished, choose problems from earlier sets to work independently.</i></p>
<b>SUMMARIZE/Closure</b>	<p><b>Select students to put up solutions for #16, 25, 26, 27.</b></p> <p><i>Discuss</i> solutions and <b>record</b> strategies used to compare fractions with unlike denominators.</p> <p><b>Assess: Lesson Quiz: 8.23 TE p. 167.</b></p>
<b>Homework:</b>	<p><b>p. 167; Complete first problem in each set: (#2, 6, 9, 17, 20).</b></p> <p><i>Solve and explain #28.</i></p>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 8 - LESSON: 8.4

<b>LESSON FOCUS:</b>	Explore Fractions and Decimals (Lesson has been modified.)
<b>CA STANDARD:</b>	<b>NS 1.0 Key Standard; (NS 2.0 Key Standard; MR 2.2; MR 2.4; MR 2.5)</b>
<b>Purpose of Lesson:</b> Math Background: TE p. 168A	At the end of the lesson students will understand equivalent decimals and fractions, and be able to use the division model of fraction to convert/change a fraction to a decimal.
<b>Warm-up/Routine(s):</b> TR 8	<ul style="list-style-type: none"> <li>Use decimal grid to solve: <math>3/4 - 0.15 =</math></li> </ul> <p><i>Discuss</i> solutions with partner/ group.</p>
<b>LAUNCH:</b>  10x10 grids; p. 168   TE p. 168	<p><b>MATH LAB Activity: p. 168.</b></p> <p><i>"If the large square equals one unit or one whole, determine the value of one small square and one column of small squares. Explain how you decided."</i></p> <p><b>Think and Discuss: TE p. 168.</b></p> <ul style="list-style-type: none"> <li><b>Practice p. 168: #1, 3, 4, 6.</b> Students explain the difference between models for #3 and #4.</li> <li><b>Part-Whole Fraction:</b> Ask students to sketch a model to represent three-fourths of one whole candy bar and discuss the meaning.</li> </ul>
<b>EXPLORE:</b>  10x10 grids	<p><b>Division Model of Fractions:</b> <i>"If I had 3 candy bars and wanted to divide them evenly between four people, what fraction of a candy bar would each person receive?"</i> Select a couple of students to record their solutions.</p> <p><b>Record and read:</b> 3 divided by 4 = <math>3/4</math>, as <i>"3 divided by 4 equals three-fourths."</i></p> <ul style="list-style-type: none"> <li>Have students use 10x10 grids to model the same problem and have them record the decimal and fraction. (<math>75/100</math> and <math>0.75</math>)</li> <li>Assign one problem for each group to solve with sketches and grids: 2 bars divided by 5 people. (<math>2</math> divided by <math>5 = 2/5</math> and the grid shows <math>0.4</math> or <math>0.40 = 4/10 = 40/100</math>; 4 bars divided by 5 people and 3 bars divided by 2 people. Students move to any problem, once assigned problem is complete.</li> <li>Determine the fraction and decimal for 3 cakes divided among 20 people. 3 candy bars divided among 10 people. 2 cakes divided among 25 people. (<math>3/20</math>, <math>3/10</math>, <math>2/25</math> with decimal and fraction equivalents in 100ths.)</li> </ul>
<b>Practice:</b>	<p><b>Partners use the grids and division model to convert fractions to decimals.</b></p> <p><math>2/5</math> is 2 whole grids divided by 5; or 2 out of 5 equal parts in one grid. (<math>3/25</math>, <math>3/10</math>. <math>2/50</math>)</p>
<b>SUMMARIZE/Closure</b>	<p>Six fractions drawn on the board as a part-whole fraction (<math>2/5</math> is 2 out of 5 equal parts in the whole.) and as a division model of a fraction (<math>2/5</math> is 2 units divided into 5 equal parts.)</p> <p><i>"Use one grid to model an equivalent decimal for <math>3/4</math>. How can you use 3 grids to model the same equivalent decimal for <math>3/4</math>?"</i></p>
<b>Homework:</b>	<b>p. 168; #7-10.</b> <i>"Use two grids to determine the decimal equivalent of <math>4/5</math> or <math>2/8</math>. Write the equivalent decimal and fraction."</i>


## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 9 - LESSON: 8.5

<b>LESSON FOCUS:</b>	Fractions, Decimals and Percents
<b>CA STANDARD:</b>	<b>NS 1.0 Key Standard; (NS 2.0 Key Standard; MR 2.2; MR 2.4; MR 2.5)</b>
<b>Purpose of Lesson:</b> Math Background: TE p. 169A	At the end of the lesson students will understand and use strategies to translate between fractions, decimals and percents.
<b>Warm-up/Routine(s):</b> TR 8	<ul style="list-style-type: none"> <li>Continue decimal grid work from the day before.</li> <li><b>PROBLEM OF THE DAY 8.5: TE p. 169A</b></li> </ul>
<b>LAUNCH:</b>  Pp. 169-170  TE p. 169	<p><i>"Use more than one strategy to find equivalent decimal and fraction in hundredths and/or tenths for <math>\frac{2}{5}</math> and <math>\frac{3}{25}</math>. Determine the difference in value between the two amounts." (Verify with the decimal grids.)</i></p> <ul style="list-style-type: none"> <li>Partners/ groups explain different strategies used or tried. Select students to explain strategies to the group.</li> <li>Study <b>EXAMPLES 1-4 (pp. 169-170)</b> to determine if there are strategies they haven't used. Record the strategies that they used.</li> <li><b>Guided Instruction, TE p. 169</b> for any strategy/ reasoning that does not come from the student solutions.</li> </ul>
<b>EXPLORE:</b>  10x10 grids	<p><i>"Let the 10x10 grid represent the total amount of land that each person was supposed to clear in a day. The fractions, decimal, and percent represent the portion of the assigned land that each person cleared by noon."</i></p> <p><b>MARIE: 0.68; JULIA: <math>\frac{3}{5}</math>; OSCAR: 62%; FELIX <math>\frac{13}{20}</math></b></p> <ul style="list-style-type: none"> <li><i>"Order, smallest to largest, the portion of his/her land each person had cleared by lunch. Use grids as one strategy to verify the order. Justify solution to your partner/ group. Write three mathematical questions that can be answered using the information in the problem."</i></li> </ul> <p><b>Start with Private Think Time.</b></p>
<b>Practice:</b> Decimal model paper; TR 8 ; Transparency of TR 8	<p><b>PRACTICE AND PROBLEM SOLVING: p. 171 #26-37.</b></p> <ul style="list-style-type: none"> <li>Use division to find repeating decimals.</li> <li>Students <i>predict</i> the fractions that are <b>terminating</b> or <b>repeating decimals</b> and use any method to convert them to decimals.</li> <li>Use division on the calculator to <i>verify terminating</i> or <b>repeating decimals</b>. Groups <i>record</i> the assigned fractions and the equivalent decimals on the board under the headings: <b>Terminating</b> or <b>Repeating</b>.</li> </ul>
<b>SUMMARIZE/Closure</b>	<p><b>Chart</b> strategies for converting fractions to decimals: Use fractions that will bring out the different strategies. (<math>\frac{6}{25}</math>. <math>\frac{4}{10}</math>. <math>\frac{1}{8}</math>. <math>\frac{1}{9}</math>)</p> <p><i>"Convert <math>\frac{3}{20}</math> into a decimal and a percent using two different strategies. Start with the strategy that is the easiest for you with this fraction."</i></p>
<b>Homework:</b>	<b>p. 171; #40-45. And MIXED REVIEW AND TEST PREP; p. 171; #57-61</b>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 10 - ASSESSMENT

