

TEACHER RESOURCE BOOK



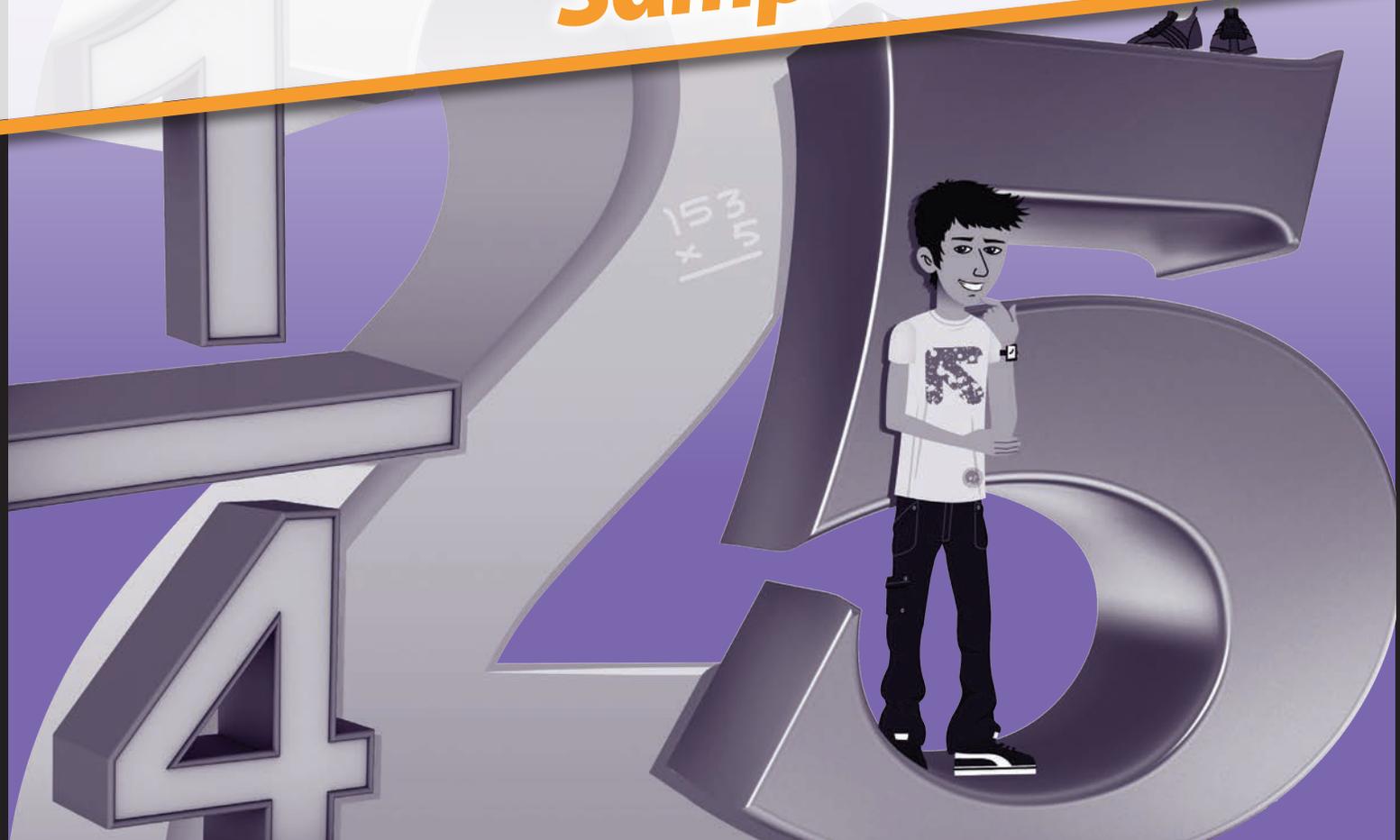
**4** Mathematics  
INSTRUCTION  
*Teacher Resource Book*



$$\frac{3}{2} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$$



**Sampler**



# Teacher Resource Book: Lesson Overview

Use the information on these pages to plan whole class instruction, ongoing monitoring, and small group differentiation.

**Standards Focus** sets expectations for what students should understand and be able to do.

**Prerequisite Skills** can be used to monitor the understanding of students at different levels and to scaffold instruction for small group discussions.

**Content Objectives** identify the mathematical goals for the lesson, while **Language Objectives** identify how students demonstrate their understanding of those goals.

The **Learning Progressions** set a context for the standards of the lessons based on how the standard builds on prior knowledge, particularly from the previous grades, and how it leads to expectations for the next year.

## LESSON OVERVIEW

## Lesson 16 Add and Subtract Fractions

### CCSS Focus

#### Domain

Number and Operations—Fractions

#### Cluster

**B.** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

#### Standard

**4.NF.B.3** Understand a fraction  $\frac{a}{b}$  with  $a > 1$  as a sum of fractions  $\frac{1}{b}$ .

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

#### Standards for Mathematical Practices (SMP)

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

### Lesson Objectives

#### Content Objectives

- Add fractions with like denominators.
- Subtract fractions with like denominators.
- Use fraction models, number lines, and equations to represent word problems.

#### Language Objectives

- Draw pictures or diagrams to represent word problems involving fraction addition and subtraction.
- Use fraction vocabulary, including *numerator* and *denominator*, to explain how to add and subtract fractions with like denominators.
- Orally define and use the key mathematical terms *add*, *subtract*, *equal parts*, *fraction*, *numerator*, and *denominator* when reasoning and arguing about fraction addition and subtraction.
- Write and solve equations to represent word problems involving fraction addition or subtraction.

### Prerequisite Skills

- Understand addition as joining parts.
- Understand subtraction as separating parts.
- Know addition and subtraction basic facts.
- Understand the meaning of fractions.
- Identify numerators and denominators.
- Write whole numbers as fractions.
- Compose and decompose fractions.

### Lesson Vocabulary

There is no new vocabulary. Review the following key terms.

- numerator** the top number in a fraction; it tells the number of equal parts that are being described
- denominator** the bottom number in a fraction; it tells the total number of equal parts in the whole

### Learning Progression

**In the previous lesson** students begin developing an understanding of adding and subtracting fractions with like denominators. They develop an understanding of adding fractions as combining parts referring to the same whole.

**This lesson** extends student's understanding of fraction addition and subtraction. Here students begin to deal with addition and subtraction in the abstract. Students use visual models to

represent word problems involving the addition and subtraction of fractions with the same whole. Students also use equations to solve word problems.

**In the next lesson** students will add and subtract mixed numbers with like denominators. The focus in Grade 4 is on adding and subtracting fractions with like denominators. In Grade 5 students begin to add and subtract fractions with unlike denominators.

Lesson Pacing Guide

Whole Class Instruction

<p><b>Day 1</b> 45–60 minutes</p> <p><b>Toolbox: Interactive Tutorial</b> <i>Understand Adding and Subtracting Fractions—Level D</i></p> <p><b>Introduction</b></p> <ul style="list-style-type: none"> <li>• Use What You Know 10 min</li> <li>• Find Out More 15 min</li> <li>• Reflect 10 min</li> </ul>	<p><b>Practice and Problem Solving</b> Assign pages 175–176.</p>
<p><b>Day 2</b> 45–60 minutes</p> <p><b>Modeled and Guided Instruction</b></p> <p><b>Learn About Adding Fractions</b></p> <ul style="list-style-type: none"> <li>• Picture It/Model It 20 min</li> <li>• Connect It 10 min</li> <li>• Try It 15 min</li> </ul>	<p><b>Practice and Problem Solving</b> Assign pages 177–178.</p>
<p><b>Day 3</b> 45–60 minutes</p> <p><b>Modeled and Guided Instruction</b></p> <p><b>Learn About Subtracting Fractions</b></p> <ul style="list-style-type: none"> <li>• Picture It/Model It 10 min</li> <li>• Connect It 20 min</li> <li>• Try It 15 min</li> </ul>	<p><b>Practice and Problem Solving</b> Assign pages 179–180.</p>
<p><b>Day 4</b> 45–60 minutes</p> <p><b>Guided Practice</b></p> <p><b>Adding and Subtracting Fractions</b></p> <ul style="list-style-type: none"> <li>• Example 5 min</li> <li>• Problems 16–18 15 min</li> <li>• Pair/Share 15 min</li> <li>• Solutions 10 min</li> </ul>	<p><b>Practice and Problem Solving</b> Assign pages 181–182.</p>
<p><b>Day 5</b> 45–60 minutes</p> <p><b>Independent Practice</b></p> <p><b>Adding and Subtracting Fractions</b></p> <ul style="list-style-type: none"> <li>• Problems 1–6 20 min</li> <li>• Quick Check and Remediation 10 min</li> <li>• Hands-On or Challenge Activity 15 min</li> </ul> <p><b>Toolbox: Lesson Quiz</b> Lesson 16 Quiz</p>	

