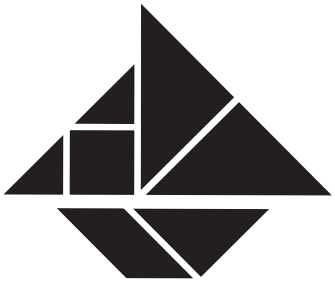


Teachers Guide

GRADE 5 – UNIT 2 – MODULE 3

BRIDGES®
IN MATHEMATICS

Module 3

Common Denominators

Teacher Masters

Pages renumber with each module.

Student Book Pages

Page numbers correspond to those in the consumable books.

Home Connections Pages

Page numbers correspond to those in the consumable books.

Module 3

Common Denominators

Overview

In this module, students compare the ways they have used ratios tables to solve problems and discuss the operations that work in a ratio table. In Session 3, students solve addition and subtraction story problems using a variety of strategies, which they share and compare in the next session. In Session 5, they make generalizations about finding common denominators to add and subtract fractions. The module ends with the Unit 2 Post-Assessment.

Planner

Session & Work Places Introduced	P&I	PS	MF	WP	A	DP	HC
Session 1 Buying Granola The class works together to investigate buying different amounts of granola when granola costs $6 for 5 pounds. After an initial discussion, students work in pairs to find the cost of various amounts using ratio tables. The teacher reconvenes the class to compare and discuss strategies. The discussion culminates with an error analysis and then a generalization about the operations that can (and cannot) be allowed in ratio tables.	●					●	●
Session 2 Fractions Are Ratios The teacher leads a discussion with the class to generate a chart showing how they have been using ratio tables to solve problems. The teacher then points out that fractions are a type of ratio, so students can use ratio tables to find equivalent fractions in order to add and subtract fractions. The class uses a ratio table to find equivalent fractions and to simplify fractions, and then students complete a related assignment in their Student Books. When they finish, students visit Work Places if time allows.	●			●		●	
Session 3 Working with Fractions Checkpoint Students take a checkpoint based on their work with fractions. Then they solve fraction story problems that will be discussed in Session 4.	●				●	●	●
Session 4 Fraction Strategies Poster In this session, students discuss the strategies they used to solve the fraction addition and subtraction story problems from the previous session. As they share, the teacher makes a poster of their strategies. Students spend the remaining time visiting Work Places.	●			●		●	
Session 5 Common Denominators In this session, students make generalizations about finding common denominators in order to add and subtract fractions. Then they spend the remainder of the session visiting Work Places.	●			●		●	●
Session 6 Unit 2 Post-Assessment Students take the Unit 2 Post-Assessment and then visit Work Places.				●	●	●	

P&I – Problems & Investigations, **PS** – Problem String, **MF** – Math Forum **WP** – Work Place, **A** – Assessment, **DP** – Daily Practice, **HC** – Home Connection

Materials Preparation

Each session includes a complete list of the materials you'll need to conduct the session, as well as notes about any preparation you'll need to do in advance. If you would like to prepare materials ahead of time for the entire module, you can use this to-do list.

Task		Done
Copies	Run copies of Teacher Masters T1–T6 according to the instructions at the top of each master.	
	Run a single display copy of Student Book pages 50–51, 53–54, and 56.	
	If students do not have their own Student Books, run a class set of Student Book pages 50–60.	
	If students do not have their own Home Connections books, run a class set of the assignments for this module using pages 31–36.	
	If you've run out of clock faces strips (made from the the Clock Faces Teacher Master in Unit 2, Module 1, Session 5), run additional copies and cut the sheets apart into strips.	
Charts	Write the title "What We Can Do with Ratio Tables" at the top of a large sheet of chart paper for Session 2.	
	Write the title "Fraction Addition & Subtraction Strategies" at the top of a large piece of chart paper for Session 4.	

Additional Resources

Please see this module's Resources section of the Bridges Educator site for a collection of resources you can use with students to supplement your instruction.

Session 1
Buying Granola

Summary

The class works together to investigate buying different amounts of granola when granola costs $6 for 5 pounds. After an initial discussion, students work in pairs to find the cost of various amounts using ratio tables. The teacher reconvenes the class to compare and discuss strategies. The discussion culminates with an error analysis and then a generalization about the operations that can (and cannot) be allowed in ratio tables.

Skills & Concepts

- Relate strategies for computing with decimals to hundredths to written methods (5.NBT.7)
- Solve story problems involving division of whole numbers with fraction or mixed number quotients (e.g., 3 ÷ 4 = ¾) (5.NF.3)
- Make sense of problems and persevere in solving them (5.MP.1)
- Model with mathematics (5.MP.4)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Buying Granola		
SB 50–51* Buying Granola **TM T1** Nine Pounds of Granola		
Home Connection		
HC 31–32 Using a Ratio Table		
Daily Practice		
SB 52 Buying Apples		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master. ** Run 1 copy of these pages for display.*

Preparation

You will model strategies on ratio tables today. You can draw a new ratio table each time on the board or on blank paper under a document camera, or you can make extra copies of the Buying Granola Student Book page to use.

Problems & Investigations

Buying Granola

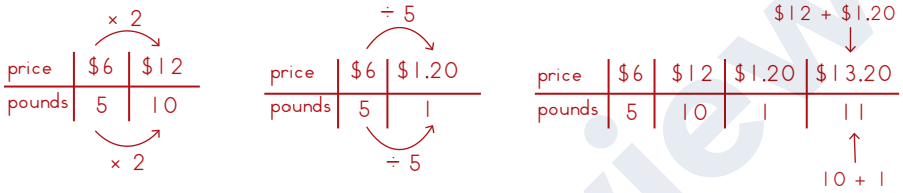
1 Begin the session by telling students that today they will work together to investigate the prices of different amounts of granola.

2 Introduce a granola buying scenario that involves the class buying granola to sell as a fundraiser. Five pounds of granola cost $6.

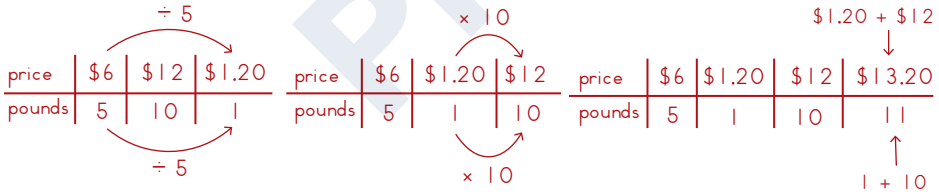
3 Ask students to determine how much 11 pounds of granola would cost. Have students think privately of a strategy, then share strategies with a neighbor.

Highlight the two strategies described below, and model them on ratio tables. If students do not suggest these strategies, share them yourself.

- Strategy 1:
  - » Double 5 pounds for $6 to get 10 pounds for $12.
  - » Divide $6 by 5 pounds to get $1.20 for 1 pound.
  - » Add the 10 pounds to the 1 pound to get a combined price of $13.20 for 11 pounds.



- Strategy 2:
  - » Divide the 5 pounds for $6 by 5 to get 1 pound for $1.20.
  - » Multiply the l pound by 10 to get 10 pounds for $12.
  - » Add the 10 pounds to the 1 pound to get a combined price of 11 pounds for $13.20.



4 Have students turn to the first Buying Granola Student Book page as you display your copy. Explain that they need to find the prices for the amounts of granola listed and use ratio tables to show their strategies.

ELL Make sure students understand the initial rate (5 pounds cost $6) and that you want to find the cost of other amounts. Use gestures, pictures, and a language partner if available. Emphasize that students can find the amounts in any order.

SUPPORT Work through the strategies for finding the price for 11 pounds again if necessary. Encourage students to look for helpful relationships as they work. Help students choose which amount to look for first by asking them to think of ways they can manipulate the amounts you have so far: 1 pound, 5 pounds, 10 pounds, 11 pounds. If needed, as students verbalize their strategies, write the numbers in the ratio tables with arrows to model their thinking. Suggest that students just start by finding amounts they can, and then use those to help find others that seem too difficult right now.

CHALLENGE Encourage students to be thoughtful about the order they choose. How can they be the most efficient? Which answers can help find other answers?

About This Session

Until now, students have worked with ratio tables where the ratio is 1 to something, a unit rate. For example, 1 ball costs $15. In today's session, students start with a non-unit rate: 5 pounds of granola costs $6. One of the goals of the lesson is for students to learn to find the unit rate and use it to find other rates. For example, students can divide five pounds for $6 by 5 to get one pound for $1.20, a rate of $1.20 per pound. They can then double this rate to get the price of $2.40 for 2 pounds.

A second goal is for students to realize that they do not have to find the unit rate to find many other equivalent rates. For example, to find the price for 10 pounds, students can double the 5 pounds for $6 to get 10 pounds for $12.

A third goal is for students to begin to generalize which operations work in ratio tables—those that result in equivalent ratios. Students can look to the relationships in the numbers in the problem to help them decide what to do in a flexible, efficient way and use context to keep the ratios equivalent.

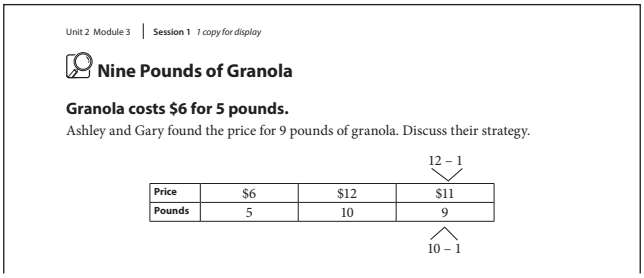
5 When the students have had 20–30 minutes to work on the assignment, reconvene the class and invite them to share the ways in which they found the prices for various amounts of granola.