<b>LESSON FOCUS:</b>	Fraction-Decimal Equivalents
<b>CA STANDARD:</b>	NS 1.0 Key Standard; (NS 2.0 Key Standard; MR 2.2; MR 2.4; MR 2.5)
<b>Purpose of Lesson:</b> Math Background: TE p. 169A	To assess students' understanding of fractions and fraction-decimal equivalents.
<b>Warm-up/Routine(s):</b> TR 8	<ul style="list-style-type: none"> <li>Continue decimal grid work from the day before.</li> <li><b>PROBLEM OF THE DAY 8.5: TE p. 169A</b></li> </ul>
<b>LAUNCH:</b> p. 29	<b>Independent Practice, p. 29, #9-12:</b> <ul style="list-style-type: none"> <li><i>Write</i> headings on the board or chart: <b>Numerical Expressions</b> and <b>Algebraic Expressions</b>.</li> <li><i>Read aloud</i> and have the students write the <i>equivalent numerical</i> or <i>algebraic expression</i> for problems #9-12.</li> <li><i>Record</i> each expression under the correct heading.</li> <li>"From these examples, what can you determine about the difference between a <i>numerical</i> and an <i>algebraic expression</i>?"</li> <li>Partners/ groups determine the classification of three more expressions: <math>27/3 + 2</math> (numerical expression); <math>274/x</math>; and <math>a + 6</math> (algebraic expressions)</li> </ul>
<b>EXPLORE:</b> PA 22; Run one copy per student	<b>Performance Assessment 6.3B: PA 19-27. Pen Pal</b>
<b>Practice:</b>	
<b>SUMMARIZE/Closure</b>	 <p>Students <i>discuss</i> their solutions (to <i>Pen Pal</i>) including their <i>path to solution</i> with a partner, followed by whole group discussion.</p>
<b>Homework:</b> CHALLENGE 1.6 or 8.5; TE p. 31 or TE p. 170 Run one copy per student	<ul style="list-style-type: none"> <li><b>CHALLENGE 1.6; TE p. 31. OR</b></li> <li><b>CHALLENGE 8.5; TE p. 170. OR</b></li> <li>Select problems according to class need.</li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 11 - LESSON: 9.1

<b>LESSON FOCUS:</b>	Estimate Sums and Differences
<b>CA STANDARD:</b>	NS 2.1; (NS 2.0 Key Standard; MR 2.4)
<b>Purpose of Lesson:</b> Math Background: TE p. 176A	At the end of the lesson students will be able to use strategies to estimate sums and differences of fractions.
<b>Warm-up/Routine(s):</b> TR 23	<ul style="list-style-type: none"> <li>• <b>Use a ruler:</b> <math>1/4'' + 1/16''</math>; <math>2\ 5/16'' - 1\ 5/8''</math>; <math>2\ 1/8'' - 3/4''</math> <i>Discuss</i> strategies. (The first two problems have compatible denominators" which will come in Lesson 9.2.)</li> <li>• <b>PROBLEM OF THE DAY 9.1:</b> TE p. 176A:</li> </ul>
<b>LAUNCH:</b>  Guided Instruction: TE p. 176  Another Way, p. 176	<p><b>Introduction:</b> (Books Closed.)</p> <ul style="list-style-type: none"> <li>• <i>Sketch</i> the number line from p. 176 on the board.</li> <li>• <i>Ask:</i> "How do you decide whether <math>3/8</math> is closer to 0, <math>1/2</math> or 1 on the number line?" <b>Guided Instruction:</b> TE p. 176.</li> </ul> <p><b>Another Way, p. 176.</b></p> <ul style="list-style-type: none"> <li>• <i>Write</i> the (9) fractions on the board out of order.</li> <li>• <i>Ask:</i> "How can you decide when looking at fractions that they are equal to, greater than, or less than <math>1/2</math>?"</li> </ul> <p><i>Assess if students can determine what <math>1/2</math> and 1 whole would be for each fraction including odd number denominators.</i> (Example: 4 and a half ninths equals <math>1/2</math>. <math>9/9</math> equals 1 whole.)</p> <ul style="list-style-type: none"> <li>• With a partner or group, <b>sort</b> the 9 fractions: Closest to 0, <math>1/2</math> or 1.</li> <li>• <i>Discuss</i> and <i>record</i> the strategies used.</li> </ul>
<b>EXPLORE:</b> EXAMPLES 1-4: pp. 176-177  Guided Instruction, TE p. 176	<p><b>EXAMPLES 1-4:</b> pp. 176-177:</p> <ul style="list-style-type: none"> <li>• Partners: <i>Examine</i> the path to the solution for EXAMPLE 1 that is listed under the problem. <i>Discuss</i> the reasoning you think was used to determine the answer given.</li> <li>• Use questions from <b>Guided Instruction, TE p. 176.</b></li> <li>• <b>p. 179, #38-44.</b> Take turns explaining reasoning for the problems. Use <b>EXAMPLES #1-4</b> on p. 176 and 177 to help.</li> </ul>
<b>Practice:</b> <b>Independent Practice,</b> p. 178	<ul style="list-style-type: none"> <li>• Complete the first problem in each section of <b>Independent Practice, p. 178 #15, 19, 31.</b></li> <li>• <i>Explain</i> estimate to a partner.</li> </ul>
<b>SUMMARIZE/Closure</b>	<p><b>Assess: DISCUSS, TE p. 179.</b></p> <p><b>Assess: Lesson Quiz 9.1: TE p. 179; #3-5</b></p>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• <b>P. 178; #35-37.</b></li> <li>• <b>Problem Solving Applications: p. 179; #47.</b></li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 12 - LESSON: 9.2

