Grade 5 – Unit 2 – Module 1
Teachers Guide Sample

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in mathematics

Module 1
Adding & Subtracting Fractions

Print Originals

Pages renumber with each module.

Student Book Pages

Page numbers correspond to those in the Bridges Student Books.

Home Connections Pages

Page numbers correspond to those in the Home Connections books.

Module 1

Adding & Subtracting Fractions

Overview

This module focuses on using money and clocks as models for adding and subtracting fractions. Using familiar units of money and time (quarters, dimes, nickels and halves, thirds, and quarters of hours) helps students figure out how to add and subtract fractions efficiently with and without finding common denominators. Students work with fractions, mixed numbers, and improper fractions. Students also learn how to play the new Clock Fractions Work Place, and create a Clock Fractions tool to use in their work.

Sessions	P&I	NS	MF	WP	A	HC
Session 1 Using a Money Model In this session, students discuss the connections between fractions and money while using money as a model to find equivalent fractions. Then the teacher leads students in solving several problems in which the addition of fractions with unlike denominators is framed in the context of money amounts.	●					
Session 2 Unit 2 Screener The session begins with a money-related fraction student book page. Then students take the Unit 2 Screener. Finally, the teacher introduces and assigns the Comparing Fractions Home Connection.	●			●	●	●
Session 3 Clock Fractions This session begins with a same and different activity about fraction expressions. Then the class begins to explore fractions on a clock, using the Clock Fractions tool they construct during the session. They use this tool to deepen their understanding of equivalent fractions.	●					
Session 4 More Clock Fractions This session begins with a review of some basic fractions using the clock model. Then students use their new Clock Fractions tool to model other fractions, as well as several fraction problems. Next, the teacher introduces the Clock Fractions Work Place to provide more practice with equivalent fractions and informal addition of fractions. Finally, the teacher introduces and assigns the More Adding Fractions Home Connection.	●					●
Session 5 What's Best & Why? This session begins by introducing a new discussion structure called What's Best & Why? Then the class creates a Venn diagram showing which denominators work best with the different visual models students have learned: money, clocks, or both. Students also use the discussion structure to consider which model works best for a series of subtraction problems. Finally, students go to Work Places.	●			●		

P&I – Problems & Investigations, **NS** – Number String, **MF** – Math Forum, **WP** – Work Places, **A** – Assessment, **HC** – Home Connection

Materials Preparation

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

Copies & Display

- [ ] Visit the Bridges Educator Site to review the Interactive Display Materials for this module. Decide whether you will use digital materials for display or copies of print originals and student pages. Make copies as needed.

Work Places

- [ ] Prepare the materials for Work Place 2A using the materials listed on the Work Place Guide.

Charts

- [ ] Session 5: Create a large Venn diagram on chart paper. Label one circle Money Model and the other circle Clock Model. Make sure to leave plenty of room in the overlapping section.

Special Items

- [ ] Session 3: Construct at least one Clock Fractions tool.

Copies

- [ ] Session 1: Make 3 class sets of the Money Model Dollar Pieces print original for use during the module. One class set is for use with the Session 1 Daily Practice page.
- [ ] Session 5: Run a copy of the Fraction Cards print original and cut them apart for students to post to the Venn diagram during the session.

Concepts, Skills & Practices	Sessions					Work Places				
	1	2	3	4	5	1A	1B	1C	1D	2A
4.OA.4 Demonstrate an understanding that a whole number is a multiple of each of its factors						●				
4.OA.4 Determine whether a whole number between 1 and 100 is a multiple of a given 1-digit number						●				
4.OA.4 Find all factor pairs for a whole number between 1 and 100							●	●		
4.NBT.5 Multiply two 2-digit numbers, or a 3-digit number by a 1-digit number using strategies based on place value and the properties of operations							●			
Supports 4.NF Convert a decimal to a fraction, and a fraction to a decimal	**DP** **P&I**									
Supports 4.NF Convert a fraction to a mixed number		**DP**								
Supports 4.NF Create a visual representation of a mixed number or improper fraction		**DP** **HC**								
4.NF.1 Generate and recognize equivalent fractions. Use a visual model to explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$				**P&I**	**DP**					●
4.NF.2 Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators				**HC**	**DP**					
4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100				**DP**						
4.NF.6 Write fractions with denominator 100 in decimal notation				**DP** **P&I**						
5.OA.1 Evaluate numerical expressions with parentheses								●		
5.NBT.6 Use area models to explain strategies for dividing multidigit whole numbers									●	
5.NF.1 Rewrite fractions or mixed numbers with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference	**P&I** **DP**	**P&I** **HC** **DP**	**P&I** **DP**	**P&I** **HC** **DP**	**P&I**					●
5.NF.2 Solve story problems involving addition and subtraction of fractions referring to the same whole, with like and unlike denominators				**HC**					●	
5.MP.1 Make sense of problems and persevere in solving them		**P&I**			**P&I**					
5.MP.2 Reason abstractly and quantitatively				**P&I**	**P&I**					
5.MP.3 Construct viable arguments and critique the reasoning of others			**P&I**		**P&I**					
5.MP.5 Use appropriate tools strategically	**P&I**		**P&I**	**P&I**	**P&I**					
5.MP.7 Look for and make use of structure		**P&I**								
5.MP.8 Look for and express regularity in repeated reasoning	**P&I**									

P&I – Problems & Investigations, **MF** – Math Forum, **NS** – Number String, **HC** – Home Connection, **DP** – Daily Practice, **A** – Assessment

Session 1

Using a Money Model

Summary

In this session, students discuss the connections between fractions and money while using money as a model to find equivalent fractions. Then the teacher leads students in several problems in which the addition of fractions with unlike denominators is framed in the context of money amounts.

Module 1 Learning Goals

Students learn about using models to add and subtract fractions with unlike denominators.

- ■ **Students represent adding and subtracting fractions with unlike denominators with a money model.**
- □ Students represent adding and subtracting fractions with unlike denominators with a clock model.
- □ Students compare fraction models for representing, adding, and subtracting fractions.

Materials

Problems & Investigations Using a Money Model with Fractions	
Copies & Display	**PO P1** Money Model Dollar Pieces (see Preparation) **SB 35** Fractions & Decimals with Money **SB 36–37** Adding & Subtracting Fractions
Kit Materials	money value pieces
Daily Practice	
Copies & Display	**SB 38** Money & Fractions

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Preparation

Make 3 class sets of the Money Dollar Pieces print original. One class set is for use with the Money & Fractions Daily Practice student book page.

Vocabulary

**Word Resource Card available*

decimal*
decimal notation
denominator*
dime
equivalent fractions*
fraction*
hundredth*
numerator*
penny
quarter
tenth*

Problems & Investigations

Using a Money Model with Fractions

1 Open the session by telling students that adding and subtracting fractions is the focus of the new unit. Today, they'll be investigating and using a model they may be familiar with: the money model.

2 Make sure that all students have easy access to money value pieces and the Money Model Dollar Pieces print original. Display one of each money value piece for the discussion, as well.

Digital Resources

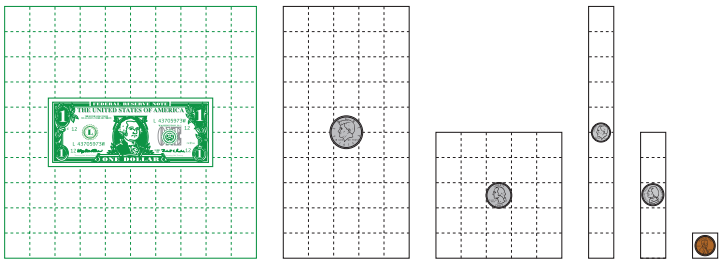
Use the Money Pieces app to display money value pieces digitally.

Apps are available at apps.mathlearningcenter.org.

3 Open the discussion by inviting students to share their observations about the money value pieces, especially as they relate to fractions.

- Expect students to draw connections to previous work with money models in Number Corner and work with 100-frames to model fractions and decimals in fourth grade.
- If no one mentions that the dollar is 1 whole, explicitly bring it up.

Teacher *Who would like to share something they know or notice about these money value pieces?*



Amos *I remember these from the September Calendar Grid in Number Corner!*

Bianca *They're kind of like the base ten number pieces, except with money. We used the 100-piece last year to represent 1 whole.*

Amos *It's cool because you can see that the piece with the quarter on it really is one-fourth of a dollar.*

Bianca *Yeah, and the dime is like a strip from the base ten number pieces. It takes 10 of them to make the dollar mat, so you can see they're each one-tenth of a dollar.*

Amos *So I guess the dollar piece is the whole, and we can talk about fractions and decimals using the other pieces.*

Teacher *I like how you're making connections between fractions and decimals.*

4 After students have had a few minutes to examine the money value pieces and share observations, invite them to open their student books to the Fractions & Decimals with Money page as you display a copy. Have students work individually or with a partner to complete the page, filling in as many equivalent fractions or decimals as they can for each money value piece.

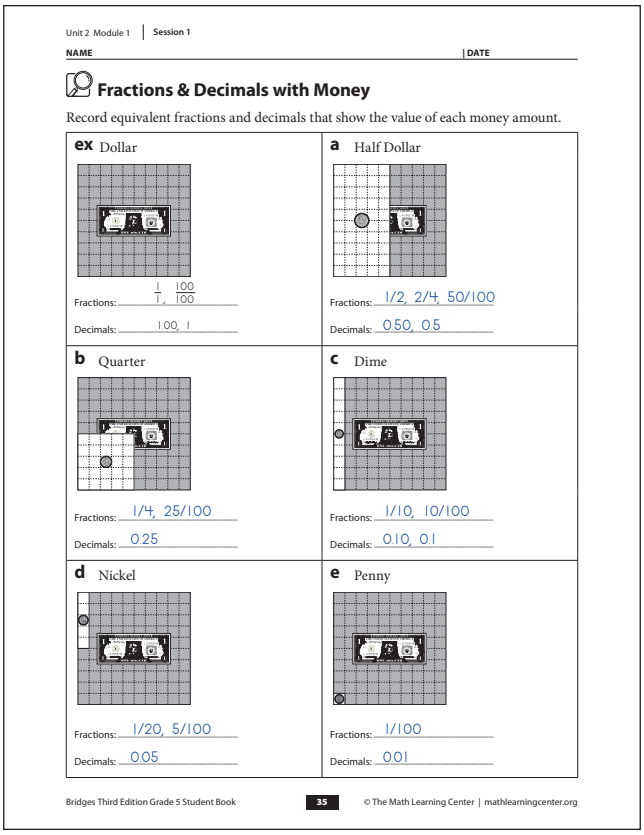
5 When most students are done, invite the class to share the fractions and decimals they found for each money value piece.

- Record this information on the display copy.
- Support students' understanding of the money model by connecting the written forms of the fractions and decimals to the money value pieces and images.

Equity-Based Practice

Drawing on multiple resources of knowledge

This discussion is designed to use students' previous experience with money value pieces as a foundation for using them to work with fractions. At the same time, students will draw from their experiential knowledge of coins and dollar bills when sharing observations.



Unit 2 Module 1 | Session 1

NAME | DATE

Fractions & Decimals with Money

Record equivalent fractions and decimals that show the value of each money amount.

ex Dollar

Fractions: 1, T, 100, 100

Decimals: 1.00, 1

a Half Dollar

Fractions: 1/2, 2/4, 50/100

Decimals: 0.50, 0.5

b Quarter

Fractions: 1/4, 25/100

Decimals: 0.25

c Dime

Fractions: 1/10, 10/100

Decimals: 0.10, 0.1

d Nickel

Fractions: 1/20, 5/100

Decimals: 0.05

e Penny

Fractions: 1/100

Decimals: 0.01

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Teacher *What fractions or decimals can describe the value of the half dollar?*

Malik *Well, the name is half dollar, so it's half of a dollar. We could write ½.*

Teacher *Turn to someone near you and talk about where you see the 1 and the 2 of ½ on the image of the half dollar.*

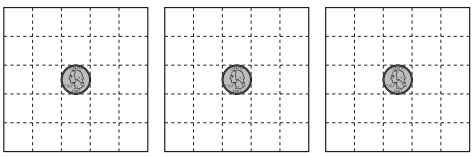
Rosie *Well, there's one half dollar piece, so that's where the 1 comes from.*

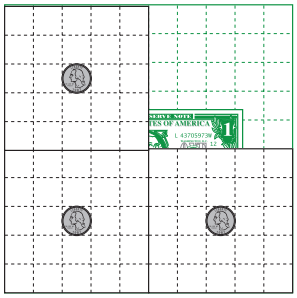
Sasha *Oh! It takes 2 of the half dollar pieces to make the whole dollar. So it's ½ because we're talking about 1 of them, but it takes 2 of them to make the whole.*

6 Next, record ¾ on the board. Ask students to build this fraction of a dollar with their money value pieces or shade the fraction on one of the Money Model Dollar Pieces. Then work together to use the value of the collection to determine the decimal equivalent.

Record the results on the board or on your copy of the print original.

Rhonda *See how they look if you put them on top of the dollar mat? You can see that they really do fill up 3 fourths of the whole mat.*





Students *And 3 quarters is seventy-five cents.*

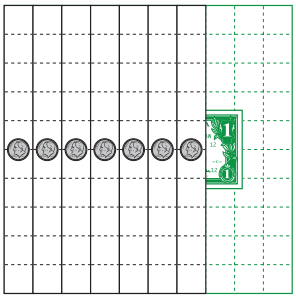
Willie *Exactly. So another fraction is 75/100, because it's 75 cents out of 100 cents.*

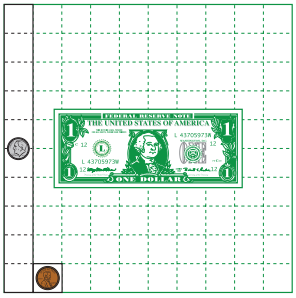
Sam *Or we could write it as a decimal, 0.75.*

Teacher *I'll record those on the board.*

$\frac{3}{4}$ of a dollar = 75¢ = $\frac{75}{100}$ = 0.75

7 Repeat step 7 with the fractions 7/10 and then 11/100.





$\frac{7}{10}$ of a dollar = 70¢ = $\frac{70}{100}$ = 0.70

$\frac{11}{100}$ of a dollar = 11¢ = 0.11

8 End this section of the session by writing the fraction 11/10 on the board. Before students make a model of it, ask them to consider why it's different from the previous fractions, and then how it could be recorded in terms of money.

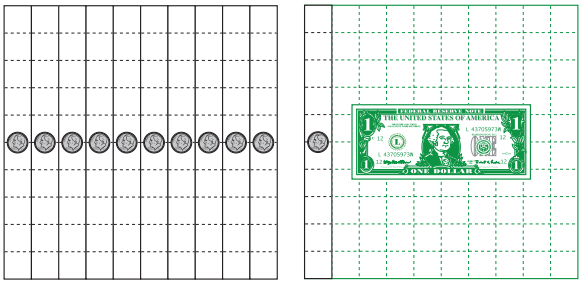
Students *The numerator is more than the denominator.*

That means it's bigger than 1, right? Like 10/10 is one whole. We'd need two dollar grids to model it.

We said that 1/10 was a dime, so 11/10 is 11 dimes. That's one dollar and one more dime, or $1.10.

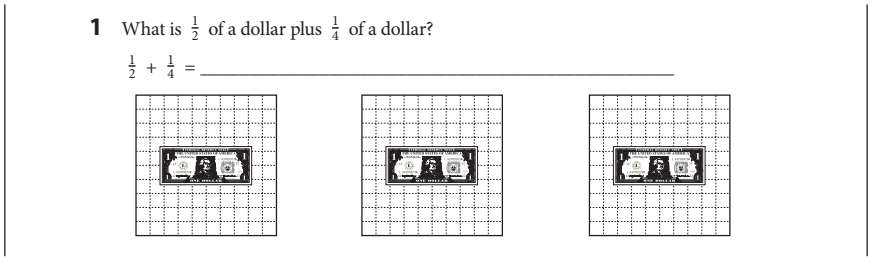
It's also 1 1/10.

9 Have students model 11/10 using money value pieces or money model dollar pieces and record equivalent names for 11/10.



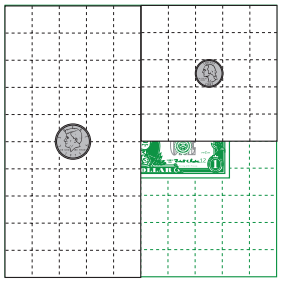
Adding & Subtracting Fractions

10 Invite students to turn to Adding & Subtracting Fractions in their student book as you display problem 1. Tell students to solve the problem with a partner, using money value pieces or the money model dollar pieces.



11 Invite several pairs to share their solutions and models. Either display their models or notate their solutions on your copy of the page.

Highlight different equivalent fractions used to solve the problem, as well as different uses of the money model.



Students *We used the money value pieces and put a half dollar and a quarter on top of a dollar. It's ¾ of the dollar covered, so the answer is ¾.*

That makes sense because half a dollar is two quarters, so you could think about the problem as ¾ + ¼.

We shaded one of the grids on the page. Fifty cents plus 25 cents is 75 cents.

