Critical Area

Fractions and Decimals

CRITICAL AREA Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers

A *luthier,* or guitar maker, at his workshop

Project

Building Custom Guitars

Do you play the guitar, or would you like to learn how to play one? The guitar size you need depends on your height to the nearest inch and on *scale length*. Scale length is the distance from the *bridge* of the guitar to the *nut*.

Get Started

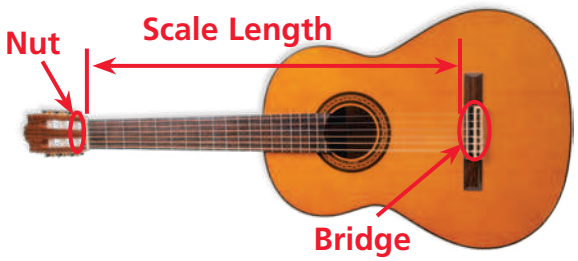
Order the guitar sizes from the least size to the greatest size, and complete the table.

Important Facts

Guitar Sizes for Students			
Age of Player	**Height of Player (to nearest inch)**	**Scale Length (shortest to longest, in inches)**	**Size of Guitar**
4–6	3 feet 3 inches to 3 feet 9 inches	19	
6–8	3 feet 10 inches to 4 feet 5 inches	20.5	
8–11	4 feet 6 inches to 4 feet 11 inches	22.75	
11–Adult	5 feet or taller	25.5	

Size of Guitar: $\frac{1}{2}$ size, $\frac{4}{4}$ size, $\frac{1}{4}$ size, $\frac{3}{4}$ size

Adults play $\frac{4}{4}$-size guitars. You can see that guitars also come in $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ sizes. Figure out which size guitar you would need according to your height and the scale length for each size guitar. Use the Important Facts to decide. **Explain** your thinking.



Completed by _____

Chapter 6

Fraction Equivalence and Comparison

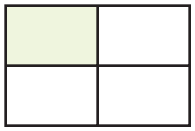
Show What You Know

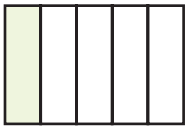
Check your understanding of important skills.

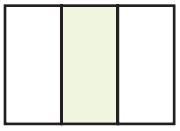
Name _____

Part of a Whole

Write a fraction for the shaded part.

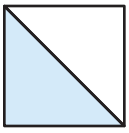
1.  _____

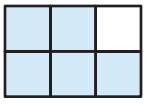
2.  _____

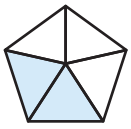
3.  _____

Name the Shaded Part

Write a fraction for the shaded part.

4.  _____

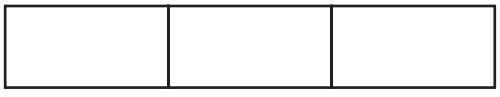
5.  _____

6.  _____

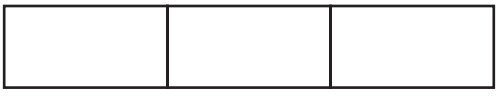
Compare Parts of a Whole

Color the fraction strips to show the fractions. Circle the greater fraction.

7. $\frac{1}{2}$ 

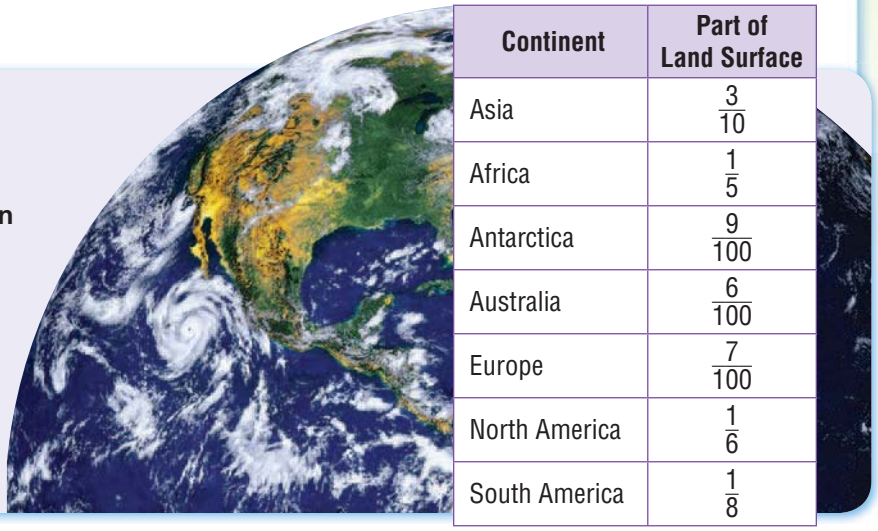
   $\frac{1}{3}$ 

8. $\frac{1}{5}$ 

   $\frac{1}{3}$ 

Math Detective

Earth's surface is covered by more than 57 million square miles of land. The table shows about how much of Earth's land surface each continent covers. Be a Math Detective. Which continent covers the greatest part of Earth's land surface?



Continent	Part of Land Surface
Asia	$\frac{3}{10}$
Africa	$\frac{1}{5}$
Antarctica	$\frac{9}{100}$
Australia	$\frac{6}{100}$
Europe	$\frac{7}{100}$
North America	$\frac{1}{6}$
South America	$\frac{1}{8}$

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the flow map by using the words with a ✓.

Whole Numbers and Fractions

What is it?	What are some examples?
_____ →	6: 1, 2, 3, 6
_____ →	6: 6, 12, 18, 24, ...
_____ →	$\frac{1}{6}, \frac{2}{3}, \frac{4}{5}$
_____ →	$\frac{1}{3}$
_____ →	$\frac{1}{3}$

Review Words

- common multiple
- ✓ denominator
- ✓ factor
- ✓ fraction
- ✓ multiple
- ✓ numerator

Preview Words

- benchmark
- common denominator
- equivalent fractions
- simplest form

Understand Vocabulary

Complete the sentences by using preview words.

1. A fraction is in _____ if the numerator and denominator have only 1 as a common factor.
2. _____ name the same amount.
3. A _____ is a common multiple of two or more denominators.
4. A _____ is a known size or amount that helps you understand a different size or amount.

Name _____

Equivalent Fractions

Essential Question How can you use models to show equivalent fractions?

Number and Operations—Fractions—4.NF.1

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7

Investigate

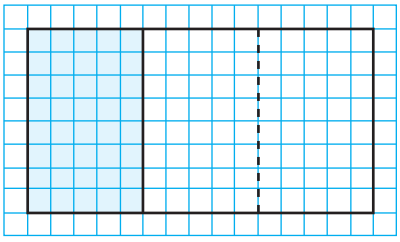
Materials ■ color pencils

Joe cut a pan of lasagna into third-size pieces. He kept $\frac{1}{3}$ and gave the rest away. Joe will not eat his part all at once. How can he cut his part into smaller, equal-size pieces?