<b>LESSON FOCUS:</b>	Model Addition and Subtraction
<b>CA STANDARD:</b>	NS 2.1; (NS 2.0 Key Standard; NS 2.4 Key Standard; MR 2.4; MR 2.5)
<b>Purpose of Lesson:</b> Math Background: TE p. 180	At the end of the lesson students will be able to use fraction bars to add and subtract fractions with unlike denominators.
<b>Warm-up/Routine(s):</b> TE p. 182A	<b>NUMBER OF THE DAY 9.3; TE p. 182A.</b> <i>"Can you think of more than one solution?"</i>
<b>LAUNCH:</b>  Fraction Bars: TR 18  TE, p. 180	<b><i>"Use the fraction bars/ strips to determine the sum of <math>1/6</math> and <math>1/4</math>."</i></b> <ul style="list-style-type: none"> <li>• Partners <b>explain</b> their thinking using the manipulatives.</li> <li>• <b>Discuss</b> the solutions and model a sketch that matches the actions with the bars. Help students <b>translate</b> the actions/ thinking into <i>equivalent</i> numerical representation and <b>record</b>.</li> <li>• <b>Think and Discuss</b>, TE p. 180.</li> </ul> <p><b>Early Finishers: Practice: p. 180:</b></p> <ul style="list-style-type: none"> <li>• Problems #1 and #4 have compatible denominators; #2 and #3 do not.</li> <li>• Students make observations to determine what is meant by the term <b>compatible denominators</b>. (One denominator is a multiple of the other denominator, which means that only one fraction needs to be changed to an equivalent fraction with a common denominator.)</li> <li>• <i>"What are other fractions with <b>compatible denominators</b> in problems #6-12?" "How do <b>compatible denominators</b> make it easier to add or subtract?"</i></li> </ul>
<b>EXPLORE:</b> Fraction Bars: p. 180  p. 181	<b>Practice: p. 180, #1-5. Solve</b> using the fraction bars. <ul style="list-style-type: none"> <li>• <i>Pairs start with different assigned problem; then select other problems. Make a <b>sketch</b> and <b>record</b> the numerical path of the action with the bars.</i></li> <li>• Select students to sketch the solution and numerical "path" for different problems.</li> <li>• <i>Students <b>explain</b> strategy used to determine which bar would be common to both fractions.</i></li> </ul> <p><b>Activity 2; p. 181: Subtraction - Students use Fraction Bars.</b>  <b><i>"Sal had <math>1/2</math> of a candy bar. He gave Ashley <math>1/5</math> of a whole candy bar. How much did he have left?"</i></b> ("Take away" model of subtraction. <math>1/5</math> is taken from <math>1/2</math>.)  <b><i>"Sal had <math>1/2</math> of a candy bar. Ashley had <math>1/5</math> of a whole candy bar. How much more did Sal have than Ashley?"</i></b>          (Measurement/ difference model of subtraction; nothing is taken away.)</p>
<b>Practice:</b>	<b>Use Fraction Bars to solve p. 181, #5-8.</b> Sketch solution to assigned problem.
<b>SUMMARIZE/Closure</b>	<i>"Picture <math>1/2 - 3/8</math>. Describe actions to subtract to a partner."</i> Repeat. <b>WRITING IN MATHEMATICS: TE p. 180; Oral Assessment: TE p. 181.</b>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• Sketch solutions for p. 180; #11 and 12 and p. 181 #11 and #12.</li> <li>• <b>MIXED REVIEW AND TEST PREP: p. 181, #13-#17.</b></li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 13 - LESSON: 9.3

<b>LESSON FOCUS:</b>	Add and Subtract Fractions and Mixed Numbers
<b>CA STANDARD:</b>	NS 2.0 Key Standard; NS 2.4 Key Standard; MR 2.1; (NS 1.0 Key Standard; NS 2.1; MR 1.0; MR 1.1)
<b>Purpose of Lesson:</b> Math Background: TE p. 182A	At the end of the lesson students will be able to add and subtract fractions.
<b>Warm-up/Routine(s):</b> Decimal Grids	<ul style="list-style-type: none"> <li>Use decimal grids to evaluate the <i>numerical expression</i>: <math>12/1000 + 27/10 + 3/5 - 0.25 =</math></li> <li>PROBLEM OF THE DAY 9.3; TE p. 182A.</li> </ul>
<b>LAUNCH:</b>	<p><i>Draw two congruent rectangles on the board. Ask the students to use the rectangles to represent <math>1/4</math> and <math>1/3</math>.</i></p> <ul style="list-style-type: none"> <li>Partners explain how their sketches represent the fractions. (4 equal parts, 1 part shaded.) <ul style="list-style-type: none"> <li>"What is the fewest number of pieces I can use in the whole to model both <math>1/4</math> and <math>1/3</math> with equal sized parts?" "How did you decide?"</li> <li>"What is different and what is the same about the rectangles before and after dividing them up?" (The number of pieces changed, but the area is unchanged. The old and new rectangles are equivalent. The same amount is still shaded. The number of parts in the whole is three times larger.)</li> </ul> </li> <li>Students <b>describe</b> actions to convert <math>1/4</math> to <math>3/12</math> and <math>1/3</math> to <math>4/12</math> and <b>translate</b> the actions into numerical expressions. <ul style="list-style-type: none"> <li>Multiplying by the "Giant One", <math>\frac{3}{3} = \square</math> should emerge for some of the students. If the students do not use terms <b>LCM</b> and <b>LCD</b>, bring up in context.</li> </ul> </li> </ul>
<b>EXPLORE:</b>  Thinker's CORNER; p. 185 Index cards: 9 per group	<ul style="list-style-type: none"> <li>Students repeat for two fractions with compatible denominators, <math>3/4</math> and <math>5/8</math>; <b>explain</b> to a partner and <b>record</b> the numerical "path" that matches the sketch.</li> <li>Students use their sketches to add and subtract both sets of fractions, and then <b>record</b> the numerical path that matches actions with the sketches.</li> <li>Thinker's CORNER; p. 185</li> </ul>
<b>Practice:</b>	<b>PRACTICE AND PROBLEM SOLVING:</b> pp. 184-185, #44-49. <ul style="list-style-type: none"> <li><b>Read</b> as a group or with a partner.</li> <li><b>Solve</b> using any method; but <b>translate</b> into a <i>numerical expression</i>.</li> </ul>
<b>SUMMARIZE/Closure</b>	<ul style="list-style-type: none"> <li><b>Discuss</b> solutions and chart strategies to determine the LCD.</li> <li><b>Discuss</b> solutions and chart strategies to determine the LCM.</li> </ul> <p><b>Assess:</b> Lesson Quiz 9.3; TE p. 185 #4 and #6.</p>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>p. 184; #34-38.</li> <li><b>MIXED REVIEW AND TEST PREP:</b> p. 185, #51-55.</li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 14 - LESSON: 9.4

