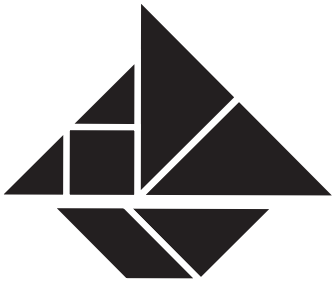


Teachers Guide

GRADE 5 – UNIT 2 – MODULE 4

BRIDGES®
IN MATHEMATICS

Module 4
LCMs & GCFs

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 4
LCMs & GCFs

Overview

In this module, students extend their understanding of fractions, factors, and multiples. They learn how to use the least common multiple to generate equivalent fractions with common denominators. Then they learn how to use the greatest common factor to simplify fractions to the simplest, or simplified, form. Finally, they apply what they have learned as they solve, share, and discuss a variety of story problems.

Planner

Session	P&I	PS	MF	WP	A	DP	HC
Session 1 LCMs & LCDs Students learn how to generate equivalent fractions by finding the least common multiple of the denominators of both fractions. This helps them compare and find the difference between fractions in this session and add and subtract fractions in later sessions. Students practice comparing fractions and discuss their work.	●					●	●
Session 2 Simplifying Fractions Students learn how to simplify fractions by dividing both the numerator and the denominator by their greatest common factor. Then they practice using the greatest common factor to simplify fractions.	●					●	
Session 3 Fraction Problem Solving Students review finding the least common multiple and the greatest common factor and work with a partner to apply what they have learned to solve a variety of problems. Then each student pair selects two of the problems and creates a mini-poster of each featuring their strategies and solutions. The class goes on a gallery walk to view each others' work and debriefs in a class discussion.	●			●		●	●

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–T2 according to the instructions at the top of each master.	
	Run a single display copy of Student Book pages 61–62, 64–65, and 67–69.	
	If students do not have their own Student Books, run a class set of Student Book pages 61–69.	
	If students do not have their own Home Connections books, run a class set of the assignments for this module using pages 37–40.	

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
LCMs & LCDs

Summary

Students learn how to generate equivalent fractions by finding the least common multiple of the denominators of both fractions. This helps them compare and find the difference between fractions in this session and add and subtract fractions in later sessions. Students practice comparing fractions and discuss their work. Finally, the teacher introduces and assigns the Find the Greater Fraction Home Connection.

Skills & Concepts

- Use a visual mode to explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ (4.NF.1)
- Recognize equivalent fractions and generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number (4.NF.1)
- Compare two fractions with different numerators and different denominators, and use the appropriate symbols and explain why one fraction must be greater than or less than another fraction (4.NF.2)
- 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 of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- 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 LCMs & LCDs		
TM T1 Square Sandwiches & Bedroom Walls **TM T2** Same-Sized Pieces **SB 61–62*** Fraction Equivalents		• piece of copy paper to mask portions of the teacher master • rulers for student use • scissors for student use
Home Connection		
HC 37–38 Find the Greater Fraction		
Daily Practice		
SB 63 Which Is Bigger?		

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.*

Vocabulary

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

denominator*
equivalent fractions*
least common denominator
least common multiple
multiple*
numerator*

Problems & Investigations

LCMs & LCDs

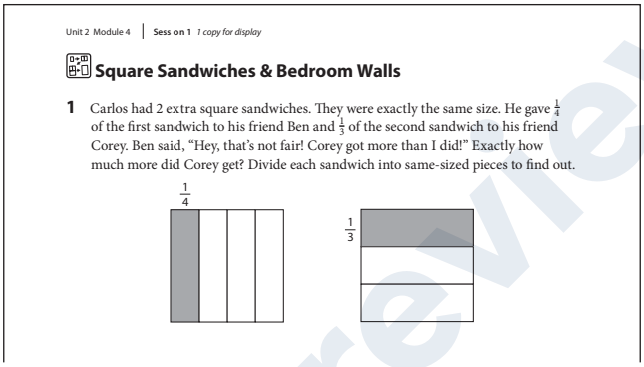
1 Open the session.

- Recognize students for their effort on the Unit 2 Post-Assessment.
- Then explain that you are going to introduce another strategy for finding common denominators today, one that will probably remind them of some of the work they've done recently with the double number line and ratio tables.

2 Display the top portion of the Square Sandwiches & Bedroom Walls Teacher Master, keeping the bottom of the sheet covered for now.

Read the text to the class and ask students to pair up to share ideas about the situation. Here are some questions to pose:

- Is it true that Corey got more than Ben?
- Exactly how much more did Corey get?
- How might dividing each of the sandwiches into same-sized pieces help students solve the problem?



Unit 2 Module 4 | Sess on 1 *1 copy for display*

Square Sandwiches & Bedroom Walls

1 Carlos had 2 extra square sandwiches. They were exactly the same size. He gave $\frac{1}{4}$ of the first sandwich to his friend Ben and $\frac{1}{3}$ of the second sandwich to his friend Corey. Ben said, "Hey, that's not fair! Corey got more than I did!" Exactly how much more did Corey get? Divide each sandwich into same-sized pieces to find out.

$\frac{1}{4}$ $\frac{1}{3}$

Students *A third is more than a fourth, but it's hard to tell how much more.*

If you could cut both of the sandwiches into smaller pieces, you could maybe count up the pieces to see how many more of them are in a third.

I don't get it!

I think we're supposed to figure out a way to cut the sandwiches so they both have the same number of pieces. Right now, the first sandwich is cut into 4 pieces. The second sandwich is cut into 3 pieces. How could we make more cuts so they both have the same number?

3 Give students each a copy of the Same-Sized Pieces Teacher Master. Note with students that there are 2 copies of the sandwich squares, so they can try at least two different ideas.

Some students might want to cut out and fold the sandwich squares, while others may want to draw lines on the squares.

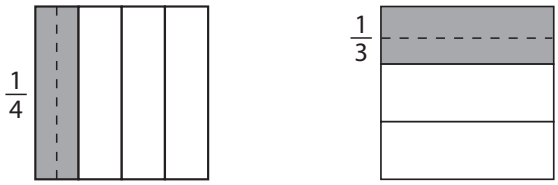
4 After they have had a few minutes to work ask students to share their thinking and compare their answers with neighbors. Then invite several volunteers to share their thinking for everyone to see.

About This Session

Much of the instruction in this session is a review and summary of skills and concepts covered in the previous three modules. While it may seem repetitive in some ways, today's activities reinforce the need to find common denominators when comparing, adding, or subtracting fractions with unlike denominators. The session offers first a visual and then a numeric path to obtaining least common denominators by finding the least common multiple of those denominators. Some students will likely have already constructed these ideas on their own, or at least developed the intuitions needed to support a more formal understanding of the relationship between least common multiples (LCMs) and least common denominators (LCDs). Others, whose understandings have been fragile or fragmentary up until now, may be able to access the skills and concepts more easily given the models offered in this session.