Small Group Differentiation

Teacher-Toolbox.com

**Reteach**  
**Ready Prerequisite Lessons** 45–90 min

**Grade 3**

- Lesson 14 *Understand What a Fraction Is*
- Lesson 15 *Understand Fractions on a Number Line*

**Teacher-led Activities**  
**Tools for Instruction** 15–20 min

**Grade 3 (Lessons 14 and 15)**

- Parts of a Whole
- Parts of a Set
- Fractions on a Number Line
- Place Fractions on a Number Line

**Grade 4 (Lessons 16)**

- Fractions as Sums

**Student-led Activities**  
**Math Center Activities** 30–40 min

**Grade 3 (Lessons 14 and 15)**

- 3.25 Write the Fraction
- 3.26 Show Fractions
- 3.27 Use Fraction Vocabulary
- 3.28 Identify Fractions on a Number Line

**Grade 4 (Lessons 16)**

- 4.31 Different Ways to Show Sums

Personalized Learning

**i-Ready.com**

**Independent i-Ready Lessons** 10–20 min

**Grade 3 (Lessons 14 and 15)**

- Understand What a Fraction Is
- Understand Fractions on a Number Line

Lesson Pacing Guide

The day-by-day pacing guide can be used to plan whole class and small group instruction, for ongoing monitoring, and for individualized learning with *Ready* and *i-Ready* blended learning options.

Plan teacher-led **whole and small group instruction**. Practice can be assigned after every section of the lesson in class, after school, or at home with *Practice and Problem Solving*. Assess students' mastery of lesson content and identify the need for reteaching with lesson quizzes.

Plan **small group differentiation** using *Ready Instruction* prerequisite lessons for in-depth instruction from earlier grades to review prerequisite concepts or fill in gaps in student knowledge, student-led Math Center Activities for standards practice in three different levels, and teacher-led Tools for Instruction activities for small groups of students requiring additional instruction on a prerequisite or on-level skill.

Plan students' **personalized learning** using *i-Ready's* adaptive instruction to remediate and fill gaps.

# Student Book: Modeled and Guided Instruction

The Modeled and Guided Instruction supports students as they explore different ways of solving a real-world or mathematical problem.

## Picture It/Model It (whole class)

**Teacher's Role** Read the problem at the top of the page, then work through the *Picture It* and *Model It* as a class. Pose the scaffolded questions to guide students' understanding of the approaches on the page.

Use *Mathematical Discourse* questions in the Teacher Resource Book (TRB) to promote thoughtful dialogue about the models and strategies. Encourage the exchange of ideas among students by having them suggest solution methods that differ from those shown. Have students share which solution strategy works best for them and explain why.

**Student's Role** As they discuss different ways of representing a given problem, students begin to understand there are multiple access points from which they can draw on prior knowledge.

Looking at other ways to solve the problem encourages students to think in ways they would not have otherwise, building flexibility in their ability to solve problems.

## Lesson 16 Modeled and Guided Instruction

### Learn About Adding Fractions

Read the problem. Then explore different ways to understand adding fractions.

Josie and Margo are painting a fence green. Josie starts at one end and paints  $\frac{3}{10}$  of the fence. Margo starts at the other end and paints  $\frac{4}{10}$  of it. What fraction of the fence do they paint?

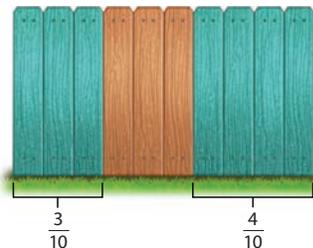
**Picture It** You can use a picture to help understand the problem.

Think what the fence might look like. It has 10 equal-sized parts.

Each part is  $\frac{1}{10}$  of the whole.

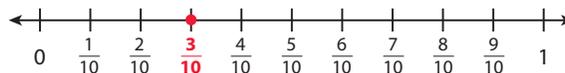


The girls paint 3 tenths and 4 tenths of the fence.

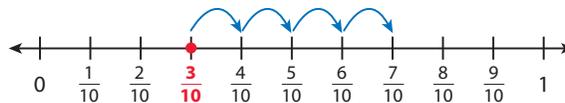


**Model It** You can also use a number line to help understand the problem.

The number line below is divided into tenths, with a point at  $\frac{3}{10}$ .



Start at  $\frac{3}{10}$  and count 4 tenths to the right to add  $\frac{4}{10}$ .



**Connect It** Now you will solve the problem from the previous page using equations.

**2** How do you know that each section of fence is  $\frac{1}{10}$  of the total fence?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3** What do the numerators, 3 and 4, tell you? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**4** How many sections of the fence did Josie and Margo paint altogether? \_\_\_\_\_

**5** Complete the equations to show what fraction of the fence Josie and Margo painted altogether.

Use words: **3 tenths** + **4 tenths** =  tenths

Use fractions:  $\frac{3}{10}$  +  $\frac{4}{10}$  =  $\frac{\text{ } \text{ }}{10}$

**6** Explain how you add fractions that have the same denominator.

\_\_\_\_\_

\_\_\_\_\_

**Try It** Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

**7** Lita and Otis are helping their mom clean the house. Lita cleaned  $\frac{1}{3}$  of the rooms. Otis cleaned  $\frac{1}{3}$  of the rooms. What fraction of the rooms did Lita and Otis clean altogether? \_\_\_\_\_

**8** Mark's string is  $\frac{1}{5}$  of a meter long. Bob's string is  $\frac{3}{5}$  of a meter long. How long are the two strings combined? \_\_\_\_\_ of a meter

**Connect It** (whole class)

**Teacher's Role** Discuss the *Connect It* as a class, guiding students to make the connection between the representations on the previous page and a more general symbolic representation of the problem and solution.

Use *SMP Tips* in the TRB to help students advance through the content, critically analyze information, and use complex cognitive thinking. This reflects the expectation that students are actively engaged in doing mathematics rather than passively receiving mathematics instruction.

**Student's Role** Students who engage with the symbolic representations by making and defending conjectures are able to apply what they have learned to solve similar problems. This helps them understand their own progress as they look for approaches that work best for them and find what they still need feedback on.

**Try It** (small group)

**Student's Role** Discussing how the responses to the *Connect It* relate to the problem they are about to solve adds to students' understanding as they apply the newly learned skill to a new situation.

**Teacher's Role** Have students read and discuss the *Try It*, then solve the problems on their own. Look for errors in student thinking and use the TRB *Error Alerts* to provide support.

**Teacher's Role** Assign *Practice and Problem Solving* as independent work in class or at home for additional practice with the skills of the lesson.

# Teacher Resource Book

Point-of-use professional development and step-by-step instructional ideas help teachers address even the most challenging standards effectively.

Complete **Solutions** at point of use provide a correct response and model at least one way to solve the problem and include the DOK level of each question.

In the **Quick Check and Remediation**, an “exit” question is given to monitor understanding of the lesson content. A chart provides a list of incorrect answers based on common errors and gives specific remediation suggestions for each error.

## Lesson 16 Add and Subtract Fractions

### Independent Practice

#### At A Glance

Students add and subtract fractions to solve word problems that might appear on a mathematics test.

#### Solutions

##### 1 Solution

C; Possible student work using an equation:  $\frac{5}{8} + \frac{2}{8} = \frac{7}{8}$

**DOK 1**

##### 2 Solution

C; Possible student work using equations:  $\frac{2}{12} + \frac{3}{12} = \frac{5}{12}$ ;  $\frac{12}{12} - \frac{5}{12} = \frac{7}{12}$

**DOK 2**

##### 3 Solution

$\frac{1}{3}$  cup; Possible student work using an equation:  $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

**DOK 2**

#### Quick Check and Remediation

- Ask students to find  $\frac{4}{10} + \frac{2}{10}$ . [ $\frac{6}{10}$  or  $\frac{3}{5}$ ]
- For students who are still struggling, use the chart to guide remediation.
- After providing remediation, check students’ understanding. Ask students to explain their thinking while finding  $\frac{2}{5} + \frac{3}{5}$ . [ $\frac{5}{5}$  or 1]
- If a student is still having difficulty, use *Ready Instruction*, Grade 4, Lesson 15.

## Lesson 16 Independent Practice

### Practice Adding and Subtracting Fractions

Solve the problems.