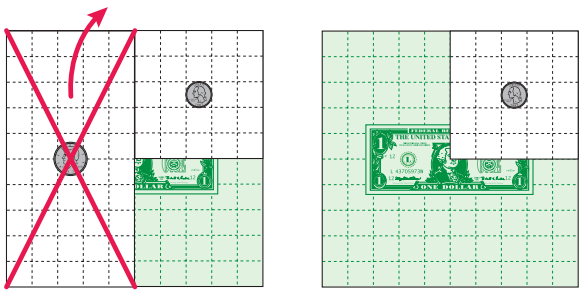
Teacher *And how did you write that answer?*

Students *We wrote it like it was money, using a decimal point like this: 0.75.*

We did something similar but wrote it as a fraction: 75/100.

12 Repeat steps 11 and 12 to solve and discuss problem 2. Pay attention to how students use the money model to show subtraction and whether some see the connection to problem 1.

Students *We built ¾ with a half dollar and a quarter, and then took away the half dollar. So ¾ – ½ = ¼.*



We didn't even build anything. Since the first problem was ½ + ¼ = ¾, we saw that problem 2 was just the opposite. Start with ¾ and take away ½, and you end up with ¼. It's like a fact family, kind of.

13 Answer any questions and give students time to complete problems 3–7 with a partner.

- Observe how students are using the visual money models.
- Encourage students to write their answers in multiple forms.
- As pairs finish, have them compare answers with another pair of students.

SUPPORT: Work with a small group on one or two more problems if students have trouble getting started.

14 When most pairs are done with most of the problems, review problem 5 briefly. Look for students who recognize that $\frac{2}{10}$ is equivalent to $\frac{1}{5}$, even though there is not a coin that represents $\frac{1}{5}$.

15 To finish this session, ask students to turn to a partner and talk about how they used money to find equivalent relationships to solve problems.

Daily Practice

The optional Money & Fractions student book page provides additional opportunities to apply the following skills:

- Convert a decimal to a fraction, and a fraction to a decimal
- Add fractions with unlike denominators, including mixed numbers
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference

Session 2

Unit 2 Screener

Summary

The session begins with a money-related fraction student book page. Then students take the Unit 2 Screener, and spend the rest of the session in Work Places. Finally, the teacher introduces and assigns the Comparing Fractions Home Connection.

Module 1 Learning Goals

Students learn about using models to add and subtract fractions with unlike denominators.

- ■ **Students represent adding and subtracting fractions with unlike denominators with a money model.**
- □ Students represent adding and subtracting fractions with unlike denominators with a clock model.
- □ Students compare fraction models for representing, adding, and subtracting fractions.

Materials

Problems & Investigations More Adding & Subtracting Fractions	
Copies & Display	**PO P1** Money Model Dollar Pieces **SB 39–40** More Adding & Subtracting Fractions
Kit Materials	money value pieces
Assessment Unit 2 Screener	
Copies & Display	**PO P2–P4** Unit 2 Screener
Classroom Materials	scratch paper (optional)
Work Places	
1A Products Four in a Row (introduced in Unit 1, Module 1, Session 1) **1B** Claim the Factors (introduced in Unit 1, Module 2, Session 3) **1C** Strategy Match (introduced in Unit 1, Module 3, Session 4) **1D** Quotients Win (introduced in Unit 1, Module 4, Session 5)	
Home Connection	
Copies & Display	**HC 21–22** Comparing Fractions
Daily Practice	
Copies & Display	**SB 41** Fractions & Mixed Numbers

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

decimal*
decimal notation
denominator*
dime
equivalent fractions*
fraction*
hundredth*
nickel
numerator*
penny
quarter
tenth*
twentieth

Preparation

Write a list on the board of the Work Places available to students today. You can write the numbers (1A, 1B, 1C, and 1D) or the full names.

Problems & Investigations

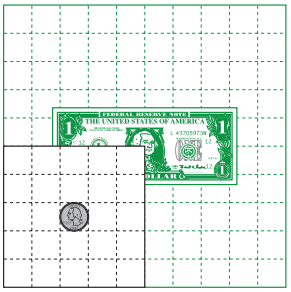
More Adding & Subtracting Fractions

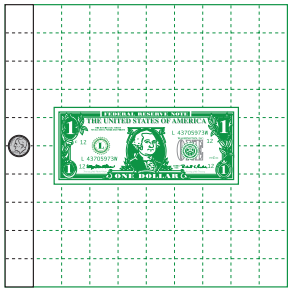
1 Explain that students will begin the session adding and subtracting fractions and then take the Unit 2 Screener.

2 Display the More Adding and Subtracting Fractions student book page as students find theirs.

- Review the directions with the class, pair students up, and have them begin working on the assignment.
- Make sure all students have easy access to the money value pieces, if that's how they'd like to model the problems. Some students might like to shade the fractions on money model dollar pieces, while others may choose to do these problems mentally.
- Encourage students to record their answers in as many forms as they can.

$\frac{1}{4} + \frac{1}{10}$





SUPPORT Help students maintain the connection between fractions and money throughout this activity by encouraging them to either use the money value pieces to build each problem, or to shade in the money model dollar pieces.

CHALLENGE Pose additional questions on the board that allow students to explore more problems with non-unit fractions and mixed numbers. Use these suggestions or have students pose and solve their own problems:

- $1\frac{2}{5} - \frac{1}{4}$
- $1\frac{3}{20} + 1\frac{3}{10}$
- $\frac{7}{20} + \frac{2}{5}$
- $\frac{3}{10} - \frac{3}{100}$

3 After most students have finished the first few problems, have the class pause their work for a moment. Invite a few students to share their models and answers for problems 1 and 2.

> ***Students*** *Thinking about coins was useful. A quarter plus a dime is 35 cents, so you could write that as a decimal, 0.35.*
>
> *Or you could write it like a fraction, $\frac{35}{100}$. Wait! Both ways are read as "thirty-five hundredths." That's cool.*
>
> ***Students*** *I got the fraction $\frac{35}{100}$, but I also got another answer by thinking about nickels.*
>
> *What do you mean?*
>
> *Well, there are 7 nickels in 35 cents, and 20 nickels in a dollar, so that means $\frac{35}{100}$ is equivalent to $\frac{7}{20}$.*
>
> ***Teacher*** *Keep that in mind as you work on the rest of the problems.*

Math Practices in Action

Look for and make use of structure

Repeated use of the money model invites students to draw upon their understanding of the structure inherent in money and the base ten system. Though limited, the common denominators available using a money model are familiar and accessible to students.

4 Have students work in pairs to complete the rest of the problems. Circulate to provide support and encouragement.

SUPPORT It's not unusual for students to think that ⅕ of a dollar is a nickel. If this happens, have students refer to their money value pieces. Ask them to place a nickel piece on the dollar mat. Does it fill ⅕ of the mat? Confirm with them that it takes more than 5 of them to fill.

5 Wrap up the activity by having pairs compare answers with another pair. Invite them to share the problem that the money model was the most helpful for. Then invite a few pairs to share from their conversations.

6 Then have students put away their student books and money value pieces to get ready for the Unit 2 Screener.

Assessment

Unit 2 Screener

7 Introduce the Unit 2 Screener.

- Display the screener, give each student a copy, and preview it together.
- Remind them that when you conduct an assessment like this, you need to see what each student can do on their own.
- Remind students to wait to begin working until they are asked to.
- Give students a minute to look over the screener and ask questions.

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

Remind them to raise their hands if they need help reading a problem; this is not meant to be a reading test.

9 If students finish early, have them give you their screener and then go to Work Places.

Work Places

10 Invite students to spend any remaining time at Work Places.

Have them get their Work Place folders as they complete their assessments. Remind them to fill out their Work Place Logs as they finish each Work Place.

11 Close the session.

- Have students put away Work Place materials.
- Collect any unfinished assessments, and let students know when they will be able to complete their work.

Home Connection

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

- Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators
- Add fractions with unlike denominators, including mixed numbers
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference

Daily Practice

The optional Fractions & Mixed Numbers student book page provides additional opportunities to apply the following skills:

- Convert a fraction to a mixed number
- Create a visual representation of a mixed number or improper fraction
- Express a fraction with denominator 10 as an equivalent fraction with denominator 100
- Write fractions with denominator 100 in decimal notation
- Add fractions with unlike denominators

Session 3

Clock Fractions

Summary

This session begins with a same and different activity about fraction expressions. Then the class begins to explore fractions on a clock, using the Clock Fractions tool they construct during the session. They use this tool to deepen their understanding of equivalent fractions.

Module 1 Learning Goals

Students learn about using models to add and subtract fractions with unlike denominators.

- ☐ Students represent adding and subtracting fractions with unlike denominators with a money model.
- ■ **Students represent adding and subtracting fractions with unlike denominators with a clock model.**
- ☐ Students compare fraction models for representing, adding, and subtracting fractions.

Materials

Problems & Investigations Money Models & Clock Models	
Copies & Display	**PO P1** Money Model Dollar Pieces **PO P5** Same & Different — Fraction Operations **PO P6–P7** Clock Fractions Tool Template (see Preparation) **SB 42** Fractions on a Clock Face
Kit Materials	money value pieces
Classroom Materials	colored pencils (class set)
Daily Practice	
Copies & Display	**SB 43** Clock Face Fractions

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

clock face
denominator*
equivalent fractions*
fraction*
hour (hr.)
hundredth*
minute (min.)
numerator*
sixtieth
twelfth

Preparation

Make class sets, plus a few extra copies, of both the Clock Fractions Tool Template print originals. The two pages should be printed on different colors of cardstock.

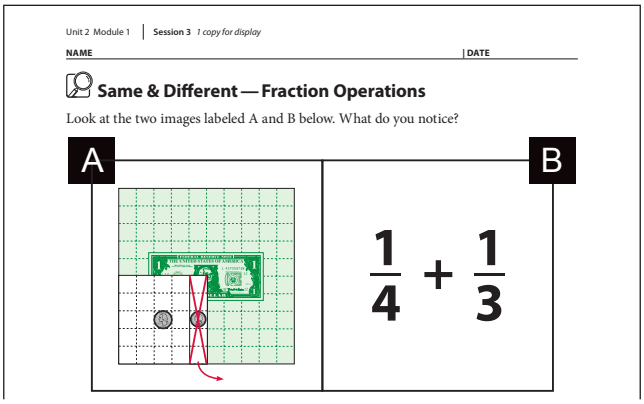
Construct at least one Clock Fractions tool ahead of time, even if you plan to demonstrate making one during class. Consider making a few extras in case students need assistance to make theirs precisely.

Problems & Investigations

Money Models & Clock Models

Same & Different

1 Open the session by introducing the same and different routine. Let them know that in this routine, students will examine two images, numbers, or expressions and look for mathematical similarities and differences between them. Explain that the same and different routine gives students opportunities to make comparisons and justify their thinking.


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

NAME | DATE

Same & Different — Fraction Operations

Look at the two images labeled A and B below. What do you notice?

A

B

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

2 Ensure that students have access to money value pieces and money model dollar pieces, and display the Same & Different — Fraction Operations print original. Read the instructions with the class and allow them time to consider the two images.

3 Use the think-pair-share routine to discuss the similarities and differences between the two images. During the discussion, record comments and ideas from students on the display. The following questions, as well as the next two steps in the session, will help you to highlight some of the likely similarities and differences that students may bring up.

- *What expression is image A modeling?* (¼ – ½₀)
- *Can you find an answer or multiple answers for each image?* (some answers for A are ⁴⁄₂₀, ⅕, ²⁄₁₀. 0.2, 20 cents; B is equal to ⁵⁄₁₂ or ¹⁰⁄₂₄)
- *How could you model the expression in image B?* (Some students may refer to egg cartons, while others may choose other models.)

Students *One difference is that A is a money model and B is an expression with numbers.*

But A is a model of a quarter minus a nickel, so that could also be an expression, like 0.25 – 0.05.

Or ¼ – ⅕.

If you think about it like that, then both A and B have the fraction ¼.

Actually, both A and B have only unit fractions if you think about it like that, so that's the same.

But they're different because one is addition and one is subtraction.

They're also different because you can show A with either a money model or with numbers, but you can't show B with a money model.

Why not?

Well, you can show ¼ as a quarter, but you can't show ⅓ with money.

4 Discuss the challenge of modeling the expression in image B by having students consider the limits of money as a fraction model.

- Invite students to share why it was difficult to model the expression in image B using money.
- Ask students to share denominators that work well with a money model (factors of 100: 1, 2, 4, 5, 10, 20, 25, 50, 100).
- Ask students if they would want to use money to think about ⅓ or ⅙ of a dollar.

Constructing a Clock Fractions Tool

5 Display the Clock Fractions tool you prepared and let students know that a clock model is another way to model fractions. Invite students to share their ideas about or experiences with using the clock model to work with fractions. Ask:

- *How could a clock be used for a fraction model?*
- *What fractions might you see on a clock?*

6 Give each student a copy of each Clock Fractions Tool Template print original and a pair of scissors.

7 Provide directions to make the Clock Fractions tool. Demonstrate making one as students make theirs, if you wish. Encourage students to take their time and to cut carefully.

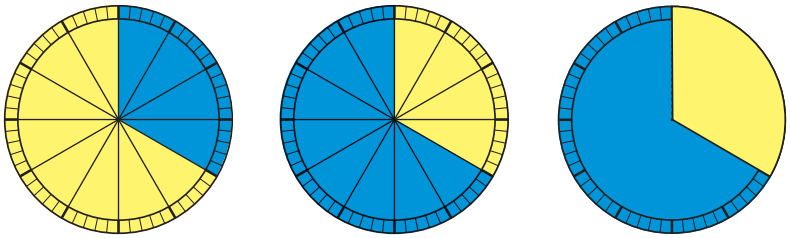
- Cut out each circle.
- Carefully make a single, straight cut on each circle from the edge to the center. Cut along the dotted line on the second Clock Fractions Tool Template page and along one of the lines that runs from the outside of the circle to the center on the first Clock Fractions Tool Template page.
- Try to cut exactly to the center. It will make the tool more precise.
- With the cuts facing each other, slide one circle into the other using the cuts and lay them flat, so part of each circle lies on top of the other. The cuts should match up in the middle and you should be able to rotate one circle to reveal the other.
- Do not label the tool with clock numbers or other fractional amounts.
- Write your name or initials in small letters on the back of each circle.

SUPPORT Consider providing a premade tool for any student who would struggle unproductively with the fine motor skills required for this preparation.

8 Give students a few minutes to explore what they can show with the Clock Fractions tool. Encourage them to find different ways to use the tool and different fractions they can show.

Note

There is no "correct" way to use the tool. Some students show fractions with the partitioned circle, while others may use the circle with no partitions. Some might even turn one of the circles over so it's completely blank and use it that way. The tool is meant to be flexible, which is also why we recommend leaving it unlabeled.



9 After inviting several students to share anything they notice, let students know that they'll have a chance to use their tool right now, as they explore fractions on a clock as a class.

> ***Students*** *You can show twelfths on a clock. The darker tick marks around the outside are the twelfths.*
>
> *As you turn one clock, you can count by twelfths. One-twelfth, two-twelfths, three-twelfths, four-twelfths — hey, that's one-third!*
>
> ***Teacher*** *Tell me more about that.*
>
> ***Students*** *It's like a peace sign, dividing the clock into thirds. One-third is equivalent to four-twelfths.*
>
> *And it's also the same as 20/60, because it's 20 minutes out of an hour, or 60 minutes.*
>
> ***Teacher*** *Let me see whether I understand what you are saying. You have observed that 20/60 is equivalent to 1/3, and they are both equivalent to 4/12. Is that correct?*
>
> ***Student*** *Yes. And it works all the way around the clock. Like when it's 35 minutes after the hour, the minute hand is pointing at the 7. So, 35 minutes out of 60 minutes is the same as 7/12.*

Fractions on a Clock Face

10 Display the Fractions on a Clock Face page as students find the page in their student books. Draw their attention to the first clock, labeled 1.

- Clarify that with the clock model, the clock face represents 1 whole, like a dollar represents 1 whole with the money model.
- Ask a student volunteer to pass out colored pencils.
- Have students shade in the whole clock face with a colored pencil, as you do the same on the display.

11 Have students use their Clock Fractions tool to think-pair-share different ways to think about and represent 1 whole on a clock face.

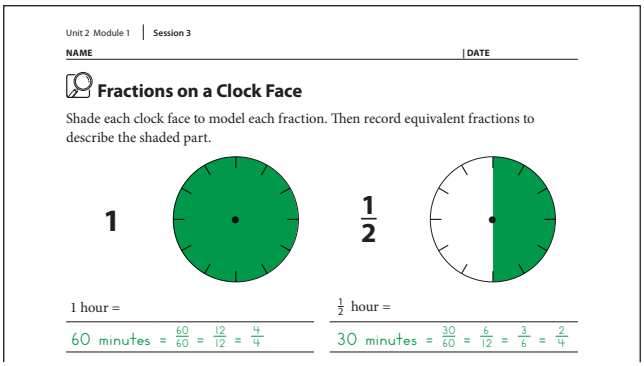
- Let students know that 1 hour is the whole in the example solutions that follow, with fractions referred to as parts of an hour. Some students may also note that the whole clock face could refer to 12 hours.
- Record students' thinking on the display copy as they do so on their own.
- Use the following questions to support students as necessary:

- » *How many minutes are there in one hour?*
- » *Where do we see minutes on a clock?*
- » *There are 12 tick marks around the clock, where the numbers are on a real clock. How are those related to minutes?*

12 Turn the focus to the second clock, labeled ½. Explain that students should shade that fraction on the clock face on the page, and then use their Clock Fractions tool to generate a variety of fractions equivalent to ½. Give students a few minutes to do this.