ELL/SUPPORT This session addresses both the least common multiple (LCM) and the least common denominator (LCD), which can be confusing to students—especially English Language Learners. Help students understand the difference between the two terms by emphasizing that any two (or more) numbers can have a least common multiple and any two (or more) fractions can have a least common denominator, which is the least common multiple of the two (or more) denominators you are using.

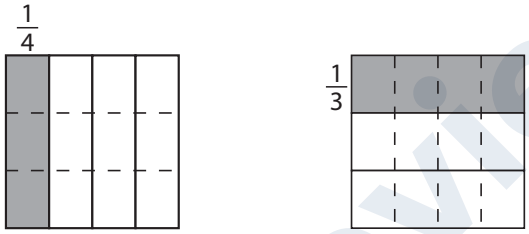
Monroe *I saw that if you divide each section of the first sandwich up and down you would get 8 pieces so Ben got 2/8 of a sandwich. I divided the other sandwich with a line across and saw that you would get 6 pieces and two of those would be the same as the third, so Corey got 2/6 of a sandwich. Sixths are bigger than eighths, so 2/6 is more than 2/8.*



Amelia *But that still doesn't tell us how much more Corey got than Ben. I thought we were supposed to make both sandwiches into the same-sized pieces.*

Teacher *How did you solve the problem, Amelia?*

Amelia *Well, I kind of thought about how fourths and thirds go together, and I realized you could cut both of the sandwiches into 12 pieces, like this.*



Teacher *Let's look at the situation again. Should we end up with more pieces all the same size for each sandwich like Monroe did or should we cut both sandwiches so they both have the same number of pieces, like Amelia did? Talk to the person next to you about this.*

Fiona *It's easier to compare if both sandwiches are cut the same. I did the same thing as Amelia. You can see that Corey got 4/12 of a sandwich, and Ben only got 3/12. Corey got 1/12 more than Ben did.*

5 Summarize the sandwich situation by writing the following equations on the board.

How do fourths, thirds, and twelfths relate to one another? Ask students to pair up to share ideas, and then call on volunteers to share with the class.

$\frac{1}{4} = \frac{3}{12}$ $\frac{1}{3} = \frac{4}{12}$ $\frac{3}{12} < \frac{4}{12}$

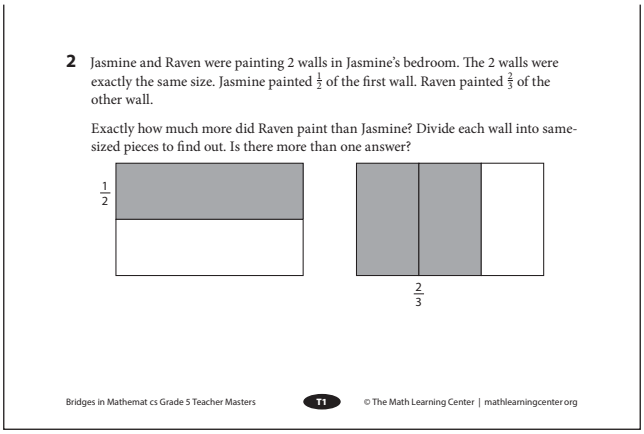
Students *If you can figure out how to make both things, like the sandwiches, into pieces that are the same, you can tell who has more.*

You can cut fourths and thirds into twelfths.

Three and 4 both go into 12. Also, you can get to 12 if you count by 3s and if you count by 4s.

Teacher *So, 3 and 4 are both factors of 12, and 12 is a multiple of 3 and a multiple of 4.*

6 Reveal the problem on the bottom half of the Square Sandwiches Teacher Master. Read it with the class and clarify the situation as needed.



2 Jasmine and Raven were painting 2 walls in Jasmine's bedroom. The 2 walls were exactly the same size. Jasmine painted $\frac{1}{2}$ of the first wall. Raven painted $\frac{2}{3}$ of the other wall.

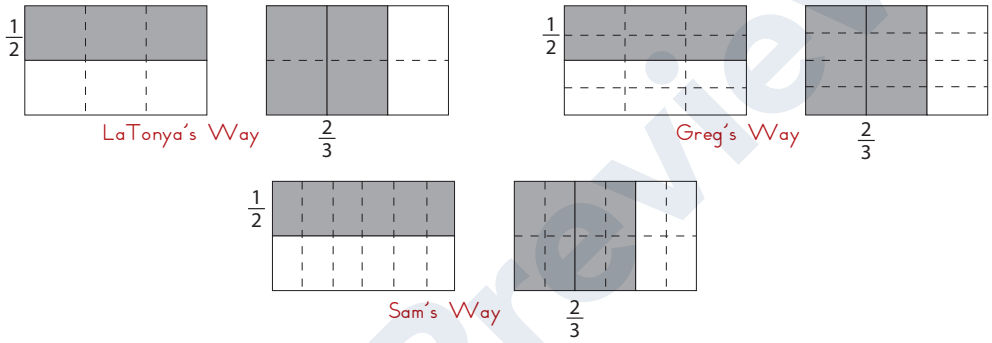
Exactly how much more did Raven paint than Jasmine? Divide each wall into same-sized pieces to find out. Is there more than one answer?

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

Bridges in Mathemat cs Grade 5 Teacher Masters T1 © The Math Learning Center | mathlearningcenter org

7 Give students a few minutes to solve the problem by experimenting with the rectangles at the bottom of their Same-Sized Pieces sheet.

- Encourage students who finish quickly to generate a second, and even third solution.
- Ask them to check their ideas and solutions with others nearby, and then invite several volunteers to share their thinking with the class.



LaTonya *This is so cool! I just split the halves into thirds and the thirds into halves, and got sixths for both walls. Raven painted one more sixth of her wall.*

Sam *I did sixths at first, and then I split them up into twelfths. Jasmine painted 6/12 of her wall, and Raven painted 8/12 of her wall.*

Greg *I did the same thing as Sam, but I cut the pieces the other way.*

8 Students will likely discover that the amount of wall space each girl painted can be compared by cutting the rectangles into sixths, twelfths, perhaps even eighteenths or twenty-fourths.

- Summarize their findings by writing equations similar to the ones below for display.
- Ask students to share their ideas about how sixths and twelfths relate to halves and thirds.

$\frac{1}{2} = \frac{3}{6}$ $\quad \frac{2}{3} = \frac{4}{6}$ $\quad \frac{3}{6} < \frac{4}{6}$

$\frac{1}{2} = \frac{6}{12}$ $\quad \frac{2}{3} = \frac{8}{12}$ $\quad \frac{6}{12} < \frac{8}{12}$

9 Review the fact that in order to compare, add, or subtract fractions that have different denominators, such as 1/4 and 1/3 or 1/2 and 2/3, people usually rewrite both fractions so they have the same denominator.