- Use blank ratio tables to model students' strategies.
- Encourage students to compare some of the different strategies shared by their classmates for the amounts of granola discussed. Following are some examples:
- *8 pounds*
  - » Double 1 pound to get 2 pounds, then double 2 to get 4 and double again to get 8 pounds
  - » Double 1 pound to get 2 pounds and then subtract 2 pounds from 10 pounds
- *13 pounds*
  - » Add 10 pounds to 3 pounds
  - » Add 8 pounds to 5 pounds
- *50 pounds*
  - » Add the price for 5 groups of 10 pounds
  - » Multiply 5 pounds times 10 and multiply 10 pounds times 5
- *¾ pound*
  - » Divide the price for 1 pound by 2 to find the price of ½ pound, then divide the price of ½ a pound by 2 to find the price of ¼, and add the results of each calculation to get the price for ¾ pound
  - » Divide the price for 1 pound by 4 and then multiply that price by 3
- Explore other relationships you and your students find interesting as well.

6 Display the first strategy at the top of the Nine Pounds of Granola Teacher Master and tell students they are looking at another strategy. Have them think about the strategy, then pair up to share their observations and address the following questions:

- Is the answer correct?
- Does the strategy work, or not?
- If not, why not? What's wrong with it?

At first, display only the strategy at the top of the sheet. Ask students to discuss the strategy (which is incorrect because the price per pound isn't reflected in the calculation in the top row, last box) and identify the error. Then show the second strategy on the sheet, which is correct. Have students compare the two to reinforce the error and the correct way use a ratio table.


Unit 2 Module 3 | Session 1 *1 copy for display*

Nine Pounds of Granola

Granola costs $6 for 5 pounds.

Ashley and Gary found the price for 9 pounds of granola. Discuss their strategy.

			12 – 1
Price	$6	$12	$11
Pounds	5	10	9
			10 – 1

7 Use students' comments and observations about the two strategies on the teacher master as a springboard for discussion about some of the things you can and can't do on a ratio table—ratio table rules, you might call them.

Here are four big ideas that should come out of the discussion. Your students may have additional ideas:

- When you add pounds, you must add their corresponding prices.
- When you subtract pounds, you must subtract their corresponding prices.

Math Practices in Action 5.MP.1

When you give them plenty of time and support—in the form of a ratio table and the freedom to work with partners—you help students get comfortable making sense of problems and persevering in solving them. For students to embrace working in this way, they need many opportunities to work on challenging problems, the support of their peers, and access to models and strategies that permit them to be successful.

- When you multiply the pounds by a given factor, you must multiply the price by the same factor.
- When you divide the pounds by a given divisor, you must divide the price by the same divisor.

8 Wrap up the session.

- Have students turn to a partner and talk about an example of a situation in which they could use a ratio table.
- Have students give a thumbs-up or thumbs-down to show how confident they are using a ratio table to work with numbers that have multiplicative relationships, like those today.
- Suggest to students that when they work with numbers that have multiplicative relationships, they think about the numbers in a helpful context, like price per pound, to help ensure they are using a ratio table correctly.

Home Connection

9 Introduce and assign the Using a Ratio Table Home Connection, which provides more practice with the following skills:

- Solve multi-step story problems involving only whole numbers, using subtraction and multiplication (4.OA.3)
- Assess the reasonableness of answers to multi-step story problems using mental computation, rounding and other estimation strategies (4.OA.3)
- Multiply two 2-digit numbers using strategies based on place value and the properties of operations (4.NBT.5)
- Write and evaluate numerical expressions with parentheses (5.OA.1)
- Interpret numerical expressions without evaluating them (5.OA.2)

Daily Practice

The optional Buying Apples Student Book page provides additional opportunities to apply the following skills:

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Solve story problems involving division of whole numbers with fraction or mixed number quotients (e.g., $3 \div 4 = 3/4$) (5.NF.3)
- Relate strategies for computing with decimals to hundredths to written methods (5.NBT.7)

Session 2
Fractions Are Ratios

Summary

The teacher leads a discussion with the class to generate a chart showing how they have been using ratio tables to solve problems. The teacher then points out that fractions are a type of ratio, so students can use ratio tables to find equivalent fractions in order to add and subtract fractions. The class uses a ratio table to find equivalent fractions and to simplify fractions, and then students complete a related assignment in their Student Books. When they finish, students visit Work Places if time allows.

Skills & Concepts

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Write a fraction as the quotient of its numerator and denominator ($^{a}/_{b} = a \div b$) (5.NF.3)
- Solve story problems involving division of whole numbers with fraction or mixed number quotients (e.g., $3 \div 4 = \frac{3}{4}$) (5.NF.3)
- Look for and make use of structure (5.MP.7)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Fractions Are Ratios		
SB 53–54* Ratio Tables	• Word Resource Cards for *ratio* and *ratio table* • money value pieces	• butcher or poster paper (see Preparation) • markers • whiteboards, markers, and erasers OR scratch paper (class set) • Clock Faces strips (TM T9 from Module 1, Session 5)
Work Places in Use		
1B The Multiple Game (introduced in Unit 1, Module 2, Session 5) **1C** Beat the Calculator (introduced in Unit 1, Module 3, Session 4) **1D** Quotients Win (introduced in Unit 1, Module 4, Session 4) **2A** Clock Fractions (introduced in Unit 2, Module 1, Session 4) **2B** Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5)		
Daily Practice		
SB 55 More Ratio Tables		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master. ** Run 1 copy of these pages.*

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

equivalent fractions*
fraction*
ratio*
ratio table*
lowest terms* (simplest form*)

Preparation

- Write the title "What We Can Do with Ratio Tables" at the top of a piece of poster or butcher paper about 3 feet wide and 5 feet long, and post it in a place where all the students can see it.
- Run additional copies of the Clock Faces Teacher Master from Module 1, Session 5 and cut the sheets apart into strips if you've run out so you can make these available to students who want to use them to help solve some of the problems you'll pose today.
- Write the list of Work Places from which students can choose today. You can just write the numbers (1B–2C) or write out the full names if you prefer. (See the list in the Work Places in Use row of the Materials Chart for the complete list of Work Places used today.)

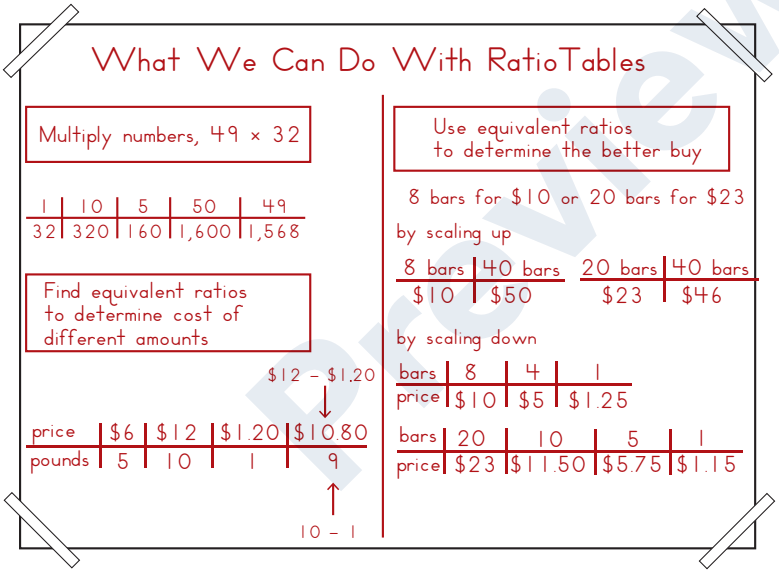
Problems & Investigations

Fractions Are Ratios

1 Begin the session by telling students that today they will consider the ways they have been using ratio tables, and then discuss one more way ratio tables can be used to solve problems.

2 Ask students to share, first in pairs and then as a whole class, some of the ways in which they have used ratio tables to solve problems recently.

- As students share, record their thinking on the butcher or poster paper you prepared.
- For each suggestion, add a title and an example. Here are some of the some of the ideas students are likely to share, and if they don't, you can share them yourself.
  - » Multiply whole numbers, like 49 × 32.
  - » Find equivalent ratios to determine the cost of different amounts of a product, like the prices for different amounts of granola, given that five pounds of granola cost $6.
  - » Find equivalent ratios to determine the better buy, given the same product packaged in different amounts (e.g. 8 granola bars for $10 or 20 granola bars for $23). Note with students that they can scale up or down to find prices for the same numbers of bars.



3 Use the Word Resource Cards for *ratio table* and *ratio* to help explain these terms to the class, and then post the cards for students' reference.

> ***Teacher*** *We have been using the term "ratio table" to describe all of these tables. A ratio table is a special table where the ratios of the entries in the table are equivalent. For example, when we look at the ratio table we used to multiply 49 × 32, these ratios are equivalent: 1 to 32, 10 to 320, 5 to 160. If we have 1 group of 32, then 10 of that same group has 320 and 5 of that same group has 160.*

4 Then provide an example of a table that is not a ratio table.

Remind students that not all tables are ratio tables, and show an example on the board.

Teacher *We could have other tables where the ratios of the entries are not equivalent. For instance, we could make a table that had all of your heights in one row and the number of letters in your names in the other row, but those ratios would not be equivalent.*

Example: NOT a ratio table

Your height (in inches)	48	47	49
Number of letters in your name	3	5	8

$$\frac{48}{3} \neq \frac{47}{5} \neq \frac{49}{8}$$

5 Let students know that they have also been investigating *ratios*.

Teacher *When we looked at the better buy for granola bars, we compared two ratios, the ratio of 8 bars for $10 and the ratio of 20 bars for $23. When we looked buying granola yesterday, we looked at the ratio of 5 pounds for $6 and we found lots of equivalent ratios to determine the prices for different amounts.*

6 Explain that fractions are a special type of ratio, a *part to whole ratio.* Therefore, one can use ratio tables to find equivalent fractions.

While fractions are the ratio of a part to a whole, other kinds of ratios include part to part and rates. In the last session, for example, students worked with a rate of $6 for 5 pounds of granola, and an equivalent rate to determine the unit price of $1.20 per pound.

Teacher *We have also been investigating a special kind of ratio, a ratio of a part of something to that whole thing. We can call this a part to whole ratio. Can anyone think of a part to whole relationship we have been talking about lately?*

7 Ask students to solve $\frac{3}{10} + \frac{1}{4}$ using money, clocks, and a double number line to help them understand that they've been using all three models to find equivalent ratios all along.

