LESSON OVERVIEW

Lesson 16
Add and Subtract Fractions

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.

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.

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

Day 1
45–60 minutes

Toolbox: Interactive Tutorial*
Understand Adding and Subtracting Fractions

Introduction
- Use What You Know *10 min*
- Find Out More *15 min*
- Reflect *10 min*

Practice and Problem Solving
Assign pages 175–176.

Day 2
45–60 minutes

Modeled and Guided Instruction
Learn About Adding Fractions
- Picture It/Model It *20 min*
- Connect It *10 min*
- Try It *15 min*

Practice and Problem Solving
Assign pages 177–178.

Day 3
45–60 minutes

Modeled and Guided Instruction
Learn About Subtracting Fractions
- Picture It/Model It *10 min*
- Connect It *20 min*
- Try It *15 min*

Practice and Problem Solving
Assign pages 179–180.

Day 4
45–60 minutes

Guided Practice
Adding and Subtracting Fractions
- Example *5 min*
- Problems 16–18 *15 min*
- Pair/Share *15 min*
- Solutions *10 min*

Practice and Problem Solving
Assign pages 181–182.

Day 5
45–60 minutes

Independent Practice
Adding and Subtracting Fractions
- Problems 1–6 *20 min*
- Quick Check and Remediation *10 min*
- Hands-On or Challenge Activity *15 min*

Toolbox: Lesson Quiz
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

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?

a. How many cards do Lynn and Paco get altogether? 7

b. How many cards does Todd get? 5

c. There are 12 cards in the pack. What fraction represents the whole pack of cards? $\frac{12}{12}$

d. 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? $\frac{3}{12}$

e. What fraction of the pack do Lynn and Paco get altogether? $\frac{7}{12}$

f. 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.

▶ 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

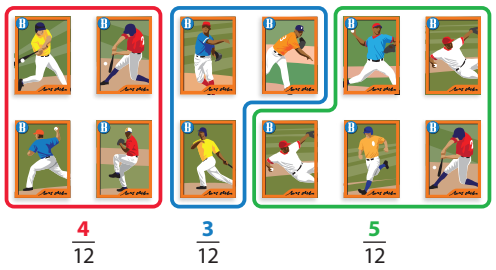
Discuss fraction use in everyday situations.

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

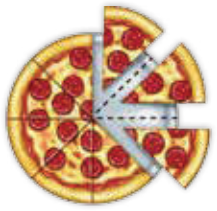
Find Out More

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.



$\frac{4}{12}$ $\frac{3}{12}$ $\frac{5}{12}$

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.

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.

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.

Ready Mathematics PRACTICE AND PROBLEM SOLVING

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

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.

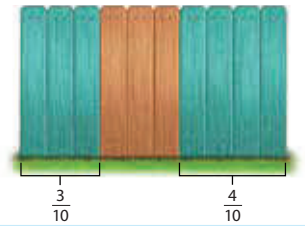
Josie and Margo are painting a fence green. Josie starts at one end and paints $\frac{3}{10}$ of the fence. Margo starts at the other end and paints $\frac{4}{10}$ of it. What fraction of the fence do they paint?

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.

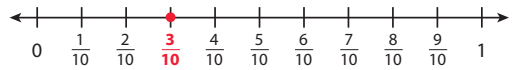
Each part is $\frac{1}{10}$ of the whole.

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

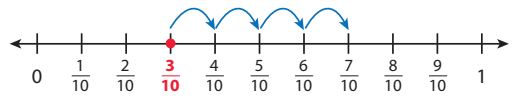


Model It You can also use a number line to help understand the problem.

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** $\frac{4}{10}$.



▶ 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

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.*

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 $\frac{4}{10}$ $\left(\text{or } \frac{2}{5}\right)$ 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.

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?* $\left[\frac{1}{6}\right]$ Say: *So, both the model and number line show that 1 sixth of a liter of water is left.*

▶ Visual Model

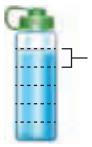
Learn About Subtracting Fractions

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

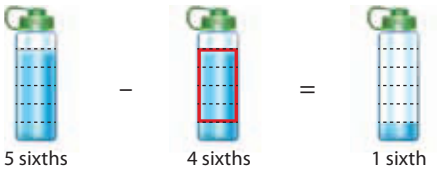
Alberto's 1-liter water bottle had $\frac{5}{6}$ of a liter of water in it. He drank $\frac{4}{6}$ of a liter. What fraction of a liter of water is left in the bottle?

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.

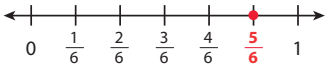


Alberto drank 4 sixths of a liter, so take away 4 shaded parts. The 1 shaded part that is left shows the fraction of a liter that is left.

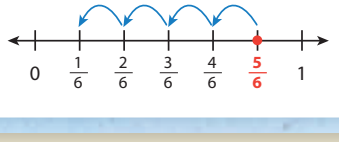


Model It You can also use a number line to help understand the problem.