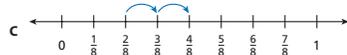
- Liang bought some cloth. He used  $\frac{5}{8}$  of a yard for a school project. He has  $\frac{2}{8}$  of a yard left. How much cloth did Liang buy?
  - $\frac{3}{8}$  of a yard
  - $\frac{7}{16}$  of a yard
  - $\frac{7}{8}$  of a yard
  - $\frac{8}{8}$  of a yard
- Carmela cut a cake into 12 equal-sized pieces. She ate  $\frac{2}{12}$  of the cake, and her brother ate  $\frac{3}{12}$  of the cake. What fraction of the cake is left?
  - $\frac{1}{12}$
  - $\frac{5}{12}$
  - $\frac{7}{12}$
  - $\frac{12}{12}$
- Lee’s muffin mix calls for  $\frac{2}{3}$  cup of milk and  $\frac{1}{3}$  cup of oil. How much more milk than oil does she need for the muffin mix?

$\frac{1}{3}$  cup

174

If the error is . . .	Students may . . .	To remediate . . .
$\frac{6}{20}$	have added both the numerators and the denominators.	Remind students that the denominator tells the kind of parts you are adding. Explain that just as 4 apples + 2 apples = 6 apples, 4 tenths + 2 tenths = 6 tenths.
$\frac{3}{10}$	have added numerators, added denominators, and then simplified.	Remind students that the denominator tells the kind of parts you are adding. Explain that just as 4 apples + 2 apples = 6 apples, 4 tenths + 2 tenths = 6 tenths.
$\frac{2}{10}$	have subtracted the fractions.	Remind students to read the problem carefully to be sure they’re using the correct operation.
$\frac{1}{5}$	have subtracted the fractions and simplified.	Remind students to read the problem carefully to be sure they’re using the correct operation.

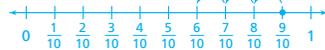
4 Lucy and Melody are painting a room. They divided the room into 8 equal sections. Lucy painted 2 sections and Melody painted 4 sections. Which model can be used to find the total fraction of the room they painted? Circle the letters of all that apply.



5 In all, Cole and Max picked  $\frac{9}{10}$  of a bucket of blueberries. Cole picked  $\frac{3}{10}$  of a bucket of blueberries. What fraction of a bucket of blueberries did Max pick?

Show your work.

Possible student work using a number line:



Answer Max picked  $\frac{6}{10}$  of a bucket of blueberries.

6 A melon is cut into 8 equal slices. Together, Regan and Juanita will eat  $\frac{5}{8}$  of the melon. What is one way the girls could eat that fraction of the melon?

Show your work. Write an equation to represent your answer.

Possible student work using a model:



Answer Regan could eat  $\frac{2}{8}$  of the melon, and Juanita could eat  $\frac{3}{8}$  of the melon.

Equation Possible equation:  $\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

Self Check Go back and see what you can check off on the Self Check on page 143.

Solutions

4 Solution

B; The model shows  $\frac{2}{8}$  shaded in light blue for Lucy's sections and  $\frac{4}{8}$  shaded in dark blue for Melody's sections. The total shaded sections represent the total fraction of the room they painted.

D; The number line starts at Melody's fraction ( $\frac{4}{8}$ ) and adds  $\frac{2}{8}$  for Lucy's fraction, for a total of  $\frac{6}{8}$ .

DOK 2

5 Solution

$\frac{6}{10}$ ; Possible student work using an equation:  $\frac{9}{10} - \frac{3}{10} = \frac{6}{10}$

DOK 2

6 Solution

Possible student work using equations:

$$\frac{0}{8} + \frac{5}{8} = \frac{5}{8}, \frac{1}{8} + \frac{4}{8} = \frac{5}{8},$$

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}, \frac{3}{8} + \frac{2}{8} = \frac{5}{8},$$

$$\frac{4}{8} + \frac{1}{8} = \frac{5}{8}, \frac{5}{8} + \frac{0}{8} = \frac{5}{8}$$

DOK 2

Hands-On Activity

Use fraction strips to add fractions.

Materials: strips of paper, markers

- Distribute paper and markers to each student.
- Direct students to fold a strip of paper in half, and then in half again in the same direction.
- Tell them to unfold the strips and use the marker to show the 4 equal sections.
- Tell students to color  $\frac{1}{4}$  of the strip. Then have them color another  $\frac{1}{4}$  of the strip. Write  $\frac{1}{4} + \frac{1}{4}$  on the board.
- Challenge them to use their fraction strips to show that the sum is  $\frac{2}{4}$ , or  $\frac{1}{2}$ .
- If time allows, repeat for other denominators by folding another strip of paper three or four times.

Challenge Activity

Write a problem for a given sum.

- Tell students that the sum of two fractions is  $\frac{2}{5}$ . However, the original fractions did not have denominators of 5.
- Challenge students to write a fraction addition problem that has a sum of  $\frac{2}{5}$ . [Possible answer:  $\frac{3}{10} + \frac{1}{10}$ ]

A **Challenge Activity** gives students who have mastered the skills and concepts of the lesson an opportunity to apply their understanding to more sophisticated problem solving.

A **Hands-On Activity** extends the concepts and skills of the lesson using common classroom manipulatives and group collaboration.