Have helpers give each student a whiteboard, marker, and eraser, or a piece of scratch paper on which to work.

SUPPORT Set out one or more sets of money value pieces and a handful of clock face strips at each table or near each cluster of desks where they will be easily accessible to students who want to use them.

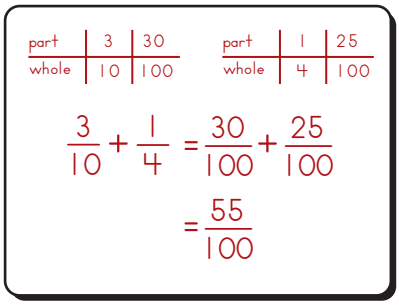
Teacher *We have been using part to whole ratios in both the clock and the money models. Let's look at one problem in several different ways.*

- Ask students to solve $\frac{3}{10} + \frac{1}{4}$ using money. When most have found a solution, record their answers on the board, and invite one or two volunteers to explain how they solved the problem. Use ratio tables labeled part/whole, along with equations to represent their thinking.

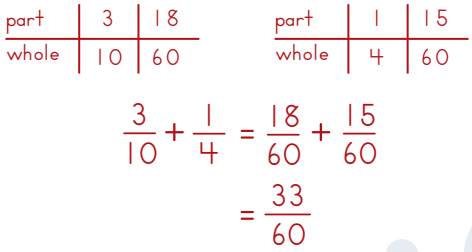
Armando *OK, it's 55 cents, because $\frac{3}{10}$ of a dollar is 3 dimes, and that's 30 cents. One-fourth of a dollar is a quarter. 30 and 25 is 55 cents in all.*

Boris *I did the same thing with hundredths. I just added $\frac{30}{100} + \frac{25}{100}$, and I got $\frac{55}{100}$.*

Teacher *So, we can show your thinking in the form of a part to whole ratio table. You're saying that 3/10 is the same as 30 cents, or 30/100, right? And 1/4 of a dollar is equivalent to 25 cents or 25/100? Here's how we can show that with ratio tables and equations.*



- Ask students to solve 3/10 + 1/4 using clocks, and then repeat the process described above. Your representation will probably look something like this:



- Work with students to solve 3/10 + 1/4 using a double number line. Model the process on the board as students work on their own whiteboards or scratch paper.

Teacher *Let's use the trail idea to model and solve this problem. Can you think of a length for the trail that would be easy to divide by 10 as well as by 4? Talk with the person next to you about this for a moment.*

Martina *We said 40 would be good, like 40 kilometers.*

Liu *We thought of 40, and then we realized 20 would also work, because you can get to 20 is you multiply by 10 or by 4.*

Teacher *Fair enough. Let's start with a line that's 20 kilometers long. I'll draw it up here, and you work on your boards.*

Teacher *What's 3/10 of 20?*

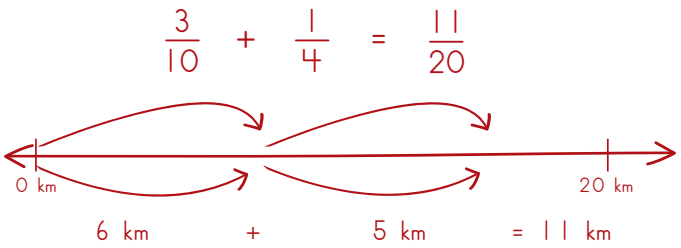
Tyrell *Well, 1/10 of 20 is 2, so 3/10 must be 6.*

Donna *And 1/4 of 20 is 5, so it's like we're adding 6 and 5, and that's 11 in all.*

Teacher *How can we express the answer as a fraction?*

Eloise *Well, it's 11 out of 20, so it must be 11/20. That's a weird answer!*

Freddie *But look! We got 33/60 when we did it with the clock. Just divide the top and the bottom by 3, and it's the same as 11/20!*



8 Build on the work you just did with the double number line to introduce the idea of using a ratio table to find equivalent fractions for 3/10 and 1/4.

Teacher *When we solve the problem on a double number line, we ask the question, "What trail length can I easily find 1/10 and 1/4 of?" We ask a similar question here, "What denominator can I easily multiply to with both 10 and 4?"*

Tanya *40 is easy. 10 times 4 is 40, so you can multiply 10 × 4 to get 40 and then multiply 4 × 10 to get 40.*

Teacher *I'll show that in a ratio table here on the board.*

Teacher *Now how do we find these missing values—the numerators for each of the new fractions?*

Roberto *Since this is a ratio table we can multiply the top number by the same as the bottom, right?*

Teacher *Let's try it and find out. What do you have to multiply 10 by to get 40?*

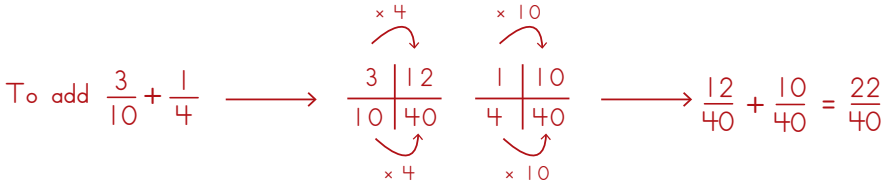
Students *Four!*

Teacher *And what about 4? By what number do you multiply 4 to get 40?*

Cara *Ten, because 10 × 4 is 40.*

Teacher *I'm going to add that to my diagram here.*

Dominic *Now we have 12/40 and 10/40. We can add those together to get 22/40.*



Teacher *Does anyone have any questions about this?*

Quinlan *Are you saying that we can use the ratio table to find equivalent fractions?*

Teacher *Yes, that is exactly what I'm saying. Why does that work?*

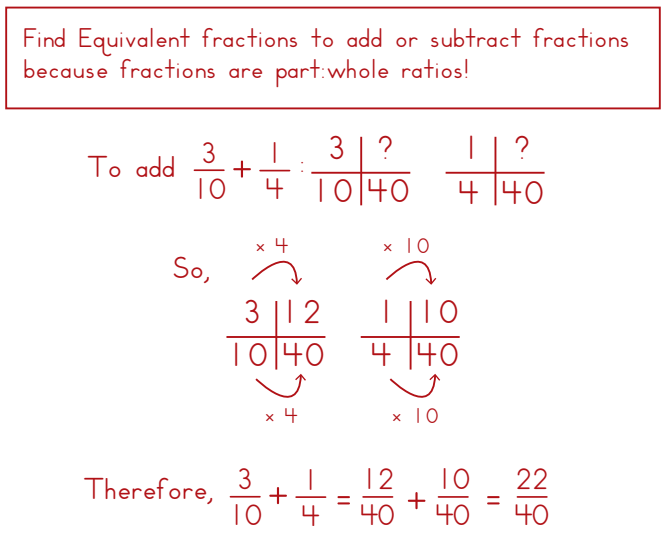
Alice *Because fractions are a special kind of ratio. Cool!*

Sasha *How come we didn't use 20 instead of 40? Then the fraction wouldn't be so big and weird.*

Teacher *Could we have used 20 instead?*

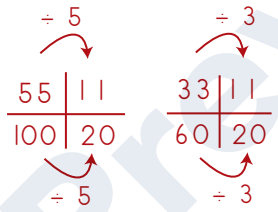
Sasha *Sure, just like with the trail way we did. But you can just cut the top and bottom in half, and you get 11/20, so it is the same as with the trail.*

9 Add "Find equivalent fractions to add or subtract fractions" to the poster with the example.



10 Now show students that a ratio table can also be used to simplify fractions.

- List all the answers you got for ³⁄₁₀ + ¼ (⁵⁵⁄₁₀₀, ³³⁄₆₀, ¹¹⁄₂₀, ²²⁄₄₀), and ask students to compare them.
- When there is general agreement that the four are equivalent, explain that a fraction is in its simplest form when the numerator and denominator do not have any common factors.
- Then work with input from the students to simplify each of the fractions using a ratio table.



Teacher *What about ²²⁄₄₀? Is there any number by which we can divide both the numerator and denominator?*

Georgie *Easy! It's what I said before. You can divide them by 2, and you get ¹¹⁄₂₀.*

Teacher *Is ¹¹⁄₂₀ the simplest form of this fraction? Talk with the person next to you about this.*

Helen *We said it has to be, because there's nothing you can divide 11 by except itself, and you can't divide 20 by 11, so you can't go any farther.*

11 Have students turn to the Ratio Tables Student Book page as you display it. Go over the directions and have students begin work.

- Circulate and ask scaffolding questions as students are working.
- Encourage students to share and compare solutions and strategies with the people nearest them as they are working.

SUPPORT If necessary, pull a small group to work on the assignment with you. If there are more than a few students who are confused and likely to need help, let those who are confident with the material work on their own or in pairs while you work with the rest of the class.

Work Places

12 If time allows, have students go to Work Places when they have completed the assignment.

- Let students know that when they're finished with the assigned pages in their Student Book, they can put their materials away, find a partner, and start in on a Work Place of their choosing.
- Have them pick up their Work Place folders and a pencil and remind them to fill out their Work Place logs as they finish each game or activity.

SUPPORT Suggest specific Work Places for struggling students to work on critical skills.

CHALLENGE Encourage students to think about the strategies they are use and share their thinking. Encourage students to generalize what happens in certain Work Places.

13 Close the session by letting students know you will leave the poster they helped create on display as a reminder of all the ways they know how to use a ratio table.

Daily Practice

The optional More Ratio Tables Student Book page provides additional opportunities to apply the following skills:

- Multiply two 2-digit numbers using strategies based on place value and the properties of operations (4.NBT.5)
- Generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number (4.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Write a fraction as the quotient of its numerator and denominator ($a/b = a \div b$) (5.NF.3)

Session 3

Working with Fractions Checkpoint

Summary

Students take a checkpoint based on their work with fractions. Then they solve fraction story problems that will be discussed in Session 4.