13 Invite students to share their fractions, and record them on the display copy, encouraging students to record them on their own copies.

- During this discussion, explicitly focus on what the different numerators and denominators refer to in the equivalent fractions. For example, ½ is 1 group of 30 minutes out of 2 groups of 30 minutes on the clock face.
- Use the following questions to prompt discussion as necessary:
  - » *How can I write that as a fraction?*
  - » *Are there any other ways I can write that?*
  - » *Where do you see that fraction on the clock face? Where is the numerator? Where is the denominator?*


Unit 2 Module 1 | Session 3

NAME | DATE

Fractions on a Clock Face

Shade each clock face to model each fraction. Then record equivalent fractions to describe the shaded part.

1

1 hour =

60 minutes = $\frac{60}{60} = \frac{12}{12} = \frac{4}{4}$

$\frac{1}{2}$

$\frac{1}{2}$ hour =

30 minutes = $\frac{30}{60} = \frac{6}{12} = \frac{3}{6} = \frac{2}{4}$

14 Give student pairs 5–10 minutes to work on the rest of the page. Encourage students to make fractions with their Clock Fractions tool. Also encourage them to discuss what the tool shows before shading in the given fractions and recording a variety of equivalent fractions.

Encourage students to be as specific as possible when they record equivalent fractions. What do the numerator and denominator in each refer to?

15 Reconvene the class and call on volunteers to share the equivalent fractions they have come up with for ¼, ⅓, ⅙, and 1/12. Encourage students to use their Clock Fractions tool to explain why different fractions are equivalent in each case.

Record their responses on the display and invite students to add ideas shared by classmates to their own page.

As students share and you discuss and record their ideas, continue to help them think about the number of minutes in each fraction as a chunk. For example, in ⅓ of an hour, there is one set of 20 minutes out of three 20-minute chunks, two sets of 10 minutes out of six 10-minute chunks, or four sets of 5 minutes out of twelve 5-minute chunks. This will help them build an understanding of equivalence and will lay the foundation for working with common denominators later in the unit.

Math Practices in Action

Construct viable arguments and critique the reasoning of others

Students construct viable arguments and critique the reasoning of others when they explain how they know that two or more fractions are equivalent. In so doing, they think more deeply about fractions, models for fractions, and factors and multiples.

16 Let students know they will continue to work with clock fractions in the next session. Have them store their Clock Fractions tool where they will be able to find them in the next session.

Daily Practice

The optional Clock Face Fractions student book page provides additional opportunities to apply the following skills:

- Use the symbols >, =, and < to record comparisons of two fractions with different numerators and different denominators
- Subtract fractions with unlike denominators, including mixed numbers

Session 4

More Clock Fractions

Summary

This session begins with a review of some basic fractions using the clock model. Then students use their new Clock Fractions tool to model other fractions, as well as several fraction problems. Next, the teacher introduces the Clock Fractions Work Place to provide more practice with equivalent fractions and informal addition of fractions. Finally, the teacher introduces and assigns the More Adding Fractions Home Connection.

Module 1 Learning Goals

Students learn about using models to add and subtract fractions with unlike denominators.

- ☐ Students represent adding and subtracting fractions with unlike denominators with a money model.
- ■ **Students represent adding and subtracting fractions with unlike denominators with a clock model.**
- ☐ Students compare fraction models for representing, adding, and subtracting fractions.

Materials

Problems & Investigations Clock Fractions	
Copies & Display	**SB 44–45** More Fractions on a Clock Face **SB 46** Clock Fractions Problems
Classroom Materials	copy paper (1 sheet, for screen)
Kit Materials	Word Resource Card for *unit fraction*
Problems & Investigations Introducing Work Place 2A Clock Fractions	
Copies & Display	**PO P8** Work Place Guide 2A Clock Fractions **PO P9** 2A Clock Fractions record sheet **PO P10** Blank Clock Face Strips (see Preparation) **SB 47** Work Place Instructions 2A Clock Fractions
Kit Materials	spinner overlay (half-class set)
Classroom Materials	• colored pencils (half-class set) • students' Clock Fractions tools from Session 3
Home Connection	
Copies & Display	**HC 23–24** More Adding Fractions
Daily Practice	
Copies & Display	**SB 48** Adding Fractions

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

clock face
denominator*
equivalent fractions*
fraction*
hour (hr.)
hundredth*
improper fraction*
minute (min.)
mixed number*
numerator*
sixth
sixtieth
twelfth
unit fraction*

Preparation

- If you are ready to explore or implement options for differentiation during Work Places or other flexible session time, see Opportunities for Differentiation in the Teaching Tips section of the Unit 2 Introduction.
- In today's session, you'll introduce Work Place 2A Clock Fractions. Before this session, review the Work Place Guide and Instructions. Make copies of the record sheet both for use today and to store in the tray along with the materials listed on the guide. The guide also includes suggestions for differentiating the game to meet students' needs.
- Make a half-class set of the Blank Clock Face Strips print original and cut them apart along the dashed lines. These will be used as an optional support in Work Place 2A Clock Fractions, as well as throughout the remainder of the unit.

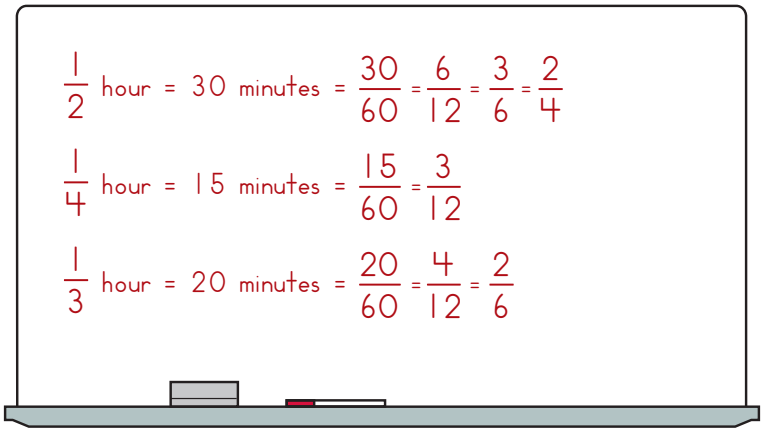
Problems & Investigations

Clock Fractions

1 Open today's session by letting students know that they will explore their Clock Fractions tool and learn a new Work Place game.

2 Connect today's activities with the previous session by inviting students to use their Clock Fractions tool to identify the number of minutes in one-half, one-fourth, and one-third of an hour, as well as any other equivalent fractions.

Record the information on the board for students' reference.



3 Review that a *unit fraction* is a fraction with a numerator of 1 by referring to the Word Resource Card. Invite students to show what ⅔ would look like on their Clock Fractions tool and what equivalent fractions they can find for ⅔.

Record students' suggestions on the board. During the discussion, help students to make connections between the equivalent fractions for ⅓ and those for ⅔.

4 Display the More Fractions on a Clock Face page and have students find the page in their student books. Model filling in ⅔ for the first fraction, using the information students shared.

5 Read the directions with students and give them 5–10 minutes to find more fractions. Let students know they can work with a partner or individually.

- Encourage students to use the Clock Fractions tool to visualize and name the equivalent fractions.
- Note with the class that the last two fractions on the second page each have two clocks. Explain that these are provided so students can record fractions greater than 1 whole.

6 Circulate as students work to observe and offer encouragement and support as needed.

SUPPORT: If student responses remain limited to unit fractions, suggest that they skip-count by sixths or twelfths to find new fractions.

7 When most students have recorded at least six fractions, have them share their fractions with another pair of students.

Equity-Based Practice

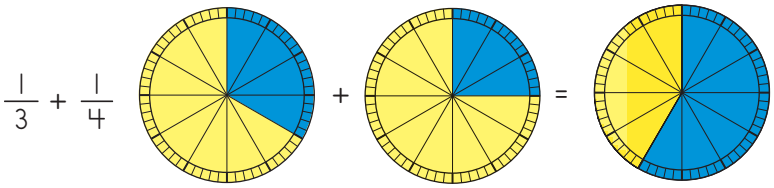
Leveraging multiple mathematical competencies

This task offers a level of demand that is appropriate for a range of skills, as students work for a given amount of time rather than on a set number of problems. The complexity of the fractions students record will vary, and only some students will choose to use the Clock Fractions tool. Regardless, any two students can discuss their work together.

Clock Fraction Problems

8 Display the first problem on the Clock Fractions Problems student book page. Have students use their Clock Fractions tool or the clock faces on the page to determine the sums of the fractions. Call on a few students to share their strategies and answers, and record their responses. Encourage students to explain their answers using equivalent fractions and by referring to their Clock Fractions tool.

> ***Students*** *One-third of an hour is 20 minutes, and ¼ of an hour is 15 minutes. In all that's 35 minutes, or 35/60 of an hour.*
>
> *We made each fraction on the circle. We started with ⅓. See, it is 4 of the sections, or 4/12. We already knew that ¼ was 3/12 so we turned the clock 3 more sections. Together that made 7 sections, which is 7/12.*
>
> ***Teacher*** *Can anyone explain how 35/60 and 7/12 represent the same amount?*
>
> ***Students*** *The 35/60 answer is thinking about it in minutes out of an hour.*
>
> *The 7/12 answer is 7 chunks of 5 minutes out of 12 chunks of 5 minutes in an hour.*



20 minutes + 15 minutes = 35 minutes

$\frac{20}{60} + \frac{15}{60} = \frac{35}{60}$ $\qquad$ $\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

9 Repeat step 8 as students model and discuss the next two problems.

- The second problem is a subtraction problem. Invite students to share different strategies for subtraction, such as take away or find the difference.
- The third problem has a sum greater than 1. Encourage students to use both an improper fraction and a mixed number to describe it.

10 Ask students to turn and talk with a partner to discuss when they would use a clock rather than money to model fraction problems. Then invite a few students to share their thinking.

Note with students that while a money model works well for fractions with denominators that are factors of 100, a clock model works better for fractions with denominators that are factors of 60.

11 Students can keep their student books and Clock Fractions tool out as they get ready to learn a new Work Place.

Introducing Work Place 2A Clock Fractions

12 Introduce the Clock Fractions Work Place.

- Display the Clock Fractions record sheet where everyone can see it.
- Explain that the game will help students add fractions with different denominators.

13 Briefly summarize the game before playing against the class.

Players take turns spinning two spinners to generate two fractions, which they use to write an addition equation. Then they use the fractions to begin filling in the first of three clocks. Players can use their Clock Fractions tool during the game if they wish, but should fill in the record sheet as well. When one clock is completely filled, players write an equation that shows which fractions were used. Players can decompose a fraction to complete one clock and then fill in the remaining portion on the next clock. The first player to completely fill all three clocks wins.

14 Play a game of Clock Fractions against the class. Use the Work Place Instructions 2A Clock Fractions student book page as needed.

As you play the game, emphasize the rules of the game.

- If you spin a fraction that is too big for the space remaining in clocks 1 or 2, record an equation that shows how you split the fraction to fill the clock.
- Model writing an equation to decompose the second addend, showing one fraction shaded in on the first clock and another fraction shaded in on the second clock.
- Clarify that to win, students do not have to fill the third clock exactly. They can go beyond the three full clocks.

15 Ask students to turn to a partner to summarize the directions for Clock Fractions. Then have them get the materials they need to play Clock Fractions with a partner.

Each student pair will need two copies of the 2A Clock Fractions record sheet, a spinner overlay to share, and two different colored pencils as well as regular pencils. Encourage students to use their Clock Fractions tool during the game, and make sure students can access blank clock face strips if they'd like to use them.

16 As students play, circulate to make observations, answer questions, and provide differentiated instruction as suggested in the Work Place Guide.

17 When there are just a few minutes left in the session, bring the class together again to share their observations about the game.

Ask students to review the equations they wrote for each turn. What made equations more or less challenging to solve?

18 Conclude the session by recognizing students for their effort and participation. Then have them clean up and put away their materials.

Math Teaching Practice

Elicit and use evidence of student thinking

Playing Work Places with the whole class is a valuable time for teachers to formatively assess their students. Teachers should observe how students use the clock model during the game, then use that information to decide which pairs to work with during future Work Place times.

Home Connection

19 Introduce and assign the More Adding Fractions Home Connection, which provides more practice with the following skills:

- Add fractions with unlike denominators, including mixed numbers
- Solve story problems involving the addition of fractions referring to the same whole, with like and unlike denominators

Daily Practice

The optional Adding Fractions student book page provides additional opportunities to apply the following skill:

- Add fractions with unlike denominators, including mixed numbers

Session 5

What's Best & Why?

Summary

This session begins by introducing a new discussion structure called What's Best & Why? Then the class creates a Venn diagram showing which denominators work best with the different visual models students have learned: money, clocks, or both. Students also use the discussion structure to consider which model works best for a series of subtraction problems. Finally, students go to Work Places.

Module 1 Learning Goals

Students learn about using models to add and subtract fractions with unlike denominators.

- ☐ Students represent adding and subtracting fractions with unlike denominators with a money model.
- ☐ Students represent adding and subtracting fractions with unlike denominators with a clock model.
- ■ **Students compare fraction models for representing, adding, and subtracting fractions.**

Materials

Problems & Investigations What's Best & Why?	
Copies & Display	**PO P11** Fraction Cards (see Preparation) **SB 49–50** Fraction Subtraction
Kit Materials	money value pieces
Classroom Materials	• students' Clock Fractions tools from Session 3 • colored pencils (class set) • glue sticks, clear tape, or thumbtacks (see Preparation) • chart paper (see Preparation)
Work Places in Use	
1A Products Four in a Row (introduced in Unit 1, Module 1, Session 1) **1B** Claim the Factors (introduced in Unit 1, Module 2, Session 3) **1C** Strategy Match (introduced in Unit 1, Module 3, Session 4) **1D** Quotients Win (introduced in Unit 1, Module 4, Session 5) **2A** Clock Fractions (introduced in Unit 2, Module 1, Session 4	
Daily Practice	
Copies & Display	**SB 51** Equivalent Fractions on a Clock

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

clock face
decimal notation
decimal*
denominator*
equivalent fractions*
fraction*
hundredth*
improper fraction*
minute (min.)
mixed number*
model
numerator*
simplify
sixtieth
twelfth
Venn diagram

Preparation

- Create a large Venn diagram on chart paper. Label one circle Money Model and the other circle Clock Model. Make sure to leave plenty of room in the overlapping section.
- Run a copy of the Fraction Cards print original and cut the cards apart.
- Write a list on the board of the Work Places available to students today. You can write the numbers (1A, 1B, 1C, 1D, and 2A) or the full names.

Problems & Investigations

What's Best & Why?

1 Open the session by introducing the What's Best & Why? discussion structure.

- This discussion structure is used when students have a choice between two strategies or models. Students are asked to decide which one is best for a given situation, and then to justify their decision.
- Today, students will first look at individual fractions, then at fraction expressions. For each, they will decide whether a money model or a clock model would be best.
- Some fractions or problems can be represented with either model. Be clear that this is an acceptable answer, as long as students can justify it with an explanation.
- In order for What's Best & Why? to be successful, introduce the following guidelines:
  - » When a student is explaining their choice, the rest of the class must listen carefully.
  - » Asking clarifying questions or respectfully disagreeing, with justification, is encouraged.

2 Display the chart paper with the Venn diagram and explain the first activity.

- Each student pair gets a fraction card with a fraction on it.
- The pair determines whether the fraction can be represented with a money model, a clock model, or if either model would work equally well.
- One at a time, pairs bring their fraction card to the Venn diagram and affix it to the appropriate place on the diagram. As they do this, they explain their choice.
- If students have questions or disagree with the placement, the class can discuss further.
- Some students may prefer to place a fraction in either the money or clock circle, even though it could be placed in the intersection. Encourage students to defend their decision, and support well-reasoned choices.

Note

Your class Venn diagram might not look exactly like the one shown here. The fractions in the overlapping section that are in red may more commonly be used with a money model, but can be represented with either model.

3 Hand out the fraction cards cut from the Fraction Cards print original, and give pairs time to come to a decision about where on the Venn diagram they want to place their fraction. Make sure all students have access to money value pieces, money model dollar pieces, blank clock face strips, and their Clock Fractions tool. Then call pairs up one at a time to place their fraction and explain their decision.

> ***Students*** *We have ⅙ and we think that it goes in the clock model section. We used our Clock Fractions tool and saw that ⅙ is the same as 2/12, which is 2 of the 12 numbers on a clock. There aren't any coins that show ⅙ of a dollar.*
>
> *We have ¾ and think that it goes in the money section. It's the same as 3 quarters or 75 cents.*
>
> *Couldn't you also use a clock for ¾? If you think about cutting the clock into 4 parts, then 3 of them would fill up to the 9 on the clock face. It's 45 minutes out of 60 minutes.*
>
> ***Teacher*** *What do people think? Does ¾ belong in the overlapping section?*

Math Practices in Action

Use appropriate tools strategically

Some students fall into a habit of only using one model, regardless of its efficiency. This discussion pushes students to think deeply about the fractions involved before choosing a model, making it more likely that the model or tool students choose will be an appropriate one for the problem.