# Unit 4 Number and Operations—Fractions

## Which lessons are students building upon?

**Grade 3, Lesson 16**  
Understand Equivalent Fractions  
3.NF.A.3a

**Grade 3, Lesson 17**  
Find Equivalent Fractions  
3.NF.A.3b, 3.NF.A.3c

**Grade 3, Lesson 18**  
Understand Comparing Fractions  
3.NF.A.3d

**Grade 3, Lesson 19**  
Use Symbols to Compare Fractions  
3.NF.A.3d

**Grade 3, Lesson 16**  
Understand Equivalent Fractions  
3.NF.A.3a

**Grade 3, Lesson 17**  
Find Equivalent Fractions  
3.NF.A.3b, 3.NF.A.3c

**Grade 4, Lesson 13**  
Understand Equivalent Fractions  
4.NF.A.1

**Grade 4, Lesson 13**  
Understand Equivalent Fractions  
4.NF.A.1

**Grade 4, Lesson 15**  
Understand Fraction Addition and Subtraction  
4.NF.B.3a, 4.NF.B.3b

**Grade 4, Lesson 13**  
Understand Equivalent Fractions  
4.NF.A.1

**Grade 4, Lesson 15**  
Understand Fraction Addition and Subtraction  
4.NF.B.3a, 4.NF.B.3b

**Grade 4, Lesson 16**  
Add and Subtract Fractions  
4.NF.B.3a, 4.NF.B.3d

**Grade 3, Lesson 1**  
Understand the Meaning of Multiplication  
3.OA.A.1

**Grade 3, Lesson 14**  
Understand What a Fraction Is  
3.NF.A.1

**Grade 4, Lesson 18**  
Understand Fraction Multiplication  
4.NF.B.4a, 4.NF.B.4b

**Grade 4, Lesson 13**  
Understand Equivalent Fractions  
4.NF.A.1

**Grade 4, Lesson 15**  
Understand Fraction Addition and Subtraction  
4.NF.B.3a, 4.NF.B.3b

**Grade 4, Lesson 16**  
Add and Subtract Fractions  
4.NF.B.3a, 4.NF.B.3d

## Unit 4

### Lesson 13

Understand Equivalent Fractions  
4.NF.A.1

### Lesson 14

Compare Fractions  
4.NF.A.2

### Lesson 15

Understand Fraction Addition and Subtraction  
4.NF.B.3a, 4.NF.B.3b

### Lesson 16

Add and Subtract Fractions  
4.NF.B.3a, 4.NF.B.3d

### Lesson 17

Add and Subtract Mixed Numbers  
4.NF.B.3b, 4.NF.B.3c, 4.NF.B.3d

### Lesson 18

Understand Fraction Multiplication  
4.NF.B.4a, 4.NF.B.4b

### Lesson 19

Multiply Fractions  
4.NF.B.4c

### Lesson 20

Fractions as Tenths and Hundredths  
4.NF.C.5

## Which lessons are students preparing for?

Grade 5, Lesson 10  
Add and Subtract Fractions  
5.NF.A.1

Grade 5, Lesson 15  
Understand Multiplication as Scaling  
5.NF.B.5a, 5.NF.B.5b

Grade 5, Lesson 11  
Add and Subtract Fractions in Word Problems  
5.NF.A.2

Grade 5, Lesson 10  
Add and Subtract Fractions  
5.NF.A.1

Grade 5, Lesson 11  
Add and Subtract Fractions in Word Problems  
5.NF.A.2

Grade 5, Lesson 10  
Add and Subtract Fractions  
5.NF.A.1

Grade 5, Lesson 11  
Add and Subtract Fractions in Word Problems  
5.NF.A.2

Grade 5, Lesson 10  
Add and Subtract Fractions  
5.NF.A.1

Grade 5, Lesson 11  
Add and Subtract Fractions in Word Problems  
5.NF.A.2

Grade 5, Lesson 13  
Understand Products of Fractions  
5.NF.B.4a

Grade 5, Lesson 14  
Multiply Fractions Using an Area Model  
5.NF.B.4b

Grade 5, Lesson 13  
Understand Products of Fractions  
5.NF.B.4a

Grade 5, Lesson 14  
Multiply Fractions Using an Area Model  
5.NF.B.4b

Grade 5, Lesson 1  
Understand Place Value  
5.NBT.A.1

Grade 5, Lesson 2  
Understand Powers of Ten  
5.NBT.A.2

# Unit 4

## Number and Operations—Fractions

### Lesson

<b>13</b> Understand Equivalent Fractions . . . . .	144
<b>14</b> Compare Fractions . . . . .	150
<b>15</b> Understand Fraction Addition and Subtraction. . . . .	160
<b>16</b> Add and Subtract Fractions . . . . .	166
<b>17</b> Add and Subtract Mixed Numbers. . . . .	176
<b>18</b> Understand Fraction Multiplication . . . . .	186
<b>19</b> Multiply Fractions . . . . .	192
<b>20</b> Fractions as Tenths and Hundredths. . . . .	200
<b>21</b> Relate Decimals and Fractions . . . . .	208
<b>22</b> Compare Decimals. . . . .	218
<b>MATH IN ACTION</b> Use Fractions and Decimals . . . . .	228
<b>Interim Assessment</b> . . . . .	236

### Standards

<b>4.NF.A.1</b>
<b>4.NF.A.2</b>
<b>4.NF.B.3a, 4.NF.B.3b</b>
<b>4.NF.B.3a, 4.NF.B.3d</b>
<b>4.NF.B.3b, 4.NF.B.3c, 4.NF.B.3d</b>
<b>4.NF.B.4a, 4.NF.B.4b</b>
<b>4.NF.B.4c</b>
<b>4.NF.C.5</b>
<b>4.NF.C.6</b>
<b>4.NF.C.7</b>
<b>4.NF.A.1, 4.NF.A.2, 4.NF.B.3, 4.NF.B.4, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7</b>

## Unit 4

## Number and Operations—Fractions



**Real-World Connection** What would the world be like without fractions? Well . . . without fractions, chefs wouldn't be able to measure  $\frac{2}{3}$ -cup of milk and construction workers wouldn't be able to cut a piece of wood  $4\frac{1}{8}$ -feet long. Without fractions, even our language would change. You wouldn't cut an apple in half to share it with a friend, you would cut it into two pieces. You wouldn't be able to talk about one-quarter or one-half of an hour.

**In This Unit** You will see that fractions are a lot like whole numbers. What you know about whole numbers will help you add, subtract, multiply, and even compare fractions. You will explore all the ways in which fractions are like whole numbers, including all the different ways you can show, build, and take apart fractions in order to solve problems.

Let's learn about fractions and decimals.



### ✓ Self Check

Before starting this unit, check off the skills you know below. As you complete each lesson, see how many more skills you can check off!

I can:	Before this unit	After this unit
find equivalent fractions, for example: $\frac{2}{3} = \frac{4}{6}$ .	<input type="checkbox"/>	<input type="checkbox"/>
compare fractions with unlike denominators, for example: $\frac{2}{5} > \frac{3}{10}$ .	<input type="checkbox"/>	<input type="checkbox"/>
add and subtract fractions with like denominators, for example: $\frac{2}{6} + \frac{3}{6} = \frac{5}{6}$ .	<input type="checkbox"/>	<input type="checkbox"/>
multiply a fraction by a whole number, for example: $3 \times \frac{1}{2} = \frac{3}{2}$ .	<input type="checkbox"/>	<input type="checkbox"/>
write a decimal as a fraction, for example: $0.4 = \frac{4}{10}$ .	<input type="checkbox"/>	<input type="checkbox"/>
compare decimals, for example: $0.65 < 0.7$ .	<input type="checkbox"/>	<input type="checkbox"/>

### At A Glance

- This page introduces students to the general ideas behind fractions and decimals.
- The checklist allows them to see what skills they will be learning and take ownership of their progress.

### Step By Step

- Explain to students that they are going to begin a new unit of lessons. Tell them that in all the lessons in this unit they will be learning about fractions and decimals.
- Have the class read together the introduction to the unit in their books. Invite and respond to comments and questions, if any.
- Then take a few minutes to have each student independently read through the list of skills.
- Ask students to consider each skill and check the box if it is a skill they think they already have. Remind students that these skills are likely to all be new to them, but it's still possible some students have some of the skills.
- Engage students in a brief discussion about the skills. Invite students to comment on which ones they would most like to learn, or which ones seem similar or related to something they already know. Remind them that the goal is to be able to check off one skill at a time until they have them all checked.

## Ready Mathematics

PRACTICE AND PROBLEM SOLVING

### Practice and Problem Solving Resources

Use the following resources from *Practice and Problem Solving* to engage students and their families and to extend student learning.

- **Family Letters** Send Family Letters home separately before each lesson or as part of a family communication package.
- **Unit Games** Use partner Unit Games at classroom centers and/or send them home for play with family members.
- **Unit Practice** Assign Unit Practice as homework, as independent or small group practice, or for whole class discussion.
- **Unit Performance Tasks** Have students solve real-world Unit Performance Tasks independently or in small groups.
- **Unit Vocabulary** Use Unit Vocabulary throughout the unit to personalize student's acquisition of mathematics vocabulary.
- **Fluency Practice** Assign Fluency Skills Practice and Fluency Repeated Reasoning Practice worksheets throughout the unit.

# LESSON OVERVIEW

## Lesson 16 Add and Subtract Fractions

### CCSS Focus

#### Domain

Number and Operations—Fractions

#### Cluster

**B.** Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

#### Standard

**4.NF.B.3** Understand a fraction  $\frac{a}{b}$  with  $a > 1$  as a sum of fractions  $\frac{1}{b}$ .

- a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

#### Standards for Mathematical Practice (SMP)

- 1 Make sense of problems and persevere in solving them.
- 2 Reason abstractly and quantitatively.
- 4 Model with mathematics.
- 5 Use appropriate tools strategically.
- 6 Attend to precision.
- 7 Look for and make use of structure.
- 8 Look for and express regularity in repeated reasoning.

### Lesson Objectives

#### Content Objectives

- Add fractions with like denominators.
- Subtract fractions with like denominators.
- Use fraction models, number lines, and equations to represent word problems.

#### Language Objectives

- Draw pictures or diagrams to represent word problems involving fraction addition and subtraction.
- Use fraction vocabulary, including *numerator* and *denominator*, to explain how to add and subtract fractions with like denominators.
- Orally define and use the key mathematical terms *add*, *subtract*, *equal parts*, *fraction*, *numerator*, and *denominator* when reasoning and arguing about fraction addition and subtraction.
- Write and solve equations to represent word problems involving fraction addition or subtraction.

### Prerequisite Skills

- Understand addition as joining parts.
- Understand subtraction as separating parts.
- Know addition and subtraction basic facts.
- Understand the meaning of fractions.
- Identify numerators and denominators.
- Write whole numbers as fractions.
- Compose and decompose fractions.

### Lesson Vocabulary

There is no new vocabulary. Review the following key terms.

- **numerator** the top number in a fraction; it tells the number of equal parts that are being described
- **denominator** the bottom number in a fraction; it tells the total number of equal parts in the whole

### Learning Progression

**In the previous lesson** students begin developing an understanding of adding and subtracting fractions with like denominators. They develop an understanding of adding fractions as combining parts referring to the same whole.

**This lesson** extends student's understanding of fraction addition and subtraction. Here students begin to deal with addition and subtraction in the abstract. Students use visual models to

represent word problems involving the addition and subtraction of fractions with the same whole. Students also use equations to solve word problems.

**In the next lesson** students will add and subtract mixed numbers with like denominators. The focus in Grade 4 is on adding and subtracting fractions with like denominators. In Grade 5 students begin to add and subtract fractions with unlike denominators.