Skills & Concepts

- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- Mentally estimate the answers to story problems involving subtraction of fractions with like and unlike denominators (5.NF.2)
- Assess the reasonableness of answers to story problems involving subtraction of fractions with like and unlike denominators (5.NF.2)
- Solve story problems involving division of whole numbers with fraction or mixed number quotients (5.NF.3)
- Multiply a whole number by a fraction (5.NF.4a)
- Make sense of problems and persevere in solving them (5.MP.1)
- Use appropriate tools strategically (5.MP.5)

Materials

Copies	Kit Materials	Classroom Materials
Assessment Working with Fractions Checkpoint		
TM T2–T3 Working with Fractions Checkpoint		• Clock Faces strips (TM T9 from Module 1, Session 5)
Problems & Investigations Solving Story Problems		
SB 56* Fraction Story Problems	• money value pieces	• student math journals • Clock Faces strips (TM T9 from Module 1, Session 5)
Home Connection		
HC 33–34 In the Library		
Daily Practice		
SB 57 Ratio Tables to the Rescue!		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master. ** Run 1 copy of this page for display.*

Assessment

Working with Fractions Checkpoint

1 Open the session by telling students they will take a quick checkpoint that focuses on the work they have been doing with fractions.

2 Give students each a copy of the Working with Fractions Checkpoint Teacher Master and place a copy on display. Give students time to look it over and ask any questions.

Have a helper place a handful of clock face strips on each table or near each cluster of desks, and let students know that they can use these to help with any of the problems on the checkpoint if they like.

3 When students understand what to do, have them begin.

- Encourage students to read each question carefully and remind them they can ask you for help reading any of the questions.
- While students work, walk around the room to make observations and answer questions.
- Give students 15–20 minutes to do the checkpoint. As this is not a timed test, if you have students who are not able to complete the work in the allotted time, give them a chance to finish the checkpoint later.
- If some students finish earlier than others, ask them to double-check their work and read quietly until you call time.

4 Collect students' checkpoints.

Assessment Guide

See the Grade 5 Assessment Guide for scoring and intervention suggestions.

Problems & Investigations

Solving Story Problems

5 After the checkpoint, introduce the Fraction Story Problems Student Book page.

- Have students turn to the page in their Student Books as you display a copy.
- Explain that the students will solve these problems in their math journals under the heading "Fraction Story Problems." Give them a minute to find the next available page in their journal and write the title and date at the top.
- Let them know that they can work the problems in any order, but they need to be sure to clearly mark the work with the problem number. Remind them to show all of their work.
- Tell students they will have the remainder of the session to work on these problems and that they will have a chance to share their strategies in the following session.

SUPPORT Encourage students to use the money value pieces or clock face strips to help model and solve these problems. Remind them, too, that they might make use of a double number line. If necessary, review this model with the class.

6 Circulate as students work to offer support and observe students' strategies.

SUPPORT Ensure students understand what each question is asking. Modify the number of problems students are expected to complete as needed.

ELL Read questions to students or have a partner read them aloud so students can focus on the mathematics in each.

CHALLENGE Assign the two challenge problems at the bottom of the page.

7

8 Close the session.

- Have students look over the problems they solved in their journals. Ask them to put a star by problems they are confident they solved well, an exclamation point by problems where they are especially proud of their solution strategy, and a question mark by any problems that left them feeling uncertain or gave them difficulty.
- Thank students for their hard work today on the checkpoint and fraction story problems.

Home Connection

9 Introduce and assign the In the Library Home Connection, which provides more practice with the following skills:

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- Solve story problems involving multiplying a whole number by a fraction (5.NF.4a)

Daily Practice

The optional Ratio Tables to the Rescue! Student Book page provides additional opportunities to apply the following skills:

- Multiply two 2-digit numbers using strategies based on place value and the properties of operations (4.NBT.5)
- Generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number (4.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Write a fraction as the quotient of its numerator and denominator ($a/b = a \div b$) (5.NF.3)

Session 4
Fraction Strategies Poster

Summary

In this session, students discuss the strategies they used to solve the fraction addition and subtraction story problems from the previous session. As they share, the teacher makes a poster of their strategies. Students spend the remaining time visiting Work Places.

Skills & Concepts

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- Construct viable arguments and critique the reasoning of others (5.MP.3)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Fraction Strategies Poster		
SB 56 Fraction Story Problems		• student math journals • chart or butcher paper (see Preparation) • markers
Work Places in Use		
1B The Multiple Game (introduced in Unit 1, Module 2, Session 5) **1C** Beat the Calculator (introduced in Unit 1, Module 3, Session 4) **1D** Quotients Win (introduced in Unit 1, Module 4, Session 4) **2A** Clock Fractions (introduced in Unit 2, Module 1, Session 4) **2B** Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5)		
Daily Practice		
SB 58 Adding Fractions & Mixed Numbers		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.

Preparation

- Today you will make a class poster of fraction addition and subtraction strategies based on the story problems from the previous session. Write the heading "Fraction Addition & Subtraction Strategies" at the top of a large piece of chart or butcher paper and choose a place to display it.
- Write the list of Work Places from which students can choose today. You can just write the numbers (1B–2C) or write out the full names if you have time. (See the list in the Work Places in Use row of the Materials Chart for the complete list of Work Places used today.)

Problems & Investigations

Fraction Strategies Poster

1 Open the session by having students find the Fraction Story Problems Student Book page from the last session, as well as the page in their math journal on which they solved the problems.

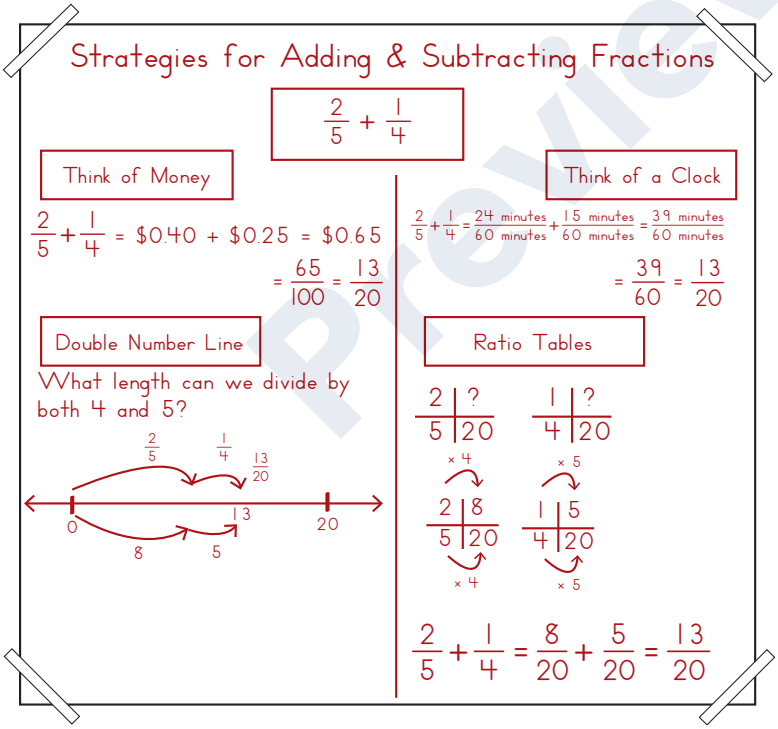
Tell them that today they will discuss their strategies to help create a class poster of strategies for adding and subtracting fractions.

2 Ask students to review their work for the first problem about Zack and Noah jogging and walking. Then ask a few students to share how they solved the problem while you record their strategies on the chart paper.

Leave space on the poster to add an additional strategy to the list in the next session.

If students do not generate a variety of strategies for the first problem, select another to discuss until your poster shows strategies using:

- money
- clocks
- a double number line
- ratio tables

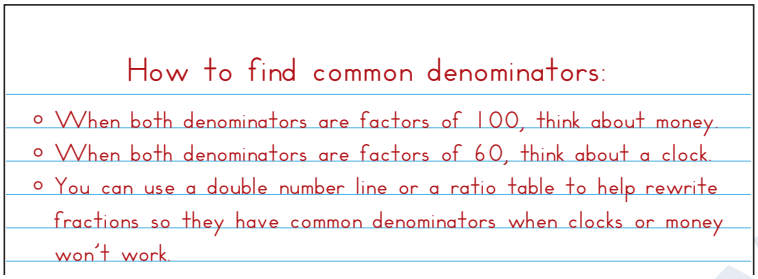


3 Discuss and compare the strategies to help students discern which strategies work well for different problems based on the numbers themselves.

Work with input from students to record a few generalizations about the kinds of numbers for which each model is most useful when it comes to finding common denominators. Here are some questions you might find helpful in this process.

SUPPORT/ELL Ask clarifying questions to make sure students understand the strategies. Show different models and strategies for the same problems and discuss how they are similar and different to help students make connections.

- Which problems lend themselves to using money to think about finding common denominators? [problems 1 and 7 because 4, 5, 10, and 20 are all factors of 100]
- What common denominator are you using when you write a fraction as its equivalent in money? [100]
- Which problems lend themselves to using a clock to think about finding a common denominator? [problems 2, 5, and 6 because 3, 4, 6, 12, and 60 are all factors of 60]
- Which problems lend themselves to using a double number line? [problems 1 and 7 because they're both about distance]
- Which problems lend themselves to using a ratio table to scale up or down to a common denominator? [problems 3, 4 and 8 because some of the denominators aren't factors of 60 or 100]



Note Although you may want to take down or cover the poster you just generated with the class during the unit post-assessment session after next, you'll need to leave it up for the next session. After the post-assessment, plan to keep this important anchor chart on display as long as possible for students' reference.

4 Based on your observations during the work time in the last session and on today's discussion, choose two or three problems to discuss as a class.

Use equations and diagrams to record students' thinking on the board for all to see.

Consider problems that will extend your students' thinking, that will provoke discussion, or that were challenging for your class.