A. Draw on the model to show how Joe could cut his part of the lasagna into 2 equal pieces.

You can rename these 2 equal pieces as a fraction of the original pan of lasagna.

Suppose Joe had cut the original pan of lasagna into equal pieces of this size.



How many pieces would there be? _____

What fraction of the pan is 1 piece? _____

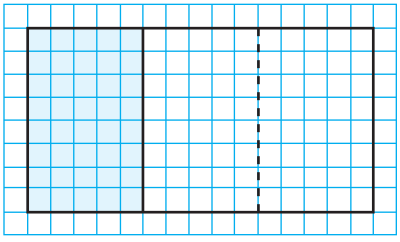
What fraction of the pan is 2 pieces? _____

You can rename $\frac{1}{3}$ as _____.

B. Now draw on the model to show how Joe could cut his part of the lasagna into 4 equal pieces.

You can rename these 4 equal pieces as a fraction of the original pan of lasagna.

Suppose Joe had cut the original pan of lasagna into equal pieces of this size.



How many pieces would there be? _____

What fraction of the pan is 1 piece? _____

What fraction of the pan is 4 pieces? _____

You can rename $\frac{1}{3}$ as _____.

C. Fractions that name the same amount are **equivalent fractions**. Write the equivalent fractions.

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

Draw Conclusions

1. Compare the models for $\frac{1}{3}$ and $\frac{2}{6}$. How does the number of parts relate to the sizes of the parts?

2. Describe how the numerators are related and how the denominators are related in $\frac{1}{3} = \frac{2}{6}$.

3. THINK SMARTER Does $\frac{1}{3} = \frac{3}{9}$? Explain.

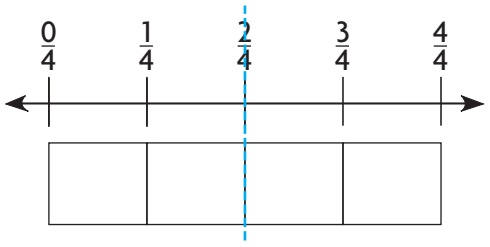
Make Connections

Savannah has $\frac{2}{4}$ yard of ribbon, and Isabel has $\frac{3}{8}$ yard of ribbon. How can you determine whether Savannah and Isabel have the same length of ribbon?

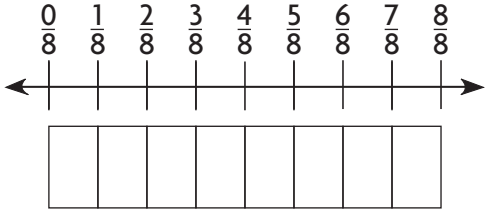
The equal sign (=) and not equal to sign (≠) show whether fractions are equivalent.

Tell whether $\frac{2}{4}$ and $\frac{3}{8}$ are equivalent. Write = or ≠.

STEP 1 Shade the amount of ribbon Savannah has.



STEP 2 Shade the amount of ribbon Isabel has.



Think: $\frac{2}{4}$ yard is not the same amount as $\frac{3}{8}$ yard.

So, $\frac{2}{4}$ ◯ $\frac{3}{8}$.

Math Talk

Mathematical Practices

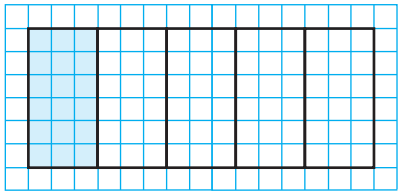
How could you use a model to show that $\frac{4}{8} = \frac{1}{2}$?

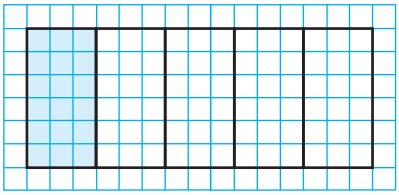
Name _____

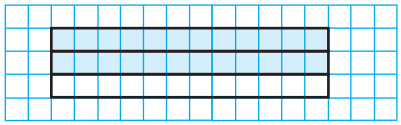
Share and Show

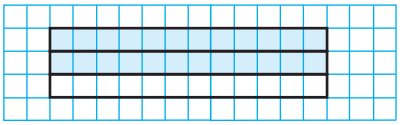
MATH BOARD

Use the model to write an equivalent fraction.

1. 

$\frac{1}{5}$ = 

2. 

$\frac{2}{3}$ = 

Tell whether the fractions are equivalent. Write = or ≠.

3. $\frac{1}{6} \bigcirc \frac{2}{12}$

4. $\frac{2}{5} \bigcirc \frac{6}{10}$

5. $\frac{4}{12} \bigcirc \frac{1}{3}$

6. $\frac{5}{8} \bigcirc \frac{2}{4}$

7. $\frac{5}{6} \bigcirc \frac{10}{12}$

8. $\frac{1}{2} \bigcirc \frac{5}{10}$

Problem Solving • Applications

9. GO DEEPER Manny used 8 tenth-size parts to model $\frac{8}{10}$. Ana used fewer parts to model an equivalent fraction. How does the size of a part in Ana's model compare to the size of a tenth-size part? What size part did Ana use?

10. MATHEMATICAL PRACTICE 5 **Use a Concrete Model** How many eighth-size parts do you need to model $\frac{3}{4}$? Explain.

What's the Error?

11. THINK SMARTER Ben brought two pizzas to a party. He says that since $\frac{1}{4}$ of each pizza is left, the same amount of each pizza is left. What is his error?

Describe Ben's error.

Draw models of 2 pizzas with a different number of equal pieces. Use shading to show $\frac{1}{4}$ of each pizza.

12. THINK SMARTER For numbers 12a–12d, tell whether the fractions are equivalent by selecting the correct symbol.

12a. $\frac{3}{15}$ [= / ≠] $\frac{1}{6}$

12b. $\frac{3}{4}$ [= / ≠] $\frac{16}{20}$

12c. $\frac{2}{3}$ [= / ≠] $\frac{8}{12}$

12d. $\frac{8}{10}$ [= / ≠] $\frac{4}{5}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Generate Equivalent Fractions

Essential Question How can you use multiplication to find equivalent fractions?

Number and Operations—Fractions—4.NF.1

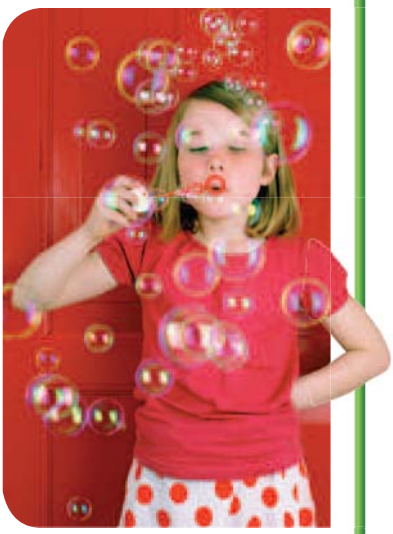
MATHEMATICAL PRACTICES
MP.4, MP.7, MP.8

Unlock the Problem

Sara needs $\frac{3}{4}$ cup of dish soap to make homemade bubble solution. Her measuring cup is divided into eighths. What fraction of the measuring cup should Sara fill with dish soap?