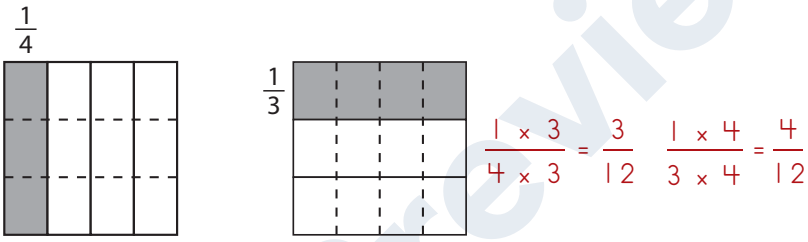
Furthermore, people usually look for the *lowest* or *least common denominator*; in this case sixths rather than twelfths, eighteenths, or twenty-fourths.

10 Now explain that while it is possible to find the least common denominator for two fractions by dividing them into smaller pieces as students have been doing today, one can also find the least common denominator by finding the least common multiple of the denominators.

- Write 1/4 and 1/3 on the board.
- Work with student input to identify the denominators and find the least common multiple of 4 and 3 by skip-counting. Record the work as shown below.

11 Ask students to consider what the equivalent of 1/4 and 1/3 would be in twelfths. How many twelfths are there in each of these fractions?

- Have them re-examine the squares they divided at the beginning of the activity.
- Then show them how to get the same results by multiplying the numerator and denominator of 1/4 and 1/3 by 3 and 4 respectively.



12 Now write ½ and ⅔ on the board. Work with student input to find the least common multiple of 2 and 3, and then multiply the numerator and denominator of ½ by 3 and the numerator and denominator of ⅔ by 3.

$$\frac{1 \times 3}{2 \times 3} = \frac{3}{6} \qquad \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

13 Write ¼ and ⅚ on the board. Which of the two fractions is greater? Exactly how much greater?

- Ask students to work in pairs to find the least common multiple of 4 and 6, and use the information to rewrite ¼ and ⅚ so they have a common denominator.
- After they have had a minute or two to work, ask volunteers to share their solutions and strategies with the class.

14 Repeat step 13 with two or three other pairs of fractions. Possibilities include ⅚ and ⅜, ¾ and 7/12, and ⅗ and ⅘.

15 Then display copies of the Fraction Equivalents Student Book pages.

- Review both sheets with the class and clarify as needed.
- When students understand what to do, have them go to work.
- Encourage them to help one another, and circulate to provide help as needed.

SUPPORT You might also want to give students a choice of working on the sheet independently, or working with you in a more supported small group setting.

Home Connection

16 Introduce and assign the Find the Greater Fraction Home Connection, which provides more practice with the following skills:

- Generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number (4.NF.1)
- Compare two fractions with different numerators and different denominators (4.NF.2)
- Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators (4.NF.2)
- 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)

Daily Practice

The optional Which Is Bigger? Student Book page provides additional opportunities to apply the following skills:

- Compare two fractions with different numerators and different denominators (4.NF.2)
- Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators (4.NF.2)
- Explain why one fraction must be greater than or less than another fraction (4.NF.2)
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference (5.NF.1)

Session 2
Simplifying Fractions

Summary

Students learn how to simplify fractions by dividing both the numerator and the denominator by their greatest common factor. Then they practice using the greatest common factor to simplify fractions. The work in this session prepares students for independent problem solving in Session 3.

Skills & Concepts

- Convert a mixed number to a fraction (supports 4.NF)
- Recognize equivalent fractions (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)
- Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators (5.NF.2)
- Reason abstractly and quantitatively (5.MP.2)
- Construct viable arguments and critique the reasoning of others (5.MP.3)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Simplifying Fractions		
SB 64–65* Using the Greatest Common Factor to Simplify Fractions		• student math journals
Daily Practice		
SB 66 Simplifying Fractions		

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.*

Vocabulary

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

factor*
greatest common factor
least common denominator
least common multiple
lowest terms (simplest form)*

Problems & Investigations

Simplifying Fractions

1 Open the session by revisiting equivalent fractions.

- Write the following fractions where everyone can see them: $\frac{3}{6}$, $\frac{5}{10}$, $\frac{18}{36}$, $\frac{25}{50}$, and $\frac{48}{96}$.
- Give students a moment to look at the fractions and then ask them to name a more familiar fraction that is equivalent to all of those listed.
- When students agree all the fractions are equal to ½, write ½ near the other fractions.
- Ask students to close their eyes and picture $\frac{18}{36}$ of a piece of a paper. Then ask them to picture ½ of a piece of paper.
- Have students turn and talk with a partner about which fraction is simplest when dealing with a quantity equal to ½. Would they want to use ½ or one of the other fractions?
- Invite a few students to share their thinking.

There is no right or wrong answer in this discussion. Students may talk about ½ being easier to deal with because it is familiar and the numerator and denominator are low numbers, while others may say it depends on the situation, as they might want a denominator other than 2 when comparing, adding, or subtracting fractions.

2 Introduce the term *simplest form* or *simplified form*.

- Explain that fractions are in their *simplest form* when the numerator and the denominator have no common factors other than 1. They cannot be divided by a common factor in order to find an equivalent fraction with smaller numbers.
- Write the fractions listed below on the board. As you write each one, have students tell whether or not it is in simplest form, and explain why.
- Circle the fractions that are in simplest form.

$\frac{3}{6}$ $\frac{2}{3}$ $\frac{5}{15}$ $\frac{7}{9}$ $\frac{6}{9}$

> ***Ming*** *I think 6/9 is already in simplest form, because you can't divide 9 by 6.*
>
> ***Solana*** *I respectfully disagree with you, Ming. You don't have to be able to divide the numerator by the denominator; you just have to be able to divide both of them by the same number. With 6/9, you can divide both numbers by 3, so you get 2/3.*

3 Ask students to think of more fractions in their simplest form and add them to the list.

As students share, ask them to prove that their fraction is in simplest form. Invite other students to challenge suggestions if appropriate.

4 Then show students how to find the simplest form of a fraction.

- Write the fraction 16/24 as you remind students that a *factor* is a whole number that divides exactly into another number.
- Ask students to tell you the factors of 16 and 24. Write them down where everyone can see.
- Explain that *greatest common factor* is a term that they will hear often and it means the largest factor shared by the numbers in question. Ask students to identify the greatest common factor of 16 and 24, as you circle it on the board.

16 1, 2, 4, (8), 16

24 1, 2, 3, 4, 6, (8), 12, 24

- Then tell students they can find the simplest form of a fraction by dividing both the numerator and the denominator by the greatest common factor.
- Elicit student help as you divide 16 and 24 by 8 to get 2/3. Represent the division as illustrated.

$\frac{16}{24}$

$\frac{16 \div 8}{24 \div 8} = \frac{2}{3}$ $\frac{2}{3} = \frac{16}{24}$

- Ask students if they think that 2/3 is in simplest form, and press them to explain why.

5 Have students pair up to summarize the steps for finding the simplest form of a fraction. List them where everyone can see them. Then answer any questions about finding the simplest form.