You'll find sample dialog that illustrates how you might discuss problems 3, 5, and 8 in the Resources section of the Bridges Educator site.

5 After discussing some of the problems as a class, ask students to turn and talk to a neighbor to summarize the strategies they have explored for adding and subtracting fractions.

Work Places

6 Draw students' attention to the available Work Places you listed on the board.

7 As students finish talking with their partners, have them get their folders, and choose a Work Place for the remainder of the session.

Have students pick up their Work Place folders and a pencil and remind them to fill out their Work Place logs as they finish each activity.

8 Close the session by letting students know they will continue their work with fractions the next day and take a post-assessment soon.

Daily Practice

The optional Adding Fractions & Mixed Numbers Student Book page provides additional opportunities to apply the following skills:

- Add fractions with unlike denominators, including mixed numbers (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Assess the reasonableness of answers to story problems involving addition of fractions with like and unlike denominators (5.NF.2)

Session 5
Common Denominators

Summary

In this session, students make generalizations about finding common denominators in order to add and subtract fractions. Then they spend the remainder of the session visiting Work Places. Finally, the teacher introduces the Fraction Addition & Subtraction Story Problems Home Connection.

Skills & Concepts

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Reason abstractly and quantitatively (5.MP.2)
- Look for and express regularity in repeated reasoning (5.MP.8)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Common Denominators		
		• fraction addition & subtraction strategies poster from the previous session (see Preparation) • markers • student math journals
Work Places in Use		
1B The Multiple Game (introduced in Unit 1, Module 2, Session 5) **1C** Beat the Calculator (introduced in Unit 1, Module 3, Session 4) **1D** Quotients Win (introduced in Unit 1, Module 4, Session 4) **2A** Clock Fractions (introduced in Unit 2, Module 1, Session 4) **2B** Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5)		
Home Connection		
HC 35–36 Fraction Addition & Subtraction Story Problems		
Daily Practice		
SB 59 Fraction Addition & Subtraction Review		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

common denominator*
double number line
factor*
multiple*
product*
ratio table*

Preparation

- Display the Fraction Addition & Subtraction Strategies poster from the previous session in a visible and accessible location. You will add to it during today's discussion.
- Write the list of Work Places from which students can choose today. You can just write the numbers (1B–2C) or write out the full names if you have time. (See the list in the Work Places in Use row of the Materials Chart for the complete list of Work Places used today.)

Problems & Investigations

Common Denominators

1 Begin the session by telling students they will start by reviewing some of the models they have been using to help add and subtract fractions. Then they will apply some of those models to solving some fraction addition and subtraction problems before visiting Work Places.

2 Have students take out their math journals and write the date and "Helpful Models" as a heading. Then ask questions to help students think about when the money and clock models are best used.

For each question, give students a moment to record an answer before you share answers and discuss them as a class.

- Name some fractions for which you might choose a clock as a model [halves, thirds, fourths, sixths, twelfths, twentieths, sixtieths; also fifths, tenths, fifteenths, and thirtieths]
- What is true about the denominators for all of these fractions? [They are factors of 60.]
- If these numbers are all factors of 60, what do we call 60? [60 is a multiple of those factors.]
- Name some fractions for which you might choose money as a model [halves, fourths, fifths, tenths, twentieths, hundredths; also twenty-fifths and fiftieths]
- What is true about the denominators for all of these fractions? [They are factors of 100; 100 is a multiple of those factors.]
- Name some fractions that do not work with money and clocks. [Fractions with denominators that are not factors of 60 or 100 do not work with money or clocks.]

3 Give students several addition problems to solve in their journals: ¼ + ⅛; ⅙ + ⅛; and ⅑ + ⅖.

- Write all three combinations on the board, and note with students that none of the three lend themselves to being solved with the clock or the money model. Instead, students will need to make use of other strategies, including the double number line or the ratio table, as well as what they already know about how fractions such as ¼ and ⅛ relate to one another.
- Circulate as students are working, and watch for individuals who are able to find common denominators for each combination, possibly using the double number line or the ratio table to help with the last two.

4 For each problem, invite one or two students to share their strategies while you record them where everyone can see them.

During the discussion, draw students' attention to the denominators their classmates have generated, and how they have done so.

> ***Teacher*** *Aria, would you please explain how you solved the first combination, ¼ + ⅛?*
>
> ***Aria*** *That one was really easy. I just turned ¼ into ⅖, and then I added them.*
>
> ***Teacher*** *OK, I'm going to record your thinking on the board. Can someone explain why Aria would want to make sure both fractions had the same denominator?*

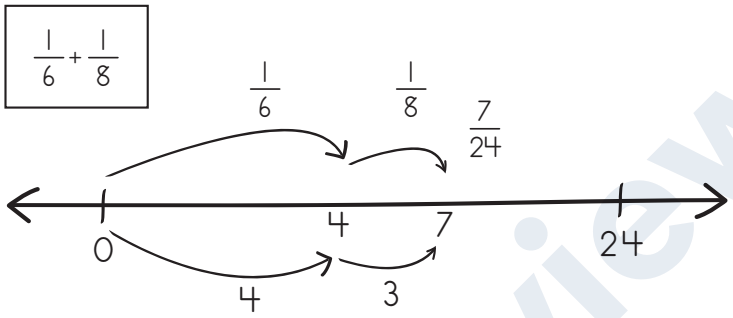
$$\frac{1}{4} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} = \frac{3}{8}$$

Ebony *Because you can't add fractions unless they're the same thing. Like, they both have to be eighths or fourths, or something the same. If you have two different numbers on the bottom, you're stuck.*

Teacher *What about the next combination, ⅙ + ⅛? Kiara, will you tell us how you solved that one?*

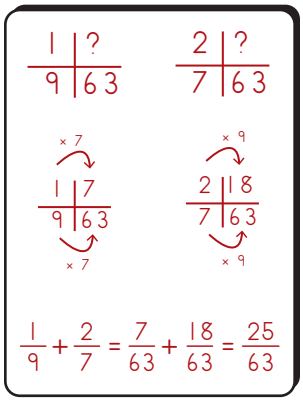
Kiara *Well, I was stuck for a minute, because 6 and 8 aren't nice together like 4 and 8. You can't just turn sixths into eighths. But then I thought about the trail problems, and tried to think of how long a trail would be that you could divide by 6 and by 8. First I thought of 48, but then I realized it could be 24. One-sixth of 24 is 4, and one-eighth of 24 is 3, so the answer is 7/24.*

Teacher *So, I'm going to show your thinking on a double number line.*



Teacher *And what about ⅑ + 2/7? Hiroshi, will you share what you did to solve this combination?*

Hiroshi *I could have used a double number line, like Kiara, but I used a ratio table instead. I really couldn't think of anything that would work for a denominator except 63, which is what you get if you just multiply 9 × 7. So, I set it up that way, and multiplied both parts of ⅑ by 7, and both parts of 2/7 by 9. I got 25/63 in all.*



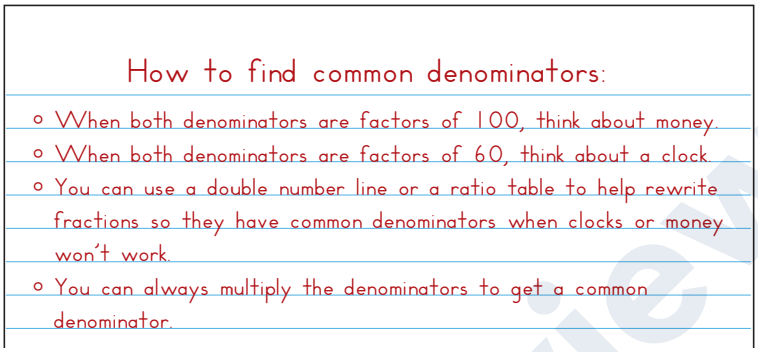
5 Revisit the numbers students chose, and guide the class toward making several generalizations about how to find common denominators.

Emphasize these three cases:

- When one denominator is a multiple of the other, you can use that denominator. (For ¼ + ⅛, you can use 8.)
- When the two denominators have a common multiple that is less than their product, you can use that multiple as a common denominator. (For ⅙ + ⅛, you can use 24 rather than 48.)
- You can always use the product of the denominators as a common denominator. (To add any two fractions, $1/a + 1/b$, you can use $a \times b$ as a common denominator.)

6 Add to the class strategy poster the generalization that you can always use the product of two fractions' denominators as the common denominator.

Have students add this information to the handbook section of their journals, as well.



Note Although you may want to take down or cover the poster you just generated with the class during the unit post-assessment in the next session, you'll need it again in Unit 3. Plan to keep this important anchor chart on display as long as possible for students' reference.

7 Ask students to brainstorm what number they would use as a common denominator in adding each pair of fractions listed below.

Students do not need to solve these problems. Instead, have them justify their choice of denominators. The lowest common denominator for each pair of fractions is shown in braces. Students could also choose larger multiples.

- $19/24 + 7/5$ [120]
- ⅓ + ⅞ [24]
- ¾ + ⅚ [28]
- ⅘ + $7/15$ [15]
- ⅙ + ⅞ [18]

Work Places

8 Draw students' attention to the available Work Places you listed on the board, and let them know they're going to spend the rest of the session doing Work Places.

9 Have students put away their journals, get their folders, and choose a Work Place.

Have students pick up their Work Place folders and a pencil and remind them to fill out their Work Place logs as they finish each activity.

SUPPORT Suggest specific Work Places for struggling students to work on critical skills.

Math Practices in Action 5.MP.8

Students look for and express regularity in repeated reasoning when they make generalizations about how to find common denominators. This process involves looking closely at common multiples and factors and considering the relationships among numbers.

Extension

Discuss the definition of the term *relatively prime* and how it relates to finding common denominators: when the denominators of two fractions are relatively prime, the least common denominator of the fractions is the product of the denominators. (Numbers are relatively prime when they have no common factors except 1. Examples are 3 and 4, 3 and 5, 3 and 7. The numbers 3 and 6 are not relatively prime because they both have the factor 3. The numbers 4 and 6 are not relatively prime because they both have the factor 2.)