- Is an eighth-size part of a measuring cup bigger or smaller than a fourth-size part?

_____



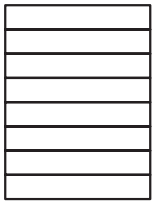
Find how many eighths are in $\frac{3}{4}$.

STEP 1 Compare fourths and eighths.

Shade to model $\frac{1}{4}$.
Use fourth-size parts.

1 part

Shade to model $\frac{1}{4}$.
Use eighth-size parts.



2 parts

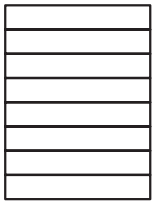
You need _____ eighth-size parts to make 1 fourth-size part.

STEP 2 Find how many eighths you need to make 3 fourths.

Shade to model $\frac{3}{4}$.
Use fourth-size parts.

3 parts

Shade to model $\frac{3}{4}$.
Use eighth-size parts.



6 parts

You needed 2 eighth-size parts to make 1 fourth-size part.

So, you need _____ eighth-size parts to make 3 fourth-size parts.

So, Sara should fill $\frac{\square}{8}$ of the measuring cup with dish soap.

Math Talk

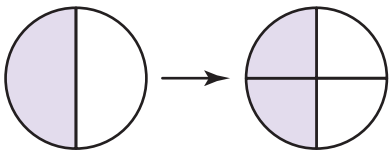
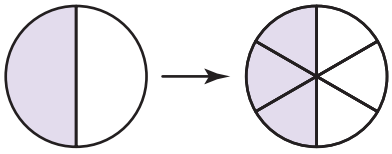
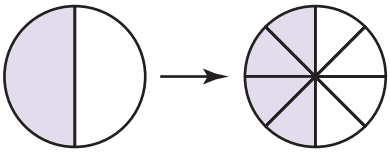
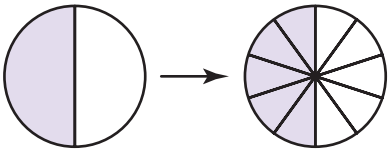
Mathematical Practices

How did you know how many eighth-size parts you needed to make 1 fourth-size part? **Explain**.

1. Explain why 6 eighth-size parts is the same amount as 3 fourth-size parts.

_____

Example Write four fractions that are equivalent to $\frac{1}{2}$.

MODEL	WRITE EQUIVALENT FRACTIONS	RELATE EQUIVALENT FRACTIONS
	$\frac{1}{2} = \frac{2}{4}$	$\frac{1 \times 2}{2 \times 2} = \frac{2}{4}$
	$\frac{1}{2} = \frac{\square}{6}$	$\frac{1 \times \square}{2 \times 3} = \frac{\square}{6}$
	$\frac{1}{2} = \frac{\square}{\square}$	$\frac{1 \times \square}{2 \times \square} = \frac{\square}{\square}$
	$\frac{1}{2} = \frac{\square}{\square}$	$\frac{1 \times \square}{2 \times \square} = \frac{\square}{\square}$

So, $\frac{1}{2} = \frac{2}{4} = \frac{\square}{6} = \frac{\square}{\square} = \frac{\square}{\square}$.

2. Look at the model that shows $\frac{1}{2} = \frac{3}{6}$. How does the number of parts in the whole affect the number of parts that are shaded? Explain.

3. Explain how you can use multiplication to write a fraction that is equivalent to $\frac{3}{5}$.

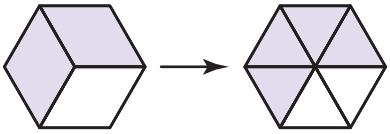
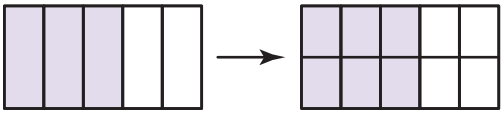
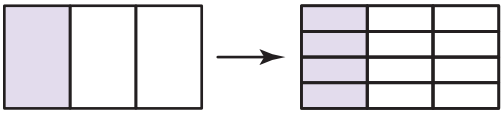
4. Are $\frac{2}{3}$ and $\frac{6}{8}$ equivalent? Explain.

Name _____

Share and Show

MATH BOARD

1. Complete the table below.

MODEL	WRITE EQUIVALENT FRACTIONS	RELATE EQUIVALENT FRACTIONS
	$\frac{2}{3} = \frac{4}{6}$	$\frac{2 \times \square}{3 \times \square} = \frac{\square}{\square}$
	$\frac{3}{5} = \frac{6}{10}$	$\frac{3 \times \square}{5 \times \square} = \frac{\square}{\square}$
	$\frac{1}{3} = \frac{4}{12}$	$\frac{1 \times \square}{3 \times \square} = \frac{\square}{\square}$

Math Talk — **Mathematical Practices**

Can you multiply the numerator and denominator of a fraction by 0? **Explain**.

Write two equivalent fractions.

2. $\frac{4}{5}$

$\frac{4}{5} = \frac{4 \times \square}{5 \times \square} = \frac{\square}{\square}$

$\frac{4}{5} = \frac{4 \times \square}{5 \times \square} = \frac{\square}{\square}$

$\frac{4}{5} = \frac{\square}{\square} = \frac{\square}{\square}$

3. $\frac{2}{4}$

$\frac{2}{4} = \frac{2 \times \square}{4 \times \square} = \frac{\square}{\square}$

$\frac{2}{4} = \frac{2 \times \square}{4 \times \square} = \frac{\square}{\square}$

$\frac{2}{4} = \frac{\square}{\square} = \frac{\square}{\square}$

On Your Own

Write two equivalent fractions.

4. $\frac{3}{6}$

$\frac{3}{6} = \frac{\square}{\square} = \frac{\square}{\square}$

5. $\frac{3}{10}$

$\frac{3}{10} = \frac{\square}{\square} = \frac{\square}{\square}$

6. $\frac{2}{5}$

$\frac{2}{5} = \frac{\square}{\square} = \frac{\square}{\square}$

Tell whether the fractions are equivalent. Write = or ≠.

7. $\frac{5}{6} \bigcirc \frac{10}{18}$

8. $\frac{4}{5} \bigcirc \frac{8}{10}$

9. $\frac{1}{5} \bigcirc \frac{4}{10}$

10. $\frac{1}{4} \bigcirc \frac{2}{8}$

Problem Solving • Applications

Use the recipe for 11–12.