- List the factors of both the numerator and denominator.
- Find the greatest factor the two numbers have in common.

- Divide both numbers by the GCF to find the simplest form.

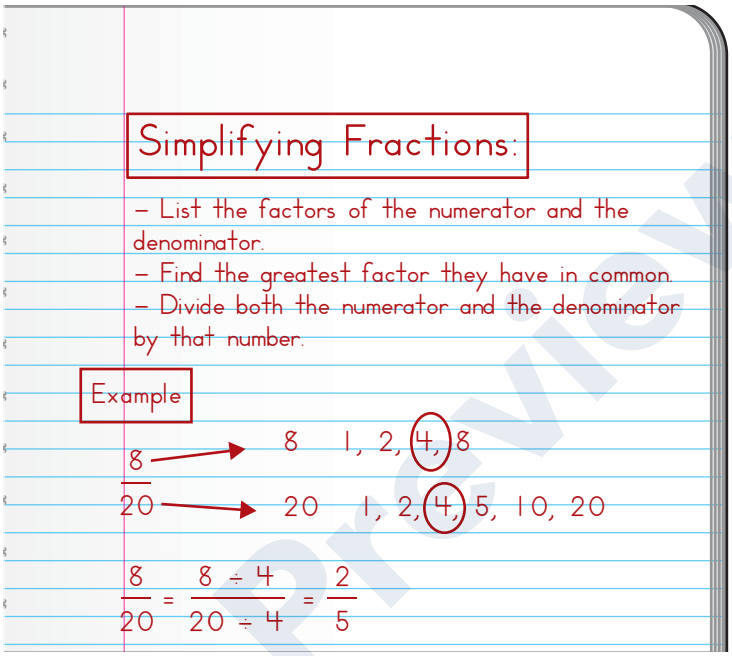
6 Have students use the steps they identified to help you find the simplest form of the fraction 9/24.

- List the factors of 9 and 24.
- Find the greatest common factor.
- Divide both 9 and 24 by the greatest common factor to find the simplest form (3/8).

7 Have students turn to a partner to summarize the steps for finding the simplest form of a fraction.

Then have them make an entry for "Simplifying Fractions" in the handbook section of their math journals, recording the steps and an example.

SUPPORT Work with the students to compose the entry. Have them write in their math journals as you write at the display.



8 Write the equation 12/30 = 6/15 on the board. Ask students turn and talk to a partner about whether 6/15 is the simplest form of 12/30. Then invite a few students to explain their thinking.

- When the class agrees that 6/15 is not the simplest form, encourage them to simplify it further—to 2/5.
- Ask students how they can make sure they have found the simplest form of a fraction.

9 Introduce and assign the Using the Greatest Common Factor to Simplify Fractions Student Book pages.

- Have students complete both pages. Invite them to work with a partner if they choose and encourage them to discuss the questions as they work.
- As students work, circulate to make observations and answer questions.

SUPPORT/ELL The structure of the page is designed to help students remember the steps for finding simplest form, but it may be overwhelming for some. Help students understand what each part of the page is asking. Work with students to solve the first problem in each section of the assignment.

Math Practices in Action 5.MP.2

The Student Book page encourages students to reason both abstractly and quantitatively by providing a structure that connects their numeric work to visual representations of the equivalent fractions.

CHALLENGE Some students will complete these pages relatively quickly. Have them generate a list of fractions, some in simplest form and some not in simplest form. Have partners find the ones not in simplest form and simplify them.

10 As students finish, have them compare their work with a classmate or another student pair and resolve any differences through discussion.

11 When most students have finished, call the class together to reflect on the pages.

- Have students talk about any part of their work that was challenging.
- Then invite several students to share how they solved the story problems at the end of the assignment.

Although students may have used other strategies, they might have used ideas from this session and Session 1. Elicit the idea that students could find the least common multiple to make common denominators, which makes it easier to add, subtract, or compare the fractions. Then they could find the greatest common factor to simplify the answer.

12 Write the fraction $^{12}/_{8}$ and ask students to find its simplest form.

Build discussion around the fact that improper fractions can be simplified just as proper fractions can. Encourage students to convert the improper fractions to a mixed number, either before or after they find the simplest form.

> ***Students*** *Wait a second, that's not right.*
>
> *It's an improper fraction.*
>
> *Can we find the simplest form of an improper fraction?*
>
> *I think so. We can find the factors of 12 and 8, just like we would if it was $^{8}/_{12}$ instead.*
>
> *Four divides into 12 and 8. Twelve divided by 4 is 3 and 8 divided by 4 is 2, so that's 3 over 2 or $^{3}/_{2}$.*
>
> *Three halves is the same as 1 ½. That seems even simpler to me!*
>
> ***Teacher*** *This has been a great discussion. You realized you could apply what you learned about simplifying proper fractions to improper fractions and you changed the fraction to a mixed number. If you have to simplify an improper fraction, you can convert it to a mixed number before or after you simplify it. What would you have had if you converted it before simplifying?*
>
> ***Student*** *Hmm, 1 and $^{4}/_{8}$. If I had done that I would have know that was 1 ½.*
>
> ***Teacher*** *So, sometimes, it might be easier to convert before you simplify and sometimes you might want to do it after.*

13 Then have students turn to a partner and talk about tips or strategies to help identify whether a fraction needs to be simplified.

Encourage students to think of what they know about numbers to help.

- Many students will see that fractions with even numbers as both the numerator and denominator can always be simplified.
- Other students might realize that if both the numerator or denominator are prime, then the fraction cannot be simplified.
- While fractions with a prime number in the numerator or the denominator are less likely to need simplifying, this is not a hard and fast rule, as the prime number may be a factor of the other number, as in the case of $^{7}/_{21}$.

14 Have students put away their materials and close the lesson with a few key review questions:

- What is the greatest common factor of any two numbers?
- What does it mean to simplify a fraction?
- What is the simplest form of a fraction?
- How do you know you have found the simplest form?

Daily Practice

The optional Simplifying Fractions Student Book page provides additional opportunities to apply the following skills:

- Recognize equivalent fractions (4.NF.1)
- Generate a fraction equivalent to fraction a/b by multiplying the numerator (*a*) and denominator (*b*) by the same number (4.NF.1)
- Add fractions with unlike denominators, including mixed numbers (5.NF.1)

Session 3
Fraction Problem Solving

Summary

Students review finding the least common multiple and the greatest common factor and work with a partner to apply what they have learned to solve a variety of problems. Then each student pair selects two of the problems and creates a mini-poster of each featuring their strategies and solutions. The class goes on a gallery walk to view each others' work and debriefs in a class discussion. Finally, the teacher introduces and assigns the Working with Fractions Home Connection.

Note

This session will likely take more than an hour, so you might plan to break off after step 6 and make Work Places available to students who finish the assignment before the end of the first hour. Resume work the following day, starting with step 7, and plan to have students visit Work Places if you finish the activity before the end of the second hour.