CHALLENGE Encourage students to think about the strategies they are use and share their thinking. Encourage students to generalize what happens in certain Work Places.

10 End the session by thanking students for their efforts adding and subtracting fractions and reminding them they will take the Unit 2 Post-Assessment in the next session.

Home Connection

11 Introduce and assign the Fraction Addition & Subtraction Story Problems Home Connection, which provides more practice with the following skills:

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)

Daily Practice

The optional Fraction Addition & Subtraction Review Student Book page provides additional opportunities to apply the following skills:

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)

Session 6
Unit 2 Post-Assessment

Summary

Students take the Unit 2 Post-Assessment and then visit Work Places when they finish.

Skills & Concepts

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- Mentally estimate the answers to story problems involving addition of fractions with like and unlike denominators (5.NF.2)
- Assess the reasonableness of answers to story problems involving addition of fractions with like and unlike denominators (5.NF.2)
- Solve story problems involving division of whole numbers with fraction or mixed number quotients (e.g., 3 ÷ 4 = ¾) (5.NF.3)
- Multiply a whole number by a fraction (5.NF.4a)
- Solve story problems involving multiplying a whole number by a fraction (5.NF.4a)
- Make sense of problems and persevere in solving them (5.MP.1)
- Attend to precision (5.MP.6)

Materials

Copies	Kit Materials	Classroom Materials
Assessment Unit 2 Post-Assessment		
TM T4–T6 Unit 2 Post-Assessment	• money value pieces	• scratch paper (see Preparation) • strips of clock faces made from TM XX, Clock Faces (see Module 1, Session 5)
Work Places in Use		
1B The Multiple Game (introduced in Unit 1, Module 2, Session 5) **1C** Beat the Calculator (introduced in Unit 1, Module 3, Session 4) **1D** Quotients Win (introduced in Unit 1, Module 4, Session 4) **2A** Clock Fractions (introduced in Unit 2, Module 1, Session 4) **2B** Racing Fractions (introduced in Unit 2, Module 2, Session 2) **2C** Target Practice (introduced in Unit 2, Module 2, Session 5)		
Daily Practice		
SB 60 More Fraction Problems		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

common denominator*
equivalent fraction*
evaluate
expression*
mixed number*

Preparation

- Prepare sets of money value pieces, as well as scratch paper, and strips of clock faces so these materials are available and easily accessible to students who want to use them during the assessment.
- Write a list on the board of Work Places from which students can choose today. You can just write the numbers (1B–2C) or write out the full names, if you prefer. (See the Work Places in Use section of the Materials chart.)

Assessment

Unit 2 Post-Assessment

1 Set the stage for today by reminding students of the work they have been doing over the past few weeks with fractions.

2 Place the Unit 2 Post-Assessment Teacher Master on display as helpers give a copy of the assessment to each student.

- Have students write their names and the date on the first page, and give them a minute to look over the assessment.
- Let students know how and where to access money value pieces, scratch paper, or strips of clock faces if they want to use any of these materials to help with some of the problems on the assessment.
- Remind students to wait for further instructions from you before they start.

3 Discuss strategies students can use to help them during an assessment.

Model the following strategies as you describe them to students.

- Read the whole assessment before you begin to get a sense of what you need to do.
- As you read, pay special attention to math words like those on the Word Resource Cards or that you added to your handbook. You might want to underline them, especially if you are having a hard time understanding a question.
- Notice which problems might be easier or more difficult for you. You might put a small star by easier problems and a question mark by more challenging ones.
- Think about how to use your time during the test so you have time and energy to finish all the problems.

4 When students understand what to do, let them begin.

Remind students to raise their hand if they need help reading a problem.

ELL AND SUPPORT Have students underline unfamiliar or confusing words so that as you circulate, you can help students clarify the meanings.

Assessment Guide

See the Grade 5 Assessment Guide for scoring and intervention suggestions.

Think about how and when you want to show students their scored post-assessments. You may decide, as well, to give them time to compare the results of their pre- and post-assessments and identify those skills and concepts they still need to work on. You'll find a Post-Assessment Student Reflection Sheet for this purpose in the Assessment Guide.

Work Places

5 As students finish the assessment, have them turn in their papers, get their folders, and choose a Work Place to use quietly until everyone has finished.

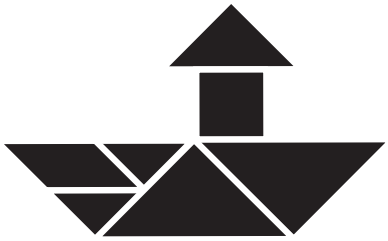
6 Close the session.

- Have students put away the Work Place materials.
- Take a few minutes to discuss the assessment with the class. Did the problems seem easier this time than when they took the assessment several weeks ago? Why or why not?

Daily Practice

The optional More Fraction Problems Student Book page provides additional opportunities to apply the following skills:

- Add and subtract fractions with unlike denominators, including mixed numbers (5.NF.1)
- Solve story problems involving subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)



Teacher Masters

GRADE 5 – UNIT 2 – MODULE 3

BRIDGES®
IN MATHEMATICS

Nine Pounds of Granola

Granola costs $6 for 5 pounds.

Ashley and Gary found the price for 9 pounds of granola. Discuss their strategy.

12 – 1

Price	$6	$12	$11
Pounds	5	10	9

10 – 1

The correct way to subtract 1 pound:

$12 – $1.20

Price	$6	$12	$1.20	$10.80
Pounds	5	10	1	9

10 – 1

If you subtract a pound, you must subtract the price of a pound!

NAME | **DATE**

Working with Fractions Checkpoint page 1 of 2

1 Find common denominators and then add or subtract.

a $3\frac{1}{9} + 2\frac{1}{4} =$ _____ + _____ = _____

b $\frac{3}{5} - \frac{1}{7} =$ _____ – _____ = _____

c $\frac{7}{8} - \frac{3}{16} =$ _____ – _____ = _____

2 Find the following:

a $\frac{3}{4}$ of 60

b $\frac{3}{5} \times 20$

c $\frac{2}{3}$ of 18

3 Which is a better buy? Twelve cans for $9 or 4 cans for $3? Explain.

(continued on next page)

NAME | **DATE**

Working with Fractions Checkpoint page 2 of 2

4 Anika walked $\frac{7}{8}$ of a mile. Kyle walked $\frac{2}{4}$ of a mile.

a Estimate how much farther Anika walked than Kyle. Explain your thinking.

b How much farther did Anika walk than Kyle? Use numbers, labeled sketches, or words to solve this problem. Show all your work.

c When Erik solved this problem, he got $\frac{5}{4}$ of a mile for his answer. Is this a reasonable answer? Why or why not?

NAME | **DATE**

Unit 2 Post-Assessment page 1 of 3

1 Add or subtract.

a $\frac{1}{5} + \frac{1}{3} =$ _____

b $2\frac{5}{6} + \frac{1}{8} =$ _____

c $\frac{3}{4} - \frac{1}{8} =$ _____

d $1\frac{2}{5} - \frac{6}{10} =$ _____

2 Write equivalent fractions with common denominators and use them to add or subtract the fractions.

a $\frac{1}{3} + \frac{1}{8} =$ _____ + _____ = _____

b $4\frac{2}{14} + 2\frac{4}{7} =$ _____ + _____ = _____

c $\frac{2}{3} - \frac{3}{6} =$ _____ – _____ = _____

d $\frac{8}{12} - \frac{3}{8} =$ _____ – _____ = _____

3 Find the following:

a $\frac{1}{3} \times 24$

b $\frac{1}{12}$ of 72

4 Sasha ran $\frac{2}{3}$ of a 27 km race before she stopped to walk. How many kilometers had she run at that point? Show your work using words, numbers, or labeled sketches.

5 Fill in the missing fraction or mixed number in each equation.

a $2\frac{3}{8} +$ _____ $= 3$

b _____ $+ \frac{1}{6} = \frac{2}{3}$

c $2\frac{3}{7} -$ _____ $= 1$

(continued on next page)

NAME | **DATE**

Unit 2 Post-Assessment page 2 of 3

6 Which is a better buy? Explain your thinking using words, numbers, or labeled sketches.

a Twelve cans for $7 or 6 cans for $4?

b Six cans for $7 or 8 cans for $9?

7 Connor gathered dry ingredients to make a large pan of brownies. He mixed $1\frac{1}{4}$ cups of sugar, $2\frac{2}{3}$ cups of flour and $1\frac{1}{6}$ cups of nuts together before adding the other ingredients. How many cups of dry ingredients did he mix? Show all your work.

8 Ryan is $5\frac{1}{4}$ feet tall. John is $5\frac{1}{3}$ feet tall.

a Who is taller?

b How much taller? Show your work.

(continued on next page)

NAME | **DATE**

Unit 2 Post-Assessment page 3 of 3

9 Dawn enjoys exercising on the hiking trail by her house. She ran $\frac{2}{5}$ of the trail on Monday and then ran a different $\frac{1}{3}$ of the trail on Tuesday.

a How much of the trail had she covered on the two days? Explain your thinking.

b Did Dawn run farther on Monday or on Tuesday?

c How much farther? Show your work.

10 Tonya ran $\frac{2}{3}$ of a mile down at the high school track and then walked $\frac{2}{6}$ of a mile.

a How far did Tonya go in all? Choose the best estimate.

- ○ More than a mile
- ○ Between half a mile and a whole mile
- ○ Less than half a mile

b How far did Tonya go in all? Use numbers, labeled sketches, or words to solve this problem. Show all your work.

c When Danny solved this problem, he got $\frac{4}{9}$ of a mile for his answer. Is this a reasonable answer? Why or why not?

Student Book

GRADE 5 – UNIT 2 – MODULE 3

BRIDGES®
IN MATHEMATICS

NAME | DATE

Buying Granola page 1 of 2

Granola costs \$6 for 5 pounds.