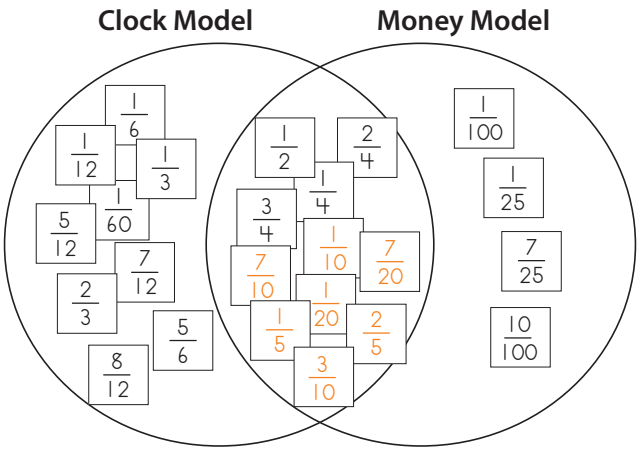
Student *I guess so. I'd rather use money, but it could be a clock, too.*

4 Once students have placed all fractions on the Venn diagram, ask whether there are any generalizations that can be made about which fractions are best suited to each model.

Students *Denominators like 100 and 25 are only used with the money model.*

And thirds, sixths, twelfths, and sixtieths are only used with the clock model. I think because none of those are factors of 100, which is what money is all about.

Oh! I get it. If the denominator is a factor of 100, you can use a money model, and if it's a factor of 60, you can use a clock model. But if the denominator is a common factor of 60 and 100, you can use either model. That's what the middle of the Venn diagram shows.



Fraction Subtraction

5 Tell students that they will now use a What's Best & Why? discussion structure to think about not just one fraction but rather a series of fraction subtraction problems. Display the first problem, ½ – ¼, on your copy of the Fraction Subtraction page, but don't have students find the page in their student books yet.

6 Give students time to consider the problem, then call on a few students to share their opinion about which model is best and why. Record several equivalent fractions for the solution (¼) on the displayed Fraction Subtraction page. You'll come back to it at the end of the session.

Students *You can use either model for this problem.*

Teacher *Why is that? And which do people prefer?*

Students *I'd rather use money because ½ minus ¼ is like 50 cents minus 25 cents, so the answer is 25 cents, or one quarter. One quarter is ¼.*

I would use a clock model. Half an hour is 30 minutes, and a quarter-hour is 15 minutes. The difference is 15 minutes, or 15/60, or ¼. Both of the denominators are factors of 60, so it depends on which model you like.

7 Have students find the Fraction Subtraction pages in their student books and complete the remaining problems.

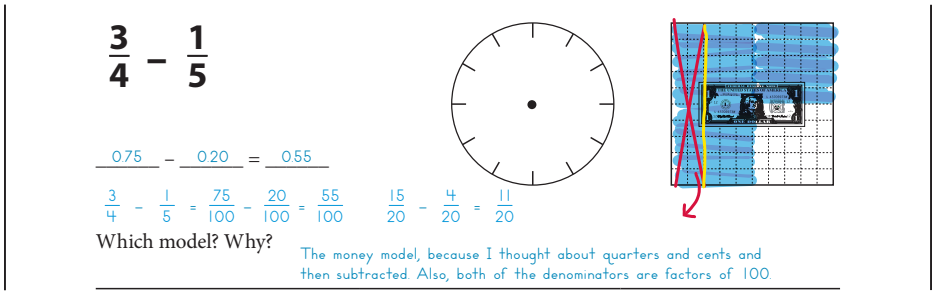
Math Practices in Action

Reason abstractly and quantitatively

By giving students the opportunity to select their own models, or to work without models, you are inviting them to reason abstractly and quantitatively. By embedding the problems in a money or time context, students are giving themselves ways to reason quantitatively about the problem. Writing equations to represent their thinking helps them move toward more abstract ways of reasoning about the problems.

- Circulate as students work and encourage them to explain why they are choosing a certain model for each problem.
- Encourage students to continue using their Clock Fractions tool and the money value pieces as visual models of the problems.

8 When most students have completed most of the problems, invite volunteers to share which model is best for each problem and why. Record students' answers, equations, and explanations for showing subtraction on either model.

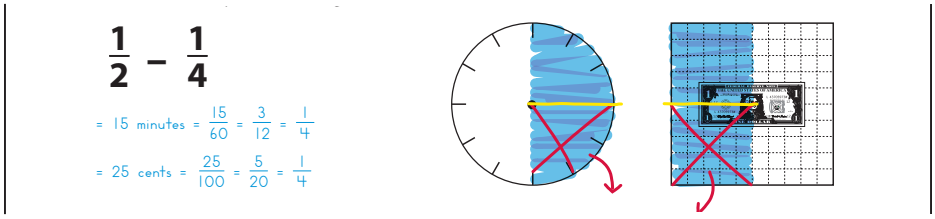


9 If you'd like, you can refer to the following chart for guidance on possible responses when discussing the remaining problems.

Expression	What's Best and Why?
¾ – ⅕	Either model can be used for this problem. Encourage students to justify their choice.
¾ – 2/12	There will likely be agreement that the clock is the best model to use in solving these combinations, as they contain thirds, sixths, and twelfths.
⅔ – 5/12	
⅘ – 1/10	Money is much more easily used than the clock for the last two problems, as they involve fifths, tenths, and hundredths.
⅘ – 15/100	

Simplest Form

10 Wrap up this part of the session with a short discussion about the simplest form of fractions. Display the first problem from the student book page (½ – ¼).



- Explain that mathematicians call ¼ the *simplified* form of 3/12, 15/60, 5/20, and 25/100.
- Help students use chunks of time or money to understand this idea.
  - » With 25/100, you can think of 1 quarter out of 4 quarters, so 25/100 = ¼.
  - » In 15/60, you can think of 1 group of 15 minutes out of 4 groups of 15 minutes, so 15/60 = ¼.
  - » Similar reasoning can be used to explain how ¼ is the simplest form of 3/12 and 5/20.
  - » With ¼, there are no more coins or groups of minutes, so ¼ is the simplified form.

- It might help students to think about 1 quarter versus 5 nickels versus 25 pennies. One quarter (¼) is the simplest form because it is a single coin, whereas it takes 5 nickels (5/20) or 25 pennies (25/100) to make up the $0.25.

In general, a fraction is in its simplest form when the numerator and denominator do not have any common factors other than 1. This definition will be explored in Module 4.

Work Places

11 Tell students they will spend the rest of the session at Work Places.

- Draw their attention to the available Work Places you've listed on the board, and point out that Clock Fractions is one of the four choices.
- Invite them to use their Clock Fractions tool if they choose to play Clock Fractions.

12 As students work, circulate to make observations and answer questions. Take advantage of this time to offer differentiated instruction as needed.

13 Close the session.

Have students clean up and put away their Work Place materials.

Daily Practice

14 The optional Equivalent Fractions on a Clock student book page provides additional opportunities to apply the following skills:

- Use a visual model to explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$
- Recognize equivalent fractions
- Generate a fraction equivalent to fraction a/b by multiplying the numerator (a) and denominator (b) by the same number

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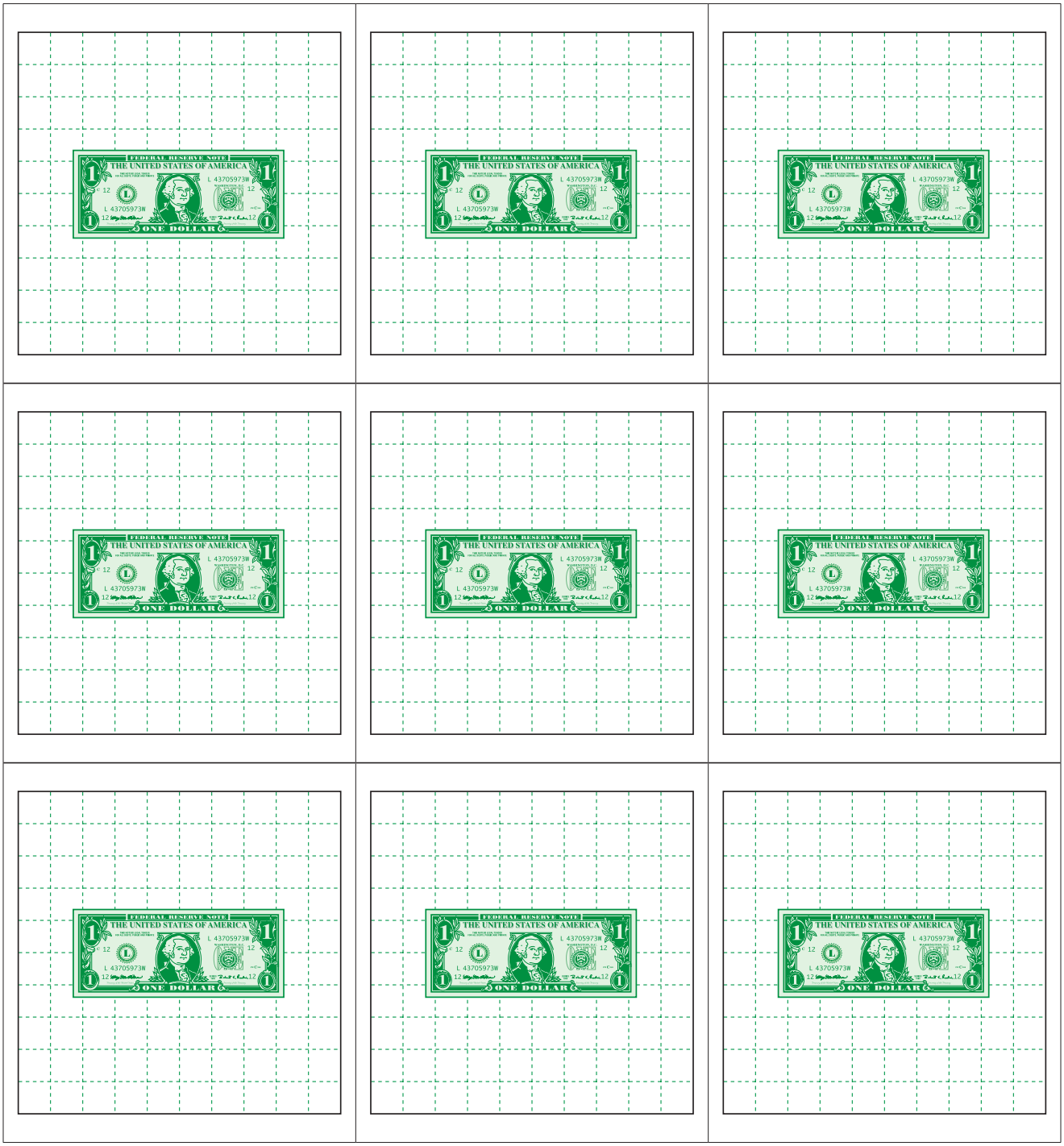
Money Model Dollar Pieces



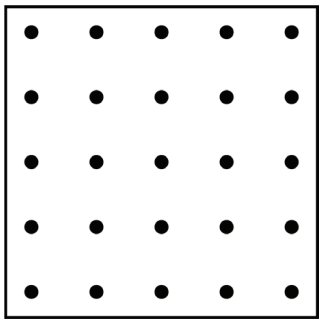
NAME | **DATE**

Unit 2 Screener page 1 of 3

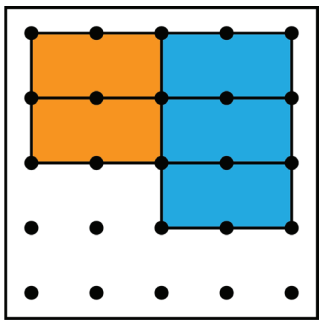
I can use visual models to justify decomposing a fraction in different ways.

1 There are several different ways to write $\frac{5}{8}$ as the sum of fractions with the same denominator.

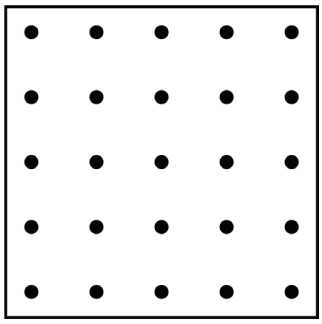
a Make a sketch on the geoboard to match this equation: $\frac{5}{8} = \frac{4}{8} + \frac{1}{8}$



b Write an equation to match the sketch on the geoboard below.



c Write an equation and make a sketch to show a different way to write $\frac{5}{8}$ as the sum of fractions with the same denominator.



(continued on next page)

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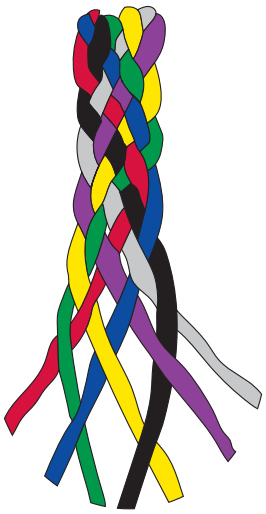
Unit 2 Screener page 2 of 3

I can solve story situations using fractions with like denominators.

2 Alicia and the other kids in their scout troop are learning how to make rope. On Monday, Alicia made $\frac{1}{6}$ of a yard of rope. On Tuesday they made $\frac{4}{6}$ of a yard of rope. How much rope did Alicia make on Monday and Tuesday put together? Show your thinking. Label your answer with the correct units.



I can compare fractions, keeping the whole in mind.

3 Kim has $\frac{1}{3}$ of a pizza. Matt has $\frac{1}{6}$ of a pizza.
Mark *all* statements about this situation that are true.

- ◯ We know for sure that Kim has more pizza than Matt.
- ◯ If the pizzas are exactly the same size, Matt has a smaller piece than Kim.
- ◯ We know for sure that Matt has more pizza than Kim.
- ◯ If Matt's pizza was bigger than Kim's pizza to start, Matt might have more pizza than Kim.

(continued on next page)

NAME | **DATE**

Unit 2 Screener page 3 of 3

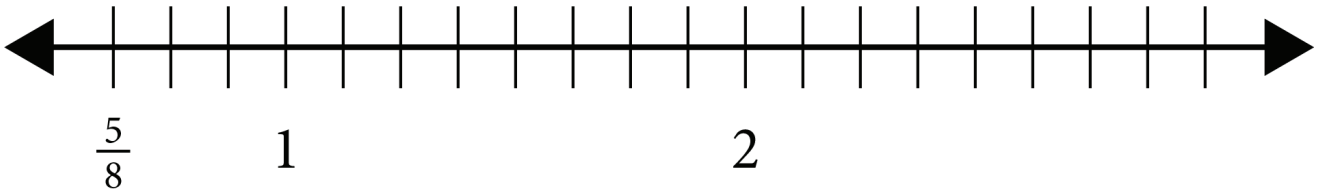
I can compare fractions and place them on the number line.

4 Mr. Alonzo's students are measuring and studying worms. The tables below show the length of 6 worms found in the field behind the school.

Student	Length of Worm
Darius	$2\frac{1}{2}$ in.
Akiko	$\frac{3}{4}$ in.
Miranda	$1\frac{7}{8}$ in.

Student	Length of Worm
Kyle	3 in.
Maria	$1\frac{1}{4}$ in.
Marco	$1\frac{3}{8}$ in.

Order the fractions by placing them on the number line below.

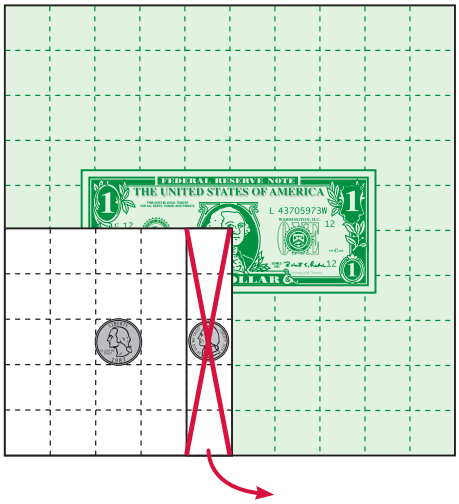


NAME | **DATE**

Same & Different — Fraction Operations

Look at the two images labeled A and B below. What do you notice?