Skills & Concepts

- Generate a fraction equivalent to fraction a/b by multiplying the numerator (*a*) and denominator (*b*) by the same number (4.NF.1)
- Convert a mixed number to a fraction (supports 4.NF)
- Compare two fractions with different numerators and different denominators (4.NF.2)
- 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)
- Make sense of problems and persevere in solving them (5.MP.1)
- Reason abstractly and quantitatively (5.MP.2)
- Construct viable arguments and critique the reasoning of others (5.MP.3)

Materials

Copies	Kit Materials	Classroom Materials
Problems & Investigations Fraction Problem Solving		
SB 67–68* Problem Solving with the LCM & GCF		• sticky notes, 2–3 per student • 8 ½ by 11 white copy paper, 1–2 sheets per student • fine-tipped markers, 2–3 colors per student pair
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 39–40 Working with Fractions		
Daily Practice		
SB 69 Evan's Turtle		

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.*

Problems & Investigations

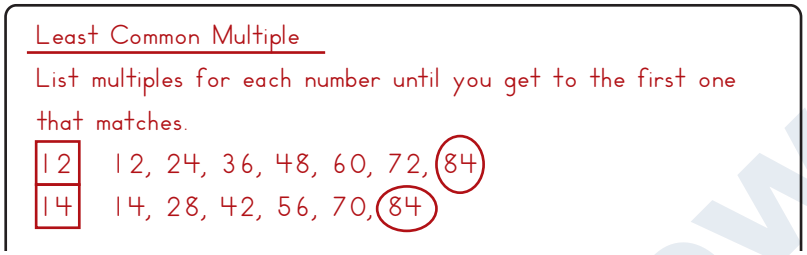
Fraction Problem Solving

1 Open the session by having students turn to a partner to describe the steps to find the least common multiple for 12 and 14.

Be sure students understand they do not have to actually find the least common multiple. Instead, they have to explain the steps they would take.

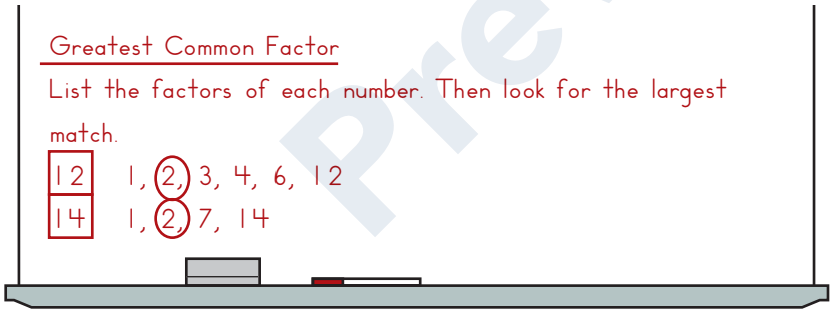
2 Invite one or two students to share their thinking with the class. If there is any disagreement, build discussion until the class comes to a consensus on a correct method.

SUPPORT Write the term *least common multiple* on the board, record students' suggested steps, and then work with input from the class to carry them out.



3 Next, have students turn to a partner to describe the steps to find the greatest common factor for any two numbers. Invite one or two students to share.

SUPPORT Write the term *greatest common factor* on the board, record students' suggested steps, and then work with input from the class to carry them out.



4 Talk about ways to keep from confusing the two terms.

- Explain that sometimes people confuse these two terms. Ask students to work with a partner to see if they can come up with a funny or clever way to help everyone remember the difference between these terms.
- Encourage students to use rhyme, song, rap or rhythm or to think of mnemonic devices to help others remember these terms.
- If students work quickly, they can draft a sketch or comic to help emphasize the meaning of each term.
- Invite students to share their ideas for understanding least common multiples and greatest common factors.

5 Then introduce and assign the Problem Solving with the LCM & GCF Student Book pages.

- Display the pages and give students a moment to look over the problems.

- Explain that students will work in pairs to solve the problems and then choose two to share in a gallery walk.
  - » Let students know the problems they share will demonstrate their understanding of least common multiples and greatest common factors. They will create a mini-poster of each on a separate sheet of paper for everyone to see.
  - » Also, point out to students that these problems can be solved without following the class steps to find the LCM or GCF, and if students want to use strategies they learned earlier in the unit, that is fine. However, they need to solve at least one problem using LCM and one for the GCF so they are prepared to share for the gallery walk.
- Confirm that everyone knows what to do and have students get started.

6 As students work, circulate to make observations and provide differentiated instruction as needed.

SUPPORT/ELL If students have difficulty understanding the questions, read them aloud and help students identify key words that will help them. Review the steps for finding the LCM and GCF if necessary.

SUPPORT/CHALLENGE Vary your expectations of which problems and how many of the five each student pair completes. For some, the first two or three problems may be a reasonable expectation. For others, all five problems may be more reasonable.

CHALLENGE Encourage students to find the most efficient way to solve each problem. This might mean not using the LCM and GCF. Make sure students know how to find the LCM and GCF, and then challenge them to compare strategies for some or all of the problems.

7 As student pairs finish the problems, have them create mini-posters for the gallery walk.

Make sure they know where to find the materials they need and the expectations for their work.

- Ask students to choose two of the problems they just solved, one that demonstrates their understanding of how to find and use the LCM in a problem and one that demonstrates their understanding of how to find and use the GCF.
- Have students show their work for these problems on a blank piece of paper using fine-tipped markers. If they choose to showcase each problem separately, let them know that they're welcome to use 2 sheets of paper.
- Have students include their names, a heading, and the problem numbers on their papers. Remind them to make sure their final answers are clearly labeled.

8 When students have finished, have them set up their papers around the room. Give each student a few sticky notes.

9 Review the expectations for a gallery walk, and then have students view each other's work.

- Remind students that a gallery walk should be quiet to allow people to think about the work they are viewing.
- Encourage students to visit work that is not crowded. No more than three students should view one piece of work at a time.
- Tell students to write comments on their sticky notes and leave them for their peers. Remind them that comments can be questions, constructive criticism, or complimentary feedback and model an example or two.
- When everyone is ready, invite students to begin the gallery walk.

10 After about ten minutes of viewing each other's work, bring the class back together to reflect on their work.

The following questions may help:

- What did you notice about the work you saw?
- Did other students solve the problems similarly to you?
- Could you see where students used the least common multiple or greatest common factor clearly? Can you give an example?
- Were there problems where you thought another strategy might be more efficient?

11 Wrap up the lesson by recognizing students for their effort and learning in this module. Then have students bring you their work for the gallery walk and put away the rest of their materials.