## Lesson Pacing Guide

### Whole Class Instruction

<b>Day 1</b> 45–60 minutes	<b>Toolbox: Interactive Tutorial*</b> <i>Understand Adding and Subtracting Fractions</i>  <b>Introduction</b> <ul style="list-style-type: none"> <li>• Use What You Know 10 min</li> <li>• Find Out More 15 min</li> <li>• Reflect 10 min</li> </ul>	<b>Practice and Problem Solving</b> Assign pages 175–176.
<b>Day 2</b> 45–60 minutes	<b>Modeled and Guided Instruction</b> <b>Learn About Adding Fractions</b> <ul style="list-style-type: none"> <li>• Picture It/Model It 20 min</li> <li>• Connect It 10 min</li> <li>• Try It 15 min</li> </ul>	<b>Practice and Problem Solving</b> Assign pages 177–178.
<b>Day 3</b> 45–60 minutes	<b>Modeled and Guided Instruction</b> <b>Learn About Subtracting Fractions</b> <ul style="list-style-type: none"> <li>• Picture It/Model It 10 min</li> <li>• Connect It 20 min</li> <li>• Try It 15 min</li> </ul>	<b>Practice and Problem Solving</b> Assign pages 179–180.
<b>Day 4</b> 45–60 minutes	<b>Guided Practice</b> <b>Adding and Subtracting Fractions</b> <ul style="list-style-type: none"> <li>• Example 5 min</li> <li>• Problems 16–18 15 min</li> <li>• Pair/Share 15 min</li> <li>• Solutions 10 min</li> </ul>	<b>Practice and Problem Solving</b> Assign pages 181–182.
<b>Day 5</b> 45–60 minutes	<b>Independent Practice</b> <b>Adding and Subtracting Fractions</b> <ul style="list-style-type: none"> <li>• Problems 1–6 20 min</li> <li>• Quick Check and Remediation 10 min</li> <li>• Hands-On or Challenge Activity 15 min</li> </ul>	
	<b>Toolbox: Lesson Quiz</b> Lesson 16 Quiz	

\*We continually update the Interactive Tutorials. Check the Teacher Toolbox for the most up-to-date offerings for this lesson.

### Small Group Differentiation

#### Teacher-Toolbox.com

#### Reteach

**Ready Prerequisite Lessons** 45–90 min

#### Grade 3

- Lesson 14 *Understand What a Fraction Is*
- Lesson 15 *Understand Fractions on a Number Line*

#### Teacher-led Activities

**Tools for Instruction** 15–20 min

#### Grade 3 (Lessons 14 and 15)

- Parts of a Whole
- Parts of a Set
- Fractions on a Number Line
- Place Fractions on a Number Line

#### Grade 4 (Lessons 16)

- Fractions as Sums

#### Student-led Activities

**Math Center Activities** 30–40 min

#### Grade 3 (Lessons 14 and 15)

- 3.25 Write the Fraction
- 3.26 Show Fractions
- 3.27 Use Fraction Vocabulary
- 3.28 Identify Fractions on a Number Line

#### Grade 4 (Lessons 16)

- 4.31 Different Ways to Show Sums

### Personalized Learning

#### i-Ready.com

#### Independent

**i-Ready Lessons\*** 10–20 min

#### Grade 3 (Lessons 15 and 16)

- Understand Fractions on a Number Line
- Understand Adding and Subtracting Fractions

## Introduction

## At A Glance

Students read a word problem and answer a series of questions designed to explore the connection between adding and subtracting fractions and adding and subtracting whole numbers. Then students use fraction models to review adding and subtracting fractions.

## Step By Step

- Work through **Use What You Know** as a class.
- Tell students that this page models building the solution to a problem one step at a time and explaining the solution.
- Have students read the problem at the top of the page.
- Ask students to explain how they figured out how many cards Lynn and Paco received altogether and how many cards Todd received.
- Guide students to understand that they needed to “join” and “take away” the numbers of cards to answer the questions.
- Be sure to point out that  $4 + 3 + 5$  equals the total number of cards, 12. Remind students that the whole is represented by the pack of cards.
- Ask student pairs or groups to explain their answers for the remaining questions.

## ▶ Mathematical Discourse 1 and 2

- Encourage students to explain the connection between adding and subtracting fractions and adding and subtracting whole numbers. [When adding or subtracting whole numbers, you join or separate *whole* numbers. When adding or subtracting fractions, you join or separate parts of the *whole*.]

## ▶ Real-World Connection

Lesson 16 Introduction  
Add and Subtract Fractions

## Use What You Know

In Lesson 15, you learned that adding fractions is a lot like adding whole numbers. Take a look at this problem.

Lynn, Paco, and Todd split a pack of 12 baseball cards. Lynn gets 4 cards, Paco gets 3 cards, and Todd gets the rest of the cards. What fraction of the pack does Todd get?



- How many cards do Lynn and Paco get altogether? 7
- How many cards does Todd get? 5
- There are 12 cards in the pack. What fraction represents the whole pack of cards?  $\frac{12}{12}$
- If Lynn gets 4 cards out of 12, that means she gets  $\frac{4}{12}$  of the pack. If Paco gets 3 cards out of 12, what fraction of the pack does he get?  $\frac{3}{12}$
- What fraction of the pack do Lynn and Paco get altogether?  $\frac{7}{12}$
- Explain how you could find the fraction of the pack that Todd gets.

**Possible answer:** Todd gets 5 cards. There are 12 cards in the pack. If the numerator tells the number of cards Todd gets, and the denominator tells the number of cards in the pack, then Todd gets  $\frac{5}{12}$  of the pack.

166

## ▶ Mathematical Discourse

- 1 What does the denominator of a fraction tell you?

Listen for responses that include the phrase “equal parts of a whole.”

- 2 What does the numerator of a fraction tell you?

Students’ responses should indicate an understanding that the numerator tells you the number of equal parts you are talking about.

## ▶ Real-World Connection

**Discuss fraction use in everyday situations.**

Encourage students to think about everyday places or situations where people might need to add or subtract like fractions. Have volunteers share their ideas.

*Examples:* cooking, construction site, distances on a map

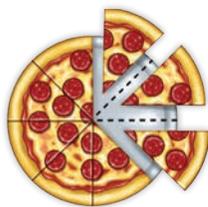
### Find Out More

We often use **fractions** in real life. Fractions can describe something that has several equal parts, as in the baseball card problem. In that problem the “whole” is the pack of cards. Since there are 12 cards in the pack, each card represents  $\frac{1}{12}$  of the whole.



Fractions in real life can also describe the equal parts of a single object, such as a pizza cut into 8 equal slices.

The pizza is the “whole,” and all the slices of pizza are equal parts of the same whole. Since there are 8 equal-sized slices, each slice is  $\frac{1}{8}$  of the pizza. Even if a person takes away one or more slices, the “whole” is still the same 8 slices.



### Reflect

- 1 Give another example of a “whole” object with equal parts that can be described by fractions.

**Possible answer:** You can think of a full egg carton as a whole object with

12 equal parts. Each egg is  $\frac{1}{12}$  of the whole.

---



---



---

167

### Step By Step

- Read **Find Out More** as a class.
- Point out that when you have a set of objects, the denominator represents the whole. Since there are 12 baseball cards in the pack, that means there are 12 equal parts. Here, the numerator represents the number of cards each person has.
- Remind students that when you have a whole that is divided into equal parts, the denominator is the total number of parts.

### Hands-On Activity

- Note that the whole pizza was divided into 8 equal slices, so the denominator is 8. If all 8 slices remain, the numerator is 8 and  $\frac{8}{8}$  of the pizza remains. If there are 7 slices, the numerator is 7 and  $\frac{7}{8}$  of the pizza remains. If 2 more slices are taken away, then  $\frac{5}{8}$  of the pizza remains.
- Have students read and reply to the **Reflect** directive.

**Ready** Mathematics  
PRACTICE AND PROBLEM SOLVING

Assign *Practice and Problem Solving* pages 175–176 after students have completed this section.

### Hands-On Activity

**Use models to add fractions.**

**Materials:** drawing paper and notebook paper

- Distribute drawing paper and a piece of notebook paper to each student. Tell students to use scissors to cut out 12 equal-sized cards. Explain to students that the 12 cards represent one pack of cards, or one whole, and that there are 12 parts in the whole.
- Tell students to hold up 2 cards. Have students write the name of the fraction represented by the 2 cards on their paper. Review the meaning of the fraction. [2 cards out of 12] Then, repeat with 7 cards.
- Tell students to add (join) the fractions and write the sum on their paper. Have a volunteer explain how they determined their answer.
- If time permits, repeat for additional fraction pairs.

## Modeled and Guided Instruction

## At A Glance

Students use models and number lines to review adding fractions. Then students revisit this problem to learn how to add fractions using equations. Students continue to solve other addition word problems.

## Step By Step

Read the problem at the top of the page as a class.