A



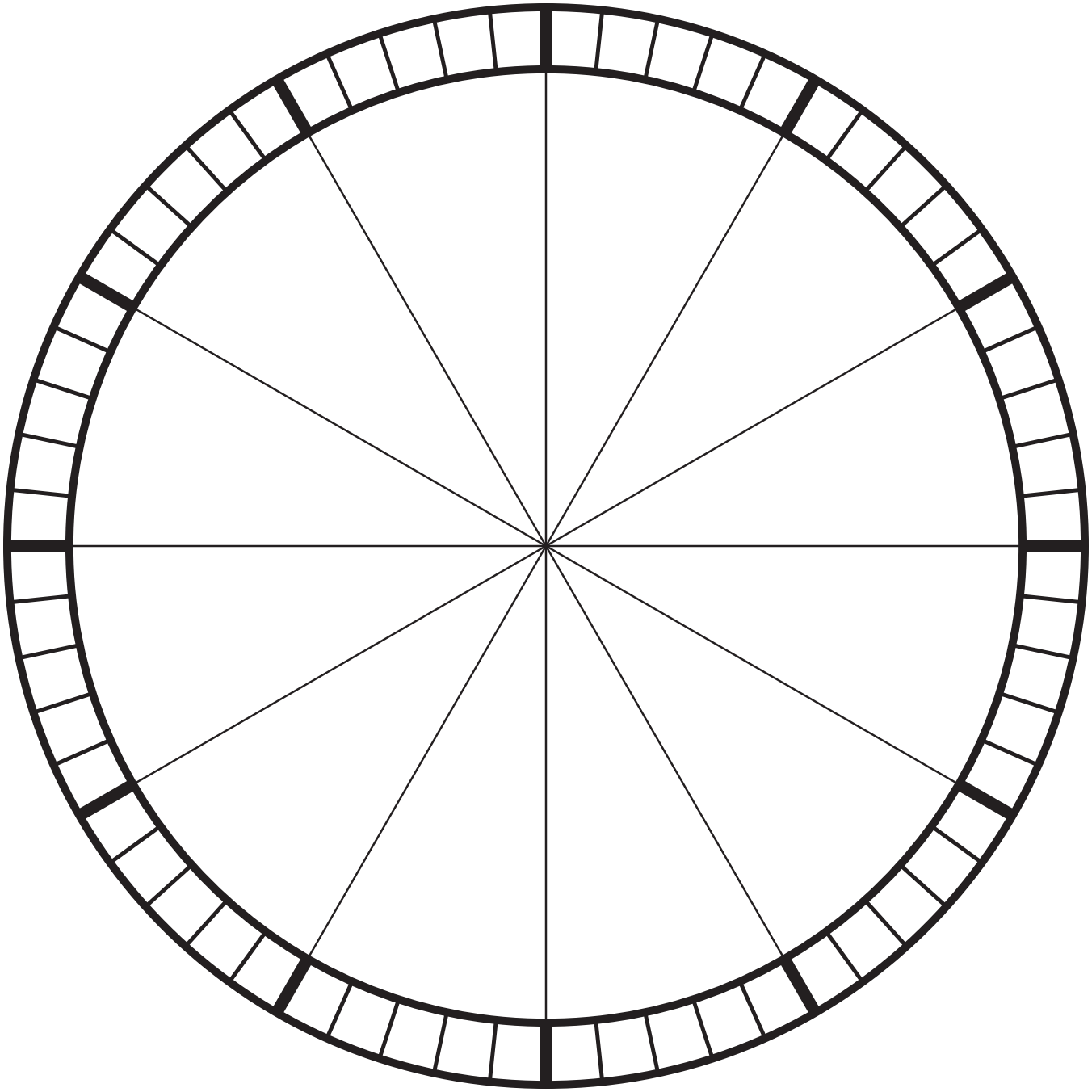
B

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

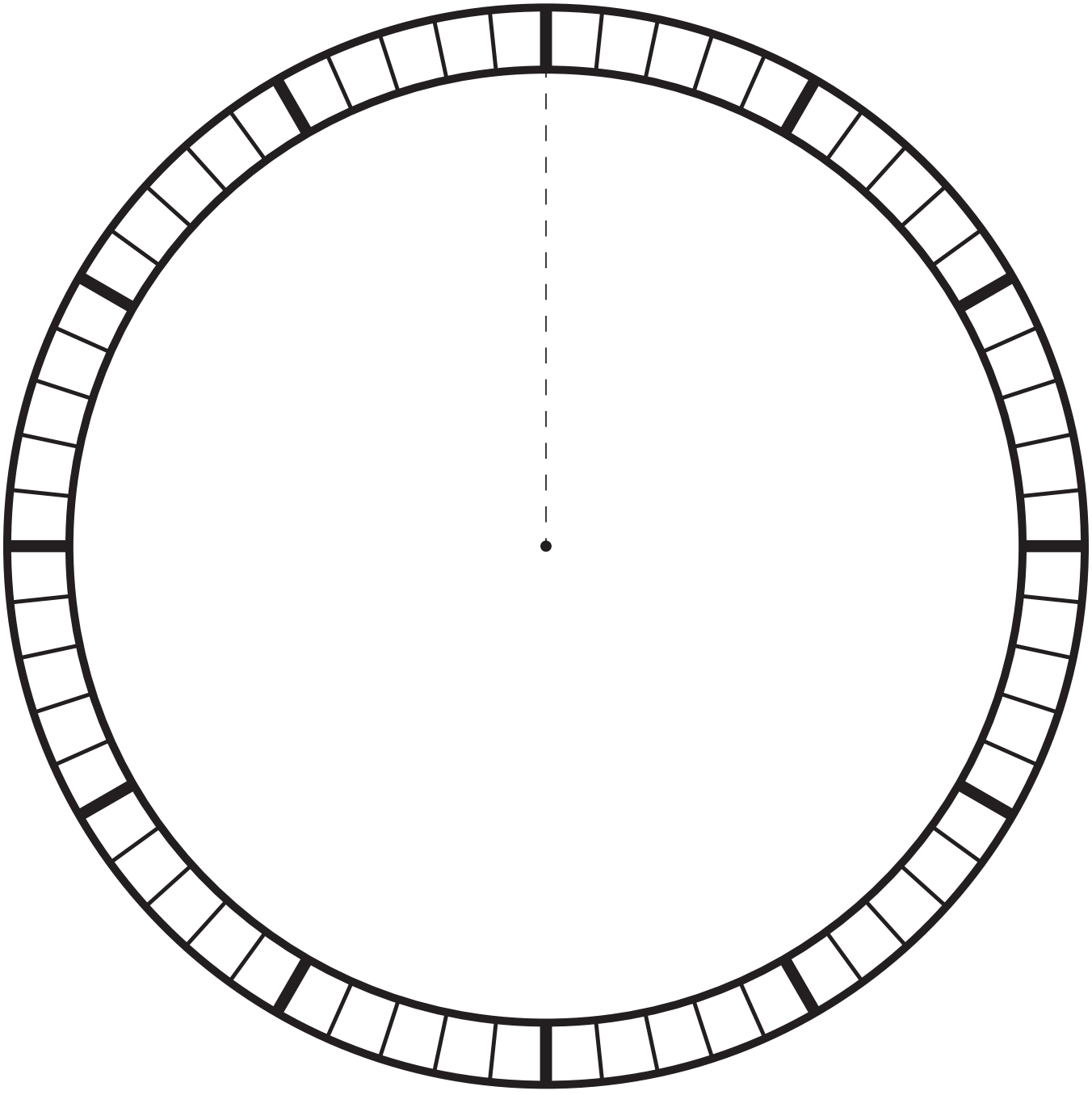
What is mathematically the same and different about A and B?

A and B are the same because …	A and B are different because …

Clock Fractions Tool Template page 1 of 2



Clock Fractions Tool Template page 2 of 2



Work Place Guide 2A Clock Fractions

Summary

Players take turns spinning two spinners to generate two fractions, which they use to write an addition equation. Then they use the fractions to begin filling in the first of three clocks. When one clock is completely filled, players write an equation that shows which fractions were used. Players can decompose a fraction to complete one clock and then fill in the remaining portion on the next clock. The first player to completely fill all three clocks wins the game.

Skills & Concepts

- Recognize equivalent fractions
- Add fractions with unlike denominators, including mixed numbers
- Rewrite fractions with unlike denominators as equivalent fractions with a common denominator in order to find their sum or difference

Materials

Copies	Kit Materials	Classroom Materials
PO P7 Work Place Guide 2A Clock Fractions **PO P8** 2A Clock Fractions record sheet **SB 37** Work Place Instructions 2A Clock Fractions **PO P10** Blank Clock Face Strips (optional)	spinner overlay (half-class set)	• colored pencils (half-class set) • students' Clock Fractions tools from Session 3 (optional)

Assessment & Differentiation

If you see that …	Differentiate	Example
A student identifies 1/12 or another unit fraction on the clock but needs assistance recognizing non-unit fractions.	SUPPORT The Clock Fractions tool may help students visualize the fractions they spin. Encourage them to work with the tool, and offer assistance if needed. Help students find the unit fraction first and then scale it up to find the non-unit fraction.	***Teacher*** *Let's use your Clock Fractions tool to find 5/6. Can you show 1/6 on the tool? Now let's count by sixths, moving the Clock Fractions tool for each sixth. Let me know when we should stop.* ***Student*** *That's 5/6 but it's also 19/12! I know that because both of them fill up the clock to 50 minutes.*
A student can add fractions and write equations easily.	CHALLENGE Encourage students to analyze the game. Ask them to figure out the fewest spins it could take to fill up one clock and then all three clocks. Have them also consider the maximum number of spins it takes to fill up the clocks.	***Teacher*** *You're playing really well. Let's take a minute to think about the game some more. Can you figure out the spins that would help you complete the game in the least amount of time?*
Multilingual learners		
• Review key vocabulary with students. Review and post the Word Resource Cards for *fraction, mixed number, numerator,* and *denominator.* • Play a round with students in which you emphasize each step of the game using gestures and examples. • Pair students with supportive partners who can explain the directions and support students in playing the game.		

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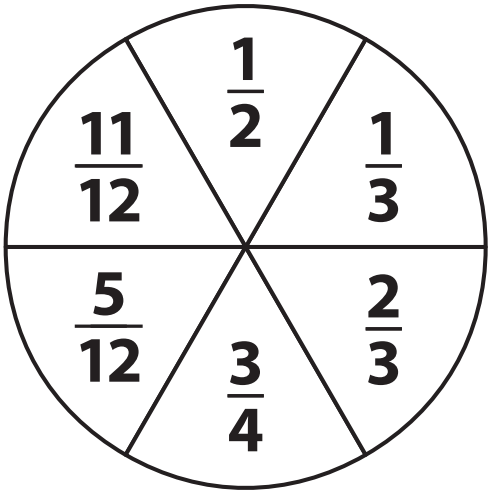
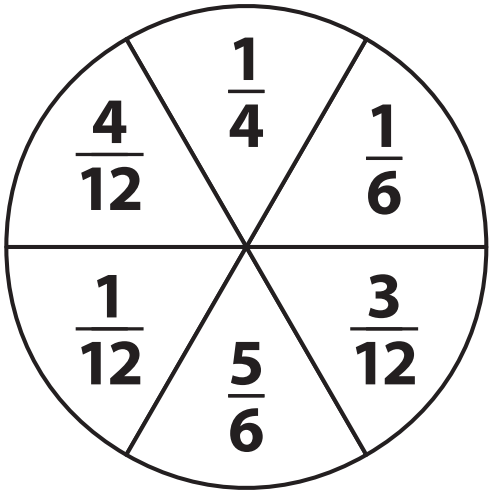
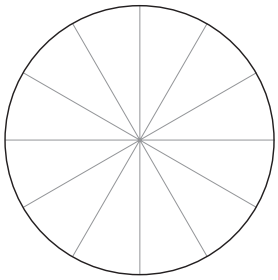
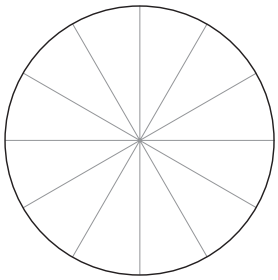
2A Clock Fractions Record Sheet



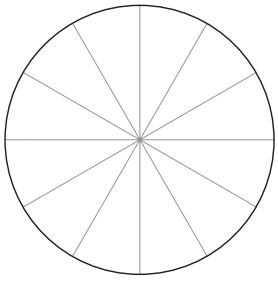




Equation for Clock 1



Equation for Clock 2

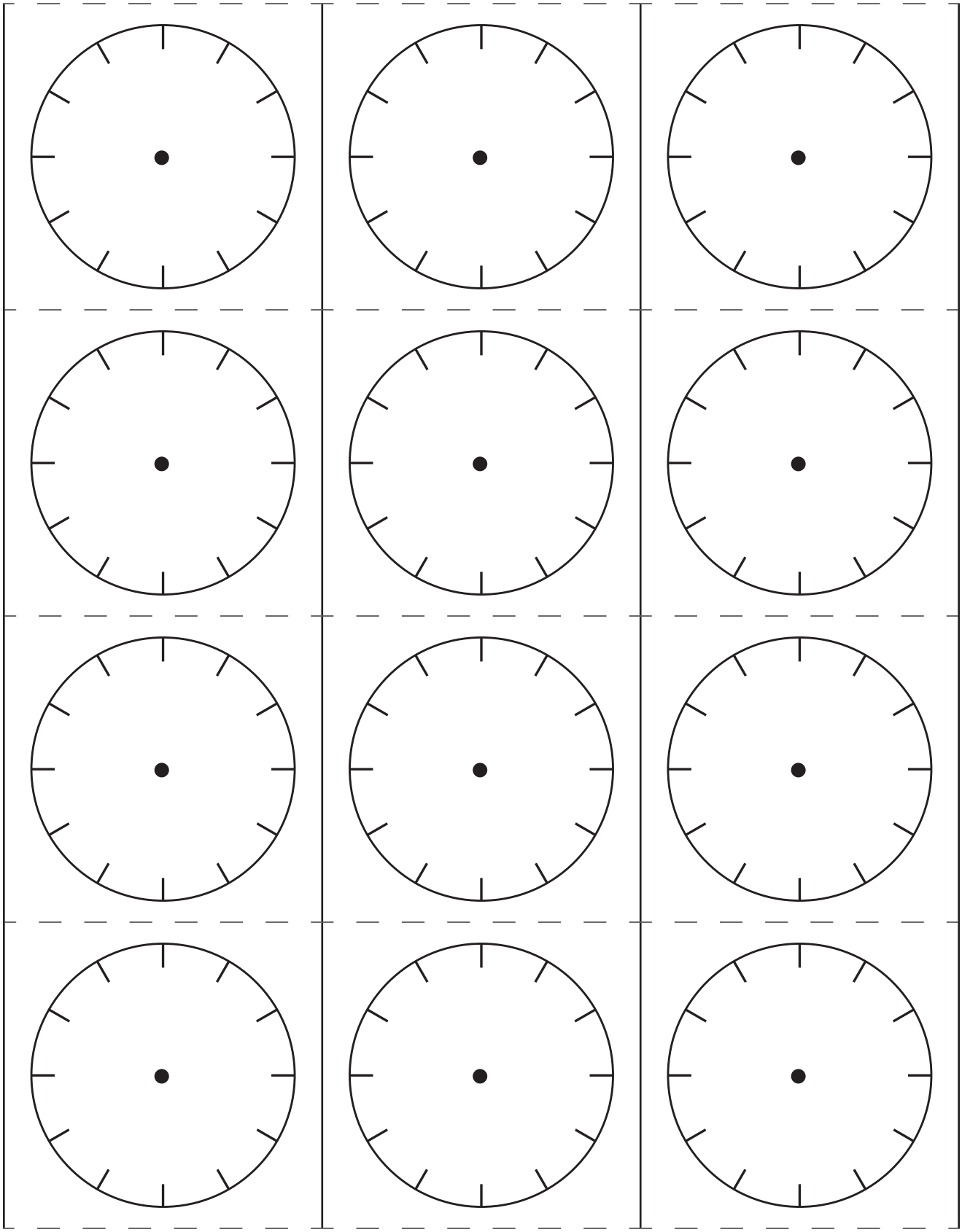


Equation for Clock 3

Equation for Each Turn

NAME | **DATE**

Blank Clock Face Strips



Fraction Cards

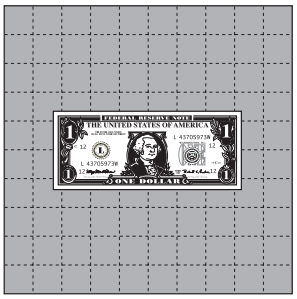
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{5}$
$\frac{1}{6}$	$\frac{1}{10}$	$\frac{1}{12}$	$\frac{1}{20}$
$\frac{1}{25}$	$\frac{1}{100}$	$\frac{2}{3}$	$\frac{2}{4}$
$\frac{3}{4}$	$\frac{1}{60}$	$\frac{2}{5}$	$\frac{5}{6}$
$\frac{7}{20}$	$\frac{5}{12}$	$\frac{7}{12}$	$\frac{10}{100}$
$\frac{3}{10}$	$\frac{8}{12}$	$\frac{7}{25}$	$\frac{7}{10}$

NAME | DATE

Fractions & Decimals with Money

Record equivalent fractions and decimals that show the value of each money amount.