<b>LESSON FOCUS:</b>	Add and Subtract Mixed Numbers
<b>CA STANDARD:</b>	NS 2.0 Key Standard; NS 2.4 Key Standard; MR 2.1; (NS 2.1; MR 2.4; MR 2.7)
<b>Purpose of Lesson:</b> Math Background: TE p. 186A	At the end of the lesson students will be able to add and subtract fractions and mixed numbers.
<b>Warm-up/Routine(s):</b> TR 23; Rulers	<b>PROBLEM OF THE DAY 9.4; TE p. 186A.</b> <i>Students should have a ruler available for access.</i>
<b>LAUNCH:</b> TE p. 186B  TE p. 186	<b>ALTERNATIVE TEACHING STRATEGY: TE p. 186B.</b> <i>Provide more access for students by encouraging them to use available tools.</i>  <b>Guided Instruction; TE p. 186: EXAMPLE 1 (Books Closed)</b> <ul style="list-style-type: none"> <li>• <i>Read</i> "bird" problem orally. Students <i>solve</i> using any strategy.</li> <li>• <i>Discuss</i> and <i>chart</i> strategies.</li> <li>• <i>Record path to solution that matches each strategy used.</i></li> <li>• Include strategies from <b>EXAMPLE 1 and 2 on p. 186</b>; if they do not come up. Have students <i>discuss</i> in groups what the reasoning is behind the "book" strategies that students do not bring up.</li> </ul>
<b>EXPLORE:</b>	<b>ESTIMATE; then SOLVE: <math>1 \frac{1}{2} - 1 \frac{1}{10}</math>; and <math>18 \frac{9}{10} - 13 \frac{2}{5}</math>:</b> <ul style="list-style-type: none"> <li>• <i>Solve</i> with a <i>sketch</i>; then <i>record</i> the numerical representation that matches the solution with a sketch.</li> </ul> <b>P. 188; #10 and #11.</b> <i>"How are adding and subtracting mixed numbers similar?"</i>
<b>Practice:</b>	<b>P. 188-189; #31-33.</b> <ul style="list-style-type: none"> <li>• <i>Assign</i> one starting problem for each group.</li> <li>• Partners <i>solve</i> the problem using one or two strategies and <i>record</i> the numerical path.</li> <li>• When each group member is able to <i>explain</i> the solution, the group works on the remaining problems.</li> <li>• Teacher chooses partners to <i>sketch/ record solutions</i>.</li> </ul>
<b>SUMMARIZE/Closure</b>	<i>Discuss</i> the solutions on the board. <ul style="list-style-type: none"> <li>• <i>"How do the solutions with the models relate to the numerical solutions?"</i></li> <li>• <i>"What part of a sketch solution represents finding the LCD?"</i></li> </ul> <b>Assess: Lesson Quiz 9.4: #1-6; TE p. 189.</b> <i>Record a numerical and sketched solution.</i>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• p. 188; #30.</li> <li>• <i>Link up to Reading:</i> p. 189, #1-4.</li> <li>• <b>MIXED REVIEW AND TEST PREP:</b> p. 189, #37-41.</li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 15 - LESSON: 9.5/ 9.6

<b>LESSON FOCUS:</b>	Rename to Subtract
<b>CA STANDARD:</b>	NS 2.0 Key Standard; NS 2.4 Key Standard; MR 2.1; (NS 2.1; MR 2.4; MR 2.7)
<b>Purpose of Lesson:</b> Math Background: TE p. 192A	At the end of the lesson students will be able to use Fraction Bars to rename and subtract mixed numbers.
<b>Warm-up/Routine(s):</b> TR 23; Rulers	<ul style="list-style-type: none"> <li>• <b>PROBLEM OF THE DAY 9.6; TE p. 192A. And/ OR</b></li> <li>• <b>1 1/8 - 3/4; and 2 - 1 15/16:</b> <i>Discuss</i> solutions: "Which problem had compatible denominators?" If no one solves by compensation, adding 1/4 to both 3/4 and 1 1/8, discuss that strategy.</li> </ul>
<b>LAUNCH:</b> Fraction Bars and/or Strips  p. 190	<p><b>Introduction (Books Closed); p. 190</b></p> <ul style="list-style-type: none"> <li>• <b>Build</b> 2 1/5 with Fraction Bars.</li> <li>• <b>Subtract</b> 1 4/5 from the 2 1/5 length of bars, then <b>explain</b> your solution to your partner.</li> <li>• <b>Discuss</b> and <b>record</b> strategies students use.</li> <li>• If no one comes up with the idea of renaming or converting one whole into 5/5, cut one of the wholes on your sketch into five parts.</li> <li>• "With your partner, determine the equivalent name for 2 1/5 represented by this sketch." (1 6/5)</li> <li>• <b>Record</b> the path to solution next to the sketch as a model for students to use. (<math>2 \frac{1}{5} - 1 \frac{4}{5} = 1 \frac{6}{5} - 1 \frac{4}{5} = \frac{2}{5}</math>)</li> </ul>
<b>EXPLORE:</b>	<ul style="list-style-type: none"> <li>• <b>Using Fraction Bars or strips, partners solve: <math>8 - 3 \frac{3}{10}</math> and <math>5 - 1 \frac{4}{5}</math>.</b></li> <li>• <b>Record</b> the path to solution that matches the action and the reasoning with the bars/ strips.</li> <li>• <b>p. 193 #19, 20, 21.</b></li> </ul>
<b>Practice:</b>	<ul style="list-style-type: none"> <li>• <b>p. 193 #4, 5, 6: Solve mentally first. Verify using any other method.</b></li> <li>• Look for other problems with compatible denominators and work with a partner to describe the model and the situation.</li> </ul>
<b>SUMMARIZE/Closure</b>	<p><b>Assess: WRITE 9.6; TE p. 193.</b></p> <p><b>Assess: Lesson Quiz 9.6; TE p. 193; #3 and #6.</b></p>
<b>Homework:</b>	<b>MIXED REVIEW AND TEST PREP: p. 193, #16, 18, 20.</b>



## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 17 - LESSON: 10.1

<b>LESSON FOCUS:</b>	Estimate products and quotients of fractions and mixed numbers.
<b>CA STANDARD:</b>	<b>NS 2.0 Key Standard; NS 2.2; (NS 1.0 Key Standard; MR 2.5)</b>
<b>Purpose of Lesson:</b> Math Background: TE p. 200A	At the end of the lesson students will be able to estimate products and quotients of fractions and mixed numbers.
<b>Warm-up/Routine(s):</b>	<p><b>NUMBER OF THE DAY 10.1; TE p. 200A.</b></p> <ul style="list-style-type: none"> <li>• <i>"How did you decide if it was closer to 1/2, 0 or 1?"</i></li> <li>• <i>"What would the exact fraction in 7ths be for 1/2?"</i></li> <li>• <i>Record as one strategy for rounding fractions and mixed numbers.</i></li> </ul> <p><b>QUICK REVIEW; p. 200; #1-5.</b> <i>Write an estimate and record if it is high or low.</i></p>
<b>LAUNCH:</b>  TE p. 200	<p><b>Books Closed: Read aloud</b> the "landfill" problem at the top of page 200.</p> <ul style="list-style-type: none"> <li>• <i>"Use a method that makes sense to you to estimate the number of pounds of garbage that would be produced every day."</i></li> <li>• With a partner/ group, then class, <b>discuss</b> strategies and estimates.</li> <li>• <b>Record/ chart</b> numerical "paths" to estimates.</li> <li>• <b>Modifying Instruction TE p. 200:</b> <i>If rounding to 250 million does not come up, write path <math>250,000,000 \times 4 = 1,000,000,000</math>.</i> <b>Ask:</b> <i>"What do think my strategy was for this path?"</i></li> <li>• Do the same with two methods on p. 200, if they do not come up: <i>Averaging two estimates and using compatible numbers. (See EXAMPLE 1, and right before and after EXAMPLE 1.)</i></li> <li>• <b>Question:</b> <i>"Why is estimation important for products and quotients of mixed numbers and fractions?"</i></li> </ul> <p><b>Books Open:</b> Partners discuss and solve p. 201, #1 and 3.</p> <ul style="list-style-type: none"> <li>• <b>Discuss</b> whole group; <b>record</b> strategies for use during Exploration.</li> </ul>
<b>EXPLORE:</b>	<ul style="list-style-type: none"> <li>• <i>"What strategy might work to easily estimate <math>10 \frac{8}{11}</math> divided by <math>2 \frac{1}{5}</math>?"</i></li> <li>• If strategy of compatible numbers (<math>10/2 = 5</math>) does not come up, record it and ask students for the thinking that might lead to that strategy.</li> </ul> <p><b>P. 201; #11, 15, 19, 23, 24.</b> Assign all groups to complete either #23 or #24 and then work on the other three problems.</p>
<b>Practice:</b>	<b>P. 201, #12-22.</b> Choose three new problems for which you use different estimation strategies. <b>Record the estimate</b> and its numerical "path".
<b>SUMMARIZE/Closure</b>	<ul style="list-style-type: none"> <li>• <i>"How did you determine which strategy to use for the different problems?"</i></li> <li>• <i>"Did more than one strategy work for some problems?"</i></li> <li>• <b>Read/ discuss:</b> Problem #1 and #2 from <b>CHALLENGE 10.1.</b></li> </ul> <p><b>Assess: Lesson Quiz 10.1; TE p. 201. Record estimate and "path".</b></p>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• <b>MIXED REVIEW AND TEST PREP; p. 201</b></li> <li>• <b>Guided Practice; p. 201.</b> Students choose 4 problems.             <ul style="list-style-type: none"> <li>• <b>Estimate</b> using different strategies and <b>record</b> paths.</li> <li>• <b>Solve</b> one problem with more than one strategy.</li> </ul> </li> </ul>



<p><b>Practice:</b>  <u>Materials needed:</u>          Number cubes</p> <p>ALTERNATIVE          TEACHING STRATEGY;          TE p. 202B</p>	<p><b>ALTERNATIVE TEACHING STRATEGY; TE p. 202B</b></p> <ul style="list-style-type: none"> <li>• <i>Students should <b>record</b> estimate and <b>explain</b> how they decided.</i></li> <li>• <i>Groups make and/ or test conjectures regarding relationship of the sketch and its numerical path.</i></li> </ul>
<p><b>SUMMARIZE/Closure</b></p>	<p><b>Discuss the problems and sketches on the board:</b></p> <ul style="list-style-type: none"> <li>• <b>Question:</b> <i>"Can you find a strategy that works for all problems without using the sketch?"</i> If students make the conjecture about the algorithm of multiplying the numerators and denominators, or if they have already learned the algorithm, see if they can <b>explain</b> the algorithm with the model. (The denominators determine the two dimensions and are multiplied to make the total parts in the whole. The numerators are the dimensions of the other rectangle. When multiplied, they form the number of equal parts being considered.)</li> <li>• <i>Have students look for verification of conjectures with the problems on the board.</i></li> </ul> <p><b>Assess: Lesson Quiz 10.2; TE p. 205, #4.</b></p> <ul style="list-style-type: none"> <li>• <b>Solve</b> numerically and with a sketch.</li> <li>• <b>Explain</b> how your sketch and the numerical <i>path</i> are connected.</li> <li>• <b>Write</b> the answer in the simplest form.  <i>* Unless the students have had an opportunity to make sense of dividing the numerator of one fraction and the denominator of the other fraction by the GCF, wait to introduce that concept and just divide after multiplying.</i></li> </ul>
<p><b>Homework:</b>          P. 205</p>	<ul style="list-style-type: none"> <li>• <b>p. 205; #31, 34, 35.</b> <ul style="list-style-type: none"> <li>• <b>Explain</b> reasoning for #31.</li> <li>• Include the <b>sketch</b> for #34.</li> </ul> </li> <li>• <b>MIXED REVIEW AND TEST PREP; p. 205 #38-42.</b></li> </ul>

# MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

## MODULE 3: DAY: 19 - LESSON: 10.3

<b>LESSON FOCUS:</b>	Multiply Mixed Numbers
<b>CA STANDARD:</b>	<b>NS 2.0 Key Standard;</b> NS 2.2; MR 2.1; ( <b>NS 1.0 Key Standard;</b> NS 2.4 <b>Key Standard;</b> NS 2.1; MR 1.3; MR 2.5)
<b>Purpose of Lesson:</b> Math Background: TE p. 206A	At the end of the lesson students will be able to connect multiplication of mixed numbers to multiplication of whole numbers and multiplication of fractions.
<b>Warm-up/Routine(s):</b> TE p. 206A	<ul style="list-style-type: none"> <li>• <b>NUMBER OF THE DAY 10.3;</b> TE p. 206A.</li> <li>• <b>5x24:</b> <i>Students estimate and record different "paths to solution". Bring up <b>compensation method:</b> <math>(5 \times 25) - (5 \times 4)</math>; <b>distributive method:</b> <math>5 \times (20 + 4) = 5 \times 20 + 5 \times 4</math>; and <b>repeated addition:</b> <math>24 + 24 + 24 + 24 + 24</math>, if they don't come up.</i></li> </ul>
<b>LAUNCH:</b>  Reference: p. 206	<p><b>Books Closed: <math>5 \times 2 \frac{3}{8}</math>.</b></p> <ul style="list-style-type: none"> <li>• <i>"Private Think Time": Students <b>solve</b> using a strategy that makes sense to them. (To scaffold, refer to chart of strategies with whole numbers)</i></li> <li>• <b>Distributive method: <math>(5 \times 2) + (5 \times \frac{3}{8})</math>.</b> <i>Record if it doesn't come up in discussion. Connect to writing a whole number as a fraction from the day before: "What does <math>5/1</math> mean using part/whole model of a fraction?"</i></li> <li>• <b><math>2 \frac{1}{2} \times 3 \frac{1}{5}</math> on board.</b> <i>Estimate and justify to partner.</i></li> <li>• <b>Solve</b> using any method that makes sense. (Examples from book/chart: <i>Sketching, area model, changing into fractions, and use of distributive property.)</i></li> </ul>
<b>EXPLORE:</b>  p. 207	<ul style="list-style-type: none"> <li>• <b>Discuss</b> different solutions.</li> <li>• <b>Partner/Group: Pg. 207, #1, 2, 3, 5, 7 and 9.</b> <i>Assign different starting problems for each group. Choose from others.</i></li> </ul>
<b>Practice:</b> pp. 206-207	<p><b>Division by "Giant One" before and after multiplying:</b></p> <ul style="list-style-type: none"> <li>• Use Bicycle problem at top of <b>page 206.</b> (<math>2 \frac{1}{2} \times 3 \frac{1}{5}</math>)</li> <li>• <b>Solve</b> in groups, simplifying at end of problem.</li> <li>• Students rewrite problems <b>#11-15 on page 207</b> as fractions. Divide by "Giant One" before or after multiplying.</li> </ul>

<p><b>SUMMARIZE/Closure</b></p>	<p><i>Discuss use of division before multiplying for problems p. 207; #11, and 12.</i></p> <ul style="list-style-type: none"> <li>• <i>"What is the advantage to dividing before multiplying?"</i></li> <li>• <i>Students make <b>observations</b> about the problems on page 207, #7-10 and #19-22. "Why do you think the book asks that these problems be solved using the distributive property?"</i></li> </ul>
	<p><b>Assess: Lesson Quiz 10.3: TE: p. 207.</b></p> <p><i>Write the path to the estimate and the estimate before multiplying.</i></p>
<p><b>Homework:</b> TE p. 206A</p>	<ul style="list-style-type: none"> <li>• <b>Copy PROBLEM OF THE DAY 10.3: Explain</b> reasoning and <i>path</i> for the solution. A sketch may be used as part of the explanation.</li> <li>• <b>Page 207, #23-25 and #27.</b></li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 20 - LESSON: 10.4