Use the ratio tables to find the prices for different amounts of granola: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 2, 3, 8, 13, 15, 28, 31, 50, 60, and 80 pounds. You can find the prices in any order.

ex

Price	\$6	\$12	\$1.20	\$13.20			
Pounds	5	10	1	11			

11 pounds cost \$13.20.

Price	\$6						
Pounds	5						

_______ pounds cost _______.

Price	\$6						
Pounds	5						

_______ pounds cost _______.

Price	\$6						
Pounds	5						

_______ pounds cost _______.

Price	\$6						
Pounds	5						

_______ pounds cost _______.

Price	\$6						
Pounds	5						

_______ pounds cost _______.

(continued on next page)

NAME ____________________ | DATE ____________

Buying Granola page 2 of 2

Price	$6						
Pounds	5						

_______ pounds cost _______.

Price	$6						
Pounds	5						

_______ pounds cost _______.

Price	$6						
Pounds	5						

_______ pounds cost _______.

Price	$6						
Pounds	5						

_______ pounds cost _______.

Price	$6						
Pounds	5						

_______ pounds cost _______.

Price	$6						
Pounds	5						

_______ pounds cost _______.

Price	$6						
Pounds	5						

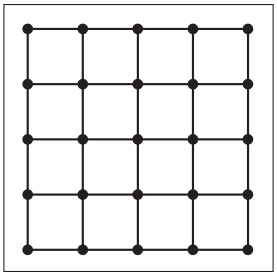
_______ pounds cost _______.

NAME | DATE

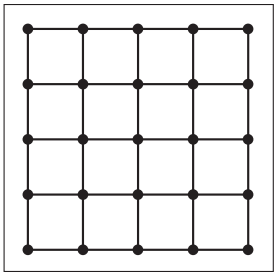
Buying Apples

1 Color in the geoboards to show the fractions below. Each geoboard represents 1 whole.

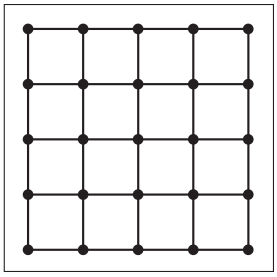
a $\frac{1}{2}$



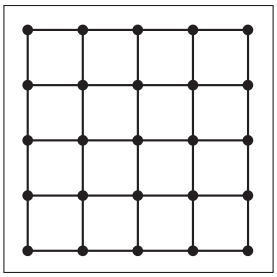
b $\frac{1}{4}$



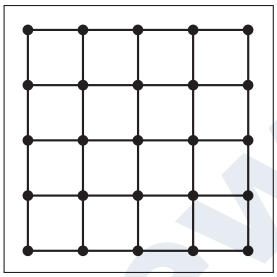
c $\frac{3}{4}$



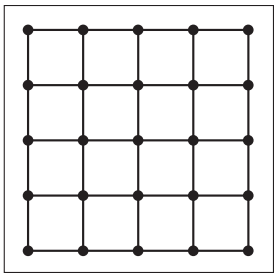
d $\frac{1}{8}$



e $\frac{2}{8}$



f $\frac{5}{8}$



Add the following fractions. If the sum is greater than 1, write the answer as both an improper fraction and a mixed number.

2 Find equivalent fractions and then add or subtract.

ex $\frac{1}{2} + \frac{5}{8} = \frac{4}{8} + \frac{5}{8} = \frac{9}{8} = 1\frac{1}{8}$

a $1\frac{1}{2} + \frac{3}{8} =$ _____ + _____ = _____ = _____

b $2\frac{1}{4} + \frac{2}{8} =$ _____ + _____ = _____ = _____

c $\frac{3}{4} - \frac{2}{8} =$ _____ − _____ = _____

3 Five pounds of apples cost $8. Use the ratio table to find the cost for 9 pounds and 11 pounds. You do not need to use all of the table cells.

Price	$8						
Pounds	5						

a Cost of 9 pounds of apples: _____

b Cost of 11 pounds of apples: _____

NAME | DATE

Ratio Tables page 1 of 2

1 Draw a line from each type of problem to the matching ratio table.

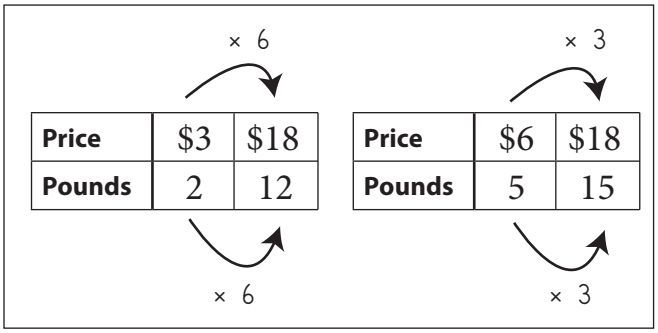
a Finding equivalent fractions to add the fractions

b Doing a multiplication problem

c Simplifying a fraction

d Finding prices for different amounts based on a constant price per unit

e Comparing two different prices to choose a better buy



6	120
7	140

9	63
20	140

$\frac{6}{7} \rightarrow \frac{120}{140}$

$+ \frac{9}{20} \rightarrow + \frac{63}{140}$

$\frac{183}{140} = 1\frac{43}{140}$

1	100	99
37	3,700	3,663

price	$12	$6	$2	$24	$48
boxes	18	9	3	36	72

24	12	6	2
60	30	15	5

2 Use the ratio table to multiply 22 × 27.

1	2	20	22
27			

3 Use the ratio table to simplify $\frac{45}{100}$. You might not need all of the columns.

part	45		
whole	100		

(continued on next page)

NAME | DATE

Ratio Tables page 2 of 2

4 Use the ratio tables to find equivalent fractions and then use them to add $\frac{3}{5} + \frac{1}{7}$.

part	3	
whole	5	35

part	1	
whole	7	35

So $\frac{3}{5} + \frac{1}{7} =$ _____ + _____ = _____

Use the ratio table to simplify $\frac{6}{18}$. You might not need all of the columns.

6		
18		

5 Use the ratio tables to find the better buy. You might not need all of the columns.

price in dollars	$15				
number of cans	12				

price in dollars	$18				
number of cans	15				

Which is the better buy? Explain.

6 Kelsey used a ratio table incorrectly to add $\frac{1}{2} + \frac{1}{3}$. Explain her error.

1	1	2
2	3	5

So $\frac{1}{2} + \frac{1}{3} = \frac{2}{5}$.

NAME | DATE

More Ratio Tables

1 Use the ratio table to multiply 16 × 32.

1	10	5	16
32			

2 Use the ratio tables to find equivalent fractions so that you can add $\frac{2}{9} + \frac{4}{6}$.

part	2	
whole	9	36

part	4	
whole	6	36

$\frac{2}{9} + \frac{4}{6} =$ _____ + _____ = _____

3 Use a ratio table to simplify a fraction. You might not need all of the columns.

ex Use a ratio table to simplify $\frac{36}{60}$.

÷ 6 ÷ 2

part	36	6	3
whole	60	10	5

÷ 6 ÷ 2

a Use a ratio table to simplify $\frac{8}{32}$.

8		
32		

4 Use the ratio tables to find the better buy. You might not need all of the columns.

price in dollars	$12				
number of cans	10				

price in dollars	$15				
number of cans	12				

Which is the better buy? Explain.

5 Byron used a ratio table incorrectly to subtract $\frac{4}{9} - \frac{2}{3}$. Explain his error.

4	2	2
9	3	6

So $\frac{4}{9} - \frac{2}{3} = \frac{2}{6}$.

NAME | DATE

Fraction Story Problems

1 Zack and Noah jogged $\frac{2}{5}$ of a mile and walked another $\frac{1}{4}$ of a mile. How far did they go in all?

2 Mrs. Brown bought a dozen eggs at the store, but when she got home she discovered that $\frac{1}{3}$ of the eggs were broken so she threw them away. She used $\frac{1}{6}$ of the eggs in a recipe. How many eggs were left? What fraction of the dozen was left?

3 Erin had $3\frac{1}{9}$ boxes of granola bars. She gave $1\frac{3}{4}$ of the boxes of granola bars to her friends. How much did Erin have left for herself?

4 Jada had $1\frac{1}{2}$ pieces of red licorice. Her cousin gave her $2\frac{1}{4}$ more pieces of red licorice. Then Jada gave $1\frac{1}{8}$ of the pieces to her dad. How many pieces did Jada have left?

5 Last Saturday, Michael spent $\frac{2}{6}$ of an hour cleaning the hamster cage, $\frac{3}{12}$ of an hour walking the dog around the block, and $\frac{5}{60}$ of an hour feeding the bird. What part of an hour did Michael spend taking care of his pets?

6 Leah was planning to spend $2\frac{1}{3}$ hours with a friend on Saturday, but her mom said she had to finish her chores first. If it took her $\frac{3}{4}$ of an hour to do her chores, how much time did Leah have left to spend with her friend?

7 Josie walked $\frac{3}{10}$ of a mile to the park. Then she walked $\frac{2}{5}$ of a mile to Angie's house. Then she walked $\frac{1}{20}$ of a mile home. How far did Josie walk in all?

8 The class was celebrating reading week with cupcakes. The red and blue table groups ate $\frac{2}{5}$ of the cupcakes and the green and purple table groups ate $\frac{3}{7}$ of the cupcakes. What fraction of the cupcakes were left? How many cupcakes might there have been?

9 **CHALLENGE** Pablo found part of a carton of eggs in the refrigerator. He used $\frac{1}{3}$ of a dozen for baking a cake and $\frac{1}{6}$ of a dozen to make brownies. Then he had 2 eggs left over. How many eggs were in the carton when Pablo started?

10 **CHALLENGE** Morgan had $\frac{1}{2}$ a box of candy left after the movie. She ate $\frac{1}{2}$ of that on the way home and still had 8 pieces left to give to her little brother. How many pieces of candy were in the box when Morgan bought it?

NAME | DATE

Ratio Tables to the Rescue!