Home Connection

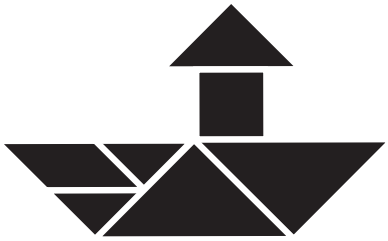
12 Introduce and assign the Working with Fractions Home Connection, which provides more practice with the following skills:

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

Daily Practice

The optional Evan's Turtle Student Book page provides additional opportunities to apply the following skills:

- Compare two fractions with different numerators and different denominators (4.NF.2)
- 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)



Teacher Masters

GRADE 5 – UNIT 2 – MODULE 4

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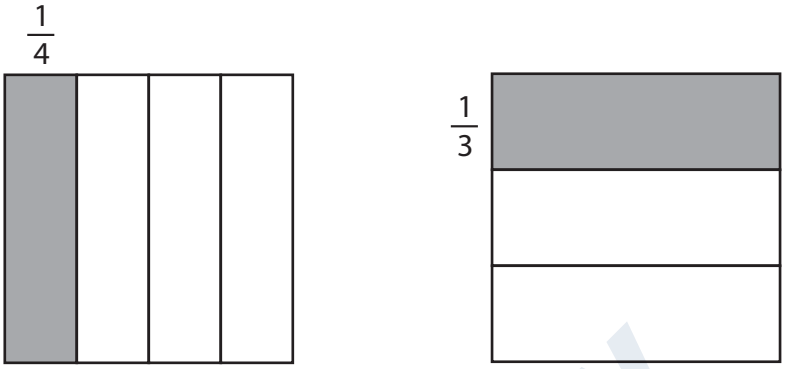
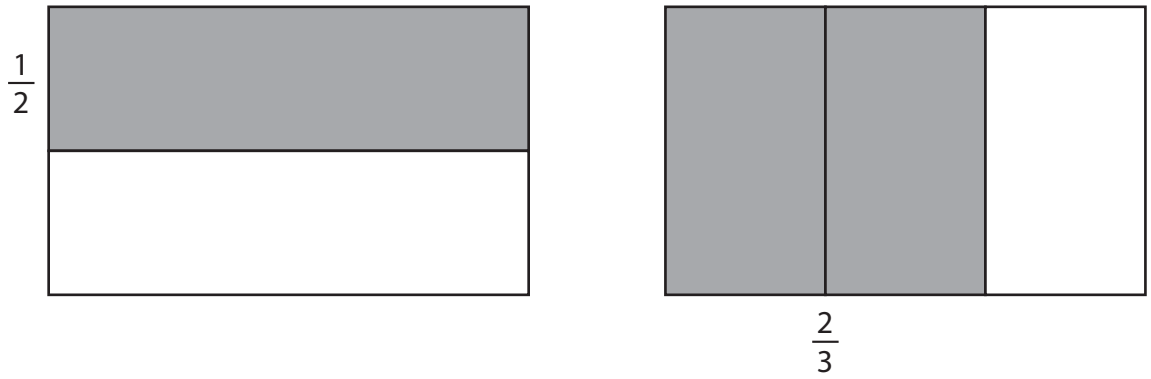
Square Sandwiches & Bedroom Walls

1 Carlos had 2 extra square sandwiches. They were exactly the same size. He gave $\frac{1}{4}$ of the first sandwich to his friend Ben and $\frac{1}{3}$ of the second sandwich to his friend Corey. Ben said, "Hey, that's not fair! Corey got more than I did!" Exactly how much more did Corey get? Divide each sandwich into same-sized pieces to find out.



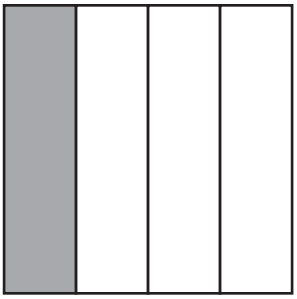
2 Jasmine and Raven were painting 2 walls in Jasmine's bedroom. The 2 walls were exactly the same size. Jasmine painted $\frac{1}{2}$ of the first wall. Raven painted $\frac{2}{3}$ of the other wall.

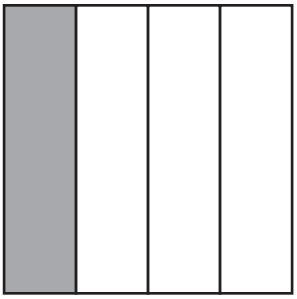
Exactly how much more did Raven paint than Jasmine? Divide each wall into same-sized pieces to find out. Is there more than one answer?

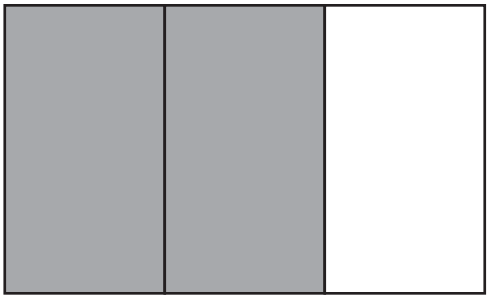


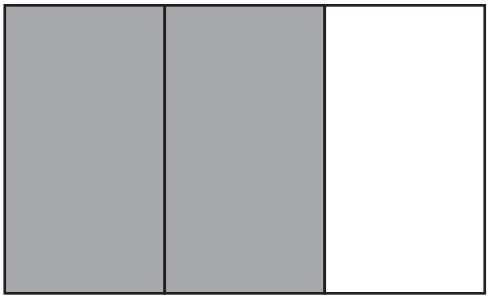
NAME | **DATE**

Same-Sized Pieces









Student Book

GRADE 5 – UNIT 2 – MODULE 4

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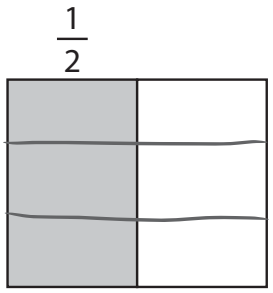
Fraction Equivalents page 1 of 2

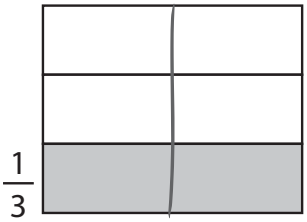
1 For each of the following pairs of fractions, draw in lines so they have the same number of pieces. Then write the equivalent fraction name beside both and write an equation under each to match the sketch.

ex



$\frac{3}{6}$

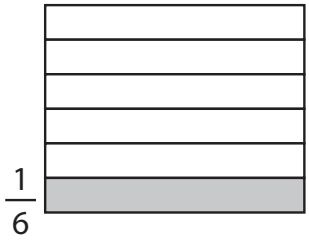
$\frac{1 \times 3}{2 \times 3} = \frac{3}{6}$



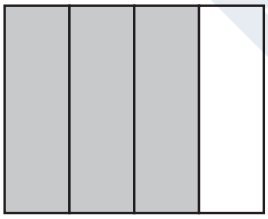
$\frac{2}{6}$

$\frac{1 \times 2}{3 \times 2} = \frac{2}{6}$

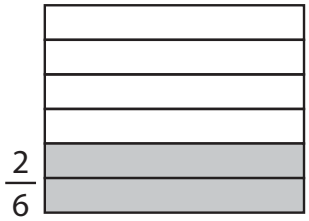
a

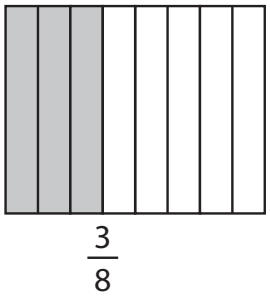


b



c





(continued on next page)

NAME | DATE

Fraction Equivalents page 2 of 2

2 Teri and Jon each got a granola bar from their dad. Teri ate $\frac{3}{5}$ of hers. Jon ate $\frac{2}{3}$ of his. Who ate more? Exactly how much more? Use the rectangles below to help solve the problem. Show all of your work.