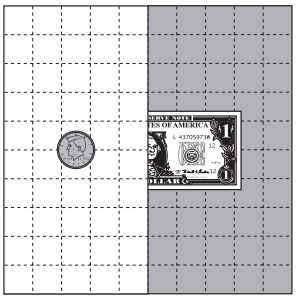
ex Dollar



Fractions: $\frac{1}{1}$, $\frac{100}{100}$

Decimals: 1.00, 1

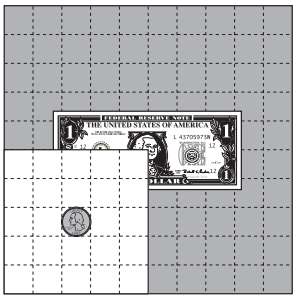
a Half Dollar



Fractions: _____

Decimals: _____

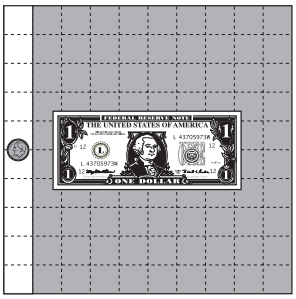
b Quarter



Fractions: _____

Decimals: _____

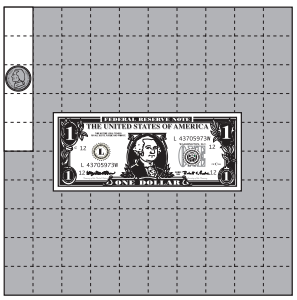
c Dime



Fractions: _____

Decimals: _____

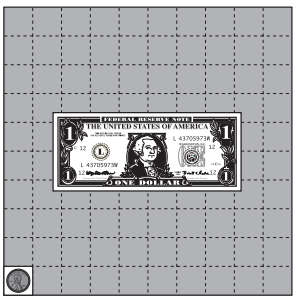
d Nickel



Fractions: _____

Decimals: _____

e Penny



Fractions: _____

Decimals: _____

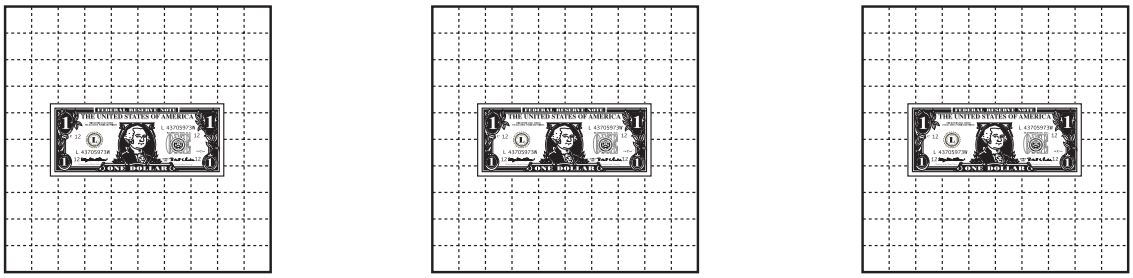
NAME | DATE

Adding & Subtracting Fractions page 1 of 2

Use money value pieces, the dollar grids below, or your own method to solve each problem. Write your answers in fraction form, decimal form, or both.

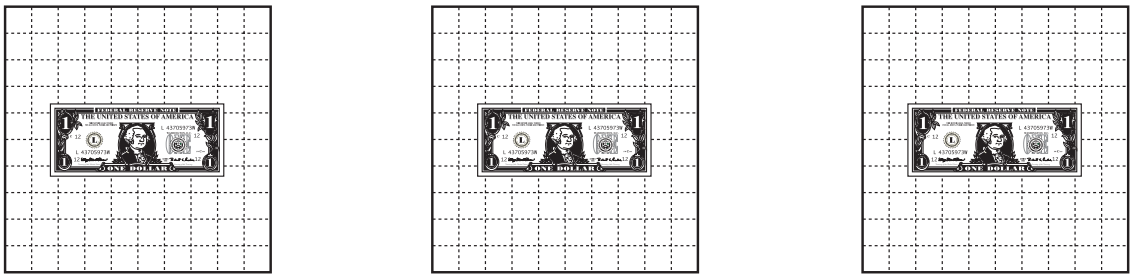
1 What is $\frac{1}{2}$ of a dollar plus $\frac{1}{4}$ of a dollar?

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



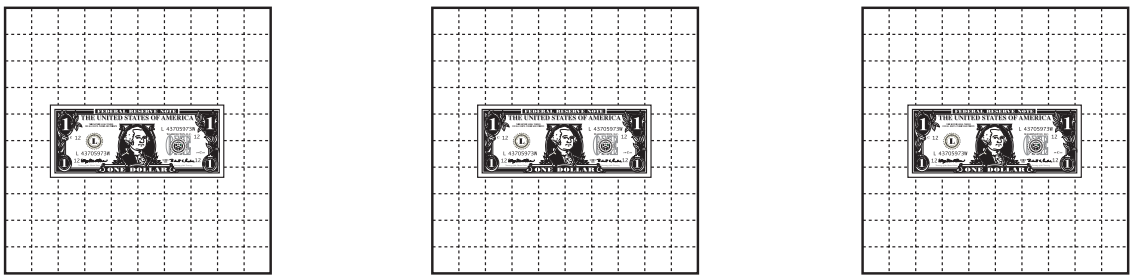
2 What is $\frac{3}{4}$ of a dollar minus $\frac{1}{2}$ of a dollar?

$\frac{3}{4} - \frac{1}{2} =$ _____



3 What is $\frac{3}{4}$ of a dollar plus $\frac{1}{2}$ of a dollar?

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



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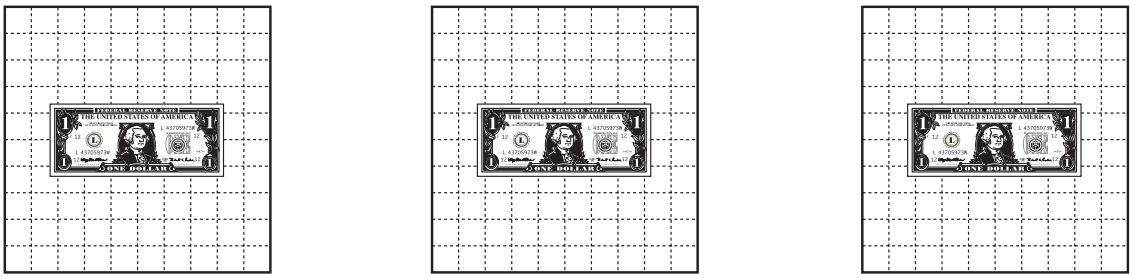
NAME | DATE

Adding & Subtracting Fractions page 2 of 2

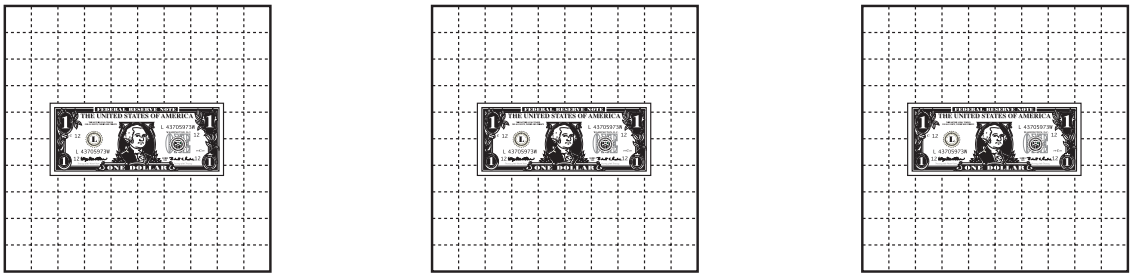
4 What is one and one-quarter dollars plus one-half of a dollar?

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



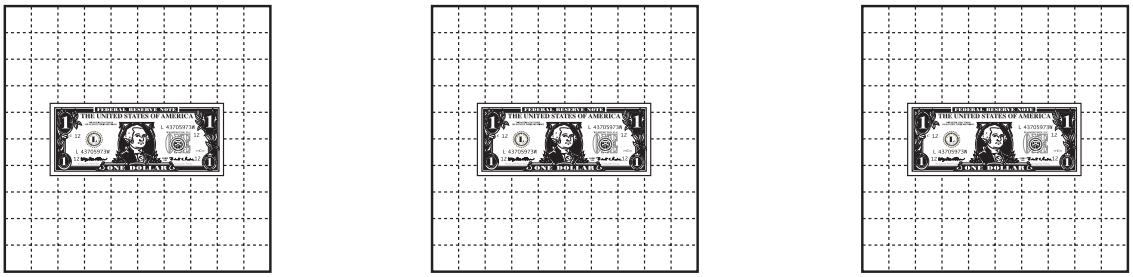
5 What is one-tenth of a dollar plus one-tenth of a dollar?

$\frac{1}{10} + \frac{1}{10} =$ _____



6 What is one and seven-tenths of a dollar minus one-fifth of a dollar?

$1\frac{7}{10} - \frac{1}{5} =$ _____



7 Use money value pieces to build a quantity. Write equations that show the quantity.

NAME | DATE

Money & Fractions

Use the money value pieces or the money model dollar pieces to help solve these problems.

1 Write each amount as a decimal.

a 2 quarters = _____

b 3 dimes and 5 pennies = _____

2 Write each amount as a fraction of a dollar.

a 3 quarters = _____

b 7 dimes = _____

3 Solve the problems below about the school store. Show your thinking.

a At the school store, sparkle pencils cost $\frac{1}{2}$ of a dollar, and superhero stickers cost $\frac{1}{4}$ of a dollar. How much would one sparkle pencil and one superhero sticker cost together? Record your answer as a fraction and as a decimal.

b One day, Mr. Rigaud spent $1\frac{1}{4}$ dollars at the school store and Ms. Fernandez spent $1\frac{1}{2}$ dollars. How much did the two teachers spend together? Record your answer as a fraction and as a decimal.

c **CHALLENGE** The school secretaries also shop at the school store. Mrs. Quirk spent $1\frac{3}{5}$ dollars on colorful paperclips, and Mrs. MacVane spent $2\frac{5}{10}$ dollars on highlighters. How much did they spend together? Record your answer as a fraction and as a decimal.

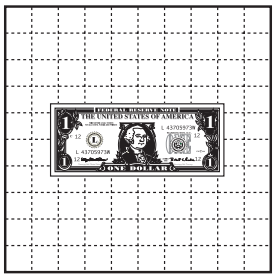
NAME | DATE

More Adding & Subtracting Fractions page 1 of 2

Use money value pieces, the dollar grids below, or your own method to solve each problem. Write your answers in fraction form, decimal form, or both.

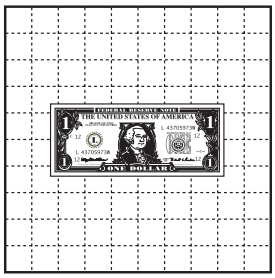
1 What is one-fourth of a dollar plus one-tenth of a dollar?

$\frac{1}{4} + \frac{1}{10} =$ _____



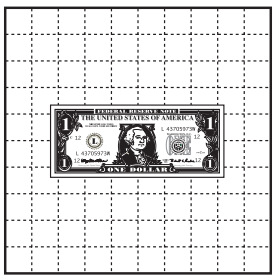
2 What is one-fourth of a dollar minus one-tenth of a dollar?

$\frac{1}{4} - \frac{1}{10} =$ _____



3 What is one-fifth of a dollar plus one-half of a dollar?

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



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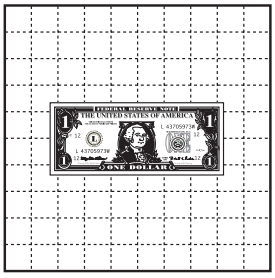
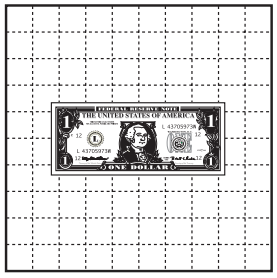
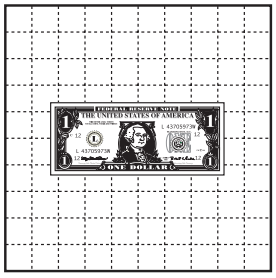
NAME | DATE

More Adding & Subtracting Fractions page 2 of 2

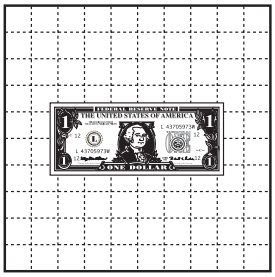
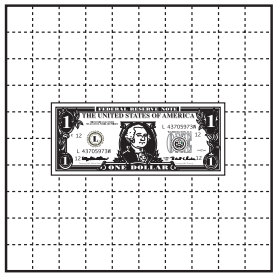
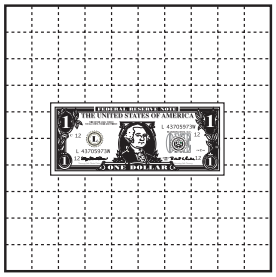
4 What is one-half of a dollar minus one-fifth of a dollar?

$\frac{1}{2} - \frac{1}{5} =$ _____

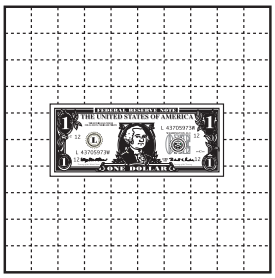
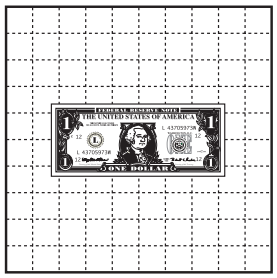
5 What is nine-tenths of a dollar plus one-and-one-half dollars?

$\frac{9}{10} + 1\frac{1}{2} =$ _____

6 What is one-and-one-half dollars minus nine-tenths of a dollar?

$1\frac{1}{2} - \frac{9}{10} =$ _____

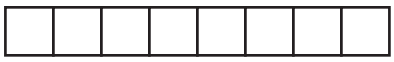



NAME | DATE

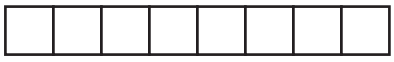
Fractions & Mixed Numbers

1 Color in the strips to show the fractions named below. Each strip represents 1 whole.

ex $\frac{1}{4}$ 

a $\frac{3}{8}$ 

b $\frac{1}{2}$ 

c $\frac{3}{4}$ 

2 Color in the strips to show the improper fractions below. Then write the fraction as a mixed number. Each strip represents 1 whole.

ex $\frac{7}{4}$ 

$1\frac{3}{4}$

a $\frac{12}{8}$ 

b $\frac{3}{2}$ 

3 Fill in the blanks to show each fraction as a fraction of a dollar and as decimal (money) notation.

ex $\frac{1}{10} = \frac{10}{100} = \$0.10$

a $\frac{1}{2}$ = _____ = _____

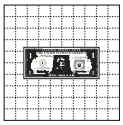
b $\frac{1}{4}$ = _____ = _____

c $\frac{3}{4}$ = _____ = _____

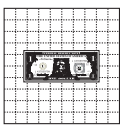
d $\frac{7}{10}$ = _____ = _____

Do you agree or disagree with the students' thinking in problems 4 and 5? Show your thinking, using the money value pieces or dollar grid if you like.

4 Esther had to solve $\frac{1}{2} + \frac{1}{4}$. She wrote: \$0.05 + \$0.25 = \$0.30, which is the same as $\frac{30}{100}$ of a dollar. So $\frac{1}{2} + \frac{1}{4} = \frac{30}{100}$.



5 Thanh had to solve $\frac{1}{10} + \frac{1}{5}$. He wrote: \$0.10 + \$0.20 = \$0.30, which is the same as $\frac{3}{10}$ of a dollar, so $\frac{1}{10} + \frac{1}{5} = \frac{3}{10}$.

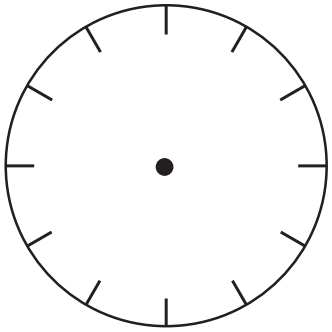


NAME | DATE

Fractions on a Clock Face

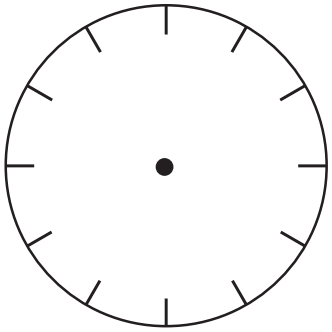
Shade each clock face to model each fraction. Then record equivalent fractions to describe the shaded part.