11. THINK SMARTER Kim says the amount of flour in the recipe can be expressed as a fraction. Is she correct? Explain.

Face Paint Recipe

- $\frac{2}{8}$ cup cornstarch
- 1 tablespoon flour
- $\frac{9}{12}$ cup light corn syrup
- $\frac{1}{4}$ cup water
- $\frac{1}{2}$ teaspoon food coloring

12. GO DEEPER How could you use a $\frac{1}{8}$-cup measuring cup to measure the light corn syrup?

13. MATHEMATICAL PRACTICE 5 **Communicate** Explain using words how you know a fraction is equivalent to another fraction.

WRITE Math
Show Your Work

14. THINK SMARTER Kyle drank $\frac{2}{3}$ cup of apple juice. Fill in each box with a number from the list to generate equivalent fractions for $\frac{2}{3}$. Not all numbers will be used.

$$\frac{2}{3} = \frac{\square}{6} = \frac{12}{\square} = \frac{\square}{\square}$$

2	4	6	8
12	15	16	18

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Simplest Form

Essential Question How can you write a fraction as an equivalent fraction in simplest form?

Number and Operations—Fractions—4.NF.1

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

Vicki made a fruit tart and cut it into 6 equal pieces. Vicki, Silvia, and Elena each took 2 pieces of the tart home. Vicki says she and each of her friends took $\frac{1}{3}$ of the tart home. Is Vicki correct?

- Into how many pieces was the tart cut?

- How many pieces did each girl take?

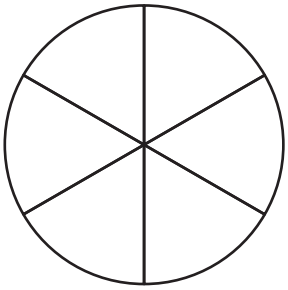
Activity

Materials ■ color pencils

STEP 1 Use a blue pencil to shade the pieces Vicki took home.

STEP 2 Use a red pencil to shade the pieces Silvia took home.

STEP 3 Use a yellow pencil to shade the pieces Elena took home.



The tart is divided into _____ equal-size pieces. The 3 colors on the model show how to combine sixth-size pieces to make

_____ equal third-size pieces.

So, Vicki is correct. Vicki, Silvia, and Elena each took ___ of the tart home.

Math Talk **Mathematical Practices**

Compare the models for $\frac{2}{6}$ and $\frac{1}{3}$. **Explain** how the sizes of the parts are related.

- What if Vicki took 3 pieces of the tart home and Elena took 3 pieces of the tart home. How could you combine the pieces to write a fraction that represents the part each friend took home? Explain.

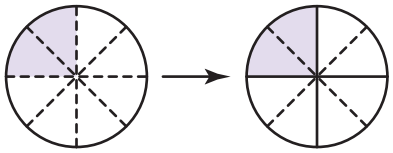
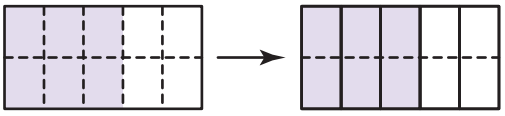
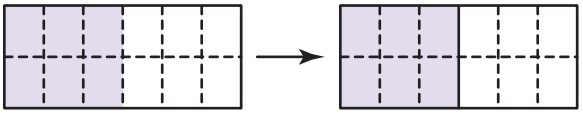
_____

_____

_____

Simplest Form A fraction is in **simplest form** when you can represent it using as few equal parts of a whole as possible. You need to describe the part you have in equal-size parts. If you can't describe the part you have using fewer parts, then you cannot simplify the fraction.

One Way Use models to write an equivalent fraction in simplest form.

MODEL	WRITE EQUIVALENT FRACTIONS	RELATE EQUIVALENT FRACTIONS
	$\frac{2}{8} = \frac{1}{4}$	$\frac{2 \div 2}{8 \div 2} = \frac{1}{4}$
	$\frac{6}{10} = \frac{\square}{5}$	$\frac{6 \div \square}{10 \div \square} = \frac{\square}{5}$
	$\frac{6}{12} = \frac{\square}{\square}$	$\frac{6 \div \square}{12 \div \square} = \frac{\square}{\square}$

To simplify $\frac{6}{10}$, you can combine tenth-size parts into equal groups with 2 parts each.

So, $\frac{6}{10} = \frac{6 \div \square}{10 \div \square} = \frac{\square}{\square}$.

Another Way Use common factors to write $\frac{6}{10}$ in simplest form.

A fraction is in simplest form when 1 is the only factor that the numerator and denominator have in common. The parts of the whole cannot be combined into fewer equal-size parts to show the same fraction.

STEP 1 List the factors of the numerator and denominator. Circle common factors.	Factors of 6: _____, _____, _____, _____ Factors of 10: _____, _____, _____, _____
STEP 2 Divide the numerator and denominator by a common factor greater than 1.	$\frac{6}{10} = \frac{6 \div \square}{10 \div \square} = \frac{\square}{\square}$

Since 1 is the only factor that 3 and 5 have in common, _____ is written in simplest form.

Name _____

Share and Show

1. Write $\frac{8}{10}$ in simplest form.

$$\frac{8}{10} = \frac{8 \div \square}{10 \div \square} = \frac{\square}{\square}$$

Write the fraction in simplest form.

2. $\frac{6}{12}$ _____

3. $\frac{2}{10}$ _____

4. $\frac{6}{8}$ _____

5. $\frac{4}{6}$ _____

Math Talk **Mathematical Practices**

Explain how you know a fraction is in simplest form.

On Your Own

Write the fraction in simplest form.

6. $\frac{9}{12}$ _____

7. $\frac{4}{8}$ _____

8. $\frac{10}{12}$ _____

9. $\frac{20}{100}$ _____

Tell whether the fraction is in simplest form. Write *yes* or *no*.

10. $\frac{2}{8}$ _____

11. $\frac{9}{12}$ _____

12. $\frac{5}{6}$ _____

13. $\frac{4}{10}$ _____

Tell whether the fractions are equivalent. Write = or ≠. Use simplest form to help.

14. $\frac{3}{6} \bigcirc \frac{5}{10}$

15. $\frac{9}{12} \bigcirc \frac{1}{3}$

16. $\frac{3}{12} \bigcirc \frac{2}{4}$

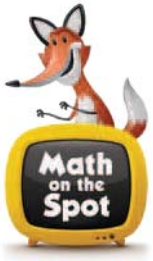
17. $\frac{6}{8} \bigcirc \frac{9}{12}$

Problem Solving • Applications Real World

Use the map for 18–19.

18. MATHEMATICAL PRACTICE 7 **Identify Relationships** What fraction of the states in the southwest region share a border with Mexico? Is this fraction in simplest form?

19. THINK SMARTER **What's the Question?** $\frac{1}{3}$ of the states in this region are on the Gulf of Mexico.



20. GO DEEPER Pete says that to write $\frac{4}{6}$ as $\frac{2}{3}$, you combine pieces, but to write $\frac{4}{6}$ as $\frac{8}{12}$, you break apart pieces. Does this make sense? Explain.