1 Use the ratio table to multiply 22×45.

1	2	20	22
45			

2 Use the ratio tables to find equivalent fractions so that you can add $\frac{2}{5} + \frac{1}{8}$.

part	2	
whole	5	40

part	1	
whole	8	40

$\frac{2}{5} + \frac{1}{8} =$ _____ + _____ = _____

3 Use a ratio table to simplify a fraction. You might not need all of the columns.

ex Use a ratio table to simplify $\frac{35}{100}$.

÷ 5

35	7	
100	20	

÷ 5

4 Use a ratio table to simplify $\frac{6}{24}$.

6		
24		

5 Use the ratio tables to find the better buy. You might not need all of the columns.

price in dollars	$30				
number of cans	24				

price in dollars	$36				
number of cans	30				

Which is the better buy? Explain.

6 Regina used a ratio table incorrectly to add $\frac{1}{6} + \frac{1}{3}$. Explain her error.

1	1	2
6	3	9

So $\frac{1}{6} + \frac{1}{3} = \frac{2}{9}$.

NAME | DATE

Adding Fractions & Mixed Numbers

1 Rewrite each pair of fractions so they have the same denominator. Then find their sum. Simplify the sum if you can.

ex $\frac{5}{8} + \frac{7}{12} =$

$\frac{15}{24} + \frac{14}{24} = \frac{29}{24}$ and $\frac{29}{24} = 1\frac{5}{24}$

ex $\frac{2}{6} + \frac{8}{12} =$

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

a $\frac{3}{4} + \frac{2}{8} =$

b $\frac{6}{8} + \frac{9}{12} =$

c $3\frac{6}{12} + 4\frac{1}{2} =$

d $1\frac{5}{8} + 2\frac{3}{4} =$

2 Randy solved the following problem: $\frac{7}{8} + \frac{9}{15}$. He said, "I can add 7 and 9 to get 16 and add 8 and 15 to get 23. The answer is $\frac{16}{23}$." Is Randy correct? Explain your answer.

3 Bobby used a ratio table to find an equivalent fraction to add $\frac{4}{6} + \frac{3}{5}$. He thought he would simplify $\frac{4}{6}$ first, and wrote down $\frac{8}{3}$. Kelly said she didn't think $\frac{4}{6}$ was equivalent to $\frac{8}{3}$. Who is correct? Explain your answer.

NAME | DATE

Fraction Addition & Subtraction Review

1 Find the sum or the difference for each pair of fractions.

a $\frac{5}{6} - \frac{2}{5} =$

b $\frac{1}{3} + \frac{6}{7} =$

2 Annie ran $\frac{5}{8}$ of a mile. Lexi ran $\frac{7}{10}$ of a mile. Who ran farther and by exactly how much? Show all your work.

3 Juan and his mother hiked $\frac{3}{8}$ of a mile this morning and $\frac{4}{5}$ of a mile this afternoon. How far did they hike today? Show all your work.

NAME | DATE

More Fraction Problems

1 Fill in the missing fraction or mixed number in each equation.

ex $1\frac{5}{6} + \underline{\frac{1}{6}} = 2$

a $1 = \frac{6}{10} + \_\_\_\_\_$

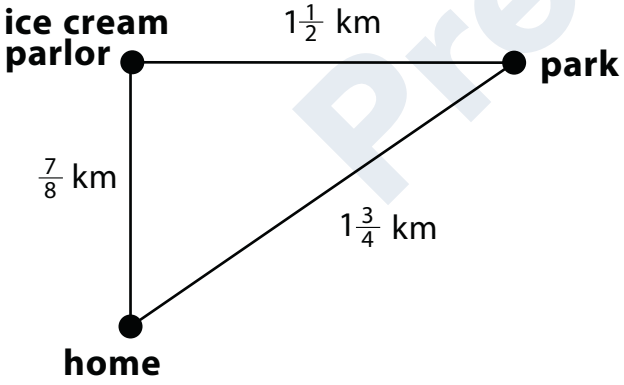
b $2 = 1\frac{4}{12} + \_\_\_\_\_$

c $3 = \_\_\_\_\_ + 1\frac{7}{8}$

d $2 = \frac{10}{12} + \_\_\_\_\_$

e $2\frac{6}{8} + \_\_\_\_\_ = 4$

2 Calvin and his family were going on a walk. They wanted to walk to the park, then go to the ice cream parlor, and finally walk home. The map below shows their path and the distances between each stop. How many kilometers will they walk in all? Show all your work.



3 Add or subtract to solve each equation. Show all your work.

a $3\frac{7}{8} + 2\frac{9}{10} =$

b $\frac{7}{16} + \frac{3}{4} =$

c $1\frac{4}{5} - \frac{6}{7} =$

Home Connections

GRADE 5 – UNIT 2 – MODULE 3

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NAME | DATE

Using a Ratio Table page 1 of 2

1 Use a ratio table to multiply the numbers.

ex 23×26

1	2	4	10	20	26
23	46	92	230	460	598

a 35×44

1	2	4	40	44
35				

b 39×20

1	2	20
39		

c 18×65

1	2	20	18
65			

d 4×18

e 75×15

1	100	50	25	75
15				

(continued on next page)

NAME | DATE

Using a Ratio Table page 2 of 2

2 True or False?

a $98 \times 34 = (100 \times 34) - (2 \times 34)$ ___

b $46 \times 28 = 23 \times 56$ ___

3 Veronica has to multiply 398×18. She says she can multiply 400×18 and then take away one group of 18.

a Do you agree with Veronica? Explain.

b Write an expression that shows Veronica's thinking.

c What is 398×18? Show your work.

4 **CHALLENGE** The aquarium has 198 fish tanks with 15 fish in each. They also have 297 tanks with 12 crustaceans in each. Does the aquarium have more fish or more crustaceans? How many more? Make an estimate and explain your reasoning. Then determine the actual answer.

a Estimate and reasoning:

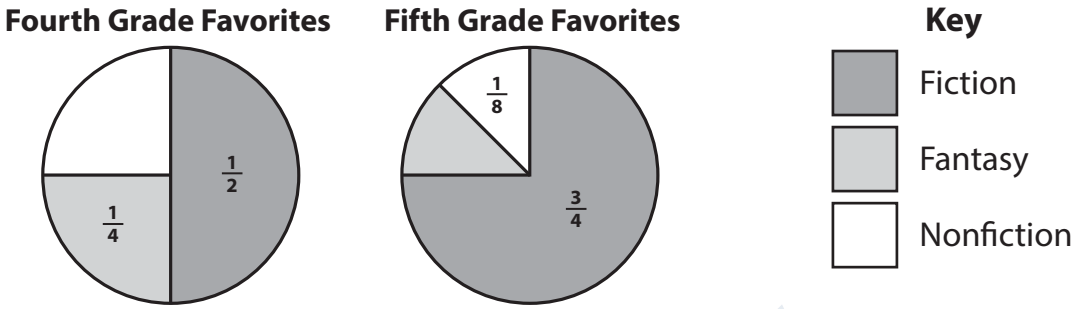
b Actual answer: (Show your work.)

c Is your answer reasonable? (Think about your estimate.)

NAME | DATE

In the Library page 1 of 2

1 The librarian at our school asked the fourth and fifth graders to vote on their favorite kind of book. The circle graphs below show the results. Use the information to answer the questions below.



a What fraction of the fourth graders said they liked nonfiction books best? How do you know?

b If there are 96 fourth graders, how many like fantasy books best? Show your work.

c What fraction of the fifth graders said they like fantasy books best? How do you know?

d If there are 112 fifth graders, how many like nonfiction books best? Show your work.

e What fraction of the fifth graders said they liked fiction books best? How do you know?

(continued on next page)

NAME | DATE

In the Library page 2 of 2

2 Madeline walked $1\frac{1}{2}$ miles to her Aunt Jenny's house yesterday morning. After visiting with Aunt Jenny, Madeline walked $\frac{3}{4}$ of a mile to the park, where her mother picked her up. How many miles in all did she walk yesterday? Show all your work.

3 Sara and her mother bought some vegetables at the farmer's market yesterday. They bought $2\frac{3}{4}$ pounds of cabbage, $\frac{1}{2}$ a pound of onions, and $1\frac{3}{8}$ pounds of carrots. How many pounds of vegetables did they buy in all? Show all your work.

4 **CHALLENGE** Madison went to the mall with her big sister last weekend. Their mom dropped them off at 1:00 and said, "I'll pick you up at 2:30." The girls spent $\frac{5}{6}$ of an hour at the toy store, $\frac{2}{3}$ of an hour at the pet store, and $\frac{1}{2}$ an hour at the food court. When they got back to the bench to meet their mom, she was already there. She said, "Where have you been? I've been waiting _____ of an hour for you!" How long had their mom been waiting for them?

NAME | DATE

Fraction Addition & Subtraction Story Problems page 1 of 2

1 Find the sum or the difference for each pair of numbers. Show all your work.

a $\frac{5}{14} + \frac{4}{5} =$

b $\frac{7}{9} - \frac{4}{7} =$

c $1\frac{7}{15} + \frac{3}{9} =$

d $2\frac{1}{3} - 1\frac{3}{5} =$

2 George and his dad made some snack mix for their camping trip. To make it, they used 2 cups of mini pretzels, $\frac{3}{4}$ cup of peanuts, and $\frac{2}{3}$ cup of chocolate chips. How many cups of snack mix did they have when they were finished? Show all your work.

(continued on next page)

NAME | DATE

Fraction Addition & Subtraction Story Problems page 2 of 2

3 Lisa drank $\frac{7}{16}$ of a bottle of water during the soccer game. Julianne drank $\frac{2}{3}$ of the water in a bottle that was the same size as Lisa's. Who drank more water and by exactly how much? Show all of your work.

4 **CHALLENGE** Austin went to the science museum. He was there for 2 hours. He spent $\frac{3}{5}$ of his time doing experiments. He spent $\frac{1}{3}$ of his time at the water station. He spent the rest of his time looking at skeletons. How long did Austin spend looking at skeletons? Show all your work, and express your answer as a number of minutes and as a fraction of an hour.