1



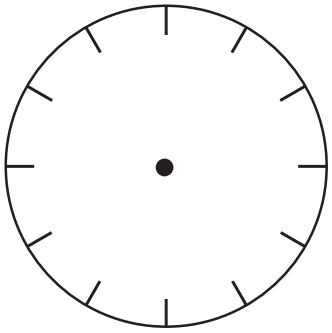
1 hour =

$\frac{1}{2}$



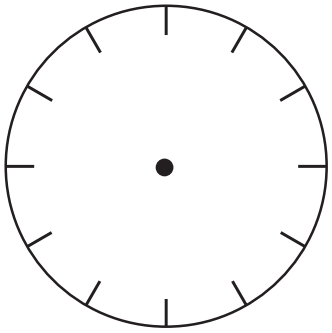
$\frac{1}{2}$ hour =

$\frac{1}{4}$



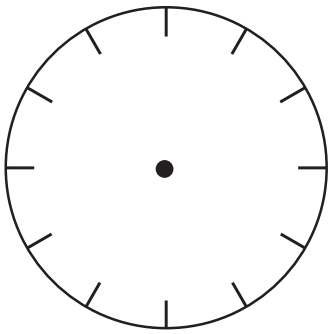
$\frac{1}{4}$ hour =

$\frac{1}{3}$



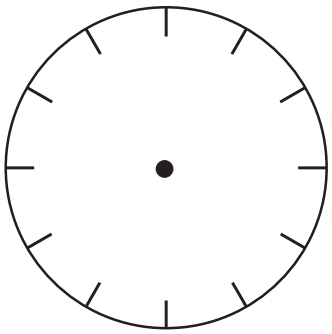
$\frac{1}{3}$ hour =

$\frac{1}{6}$



$\frac{1}{6}$ hour =

$\frac{1}{12}$

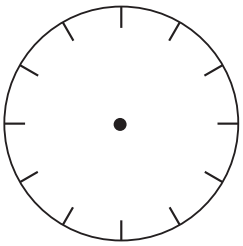


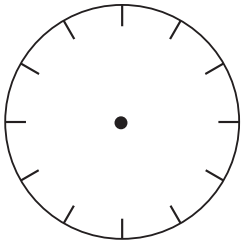
$\frac{1}{12}$ hour =

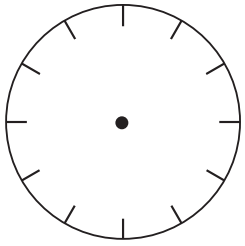
NAME | DATE

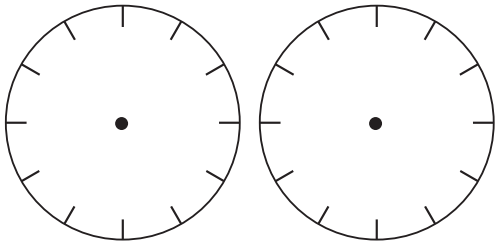
Clock Face Fractions

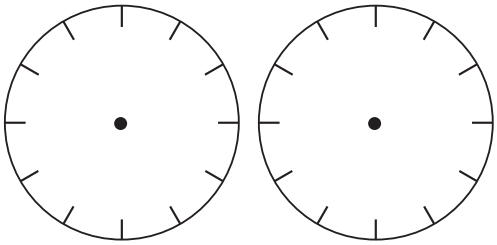
1 Color in the clock to show the fractions below. Each clock represents 1 whole.

a $\frac{1}{2}$ 

b $\frac{1}{4}$ 

c $\frac{2}{6}$ 

d $\frac{10}{6}$ 

e $\frac{5}{3}$ 

2 Compare the following pairs of fractions using <, >, or =. Some of your work in problem 1 may be helpful.

ex $\frac{1}{2} > \frac{5}{12}$

a $\frac{6}{4} \bigcirc 1\frac{1}{2}$

b $\frac{5}{6} \bigcirc \frac{5}{12}$

c $\frac{10}{6} \bigcirc 1\frac{1}{2}$

d $\frac{6}{2} \bigcirc \frac{6}{4}$

e $\frac{3}{6} \bigcirc \frac{2}{3}$

3 Fill in the blanks with the missing fraction or mixed number. (Hint: Think about money or clocks to help.)

a $\frac{1}{2} - \frac{1}{4} =$ _____

b $\frac{3}{4} -$ _____ $= \frac{65}{100}$

c $1 - \frac{1}{6} =$ _____

d $2 -$ _____ $= \frac{3}{4}$

4 A certain fraction is greater than 2. The denominator is 8. What must be true about the numerator? Show your thinking.

$\frac{?}{8}$ The numerator must be greater than _____ because:

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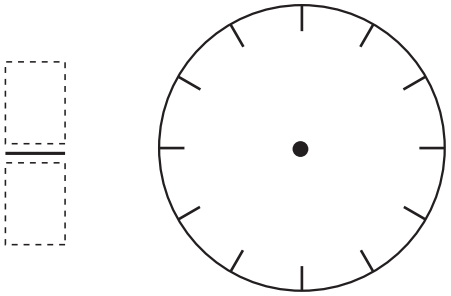
More Fractions on a Clock Face page 1 of 2

Model ⅔ on the clock face. Record the number of minutes in $\frac{2}{3}$ hour. Then record as many equivalent fractions as possible. Use your Clock Fractions tool if it's helpful.

1

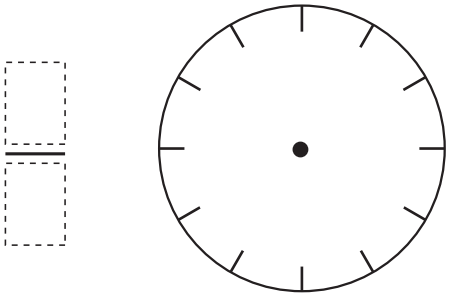


$\frac{2}{3}$ hour = _____ minutes

$\frac{2}{3}$ = _____

Find more fractions on a clock face. Choose a fraction to model on a clock face. Record the fraction next to the clock. Find the number of minutes in that fraction of an hour. Then list as many equivalent fractions as possible.

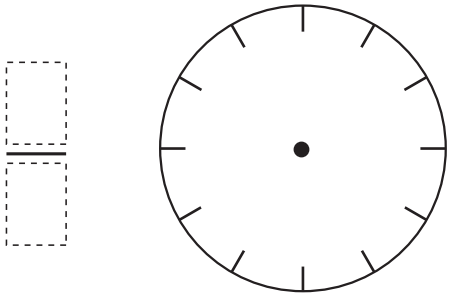
2



_____

_____

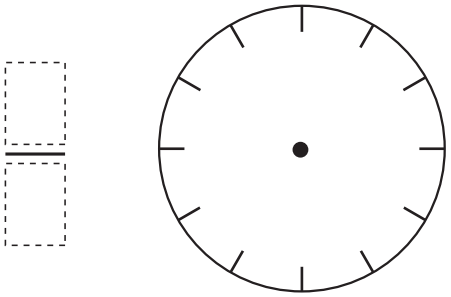
3



_____

_____

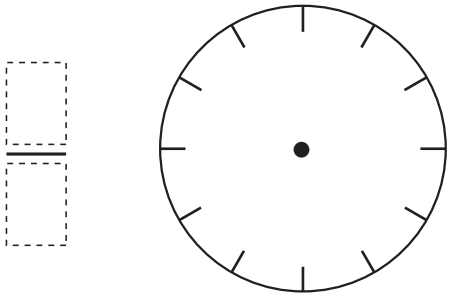
4



_____

_____

5



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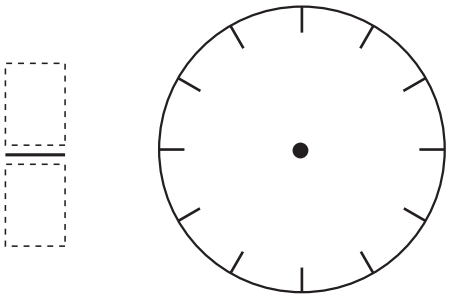
More Fractions on a Clock Face page 2 of 2

6



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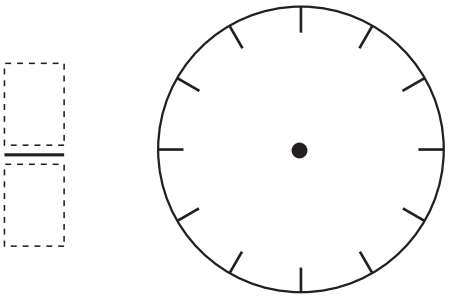

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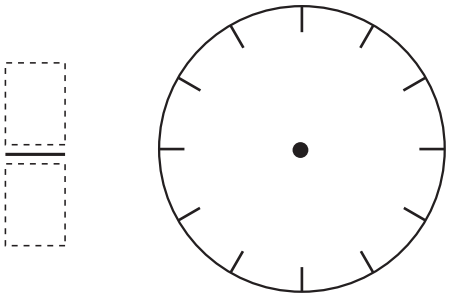

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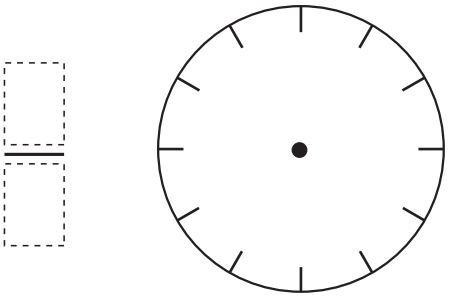

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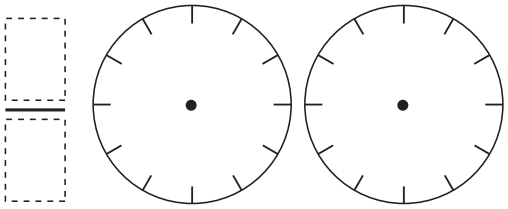

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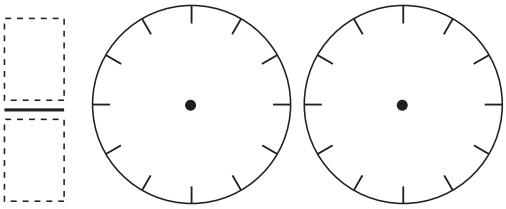

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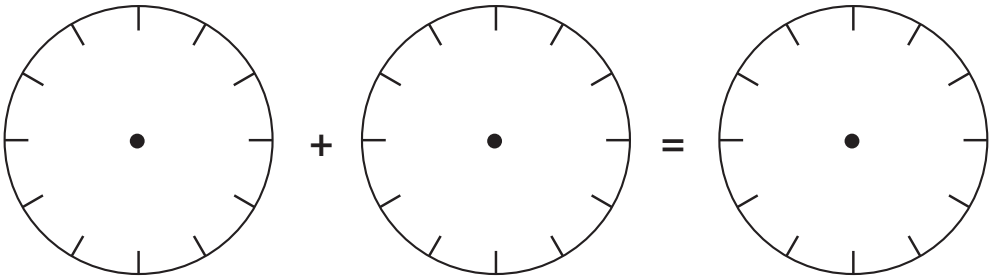
Clock Fractions Problems

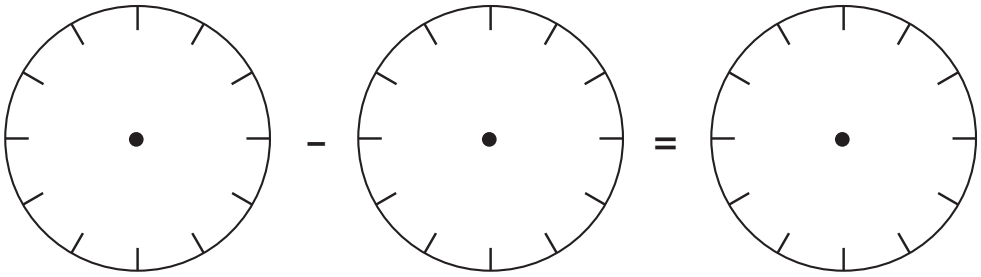
Model each fraction on a clock face. Then model the sum. Record an equation to show your thinking.

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



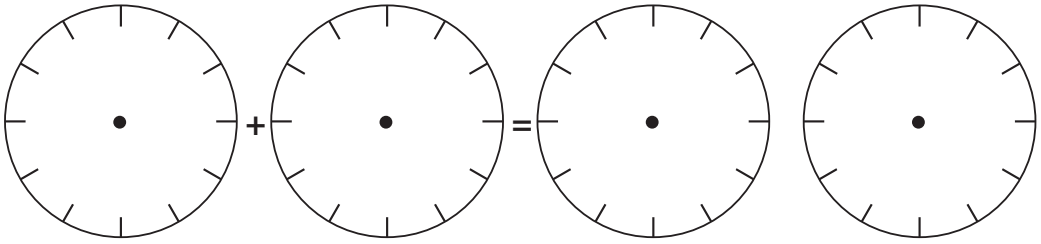
_____ + _____ = _____

$\frac{2}{3} - \frac{1}{4}$



_____ – _____ = _____

$\frac{5}{6} + \frac{1}{3}$



_____ + _____ = _____

Work Place Instructions 2A Clock Fractions

Object of the Game

Use spinners to create fractions to write addition equations and fill in clocks. The first player to completely fill all three clocks wins!

Get Ready to Play

- Each player needs their own **2A Clock Fractions record sheet**.
- Players need a **spinner overlay** to share.
- Each player needs **colored pencils** in several colors, as well as a regular **pencil**.
- Players should have easy access to their **Clock Fractions tool** and **blank clock face strips**, as optional supports.
- Each player spins the first spinner. The player who spins the greater fraction goes first.

On Your Turn

1 Spin both spinners. Write the two fractions as an addition expression.

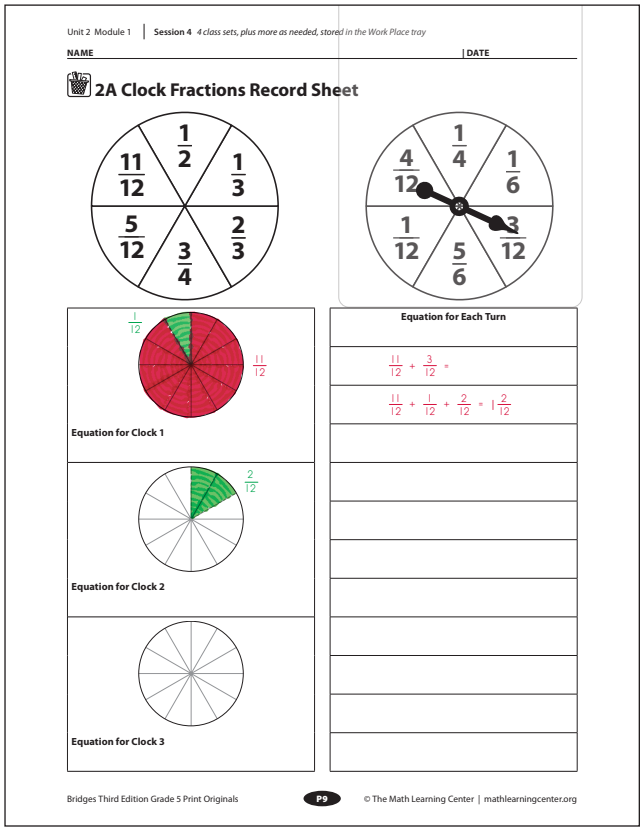
2 Shade both fractions, starting with the first clock. Use two different colors.

If the fractions you spin fill one clock and part of the next clock, record an equation that shows how you split a fraction to fill one clock. Then show much goes on the next clock, and the sum. For example, if you spin $\frac{11}{12}$ and $\frac{3}{12}$ on your first turn, record the equation $\frac{11}{12} + \frac{3}{12} = (\frac{11}{12} + \frac{1}{12}) + \frac{2}{12} = 1\frac{2}{12}$.

3 Label each fraction and record the sum of the fractions spun.

4 When you have filled a clock, write an addition equation below that clock to show the sum of the fractions shaded.

5 Have your partner check your shading, labeling, and equations. If they disagree, justify your answer. Otherwise, you lose a turn.


Unit 2 Module 1 | Session 4 *4 class sets, plus more as needed, stored in the Work Place tray*

NAME | DATE

2A Clock Fractions Record Sheet

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{12}$ $\frac{11}{12}$

$\frac{1}{4}$ $\frac{1}{6}$ $\frac{3}{12}$ $\frac{5}{6}$ $\frac{1}{12}$ $\frac{4}{12}$

Equation for Clock 1

Equation for Clock 2

Equation for Clock 3

Equation for Each Turn

$\frac{11}{12} + \frac{3}{12} =$

$\frac{11}{12} + \frac{1}{12} + \frac{2}{12} = 1\frac{2}{12}$

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Ending the Game

The first player to completely fill all three clocks (or more than three clocks) wins.

Variations

A Fill only two clocks to shorten the game, or draw another clock to lengthen the game.

B To win, the final clock must be filled in exactly. Players may choose to spin only one spinner when they get to the final clock.