**SMP TIP Look for Structure.**

Help students generalize that adding fractions is like adding whole numbers. (SMP 7)

## Picture It

- Have a volunteer name the denominator of the fraction in the problem. [10] Point out that each fence section is  $\frac{1}{10}$  of the total number of length of the fence.
- Guide students to recognize that since Josie painted  $\frac{3}{10}$  of the fence sections and Margo painted  $\frac{4}{10}$ , the picture is shaded to represent the total number of fence sections painted, 3 for Josie and 4 for Margo. Have students count aloud to find the sum.

## Model It

- Direct students to look at the number line. Emphasize that the number line is divided into tenths to represent the total number of fence sections.

## ▶ Mathematical Discourse 1 and 2

- You may wish to draw the number line on the board and have a volunteer demonstrate 4 jumps to the right to add 4 tenths to  $\frac{3}{10}$ .

## ▶ Concept Extension

## Learn About Adding Fractions

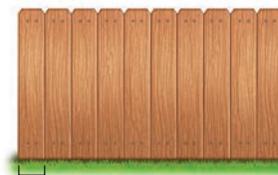
Read the problem. Then explore different ways to understand adding fractions.

Josie and Margo are painting a fence green. Josie starts at one end and paints  $\frac{3}{10}$  of the fence. Margo starts at the other end and paints  $\frac{4}{10}$  of it. What fraction of the fence do they paint?

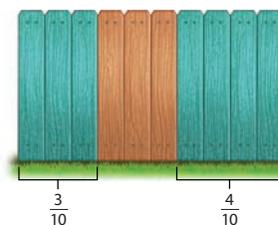
▶ **Picture It** You can use a picture to help understand the problem.

Think what the fence might look like. It has 10 equal-sized parts.

Each part is  $\frac{1}{10}$  of the whole.



The girls paint 3 tenths and 4 tenths of the fence.

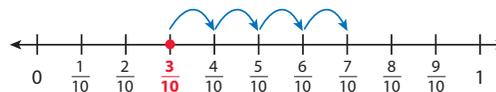


▶ **Model It** You can also use a number line to help understand the problem.

The number line below is divided into tenths, with a point at  $\frac{3}{10}$ .



Start at  $\frac{3}{10}$  and count 4 tenths to the right to add  $\frac{4}{10}$ .



168

## ▶ Mathematical Discourse

- 1 How could you use fractions to label 0 and 1 on the number line?

Students may suggest that you can write both as a number out of 10, so  $\frac{0}{10}$  and  $\frac{10}{10}$ .

- 2 What is another way you could solve the problem?

Responses may mention using fraction strips. You could line up three  $\frac{1}{10}$  strips and four  $\frac{1}{10}$  strips in a single row. Then, you could count how many tenths you have altogether.

## ▶ Concept Extension

**Illustrate the Commutative Property of Addition.**

- Ask: What if I drew the starting point at  $\frac{4}{10}$  instead of  $\frac{3}{10}$ ? Could I still solve the problem?
- To emphasize the point, draw a number line on the board with a point at  $\frac{4}{10}$ . Then, have students explain how to count on from  $\frac{4}{10}$  to find the answer. Encourage a volunteer to come to the board and demonstrate how to find the sum.

**Connect It** Now you will solve the problem from the previous page using equations.

- 2 How do you know that each section of fence is  $\frac{1}{10}$  of the total fence?

**Possible answer:** The denominator tells the total number of fence sections.

The numerator tells the number of fence sections that you are talking about.

- 3 What do the numerators, 3 and 4, tell you? **3 tells the number of fence sections that Josie painted. 4 tells the number of fence sections that Margo painted.**

- 4 How many sections of the fence did Josie and Margo paint altogether? **7**

- 5 Complete the equations to show what fraction of the fence Josie and Margo painted altogether.

Use words: **3 tenths** + **4 tenths** = **7** tenths

Use fractions:  $\frac{3}{10}$  +  $\frac{4}{10}$  =  $\frac{7}{10}$

- 6 Explain how you add fractions that have the same denominator.

**Add the numerators and leave the denominator as is.**

**Try It** Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

- 7 Lita and Otis are helping their mom clean the house. Lita cleaned  $\frac{1}{3}$  of the rooms. Otis cleaned  $\frac{1}{3}$  of the rooms. What fraction of the rooms did Lita and Otis clean altogether?  **$\frac{2}{3}$**

- 8 Mark's string is  $\frac{1}{5}$  of a meter long. Bob's string is  $\frac{3}{5}$  of a meter long. How long are the two strings combined?  **$\frac{4}{5}$**  of a meter

169

## Step By Step

### Connect It

- Read **Connect It** as a class. Be sure to point out that the questions refer to the problem on the previous page.
- Review the meanings of *numerator* (the number of equal parts of a set you have) and *denominator* (the total number of equal parts the set is divided into).
- Ask: *If the fence Josie and Margo painted had only 8 sections, what fraction would represent 1 section of the fence?*  $\left[\frac{1}{8}\right]$

### English Language Learners

### Try It

#### 7 Solution

$\frac{2}{3}$ ; Students may show  $\frac{1}{3}$  on a number line divided into thirds and count 1 mark to the right. They also may write the equation  $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ .

#### 8 Solution

$\frac{4}{5}$ ; Students may show  $\frac{1}{5}$  on a number line divided into fifths and count 3 marks to the right. They also may write the equation  $\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$ .

**Error Alert** Students who wrote  $\frac{4}{10}$  (or  $\frac{2}{5}$ ) added both the numerators and the denominators.

**Ready** Mathematics  
PRACTICE AND PROBLEM SOLVING

Assign *Practice and Problem Solving* pages 177–178 after students have completed this section.

### English Language Learners

#### Write fraction words.

- Write the word *tenths* on the board. Circle the letters that spell *ten* in the word and write the number 10 below it.
- Repeat using the word *eighths*.
- Have students write *tenths* and *eighths* on a piece of paper. Next to the words, have them write fractions associated with the words.
- *If time allows, repeat with other fraction words.*

## Modeled and Guided Instruction

## At A Glance

Students use models and number lines to learn how to subtract fractions. Then students revisit this problem to learn how to subtract fractions using equations. Students then solve other subtraction word problems.

## Step By Step

## Picture It

- Guide students to recognize that Alberto's water bottle is divided into 6 equal parts. Ask: *What do the 6 equal parts represent?* [the whole bottle] *Why is the bottle divided into 6 equal parts* [The denominator is 6.] *What do the 5 shaded parts represent?* [The amount of that is in the bottle.] *Why are 5 parts shaded?* [The numerator is 5.]
- Point out that 4 sixths are being taken away since Alberto drank 4 parts of the water bottle. Ask: *What is  $5 - 4$ ?* [1] Say: *So, 1 sixth of the liter of water is left.*

## Model It

- Tell students to look at the number line in **Model It**. Point out that the number line is divided into sixths to represent the 6 equal parts of Alberto's water bottle.

## ▶ Mathematical Discourse 1 and 2

- Have a volunteer count 4 jumps to the left from  $\frac{5}{6}$  to subtract 4 sixths. Ask: *What number did [volunteer's name] land on?* [ $\frac{1}{6}$ ] Say: *So, both the model and number line show that 1 sixth of a liter of water is left.*

## ▶ Visual Model

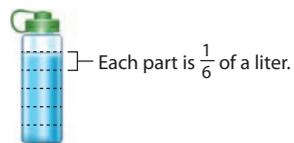
## Learn About Subtracting Fractions

Read the problem. Then explore different ways to understand subtracting fractions.

Alberto's 1-liter water bottle had  $\frac{5}{6}$  of a liter of water in it. He drank  $\frac{4}{6}$  of a liter. What fraction of a liter of water is left in the bottle?

## ▶ Picture It You can use a picture to help understand the problem.

The following model shows the water bottle divided into 6 equal parts. Five shaded parts show how much water was in the bottle.

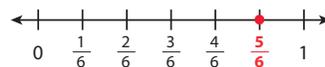


Alberto drank 4 sixths of a liter, so take away 4 shaded parts. The 1 shaded part that is left shows the fraction of a liter that is left.

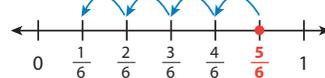


## ▶ Model It You can also use a number line to help understand the problem.

The number line below is divided into sixths, with a point at  $\frac{5}{6}$ .



Start at  $\frac{5}{6}$  and count back 4 sixths to subtract  $\frac{4}{6}$ .



170

## ▶ Mathematical Discourse

- 1 *What is the difference between adding fractions and subtracting fractions on a number line?*  
Responses may indicate direction, moving to the right to add and moving to the left to subtract.
- 2 *What is another way to solve this problem?*  
Students may mention using fraction strips or writing an equation.