WRITE Math
Show Your Work

Personal Math Trainer

21. THINK SMARTER + In Michelle's homeroom, $\frac{9}{15}$ of the students ride the bus to school, $\frac{4}{12}$ get a car ride, and $\frac{2}{30}$ walk to school. For numbers 21a–21c, select True or False for each statement.

21a.	In simplest form, $\frac{3}{5}$ of the students ride the bus to school.	○ True	○ False
21b.	In simplest form, $\frac{1}{4}$ of the students get a car ride to school.	○ True	○ False
21c.	In simplest form, $\frac{1}{15}$ of the students walk to school.	○ True	○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Common Denominators

Essential Question How can you write a pair of fractions as fractions with a common denominator?

Number and Operations—Fractions—4.NF.1

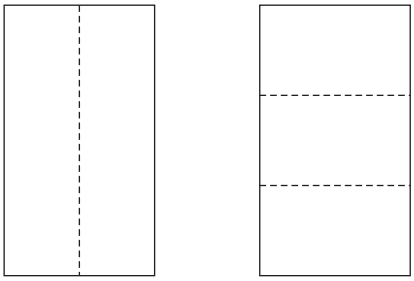
MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

Hands On

Martin has two rectangles that are the same size. One rectangle is cut into $\frac{1}{2}$-size parts. The other rectangle is cut into $\frac{1}{3}$-size parts. He wants to cut the rectangles so they have the same size parts. How can he cut each rectangle?



A **common denominator** is a common multiple of the denominators of two or more fractions. Fractions with common denominators represent wholes cut into the same number of parts.

Activity Use paper folding and shading.

Materials ■ 2 sheets of paper

Find a common denominator for $\frac{1}{2}$ and $\frac{1}{3}$.

STEP 1

Model the rectangle cut into $\frac{1}{2}$-size parts. Fold one sheet of paper in half. Draw a line on the fold.

STEP 2

Model the rectangle cut into $\frac{1}{3}$-size parts. Fold the other sheet of paper into thirds. Draw lines on the folds.

STEP 3

Fold each sheet of paper so that both sheets have the same number of parts. Draw lines on the folds. How many equal parts does each sheet of paper have? _____

STEP 4

Draw a picture of your sheets of paper to show how many parts each rectangle could have.

So, each rectangle could be cut into _____ parts.

Math Talk **Mathematical Practices**

Does Martin need to cut each rectangle the same number of times? **Explain**.

Example Write $\frac{4}{5}$ and $\frac{1}{2}$ as a pair of fractions with common denominators.

You can use common multiples to find a common denominator. List multiples of each denominator. A common multiple can be used as a common denominator.

STEP 1 List multiples of 5 and 2. Circle common multiples.

5: 5, 10, _____, _____, _____, _____

2: _____, _____, _____, _____, _____, _____

STEP 2 Write equivalent fractions.

$$\frac{4}{5} = \frac{4 \times \square}{5 \times \square} = \frac{\square}{10}$$

$$\frac{1}{2} = \frac{1 \times \square}{2 \times \square} = \frac{\square}{10}$$

Choose a denominator that is a common multiple of 5 and 2.

You can write $\frac{4}{5}$ and $\frac{1}{2}$ as _____ and _____.

ERROR Alert

Remember that when you multiply the denominator by a factor, you must multiply the numerator by the same factor to write an equivalent fraction.

1. Are $\frac{4}{5}$ and $\frac{1}{2}$ equivalent? Explain.

_____

_____

_____

2. Describe another way you could tell whether $\frac{4}{5}$ and $\frac{1}{2}$ are equivalent.

_____

_____

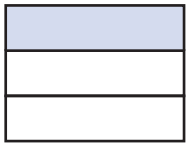
_____

Share and Show

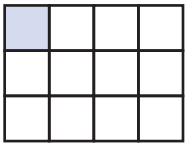
MATH BOARD

1. Find a common denominator for $\frac{1}{3}$ and $\frac{1}{12}$ by dividing each whole into the same number of equal parts. Use the models to help.

common denominator: _____



$\frac{1}{3}$



$\frac{1}{12}$

Name _____

Write the pair of fractions as a pair of fractions with a common denominator.

2. $\frac{1}{2}$ and $\frac{1}{4}$

3. $\frac{3}{4}$ and $\frac{5}{8}$

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

5. $\frac{4}{12}$ and $\frac{5}{8}$

Math Talk

Mathematical Practices

Explain how using a model or listing multiples helps you find a common denominator.

On Your Own

Write the pair of fractions as a pair of fractions with a common denominator.

6. $\frac{1}{4}$ and $\frac{5}{6}$

7. $\frac{3}{5}$ and $\frac{4}{10}$

Tell whether the fractions are equivalent. Write = or ≠.

8. $\frac{3}{4} \bigcirc \frac{1}{2}$

9. $\frac{3}{4} \bigcirc \frac{6}{8}$

10. $\frac{1}{2} \bigcirc \frac{4}{8}$

11. $\frac{6}{8} \bigcirc \frac{4}{8}$

12. $\frac{1}{3} \bigcirc \frac{2}{6}$

13. $\frac{1}{3} \bigcirc \frac{4}{12}$

14. $\frac{2}{6} \bigcirc \frac{4}{12}$

15. $\frac{4}{12} \bigcirc \frac{4}{12}$

Problem Solving • Applications

16. GO DEEPER Carrie has a red streamer that is $\frac{3}{4}$ yard long and a blue streamer that is $\frac{5}{6}$ yard long. She says the streamers are the same length. Does this make sense? Explain.

17. THINK SMARTER Leah has two same-size rectangles divided into the same number of equal parts. One rectangle has $\frac{1}{3}$ of the parts shaded, and the other has $\frac{2}{5}$ of the parts shaded. What is the least number of parts into which both rectangles could be divided?

18. MATHEMATICAL PRACTICE 6 Julian says a common denominator for $\frac{3}{4}$ and $\frac{2}{5}$ is 9. What is Julian's error? **Explain**.

WRITE Math
Show Your Work

Personal Math Trainer

19. THINK SMARTER + Miguel has two same-size rectangles divided into the same number of equal parts. One rectangle has $\frac{2}{3}$ of the parts shaded, and the other has $\frac{3}{5}$ of the parts shaded.

Into how many parts could each rectangle be divided? Show your work by sketching the rectangles.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Problem Solving • Find Equivalent Fractions

Essential Question How can you use the strategy *make a table* to solve problems using equivalent fractions?

Number and Operations—Fractions—4.NF.1

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4

Unlock the Problem

Real World

Anaya is planting a flower garden. The garden will have no more than 12 equal sections. $\frac{3}{4}$ of the garden will have daisies. What other fractions could represent the part of the garden that will have daisies?

Read the Problem

What do I need to find?