<b>LESSON FOCUS:</b>	Division of Fractions
<b>CA STANDARD:</b>	NS 2.0 Key Standard; NS 2.2; (NS 2.1 Key Standard; NS 2.4 Key Standard)
<b>Purpose of Lesson:</b> Math Background: TE p. 210A	At the end of the lesson students will understand the meaning of reciprocal and use models to relate division to multiplying by the reciprocal.
<b>Warm-up/Routine(s):</b>	<p><b>Mental Math Connection:</b> " <i>How many <math>\frac{1}{3}</math> pizza servings would there be in four mini-pizzas?</i>"</p> <ul style="list-style-type: none"> <li>• Use sketches or fraction circles to <b>justify</b> answer to a partner.</li> <li>• Read together <math>5 \div \frac{1}{5}</math> using the chart: "How many groups of <math>\frac{1}{5}</math> are in 5?"</li> <li>• Have students solve mentally and record the numerical "path": <math>6 \div \frac{1}{4}</math>; <math>8 \div \frac{1}{6}</math>.</li> <li>• <b>Question:</b> "What is the numerical path to determining the number of pieces and how does it relate to the sketch/model?" <b>Connect</b> to the meaning of how many sets of <math>\frac{1}{3}</math> can be taken out of/are in 4.</li> </ul>
<b>LAUNCH:</b>  Reference: p. 210	<p><b>Introduce Reciprocals:</b> List: <math>\frac{3}{4}</math>, <math>\frac{4}{3}</math>; <math>\frac{2}{5}</math>, <math>\frac{5}{2}</math>; <math>\frac{6}{7}</math>, <math>\frac{7}{6}</math>.</p> <ul style="list-style-type: none"> <li>• "These pairs of numbers are <b>reciprocals</b>. Can you see a pattern and determine other numbers that are reciprocals?" Generate list and discuss observations.</li> <li>• <b>Question:</b> "What would the <b>reciprocal</b> of 4 be and how do you know?" (Students read the fraction <math>\frac{4}{1}</math> using part-whole meaning if it doesn't come up in the explanation: 'One part in the whole and I have four of those equal parts.')</li> <li>• Assign a different starting problem for each group: <math>\frac{1}{2} \times 2 = \underline{\quad}</math>; <math>2 \times \frac{1}{2} = \underline{\quad}</math>; <math>6 \times \frac{1}{6} = \underline{\quad}</math>; <math>\frac{1}{6} \times 6 = \underline{\quad}</math>; <math>4 \times \frac{1}{4} = \underline{\quad}</math>; <math>\frac{1}{4} \times 4 = \underline{\quad}</math>;</li> <li>• Students <b>solve with sketch</b> and write numerical "path to solution".</li> <li>• <b>Record/chart</b> the solutions and number sentences written as fractions. (<math>\frac{1}{2} \times \frac{2}{1} = \frac{2}{2} = 1</math>).</li> <li>• In discussion, students add to definition of reciprocals the idea that reciprocals are <b>numbers whose product is 1</b>.</li> </ul>
<b>EXPLORE:</b>  P. 208 #1-4	<p><b>Division as multiplication by reciprocal:</b></p> <ul style="list-style-type: none"> <li>• Students <b>solve</b> the following problems with sketches: <ul style="list-style-type: none"> <li>• <math>10 \div 5</math> and <math>10 \times \frac{1}{5}</math>; <math>6 \div 3</math> and <math>6 \times \frac{1}{3}</math>; <math>4 \div 2</math> and <math>4 \times \frac{1}{2}</math>.</li> </ul> </li> <li>• In groups, students make <b>observations</b> and <b>conjectures</b> before solving more problems.</li> <li>• Assign different starting problems for groups to make sure all problems are solved and recorded on board within the time.</li> <li>• <math>3 \div \frac{1}{3}</math> and <math>3 \times 3</math>; <math>4 \div \frac{1}{5}</math> and <math>4 \times 5</math>; <math>\frac{1}{2} \div \frac{1}{4}</math> and <math>\frac{1}{2} \times 4</math>.</li> <li>• <b>Discuss</b> observations and conjectures.</li> <li>• Have students <b>rewrite</b> the division problems on page 208 #1-4 as equivalent multiplication problems.</li> </ul>

<b>Practice:</b> P. 209	<b>P. 209, # 5-8.</b> <i>Solve using division and verify with equivalent multiplication using reciprocal.</i>
<b>SUMMARIZE/Closure</b>	<ul style="list-style-type: none"> <li>• <b>Discuss</b> with partner, then whole group: <ul style="list-style-type: none"> <li>• "How can you solve division problems using multiplication?" Have students <b>justify</b> by giving examples from their exploration with problems.</li> </ul> </li> <li>• <b>Chart</b> observations about division of fractions and multiplication by reciprocals.</li> </ul>
	<b>Assess:</b> Draw a model to show $\frac{3}{1/6}$ . <b>Rewrite</b> the problem as an equivalent multiplication problem.
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• p. 209, #1-4: <b>Explain</b> reasoning or sketch model of solution.</li> <li>• <b>MIXED REVIEW AND TEST PREP:</b> p. 209; #9-13.</li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 21 - LESSON: 10.5

<b>LESSON FOCUS:</b>	Division of fractions and mixed numbers.
<b>CA STANDARD:</b>	<b>NS 2.0 Key Standard;</b> NS 2.2; (NS 1.0 Key Standard; NS 2.1; NS 2.4 Key Standard; MR 2.1)
<b>Purpose of Lesson:</b> Math Background: TE p. 210A	At the end of the lesson students will be able to use models and strategies for fractions and whole numbers to divide fractions and mixed numbers.
<b>Warm-up/Routine(s):</b>  Ruler; TR 23	<ul style="list-style-type: none"> <li>• <i>Private Think Time: Use ruler/sketches/mental math to solve: 9 divided by 1/2; 1/2 divided by 1/4;</i></li> <li>• <i>Discuss</i> strategies in groups, then whole class.</li> </ul> <p>If equivalent multiplication by reciprocal does not come up, write <i>path</i>: <math>1/2 \times 4/1 = 8</math>. Have students relate to Lesson 10.4.</p> <ul style="list-style-type: none"> <li>• <b>QUICK REVIEW:</b> p. 210, #1-5. Class <i>discusses</i> strategy and reasoning used to solve #1. Then <i>solve</i> #2-5 mentally and <i>explain</i> one to a partner.</li> </ul>
<b>LAUNCH:</b>  TE p. 210A  TE p. 210	<ul style="list-style-type: none"> <li>• <b>PROBLEM OF THE DAY: 10.5, TE p. 210A</b></li> <li>• <b>Books Closed: Read aloud "juice" problem at top of page 210.</b> <ul style="list-style-type: none"> <li>• Students <i>solve independently</i> then <i>discuss</i> solutions/strategies in groups.</li> <li>• <i>Discuss</i> solutions using division ("How many 1/5's are in 8") and multiplication by reciprocal. (<math>8 \times 5</math> or <math>8/1 \times 5/1</math>)</li> <li>• <i>Record</i> the <i>numerical expressions</i> for strategies and ask students to relate them. (<math>8/1 \times 5/1</math> is also <math>8 \times 5</math> because there are 5/5 in every whole liter; <math>3/1 \times 5/1 = 15/1 = 15</math>)</li> </ul> </li> </ul>
<b>EXPLORE:</b>	<p><b>Partner/group work:</b> "How would you use your same strategies to solve the problem if Stacy brought 8 1/2 liters and each serving was 3/4 liter?"</p> <ul style="list-style-type: none"> <li>• <i>Estimate</i> a reasonable answer and <i>model</i> solution with a sketch.</li> <li>• <i>Rewrite</i> the problem as equivalent multiplication problem using reciprocal and <i>solve</i> numerically.</li> </ul>
<b>Practice:</b>	<p><b>P. 212; #42-47.</b></p> <p>Student pairs rotate solving problem using sketch while other pair solves using multiplication by reciprocal.</p>
<b>SUMMARIZE/Closure</b>	<b>Assess: DISCUSS: TE p. 213</b>
	<p><b>Assess: Lesson Quiz 10.5: TE p. 213:</b></p> <ul style="list-style-type: none"> <li>• #1-3, <i>Write</i> reciprocal.</li> <li>• <i>Solve</i> #5 with sketch and multiplication by reciprocal.</li> </ul>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• P. 213 #48, 50 and 52.</li> <li>• <b>MIXED REVIEW AND TEST PREP</b> OR 4 or 5 problems from p. 212.</li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 22 - LESSON: 10.6