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** $\frac{4}{6}$.



▶ 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? $\frac{3}{10}$

▶ 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 $\frac{2}{4}$ $\left(\text{or } \frac{1}{2}\right)$ 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.

Guided Practice

At A Glance

Students use models, number lines, or equations to solve word problems involving addition and subtraction of fractions.

Step By Step

- Ask students to solve the problems individually and label fractions in their drawings.
- **Pair/Share** When students have completed each problem, have them Pair/Share to discuss their solutions with a partner or in a group.

Solutions

Example A number line is shown as one way to solve the problem. Students could also solve the problem by drawing a model that is divided into fifths and shading 4 sections (2 sections out of 5 plus 2 sections out of 5).

16 Solution
$\frac{2}{3}$ of a smoothie; Students could solve the problem by using the equation $\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$.
DOK 2

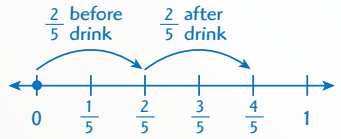
Practice Adding and Subtracting Fractions

Study the example below. Then solve problems 16–18.

Example

Jessica hiked $\frac{2}{5}$ of a mile on a trail before she stopped to get a drink of water. After her drink, Jessica hiked another $\frac{2}{5}$ of a mile. How far did Jessica hike in all?

Look at how you could show your work using a number line.



Solution Jessica hiked $\frac{4}{5}$ of a mile.

The student used labels and "jump" arrows to show each part of the hike on a number line. It is just like adding whole numbers!

Pair/Share
How else could you solve this problem?

16 Ruth made 1 fruit smoothie. She drank $\frac{1}{3}$ of it. What fraction of the fruit smoothie is left?

Show your work.

Possible student work using an equation:

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

Solution $\frac{2}{3}$ of a smoothie

What fraction represents the whole fruit smoothie?

Pair/Share
How did you and your partner decide what fraction to start with?

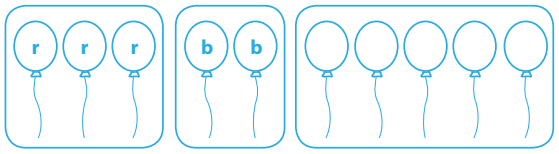
Teacher Notes

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.

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

Possible student work using a model:



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

Solution $\frac{5}{10}$

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.

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

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.

Pair/Share
Does Rob's answer make sense?

Teacher Notes

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.

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 $\frac{4}{10} + \frac{2}{10}$. $\left[\frac{6}{10}\text{ or }\frac{3}{5}\right]$
- 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 $\frac{2}{5} + \frac{3}{5}$. $\left[\frac{5}{5}\text{ or }1\right]$
- 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.

Practice Adding and Subtracting Fractions

Solve the problems.

1 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?

A $\frac{3}{8}$ of a yard

B $\frac{7}{16}$ of a yard

C $\frac{7}{8}$ of a yard

D $\frac{8}{8}$ of a yard

2 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?

A $\frac{1}{12}$

B $\frac{5}{12}$

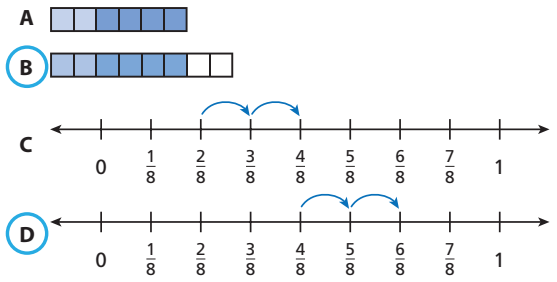
C $\frac{7}{12}$

D $\frac{12}{12}$

3 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

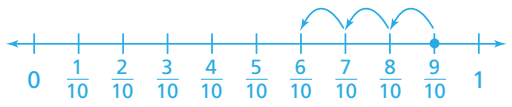
4 Lucy and Melody are painting a room. They divided the room into 8 equal sections. Lucy painted 2 sections and Melody painted 4 sections. Which model can be used to find the total fraction of the room they painted? Circle the letters of all that apply.



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:

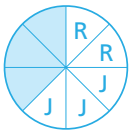


Answer Max picked $\frac{6}{10}$ of a bucket of blueberries.

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 $\left(\frac{4}{8}\right)$ 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: $\frac{3}{10} + \frac{1}{10}$]

LESSON QUIZ

Lesson 16
Add and Subtract Fractions

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

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.

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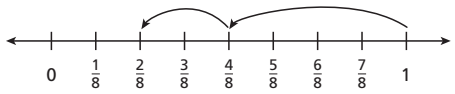
Lesson 16 Quiz

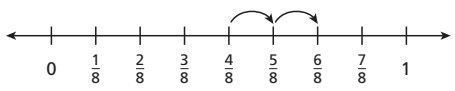
Solve the problems.

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.

A



B



C

D

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.

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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