_____ that could represent the part of the garden that will have daisies

What information do I need to use?

_____ of the garden will have daisies. The garden will not have more than

_____ equal sections.

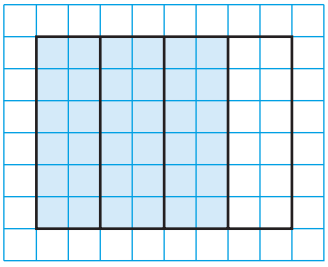
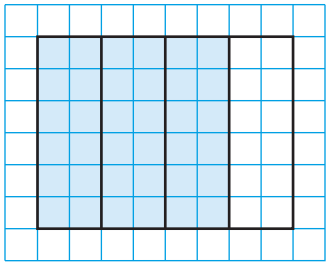
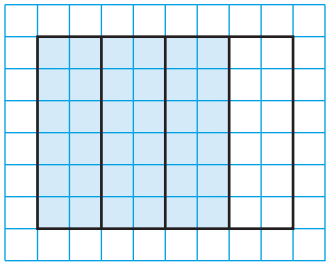
How will I use the information?

I can make a _____

to find _____ fractions to solve the problem.

Solve the Problem

I can make a table and draw models to find equivalent fractions.

$\frac{3}{4}$	$\frac{\quad}{\quad}$	$\frac{\quad}{\quad}$
		

1. What other fractions could represent the part of the garden that will have daisies? Explain. _____

_____

_____

Math Talk

Mathematical Practices

Compare the models of the equivalent fractions. How does the number of parts relate to the size of the parts? **Explain**.

Try Another Problem

Two friends are knitting scarves. Each scarf has 3 rectangles, and $\frac{2}{3}$ of the rectangles have stripes. If the friends are making 10 scarves, how many rectangles do they need? How many rectangles will have stripes?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

2. Does your answer make sense? Explain how you know.

Math Talk **Mathematical Practices**

What strategy did you use and why?

Name _____

Share and Show

MATH BOARD

1. Keisha is helping plan a race route for a 10-kilometer charity run. The committee wants to set up the following things along the course.

Viewing areas: At the end of each half of the course
Water stations: At the end of each fifth of the course
Distance markers: At the end of each tenth of the course

Which locations have more than one thing located there?

First, make a table to organize the information.

	Number of Locations	First Location	All the Locations
Viewing Areas	2	$\frac{1}{2}$	$\frac{1}{2}$
Water Stations	5	$\frac{1}{5}$	$\frac{1}{5}$
Distance Markers	10	$\frac{1}{10}$	$\frac{1}{10}$

Next, identify a relationship. Use a common denominator, and find equivalent fractions.

Finally, identify the locations at which more than one thing will be set up. Circle the locations.

_____

_____

2. THINK SMARTER What if distance markers will also be placed at the end of every fourth of the course? Will any of those markers be set up at the same location as another distance marker, a water station, or a viewing area? Explain. _____

_____

_____

3. Fifty-six students signed up to volunteer for the race. There were 4 equal groups of students, and each group had a different task.

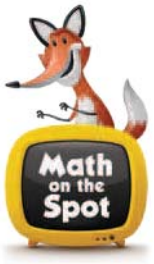
How many students were in each group? _____

Unlock the Problem

- Use the Problem Solving Mathboard.
- Underline important facts.
- Choose a strategy you know.

On Your Own

4. THINK SMARTER A baker cut a pie in half. He cut each half into 3 equal pieces and each piece into 2 equal slices. He sold 6 slices. What fraction of the pie did the baker sell?



5. GO DEEPER Andy cut a tuna sandwich and a chicken sandwich into a total of 15 same-size pieces. He cut the tuna sandwich into 9 more pieces than the chicken sandwich. Andy ate 8 pieces of the tuna sandwich. What fraction of the tuna sandwich did he eat?

WRITE Math
Show Your Work

6. MATHEMATICAL PRACTICE 6 Luke threw balls into these buckets at a carnival. The number on the bucket gives the number of points for each throw. What is the least number of throws needed to score exactly 100 points? **Explain**.

7. THINK SMARTER Victoria arranges flowers in vases at her restaurant. In each arrangement, $\frac{2}{3}$ of the flowers are yellow. What other fractions can represent the part of the flowers that are yellow? Shade the models to show your work.

$\frac{2}{3}$ $\frac{\square}{12}$ $\frac{\square}{\square}$

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
common denominator
equivalent fractions
factor

1. _____ name the same amount. (p. 237)

2. A _____ is a common multiple of two or more denominators. (p. 249)

Concepts and Skills

Write two equivalent fractions. (4.NF.1)

3. $\frac{2}{5} =$ _____ $=$ _____

4. $\frac{1}{3} =$ _____ $=$ _____

5. $\frac{3}{4} =$ _____ $=$ _____

Tell whether the fractions are equivalent. Write = or ≠. (4.NF.1)

6. $\frac{2}{3} \bigcirc \frac{4}{12}$

7. $\frac{5}{6} \bigcirc \frac{10}{12}$

8. $\frac{1}{4} \bigcirc \frac{4}{8}$

Write the fraction in simplest form. (4.NF.1)

9. $\frac{6}{8}$

10. $\frac{25}{100}$

11. $\frac{8}{10}$

Write the pair of fractions as a pair of fractions with a common denominator. (4.NF.1)

12. $\frac{3}{10}$ and $\frac{2}{5}$

13. $\frac{1}{3}$ and $\frac{3}{4}$

14. Sam needs $\frac{5}{6}$ cup mashed bananas and $\frac{3}{4}$ cup mashed strawberries for a recipe. He wants to find whether he needs more bananas or more strawberries. How can he write $\frac{5}{6}$ and $\frac{3}{4}$ as a pair of fractions with a common denominator? (4.NF.1)

15. Karen will divide her garden into equal parts. She will plant corn in $\frac{8}{12}$ of the garden. What is the fewest number of parts she can divide her garden into? (4.NF.1)

16. Olivia is making scarves. Each scarf will have 5 rectangles, and $\frac{2}{5}$ of the rectangles will be purple. How many purple rectangles does she need for 3 scarves? (4.NF.1)

17. Paul needs to buy $\frac{5}{8}$ pound of peanuts. The scale at the store measures parts of a pound in sixteenths. What measure is equivalent to $\frac{5}{8}$ pound? (4.NF.1)

Name _____

Compare Fractions Using Benchmarks

Essential Question How can you use benchmarks to compare fractions?

Number and Operations—Fractions—4.NF.2

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4

Unlock the Problem

Real World

David made a popcorn snack. He mixed $\frac{5}{8}$ gallon of popcorn with $\frac{1}{2}$ gallon of dried apple rings. Did he use more dried apple rings or more popcorn?

Activity Compare $\frac{5}{8}$ and $\frac{1}{2}$.

Materials ■ fraction strips

Use fraction strips to compare $\frac{5}{8}$ and $\frac{1}{2}$. Record on the model below.