<b>LESSON FOCUS:</b>	Choose an operation to solve a problem.
<b>CA STANDARD:</b>	<b>NS 2.0 Key Standard;</b> MR 3.2; (NS 2.1; NS 2.2)
<b>Purpose of Lesson:</b> Math Background: TE p. 214A	At the end of the lesson students will be able to use their understanding of basic operations to determine the operation needed to solve a problem and to formulate questions that require the use of different operations.
<b>Warm-up/Routine(s):</b> TE p. 214A	<b>PROBLEM OF THE DAY 10.6; TE p. 214A</b>
<b>LAUNCH:</b> TE p. 214A  TE p. 214	<p><i>Discuss</i> solutions to <b>PROBLEM OF THE DAY 10.6</b>, and the <i>numerical expression</i> to match the solution.</p> <ul style="list-style-type: none"> <li>• <i>Have students in pairs or groups write other questions that could be answered using the same situation, but that would require use of other basic operations</i></li> <li>• <i>Each group posts or reads aloud one question, and the other groups write the <b>numerical expression</b> they would use to solve it.</i></li> </ul> <p><b>Page 214:</b></p> <ul style="list-style-type: none"> <li>• <i>Students compare the chart for basic operations to the class chart created earlier in the year. Allow opportunity for revision/addition of class chart if anything on the text chart clarifies meaning for the students.</i></li> </ul>
<b>EXPLORE:</b> page 214	<p><b>Explore problems A, B, and C, and D on page 214:</b></p> <ul style="list-style-type: none"> <li>• <b>Assign</b> a different starting problem for each group.</li> <li>• <i>Independently, and then with partner/group, students write the "path to the solution" and solve it.</i></li> <li>• <i>Groups write one other mathematical question about the situation that would require use of a different operation and post the question for other groups to solve. (More information may be added if necessary when posing the question.)</i></li> <li>• <i>Each group moves to another problem and follows the same procedure,</i></li> </ul>
<b>Practice:</b>	<p><b>P. 215, #5-7.</b></p> <p><i>Write</i> the numerical expression used to solve the problem.</p>
<b>SUMMARIZE/Closure</b>	<p><b>Assess: WRITE: TE p. 215</b></p> <p><b>Assess: Lesson 10.6 Quiz: TE: p. 215.</b></p> <ul style="list-style-type: none"> <li>• <i>Solve and write</i> the numerical expression for the problems.</li> <li>• <i>For one of the problems, write a mathematical question that can be answered using information from the problem.</i></li> </ul>
<b>Homework:</b>	<ul style="list-style-type: none"> <li>• <b>p. 215: 1 and 2</b></li> <li>• <i>Write two word problems that require different operations to solve.</i></li> </ul>

## MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS

### MODULE 3: DAY: 23 - LESSON: 10.7

<b>LESSON FOCUS:</b>	Algebra: Fraction Expressions and Equations
<b>CA STANDARD:</b>	AF 1.0; <b>AF 1.1 Key Standard;</b> (NS 2.1; NS 2.2)
<b>Purpose of Lesson:</b> Math Background: TE p. 216A	At the end of the lesson students will be able to evaluate expressions with fractions and to solve equations with fractions by using substitution and mental math.
<b>Warm-up/Routine(s):</b> TE p. 216A	<ul style="list-style-type: none"> <li>• <b>Use Mental Math/ Sketches:</b> <math>\frac{1}{1/3}</math>; <math>\frac{3}{1/3}</math>; <math>\frac{7}{1/4}</math>; <math>\frac{2.5}{1/3}</math>.</li> <li>• <b>PROBLEM OF THE DAY; TE p. 216A.</b> <ul style="list-style-type: none"> <li>• <i>Ask</i> students to try to make a sketch or diagram that represents the information in the problem, and then determine a strategy.</li> <li>• <i>Record</i> numerical <i>paths</i> for strategies students explain.</li> </ul> </li> </ul>
<b>LAUNCH:</b> p. 216	<p><b>Brochure problem, top of p. 216:</b></p> <ul style="list-style-type: none"> <li>• <i>Read</i> the problem aloud but modify by asking the cost of 2 brochures.</li> <li>• <i>Record numerical expression</i> and have different groups determine the numerical expression for a different number of brochures. Record the expressions.</li> <li>• "What is the same about all of the expressions?" "What changes?"</li> <li>• Have students <i>write</i> the algebraic expression that represents finding the cost for any number of brochures, using "b" as the variable that represents the number of brochures.</li> <li>• <i>Substitute</i> different numbers of brochures for the variable and have students write the numerical expression.</li> </ul> <p><b>EXAMPLE: p. 216 (Books Closed):</b></p> <ul style="list-style-type: none"> <li>• Students <i>solve</i> <math>\frac{n}{1/4}</math> using mental math.</li> <li>• <i>Discuss</i> and <i>record</i>.</li> </ul>
<b>EXPLORE:</b> TE p. 216	<ul style="list-style-type: none"> <li>• <b>ADDITIONAL EXAMPLE; TE p. 216:</b> <i>Translate the equations into words before solving.</i></li> <li>• <b>Mental Math: p. 217: #18 - 23.</b> <i>Groups/partners choose order of problems to explore.</i></li> </ul>
<b>Practice:</b>	p. 217: #3-5
<b>SUMMARIZE:</b> Closure:	<i>Discuss</i> solutions.
	<b>Assess: Lesson Quiz 10.7: TE: p. 217</b>
<b>Homework:</b>	<p>p. 217: <b>MIXED REVIEW AND TEST PREP:</b> <i>Explain</i> solutions for #27 and 29.</p> <p>p. 218: #33-35</p>

**MODULE 3: UNIT 3: FRACTION CONCEPTS AND OPERATIONS**

**MODULE 3: DAY: 24 - ASSESSMENT**

<b>LESSON FOCUS:</b>	<i>Teacher Choice</i>
<b>CA STANDARD:</b>	
<b>Purpose of Lesson:</b>	
<b>Warm-up/Routine(s):</b>	
<b>LAUNCH:</b>	
<b>EXPLORE:</b>	
<b>Practice:</b>	
<b>SUMMARIZE:</b>	
<b>Closure:</b>	
<b>Homework:</b>	