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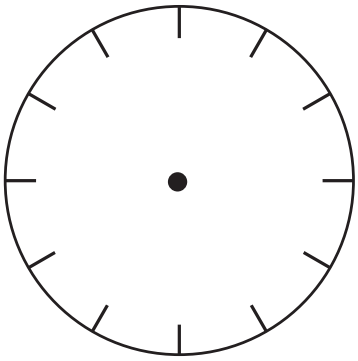
Adding Fractions

1 Show the fractions on the strips. Then add them and record the sum.

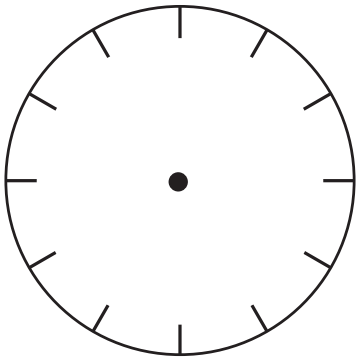
	First	Second	Add Them	Sum
a	$\frac{3}{4}$	$\frac{3}{4}$		
b	$\frac{3}{8}$	$\frac{1}{2}$		
c	$\frac{5}{8}$	$\frac{3}{4}$		
d	$\frac{1}{2}$	$\frac{7}{8}$		

2 Model each problem on a clock to add the fractions. Remember to label your work.

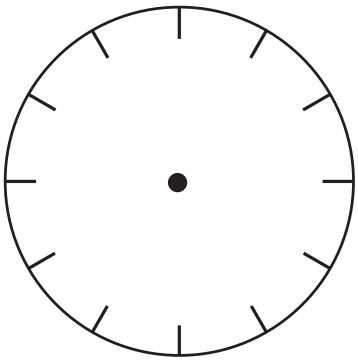
a $\frac{1}{2} + \frac{1}{6} =$



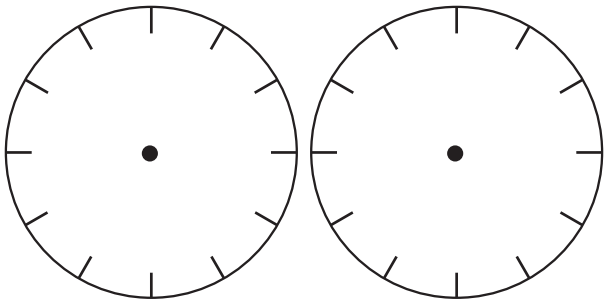
b $\frac{2}{3} + \frac{1}{6} =$



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



d $\frac{2}{3} + \frac{5}{6} =$

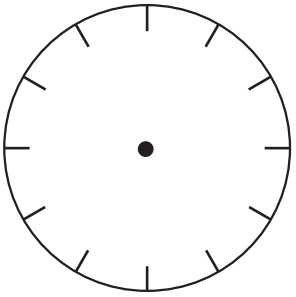


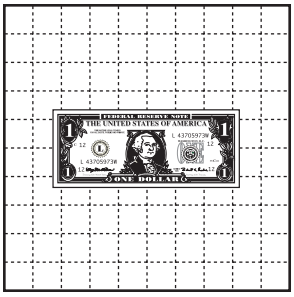
NAME | DATE

Fraction Subtraction page 1 of 2

Solve each subtraction problem. Decide whether a clock model or money model is best and explain why you chose that model. Then record an equation and use the model to show your thinking.

$\frac{1}{2} - \frac{1}{4}$

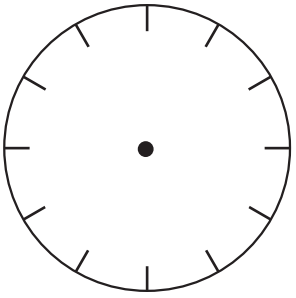


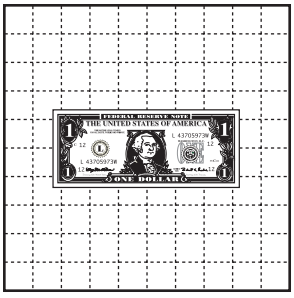


_____ – _____ = _____

Which model? Why?

$\frac{3}{4} - \frac{1}{5}$

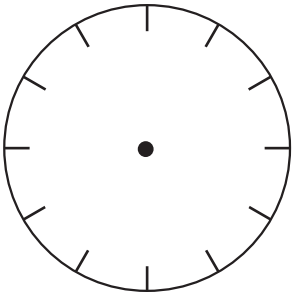


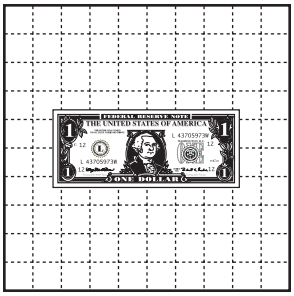


_____ – _____ = _____

Which model? Why?

$\frac{3}{4} - \frac{2}{12}$





_____ – _____ = _____

Which model? Why?

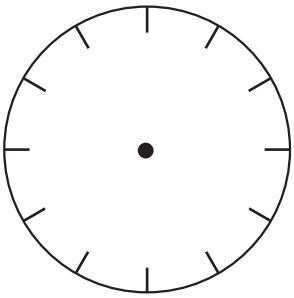
(continued on next page)

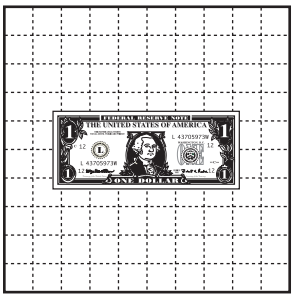
NAME | DATE

Fraction Subtraction page 2 of 2

$\frac{2}{3} - \frac{5}{12}$

_____ – _____ = _____

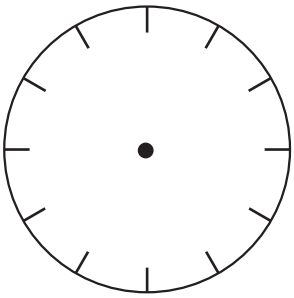


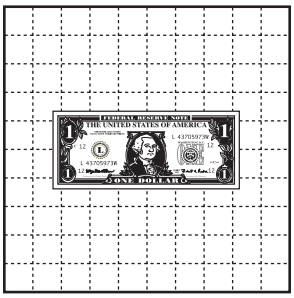


Which model? Why?

$\frac{4}{5} - \frac{1}{10}$

_____ – _____ = _____

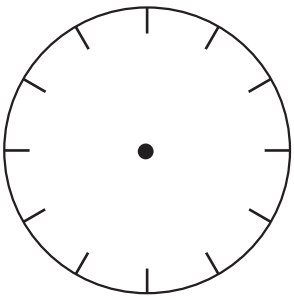


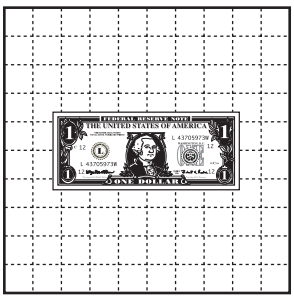


Which model? Why?

$\frac{4}{5} - \frac{15}{100}$

_____ – _____ = _____



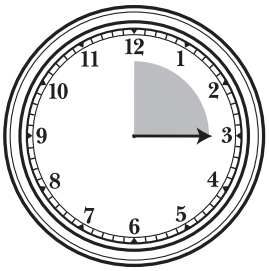


Which model? Why?

NAME | DATE

Equivalent Fractions on a Clock

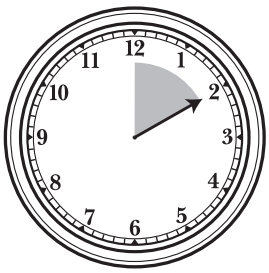
This clock is broken! The hour hand is stuck at the 12, but the minute hand can still move.



1 Marcus looked at the clock shown above and said, "$\frac{1}{4}$ of an hour has passed." Sierra said, "$\frac{3}{12}$ of an hour has passed." Ali said, "$\frac{15}{60}$ of an hour has passed." Their teacher said they were all correct. Explain how this could be possible.

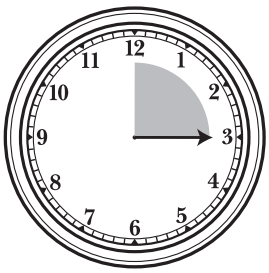
2 Label each clock with at least 3 equivalent fractions to show what part of an hour has passed.

a



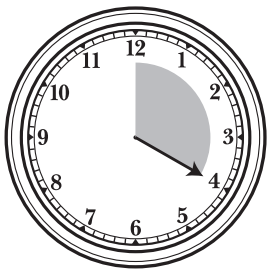
____ ____ ____

b



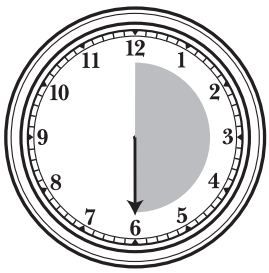
____ ____ ____

c



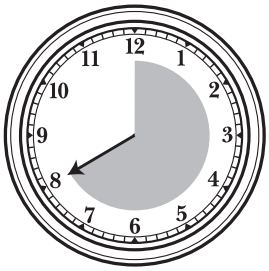
____ ____ ____

d



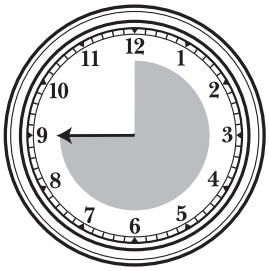
____ ____ ____

e



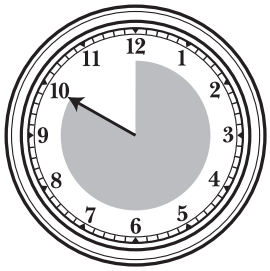
____ ____ ____

f



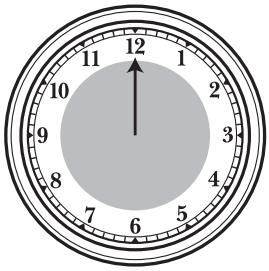
____ ____ ____

g



____ ____ ____

h



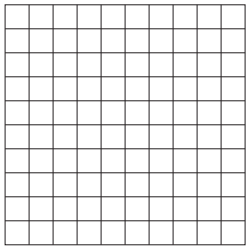
____ ____ ____

NAME | DATE

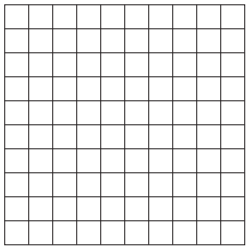
Comparing Fractions page 1 of 2

1 Color in decimal unit frames to show the fractions below. Each frame represents 1 whole.

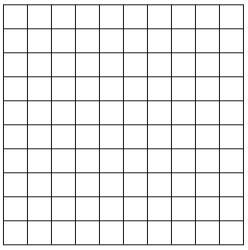
a $\frac{1}{2}$



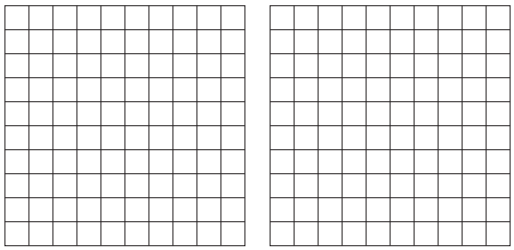
b $\frac{1}{4}$



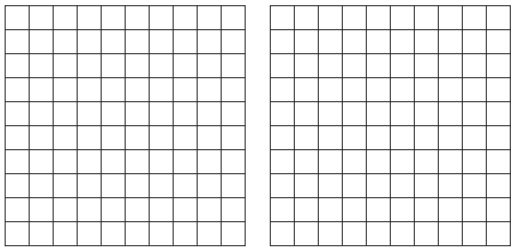
c $\frac{3}{10}$



d $\frac{16}{10}$



e $\frac{6}{4}$



2 Use the pictures above to help complete each comparison below using <, >, or =.

ex $\frac{1}{2} > \frac{3}{10}$

a $\frac{6}{4} \bigcirc 1\frac{1}{2}$

b $\frac{6}{10} \bigcirc \frac{3}{4}$

c $\frac{16}{10} \bigcirc 1\frac{1}{2}$

d $\frac{6}{10} \bigcirc \frac{6}{4}$

e $\frac{3}{10} \bigcirc \frac{1}{4}$

3 Mr. Gulati bought some fruit for a 5th grade event. He bought $2\frac{1}{2}$ pounds of peaches, $\frac{7}{10}$ of a pound of raspberries, and $1\frac{1}{4}$ pounds of apricots. How many pounds of fruit did he buy in all? Show your thinking and include units.

(continued on next page)

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Comparing Fractions page 2 of 2

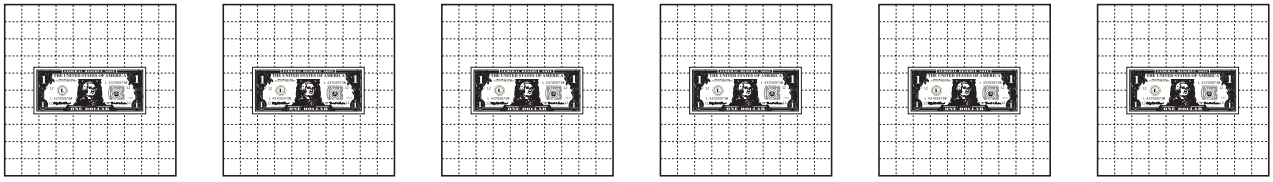
4 Fill in the blanks to show the missing fraction or mixed number. Use the dollar grids below if you'd like.

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

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

c $\frac{1}{2} + \frac{1}{10} =$ _____

d $\frac{3}{10} +$ _____ $= \frac{13}{20}$



5 **CHALLENGE** Write three fraction addition problems in which the fractions have different denominators and the sum is 1.

ex $\frac{1}{2} + \frac{2}{4} = 1$

a

b

c

6 **CHALLENGE** Fill in the missing numerators and denominators to make each comparison true.

a $\frac{\square}{2} > \frac{4}{2}$ **b** $1\frac{1}{4} = 1\frac{\square}{12}$ **c** $\frac{16}{32} < \frac{\square}{8}$

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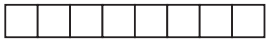
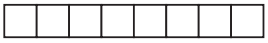
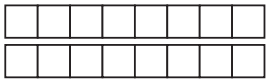
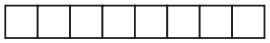
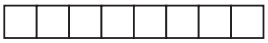
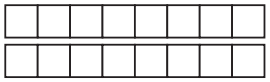
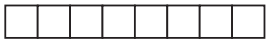
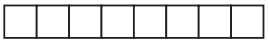
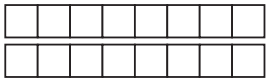
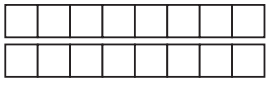
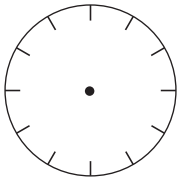
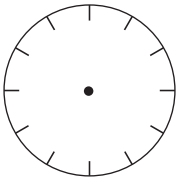
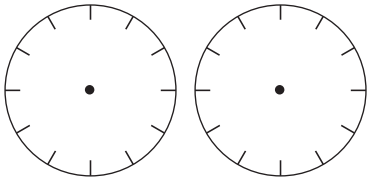
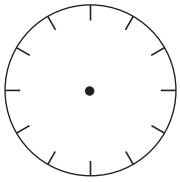
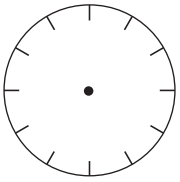
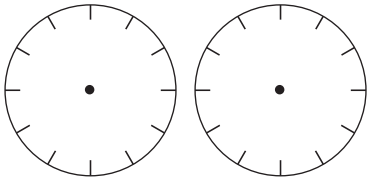
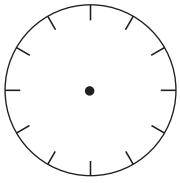
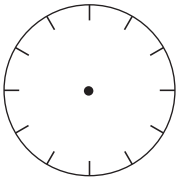
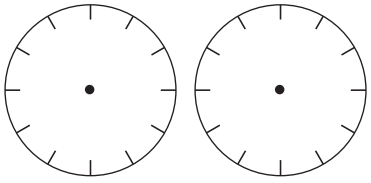
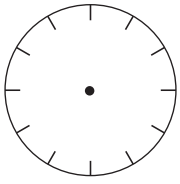
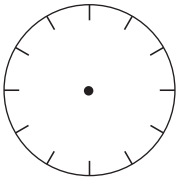
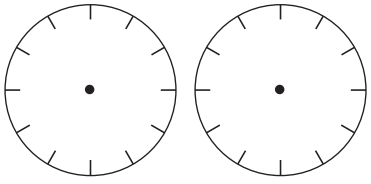
More Adding Fractions page 1 of 2

1 Show the fractions on the strips or clocks. Then add them and report the sum.

	First	Second	Add Them	Sum
a	$\frac{1}{2}$ 	$\frac{3}{8}$ 		
b	$\frac{3}{4}$ 	$\frac{3}{8}$ 		
c	$\frac{5}{8}$ 	$\frac{1}{2}$ 		
d	$\frac{3}{4}$ 	$\frac{7}{8}$ 		
e	$\frac{1}{4}$ 	$\frac{2}{3}$ 		
f	$\frac{3}{4}$ 	$\frac{2}{3}$ 		
g	$\frac{5}{6}$ 	$\frac{3}{4}$ 		
h	$\frac{1}{2}$ 	$\frac{5}{6}$ 		

(continued on next page)

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More Adding Fractions page 2 of 2

Show your thinking for each problem.

2 Abby and Mariceli are preparing for a dance performance. On Monday, they practiced for $\frac{2}{3}$ of an hour. On Tuesday, they practiced for $\frac{5}{6}$ of an hour. How long did they practice on Monday and Tuesday together?

3 On Wednesday, Abby and Mariceli could not practice together, so they practiced separately. Abby practiced for $\frac{11}{12}$ of an hour and Mariceli practiced for $\frac{2}{3}$ of an hour. How long did they practice on Wednesday?

4 **CHALLENGE** If you are adding two fractions that are both greater than $\frac{1}{2}$, what must be true about the sum? Give three examples to support your thinking.

The sum must be _____.

5 **CHALLENGE** If you are adding two fractions that are both less than $\frac{1}{2}$, what must be true about the sum? Give three examples to support your thinking.

The sum must be _____.

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