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

$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{5}{8}$ ◯ $\frac{1}{2}$

So, David used more _____.

Math Talk **Mathematical Practices**

Explain how the number of eighth-size parts in $\frac{5}{8}$ is related to the number of eighth-size parts you need to make $\frac{1}{2}$.

1. Write five fractions equivalent to $\frac{1}{2}$. What is the relationship between the numerator and the denominator of fractions equivalent to $\frac{1}{2}$?

_____

_____

2. How many eighths are equivalent to $\frac{1}{2}$?

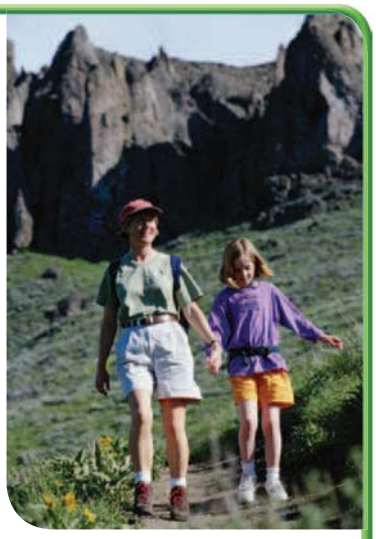
_____

3. How can you compare $\frac{5}{8}$ and $\frac{1}{2}$ without using a model?

_____

_____

Benchmarks A **benchmark** is a known size or amount that helps you understand a different size or amount. You can use $\frac{1}{2}$ as a benchmark to help you compare fractions.

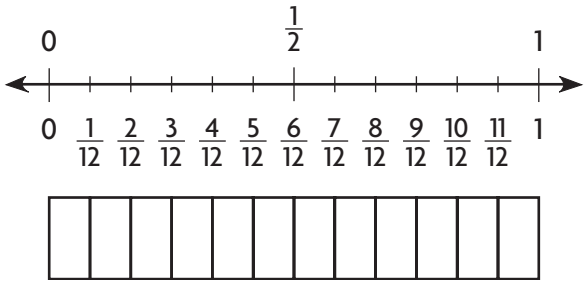


Example Use benchmarks to compare fractions.

A family hiked the same mountain trail. Evie and her father hiked $\frac{5}{12}$ of the trail before they stopped for lunch. Jill and her mother hiked $\frac{9}{10}$ of the trail before they stopped for lunch. Who hiked farther before lunch?

Compare $\frac{5}{12}$ and $\frac{9}{10}$ to the benchmark $\frac{1}{2}$.

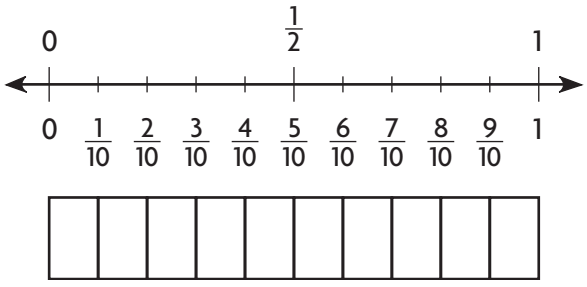
STEP 1 Compare $\frac{5}{12}$ to $\frac{1}{2}$.



Think: Shade $\frac{5}{12}$.

$\frac{5}{12}$ ◯ $\frac{1}{2}$

STEP 2 Compare $\frac{9}{10}$ to $\frac{1}{2}$.



Think: Shade $\frac{9}{10}$.

$\frac{9}{10}$ ◯ $\frac{1}{2}$

Since $\frac{5}{12}$ is _____ than $\frac{1}{2}$ and $\frac{9}{10}$ is _____ than $\frac{1}{2}$, you know that $\frac{5}{12}$ ◯ $\frac{9}{10}$.

So, _____ hiked farther before lunch.

4. Explain how you can tell $\frac{5}{12}$ is less than $\frac{1}{2}$ without using a model.

_____

_____

5. Explain how you can tell $\frac{7}{10}$ is greater than $\frac{1}{2}$ without using a model.

_____

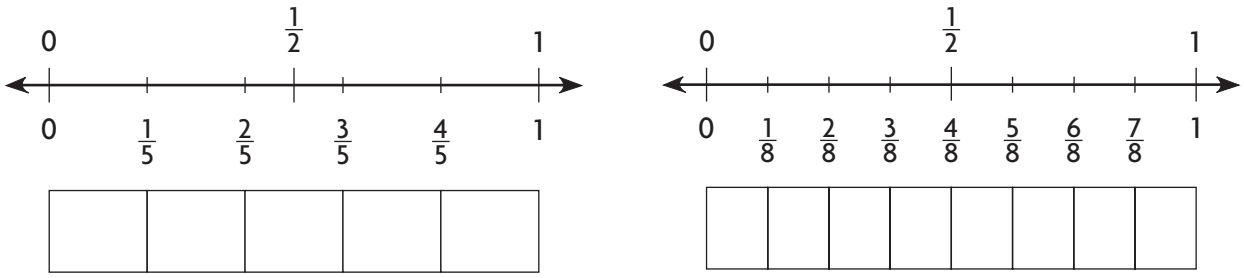
_____

Name _____

Share and Show

MATH BOARD

1. Compare $\frac{2}{5}$ and $\frac{1}{8}$. Write < or >.



$\frac{2}{5} \bigcirc \frac{1}{8}$

Compare. Write < or >.

2. $\frac{1}{2} \bigcirc \frac{4}{6}$ | **3.** $\frac{3}{10} \bigcirc \frac{1}{2}$ | **4.** $\frac{11}{12} \bigcirc \frac{4}{8}$ | **5.** $\frac{5}{8} \bigcirc \frac{2}{5}$

Math Talk — **Mathematical Practices**

Explain how you know $\frac{1}{3} < \frac{1}{2}$.

On Your Own

Compare. Write < or >.

6. $\frac{8}{10} \bigcirc \frac{3}{8}$ | **7.** $\frac{1}{3} \bigcirc \frac{7}{12}$ | **8.** $\frac{2}{6} \bigcirc \frac{7}{8}$ | **9.** $\frac{4}{8} \bigcirc \frac{2}{10}$

10. $\frac{3}{4} \bigcirc \frac{1}{2}$ | **11.** $\frac{6}{6} \bigcirc \frac{1}{3}$ | **12.** $\frac{4}{5} \bigcirc \frac{1}{6}$ | **13.** $\frac{5}{8} \bigcirc \frac{9}{10}$

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Find a numerator that makes the statement true.**

14. $\frac{2}{4} < \frac{\square}{6}$ | **15.** $\frac{8}{10} > \frac{\square}{8}$ | **16.** $\frac{10}{12} > \frac{\square}{4}$ | **17.** $\frac{2}{5} < \frac{\square}{10}$

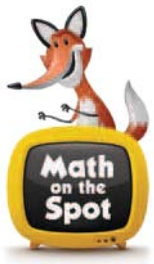
18. When two fractions are between 0 and $\frac{1}{2}$, how do you know which fraction is greater? Explain.