_____ ate exactly _____ more than _____

3 Ryan rode his bike $\frac{5}{6}$ of a mile. James rode his bike $\frac{7}{8}$ of a mile. Who rode farther? Exactly how much farther? Use the rectangles below to help solve the problem. Show all of your work.

_____ rode exactly _____ more of a mile than _____

4 Find the least common multiple (LCM) of each pair of numbers.

ex 6 and 8

6, 12, 18, (24)
8, 16, (24)
24 is the LCM of 6 and 8

a 3 and 5

b 4 and 5

5 Circle the fraction you think is greater in each pair. Then find out for sure by rewriting the fractions so they have common denominators. (Hint: Use the information from problem 4 to help.) Finally, use the < or > sign to compare the two fractions.

ex $\left(\frac{3}{8}\right) > \frac{2}{6}$

$\frac{3 \times 3}{8 \times 3} = \frac{9}{24}$

$\frac{2 \times 4}{6 \times 4} = \frac{8}{24}$

a $\frac{2}{3}$ $\frac{4}{5}$

b $\frac{1}{4}$ $\frac{2}{5}$

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Which Is Bigger?

1 Compare the fractions using the comparison symbols <, >, and =. Show your work to prove how you know which fraction is greater.

a $\frac{1}{3}$ _____ $\frac{2}{5}$

b $\frac{3}{8}$ _____ $\frac{1}{3}$

c $\frac{3}{5}$ _____ $\frac{5}{9}$

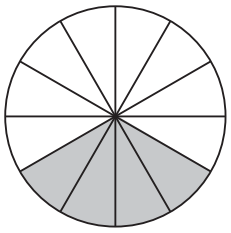
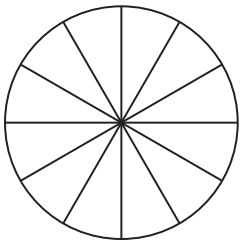
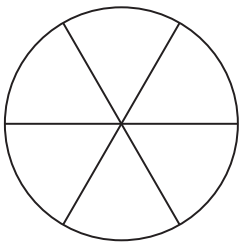
d $\frac{5}{12}$ _____ $\frac{2}{5}$

2 Jeff and Eric were painting 2 walls in Jeff's bedroom. The walls were exactly the same size. Jeff painted $\frac{2}{3}$ of the first wall. Eric painted $\frac{4}{7}$ of the other wall. Who painted more? How much more? Use numbers, labeled sketches, or words to solve the problem.

NAME | DATE

Using the Greatest Common Factor to Simplify Fractions page 1 of 2

1 Simplify each of the fractions. Then fill in the rest of the table.

Fraction	Factors of the Numerator *(Top Number)*	Factors of the Denominator *(Bottom Number)*	Greatest Common Factor	Divide to get the Simplest Form	Picture and Equation
ex $\frac{4}{12}$	1, 2, (4)	1, 2, 3, (4), 6, 12	4	$\frac{8 \div 4}{12 \div 4} = \frac{1}{3}$	 $\frac{4}{12} = \frac{1}{3}$
a $\frac{8}{12}$				$\frac{8 \div \_\_}{12 \div \_\_} = \frac{\_\_}{\_\_}$	 $\frac{8}{12} = \frac{\_\_}{\_\_}$
b $\frac{4}{6}$				$\frac{4 \div \_\_}{6 \div \_\_} = \frac{\_\_}{\_\_}$	 $\frac{4}{6} = \frac{\_\_}{\_\_}$

2 Find the greatest common factor of each pair of numbers below.

ex	6 and 16 **Factors of 6:** 1, 2, 3, 6, **Factors of 16:** 1, 2, 4, 8, 16 **Greatest Common Factor:** 2	**a**	6 and 21 **Factors of 6:** **Factors of 21:** **Greatest Common Factor:**
b	8 and 24 **Factors of 8:** **Factors of 24:** **Greatest Common Factor:**	**c**	18 and 24 **Factors of 18:** **Factors of 24:** **Greatest Common Factor:**

NAME | DATE

Using the Greatest Common Factor to Simplify Fractions page 2 of 2

3 Use your answers from problem 2 to simplify these fractions.

ex $\frac{6}{16}$ $\frac{6 \div 2}{16 \div 2} = \frac{3}{8}$ $\frac{6}{16} = \frac{3}{8}$

a $\frac{6}{21}$

b $\frac{8}{24}$

c $\frac{18}{24}$

4 A fraction is in its simplest form when its numerator and denominator have no common factor other than 1. Look at the fractions below.

- Circle the fractions that can be simplified.
- Put a line under the fractions that are already in simplest form.

$\frac{3}{6}$ $\frac{5}{8}$ $\frac{4}{10}$ $\frac{12}{15}$ $\frac{2}{7}$ $\frac{8}{14}$ $\frac{3}{13}$

For each problem, show all your work using numbers, words, or labeled sketches. Convert an improper fraction to a mixed number if needed and be sure to write your answer in simplest form.

5 Carlos and Jade are eating mini pizzas for lunch. Jade eats $\frac{3}{4}$ of her mini pizza. Carlos eats $\frac{8}{12}$ of his mini pizza. How much pizza do they eat together?

6 Adam and Sophie are also eating mini pizzas for lunch. Adam ate $\frac{5}{8}$ of his pizza. Sophie ate $\frac{2}{3}$ of her pizza.

a Who ate more?

b How much more?

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Simplifying Fractions

1 List the factors of each number below.

a 12: _____

b 15: _____

c 18: _____

2 Find the simplest form of each fraction below. The factors from item 1 might help.

a $\frac{12}{15}$ =

b $\frac{4}{18}$ =

c $\frac{15}{18}$ =

d $\frac{18}{12}$ =

3 Find the simplest form of each fraction. Show your work.

a $\frac{21}{28}$ =

b $\frac{36}{45}$ =

c $\frac{27}{18}$ =

4 Suzie says that $\frac{7}{35}$ is a fraction in simplest form. Do you agree or disagree? Explain.

5 Alex says that all unit fractions are in simplest form. Do you agree or disagree? Explain. (A unit fraction has 1 as its numerator, like $\frac{1}{3}$ or $\frac{1}{12}$.)