## ▶ Visual Model

Help students connect the picture and the number line.

- Draw the number line on the board. Then, draw the  $\frac{5}{6}$ -full water bottle on its side above the number line, making sure the bottom of the bottle is aligned with 0 and each part of the bottle with a tickmark.
- Point out that  $\frac{5}{6}$  on the number line lines up with the amount of water in the bottle.
- Then, cross out (or erase) 4 parts of the bottle one part at a time, moving from right to left along the number line, to show the water Alberto drank. Point out to students that the remaining water is lined up with the  $\frac{1}{6}$ -mark on the number line.

**Connect It** Now you will solve the problem from the previous page using equations.

- 9 In *Picture It*, why does  $\frac{1}{6}$  represent 1 of the equal parts of the bottle?  
**Possible answer:** The denominator tells the number of equal parts the bottle is divided into. The numerator tells the number of parts you are talking about.

- 10 What do the numerators, 5 and 4, tell you? **5 tells the number of parts of the bottle that had water to begin with. 4 tells the number of parts that Alberto drank.**

- 11 How many sixths of a liter are left in the bottle after Alberto drank 4 sixths? **1**

- 12 Complete the equations to show what fraction of a liter is left in the bottle.

Use words: **5 sixths** - **4 sixths** = **1** sixth

Use fractions:  $\frac{5}{6}$  -  $\frac{4}{6}$  =  $\frac{1}{6}$

- 13 Explain how you subtract fractions with the same denominator.  
**Possible answer:** Subtract the numerators and leave the denominator as is.

**Try It** Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

- 14 Mrs. Kirk had  $\frac{3}{4}$  of a carton of eggs. She used  $\frac{2}{4}$  of the carton to make breakfast.  
 What fraction of the carton of eggs does Mrs. Kirk have left?  $\frac{1}{4}$

- 15 Carmen had  $\frac{8}{10}$  of the lawn left to mow. She mowed  $\frac{5}{10}$  of the lawn. Now what fraction of the lawn is left to mow?  $\frac{3}{10}$

171

## ▶ Hands-On Activity

Use paper plates to subtract fractions.

**Materials:** paper plates, markers, scissors

- Distribute paper plates, markers, and scissors to each student. Model how to divide the plate into 8 equal sections by folding the plate on top of itself three times.
- Direct students to color  $\frac{5}{8}$  of the plate and then cut out that fraction of the plate. Ask students to name the fraction of the plate they have.  $\left[\frac{5}{8}\right]$
- Tell students to subtract 2 eighths from the 5 eighths. Guide students to cut 2 sections from the color portion of the plate they are holding.
- Ask students to name the fraction of the plate they are left with.  $\left[\frac{3}{8}\right]$
- Write  $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$  on the board.
- If time allows, repeat for other subtraction problems.

## Step By Step

### Connect It

- Read **Connect It** as a class. Be sure to point out that the questions refer to the problem on the previous page.

#### SMP TIP Attend to Precision

Discuss with students how important it is to communicate clearly and precisely by reviewing the meanings of numerator (the number of equal parts you're talking about) and denominator (the total number of equal parts in the whole).  
 Ask: If Alberto's water bottle was divided into 3 equal parts, what fraction would represent 1 of those parts?  $\left[\frac{1}{3}\right]$  (SMP 6)

- Remind students that subtracting fractions is like subtracting whole numbers. Say: To find the number of sixths of a liter of water left in the bottle, subtract the numerators of the fractions and write the difference over the denominator.

### ▶ Hands-On Activity

### Try It

#### 14 Solution

$\frac{1}{4}$ ; Students may show  $\frac{3}{4}$  on a number line divided into fourths and count 2 marks to the left. They also may write the equation  $\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$ .

**Error Alert** Students who answered  $\frac{2}{4}$  (or  $\frac{1}{2}$ ) subtracted from a full carton of eggs  $\left(\frac{4}{4}\right)$  rather than  $\frac{3}{4}$  of a carton.

#### 15 Solution

$\frac{3}{10}$ ; Students may show  $\frac{8}{10}$  on a number line divided into tenths and count 5 marks to the left. They also may write the equation  $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$ .

**Ready Mathematics**  
PRACTICE AND PROBLEM SOLVING

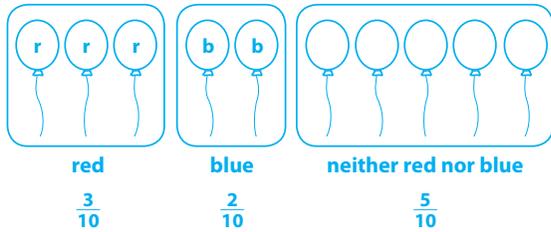
Assign *Practice and Problem Solving* pages 179–180 after students have completed this section.



- 17 Mr. Chang has a bunch of balloons.  $\frac{3}{10}$  of the balloons are red.  $\frac{2}{10}$  of the balloons are blue. What fraction of the balloons are neither red nor blue?

Show your work.

Possible student work using a model:



Solution  $\frac{5}{10}$



I think that there are at least two different steps to solve this problem.

**Pair/Share**

How is this problem different from the others you've seen in this lesson?

- 18 Emily ate  $\frac{1}{6}$  of a bag of carrots. Nick ate  $\frac{2}{6}$  of the bag of carrots. What fraction of the bag of carrots did Emily and Nick eat altogether? Circle the letter of the correct answer.

- A  $\frac{1}{6}$
- B  $\frac{1}{3}$
- C  $\frac{3}{6}$**
- D  $\frac{3}{12}$

Rob chose **D** as the correct answer. How did he get that answer?

**Rob added both the numerators and the denominators.**

\_\_\_\_\_

\_\_\_\_\_



To find the fraction of the bag Emily and Nick ate altogether, should you add or subtract?

**Pair/Share**

Does Rob's answer make sense?

**Solutions**

**17 Solution**

$\frac{5}{10}$ ; Students could solve the problem by drawing a picture of 10 balloons and labeling 3 as red and 2 as blue.

**DOK 2**

**18 Solution**

**C**; Students could solve this problem using the equation  $\frac{1}{6} + \frac{2}{6} = \frac{3}{6}$ .

Explain to students why the other two answer choices are not correct:

**A** is not correct because you are not subtracting  $\frac{1}{6}$  from  $\frac{2}{6}$ ; this is an addition problem.

**B** is not correct because  $\frac{1}{3}$  is not equivalent to  $\frac{3}{6}$ .

**DOK 3**

**Ready Mathematics**  
PRACTICE AND PROBLEM SOLVING

Assign *Practice and Problem Solving* pages 181–182 after students have completed this section.

Teacher Notes

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Independent Practice

### At A Glance

Students add and subtract fractions to solve word problems that might appear on a mathematics test.

### Solutions

#### 1 Solution

C; Possible student work using an equation:  $\frac{5}{8} + \frac{2}{8} = \frac{7}{8}$

**DOK 1**

#### 2 Solution

C; Possible student work using equations:  $\frac{2}{12} + \frac{3}{12} = \frac{5}{12}$ ;  $\frac{12}{12} - \frac{5}{12} = \frac{7}{12}$

**DOK 2**

#### 3 Solution

$\frac{1}{3}$  cup; Possible student work using an equation:  $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

**DOK 2**

## Practice Adding and Subtracting Fractions

Solve the problems.

- Liang bought some cloth. He used  $\frac{5}{8}$  of a yard for a school project. He has  $\frac{2}{8}$  of a yard left. How much cloth did Liang buy?
  - $\frac{3}{8}$  of a yard
  - $\frac{7}{16}$  of a yard
  - $\frac{7}{8}$  of a yard
  - $\frac{8}{8}$  of a yard
- Carmela cut a cake into 12 equal-sized pieces. She ate  $\frac{2}{12}$  of the cake, and her brother ate  $\frac{3}{12}$  of the cake. What fraction of the cake is left?
  - $\frac{1}{12}$
  - $\frac{5}{12}$
  - $\frac{7}{12}$
  - $\frac{12}{12}$
- Lee's muffin mix calls for  $\frac{2}{3}$  cup of milk and  $\frac{1}{3}$  cup of oil. How much more milk than oil does she need for the muffin mix?

$\frac{1}{3}$  cup

174

### Quick Check and Remediation

- Ask students to find  $\frac{4}{10} + \frac{2}{10}$ . [ $\frac{6}{10}$  or  $\frac{3}{5}$ ]
- For students who are still struggling, use the chart to guide remediation.
- After providing remediation, check students' understanding. Ask students to explain their thinking while finding  $\frac{2}{5} + \frac{3}{5}$ . [ $\frac{5}{5}$  or 1]
- If a student is still having difficulty, use *Ready Instruction*, Grade 4, Lesson 15.