6 Find $\frac{12}{15} + \frac{2}{3}$. Show your work.

NAME | DATE

Problem Solving with the LCM & GCF page 1 of 2

Show your work as you solve each problem. Make sure your answer is in simplest form.

1 Julia bought $\frac{3}{5}$ of a yard of red ribbon and $\frac{10}{15}$ of a yard of purple ribbon.

a Which piece of ribbon was longer?

b Exactly what fraction of a yard longer was it?

2 Anthony goes running three times a week. This week, he ran $\frac{3}{5}$ of a mile on Monday, $\frac{2}{3}$ of a mile on Wednesday, and $\frac{3}{4}$ of a mile on Friday. How far did Anthony run this week?

3 On Monday, Leah spent $\frac{5}{6}$ of an hour working on her homework, on Tuesday, she spent $\frac{3}{4}$ of an hour on her homework, and on Wednesday she finished her homework in $\frac{5}{8}$ of an hour.

a On which day did Leah spent the least amount of time on her homework? Prove it.

b How much time did Leah spend doing homework on Monday, Tuesday, and Wednesday in all?

NAME | DATE

Problem Solving with the LCM & GCF page 2 of 2

4 On Monday, Kevin spent $\frac{4}{5}$ of an hour working on his homework, on Tuesday he spent $\frac{2}{3}$ of an hour on his homework, and on Wednesday he finished his homework in $\frac{7}{10}$ of an hour. How long did Kevin spend doing homework on Monday, Tuesday, and Wednesday in all?

5 **CHALLENGE** Who spent more time doing homework over Monday, Tuesday, and Wednesday, Leah or Kevin? How much more? How much time did the two of them combined spend doing homework? Express your answers as fractions or mixed numbers, and in hours and minutes as well.

NAME | DATE

Evan's Turtle

Show your work as you solve each problem. Be sure your answer is in simplest form.

1 Evan's turtle lives in a rectangular aquarium. One side is $\frac{3}{4}$ of a yard long and the other side is $\frac{5}{7}$ of a yard long. What is the perimeter of the turtle's aquarium?

2 Evan found two sticks for his turtle's aquarium. One stick was $\frac{3}{4}$ of a foot long and the other was $\frac{10}{12}$ of a foot long. Which stick was longer? What fraction of a foot longer?

3 On Friday, Evan's turtle swam for $\frac{4}{10}$ of an hour. Then, he slept for $\frac{3}{8}$ of an hour.

a Did Evan's turtle swim or sleep longer? How much longer?

b How long did Evan's turtle swim and sleep?

Home Connections

GRADE 5 – UNIT 2 – MODULE 4

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Find the Greater Fraction page 1 of 2

1 Find the least common multiple for each pair of numbers. Show all your work.

ex 3 and 5

3: 3, 6, 9, 12, (15) 18
5: 5, 10, (15) 20
The LCM is 15.

a 4 and 6

b 3 and 7

c 5 and 8

d 6 and 9

2 Use the least common multiple to find equivalent fractions for each fraction pair. Then, use the symbol < or > to show the bigger fraction.

ex $\frac{3}{4}$ and $\frac{4}{6}$

[4] 4, 8, (12) 16
[6] 6, (12) 18, 24

$\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$ $\quad \frac{4}{6} = \frac{4 \times 2}{6 \times 2} = \frac{8}{12}$

$\frac{9}{12} > \frac{8}{12}$ so $\frac{3}{4} > \frac{4}{6}$

a $\frac{5}{8}$ and $\frac{2}{3}$

b $\frac{1}{6}$ and $\frac{2}{9}$

c $\frac{7}{12}$ and $\frac{5}{8}$

(continued on next page)

NAME | DATE

Find the Greater Fraction page 2 of 2

Solve the story problems below. Show your work using numbers, sketches, or words.

3 Matthew read $\frac{2}{3}$ of a book. Craig read $\frac{4}{5}$ of the same book. Who read more? How much more?

4 Carlos had two extra sandwiches. They were exactly the same size. He gave $\frac{7}{9}$ of the first sandwich to his friend Ben and $\frac{4}{6}$ of the second sandwich to his friend Corey.

a Whose piece is bigger, Corey's or Ben's?

b **CHALLENGE** If Carlos ate the remaining pieces of the two sandwiches, did he get more or less than Corey? Did he get more or less than Ben?

NAME | DATE

Working with Fractions page 1 of 2

Which is greater, $\frac{2}{3}$ or $\frac{4}{5}$? Exactly how much difference is there between these two fractions? If you want to compare, add, or subtract two fractions, rewrite them so they both have the same denominator. To do this:

- Find the least common multiple of the denominators of the fractions.

  multiples of 3 3, 6, 9, 12, 15
  multiples of 5 5, 10, 15
  The least common multiple of 3 and 5 is 15.

- Multiply the numerator and denominator of each fraction by the same number so the denominators are equal.

$\frac{2 \times 5}{3 \times 5} = \frac{10}{15}$ $\frac{4 \times 3}{5 \times 3} = \frac{12}{15}$ $\frac{4}{5}$ is greater than $\frac{2}{3}$ by exactly $\frac{2}{15}$.

---

1 Find the least common multiple (LCM) of each pair of numbers.

ex 4 and 10

4, 8, 12, 16, 20
10, 20
20 is the LCM of 4 and 10

a 5 and 6

b 2 and 7

2 Add or subtract the fractions by rewriting them so they have common denominators. Hint: Use the information from problem 1 to help.

ex $\frac{3}{4} - \frac{7}{10} =$

$\frac{3 \times 5}{4 \times 5} = \frac{15}{20}$ $\frac{7 \times 2}{10 \times 2} = \frac{14}{20}$

$\frac{15}{20} - \frac{14}{20} = \frac{1}{20}$

a $\frac{4}{5} + \frac{5}{6} =$

b $\frac{4}{7} - \frac{1}{2} =$

3 Find the greatest common factor for each pair of numbers below. Use extra paper if you need more space.

16 **28**	**15** **36**
GCF	**GCF**

(continued on next page)

NAME | DATE

Working with Fractions page 2 of 2

4 Find the simplest form of each fraction below.

a $\frac{16}{28}$	**b** $\frac{4}{48}$
c $\frac{2}{14}$	**d** $\frac{28}{16}$
e $\frac{15}{36}$	**f** $\frac{56}{42}$

5 Add or subtract. Show your work. Hint: Use the information in problem 4 above to help.

a $\frac{16}{28} + \frac{2}{14} =$

b $\frac{15}{36} + \frac{4}{48} =$

c $\frac{28}{16} + \frac{25}{100} =$

6 Alicia says that the greatest common factor of 8 and 12 is 24. Do you agree or disagree? Explain.

7 Felix says that $\frac{11}{33}$ is in simplest form. Do you agree or disagree? Explain.

8 **CHALLENGE** List three examples of times when people need to add or subtract fractions in their daily lives.