If the error is ...	Students may ...	To remediate ...
$\frac{6}{20}$	have added both the numerators and the denominators.	Remind students that the denominator tells the kind of parts you are adding. Explain that just as 4 apples + 2 apples = 6 apples, 4 tenths + 2 tenths = 6 tenths.
$\frac{3}{10}$	have added numerators, added denominators, and then simplified.	Remind students that the denominator tells the kind of parts you are adding. Explain that just as 4 apples + 2 apples = 6 apples, 4 tenths + 2 tenths = 6 tenths.
$\frac{2}{10}$	have subtracted the fractions.	Remind students to read the problem carefully to be sure they're using the correct operation.
$\frac{1}{5}$	have subtracted the fractions and simplified.	Remind students to read the problem carefully to be sure they're using the correct operation.

- 4 Lucy and Melody are painting a room. They divided the room into 8 equal sections. Lucy painted 2 sections and Melody painted 4 sections. Which model can be used to find the total fraction of the room they painted? Circle the letters of all that apply.



- 5 In all, Cole and Max picked  $\frac{9}{10}$  of a bucket of blueberries. Cole picked  $\frac{3}{10}$  of a bucket of blueberries. What fraction of a bucket of blueberries did Max pick?

Show your work.

Possible student work using a number line:



Answer Max picked  $\frac{6}{10}$  of a bucket of blueberries.

- 6 A melon is cut into 8 equal slices. Together, Regan and Juanita will eat  $\frac{5}{8}$  of the melon. What is one way the girls could eat that fraction of the melon?

Show your work. Write an equation to represent your answer.

Possible student work using a model:



Answer Regan could eat  $\frac{2}{8}$  of the melon, and Juanita could eat  $\frac{3}{8}$  of the melon.

Equation Possible equation:  $\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

**Self Check** Go back and see what you can check off on the Self Check on page 143.

## Solutions

- 4 Solution

B; The model shows  $\frac{2}{8}$  shaded in light blue for Lucy's sections and  $\frac{4}{8}$  shaded in dark blue for Melody's sections. The total shaded sections represent the total fraction of the room they painted.

D; The number line starts at Melody's fraction ( $\frac{4}{8}$ ) and adds  $\frac{2}{8}$  for Lucy's fraction, for a total of  $\frac{6}{8}$ .

DOK 2

- 5 Solution

$\frac{6}{10}$ ; Possible student work using an equation:  $\frac{9}{10} - \frac{3}{10} = \frac{6}{10}$

DOK 2

- 6 Solution

Possible student work using equations:

$$\begin{aligned} \frac{0}{8} + \frac{5}{8} &= \frac{5}{8}, \frac{1}{8} + \frac{4}{8} = \frac{5}{8}, \\ \frac{2}{8} + \frac{3}{8} &= \frac{5}{8}, \frac{3}{8} + \frac{2}{8} = \frac{5}{8}, \\ \frac{4}{8} + \frac{1}{8} &= \frac{5}{8}, \frac{5}{8} + \frac{0}{8} = \frac{5}{8} \end{aligned}$$

DOK 2

### Hands-On Activity

Use fraction strips to add fractions.

**Materials:** strips of paper, markers

- Distribute paper and markers to each student.
- Direct students to fold a strip of paper in half, and then in half again in the same direction.
- Tell them to unfold the strips and use the marker to show the 4 equal sections.
- Tell students to color  $\frac{1}{4}$  of the strip. Then have them color another  $\frac{1}{4}$  of the strip. Write  $\frac{1}{4} + \frac{1}{4}$  on the board.
- Challenge them to use their fraction strips to show that the sum is  $\frac{2}{4}$ , or  $\frac{1}{2}$ .
- If time allows, repeat for other denominators by folding another strip of paper three or four times.

### Challenge Activity

Write a problem for a given sum.

- Tell students that the sum of two fractions is  $\frac{2}{5}$ . However, the original fractions did not have denominators of 5.
- Challenge students to write a fraction addition problem that has a sum of  $\frac{2}{5}$ . [Possible answer:  $\frac{3}{10} + \frac{1}{10}$ ]

**Teacher-Toolbox.com**

**Overview**

Assign the Lesson 16 Quiz and have students work independently to complete it.

Use the results of the quiz to assess students' understanding of the content of the lesson and to identify areas for reteaching. See the Lesson Pacing Guide at the beginning of the lesson for suggested instructional resources.

**Tested Skills**

**Assesses** 4.NF.B.3a, 4.NF.B.3d

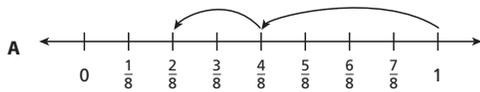
Problems on this assessment form require students to be able to use fraction models and number lines to add and subtract fractions with like denominators. Students will also need to be familiar with basic addition and subtraction facts, composing and decomposing fractions, and writing whole numbers as fractions.

**Ready® Mathematics**

**Lesson 16 Quiz**

**Solve the problems.**

- 1** Nobu is making a bracelet with 8 equal sections. He makes  $\frac{4}{8}$  of the bracelet on Saturday and  $\frac{2}{8}$  of the bracelet on Sunday. Which model can be used to find the total fraction of the bracelet that Nobu makes on Saturday and Sunday? Circle all the correct answers.



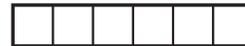
- 2** In a science class, students spend  $\frac{2}{10}$  of the time reading and  $\frac{7}{10}$  of the time doing an experiment. They spend the rest of the time cleaning up. What fraction of science class time do students spend cleaning?

- A**  $\frac{9}{10}$   
**B**  $\frac{5}{10}$   
**C**  $\frac{9}{20}$   
**D**  $\frac{1}{10}$

**Lesson 16 Quiz continued**

- 3** What is  $\frac{1}{6} + \frac{3}{6}$ ?

Shade the model to show your answer.



- 4** In Lisa's closet,  $\frac{4}{8}$  of the space is used for sweaters and  $\frac{1}{8}$  of the space is used for shirts. Lisa says that her sweaters and shirts take up  $\frac{5}{16}$  of the space in her closet.

Fill in the blanks to explain Lisa's error.

When Lisa added  $\frac{4}{8} + \frac{1}{8}$ , she added both the \_\_\_\_\_ and the \_\_\_\_\_.

She should have added only the \_\_\_\_\_.

The numerator of the correct answer is \_\_\_\_\_ and the denominator of the correct answer is \_\_\_\_\_.

- 5** What is  $\frac{5}{12} - \frac{3}{12}$ ?

**Answer:** \_\_\_\_\_

## Common Misconceptions and Errors

Errors may result if students:

- add instead of subtracting or vice versa.
- add or subtract denominators as well as numerators.
- interpret units on the number line incorrectly.
- add or subtract whole numbers incorrectly.

### Ready® Mathematics

#### Lesson 16 Quiz Answer Key

1. B, D  
**DOK 2**

2. D  
**DOK 2**

3. Student models may have any 4 parts shaded.



**DOK 1**

4. numerators  
denominators  
numerators  
5  
8

**DOK 3**

5.  $\frac{2}{12}$   
**DOK 1**

# Sampler

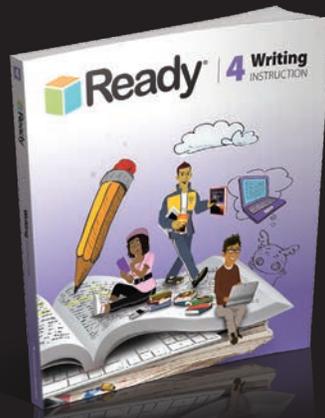
## Raising the bar and making it reachable.

*Ready*® is a rigorous, on-grade level instruction and practice program for Reading, Writing, and Mathematics. Lessons are designed to activate students' full potential to become college and career ready. Unparalleled teacher support materials provide teachers with step-by-step, point-of-use professional development.

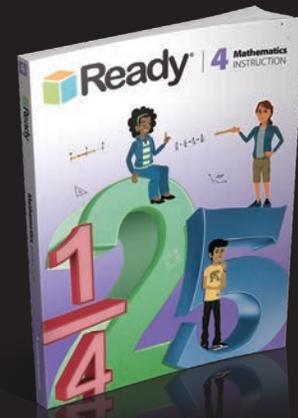
**Check out all of the subjects and grades *Ready* offers.**



**Reading**  
Grades K-8



**Writing**  
Grades 2-5



**Mathematics**  
Grades K-8



**Teacher Toolbox**  
Online Instructional Resources  
Grades K-8