_____

_____

_____

Problem Solving • Applications



19. THINK SMARTER Saundra ran $\frac{7}{12}$ of a mile. Lamar ran $\frac{3}{4}$ of a mile. Who ran farther? Explain.

WRITE Math • Show Your Work

20. **What's the Question?** Selena ran farther than Manny.

21. GO DEEPER Chloe made a small pan of ziti and a small pan of lasagna. She cut the ziti into 8 equal parts and the lasagna into 9 equal parts. Her family ate $\frac{2}{3}$ of the lasagna. If her family ate more lasagna than ziti, what fraction of the ziti could have been eaten?

22. THINK SMARTER James, Ella, and Ryan biked around Eagle Lake. James biked $\frac{2}{10}$ of the distance in an hour. Ella biked $\frac{4}{8}$ of the distance in an hour. Ryan biked $\frac{2}{5}$ of the distance in an hour. Compare the distances biked by each person by matching the statements to the correct symbol. Each symbol may be used more than once or not at all.

$\frac{2}{10}$ ● $\frac{4}{8}$	•	• =
$\frac{4}{8}$ ● $\frac{2}{5}$	•	• <
$\frac{2}{10}$ ● $\frac{2}{5}$	•	• >

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare Fractions

Essential Question How can you compare fractions?

Number and Operations—Fractions—4.NF.2

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Every year, Avery's school has a fair. This year, $\frac{3}{8}$ of the booths had face painting and $\frac{1}{4}$ of the booths had sand art. Were there more booths with face painting or sand art?

Compare $\frac{3}{8}$ and $\frac{1}{4}$.

One Way Use a common denominator.

When two fractions have the same denominator, they have equal-size parts. You can compare the number of parts.

THINK

Think: 8 is a multiple of both 4 and 8. Use 8 as a common denominator.

$$\frac{1}{4} = \frac{1 \times \square}{4 \times \square} = \frac{\square}{8}$$

$\frac{3}{8}$ already has 8 as a denominator.

MODEL AND RECORD

Shade the model. Then compare.

$\frac{3}{8}$ ◯ $\frac{2}{8}$

Another Way Use a common numerator.

When two fractions have the same numerator, they represent the same number of parts. You can compare the size of the parts.

THINK

Think: 3 is a multiple of both 3 and 1. Use 3 as a common numerator.

$\frac{3}{8}$ already has 3 as a numerator.

$$\frac{1}{4} = \frac{1 \times \square}{4 \times \square} = \frac{3}{\square}$$

MODEL AND RECORD

Shade the model. Then compare.

$\frac{3}{8}$ ◯ $\frac{3}{12}$

Since $\frac{3}{8}$ ◯ $\frac{1}{4}$, there were more booths with _____.

Math Talk **Mathematical Practices**

Explain why you cannot use $\frac{1}{2}$ as a benchmark to compare $\frac{3}{8}$ and $\frac{1}{4}$.

Try This! **Compare the fractions. Explain your reasoning.**

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

B $\frac{3}{5} \bigcirc \frac{3}{8}$

C $\frac{3}{4} \bigcirc \frac{7}{8}$

D $\frac{4}{5} \bigcirc \frac{2}{3}$

1. Which would you use to compare $\frac{11}{12}$ and $\frac{5}{6}$, a common numerator or a common denominator? Explain.

2. Can you use simplest form to compare $\frac{8}{10}$ and $\frac{3}{5}$? Explain.

Name _____

Share and Show

MATH BOARD

1. Compare $\frac{2}{5}$ and $\frac{1}{10}$.

Think: Use _____ as a common denominator.

$\frac{2}{5} = \frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

$\frac{1}{10}$

Think: 4 tenth-size parts ◯ 1 tenth-size part.

$\frac{2}{5} \bigcirc \frac{1}{10}$

2. Compare $\frac{6}{10}$ and $\frac{3}{4}$.

Think: Use _____ as a common numerator.

$\frac{6}{10}$

$\frac{3}{4} = \frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$

Think: A tenth-size part ◯ an eighth-size part.

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

Compare. Write <, >, or =.

3. $\frac{7}{8} \bigcirc \frac{2}{8}$

4. $\frac{5}{12} \bigcirc \frac{3}{6}$

5. $\frac{4}{10} \bigcirc \frac{4}{6}$

6. $\frac{6}{12} \bigcirc \frac{2}{4}$

Math Talk **Mathematical Practices**

Explain why using a common numerator or a common denominator can help you compare fractions.

On Your Own

Compare. Write <, >, or =.

7. $\frac{1}{3} \bigcirc \frac{1}{4}$

8. $\frac{4}{5} \bigcirc \frac{8}{10}$

9. $\frac{3}{4} \bigcirc \frac{2}{6}$

10. $\frac{1}{2} \bigcirc \frac{5}{8}$

11. $\frac{3}{10} \bigcirc \frac{2}{4}$

12. $\frac{75}{100} \bigcirc \frac{8}{10}$

13. $\frac{4}{6} \bigcirc \frac{2}{3}$

14. $\frac{3}{10} \bigcirc \frac{4}{100}$

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Find a number that makes the statement true.**

15. $\frac{1}{2} > \frac{\square}{3}$

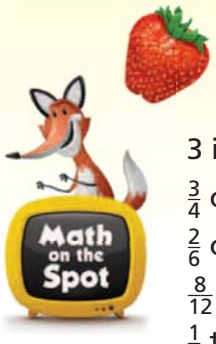
16. $\frac{3}{10} < \frac{\square}{5}$

17. $\frac{5}{12} < \frac{\square}{3}$

18. $\frac{2}{3} > \frac{4}{\square}$

Unlock the Problem Real World

19. THINK SMARTER Jerry is making a strawberry smoothie. Which ingredient will he use more of, milk, cottage cheese, or strawberries?



Strawberry Smoothie

3 ice cubes

$\frac{3}{4}$ cup milk

$\frac{2}{6}$ cup cottage cheese

$\frac{8}{12}$ cup strawberries

$\frac{1}{4}$ teaspoon vanilla

$\frac{1}{8}$ teaspoon sugar

a. What do you need to find?

_____

b. How will you find the answer?

_____

_____

c. Show your work.

d. Jerry needed more _____ than the other two ingredients.

20. GO DEEPER Angie, Blake, Carlos, and Daisy went running. Angie ran $\frac{1}{3}$ mile, Blake ran $\frac{3}{5}$ mile, Carlos ran $\frac{7}{10}$ mile, and Daisy ran $\frac{1}{2}$ mile. Which runner ran the shortest distance? Who ran the longest distance?

_____

21. THINK SMARTER Elaine bought $\frac{5}{8}$ pound of potato salad and $\frac{4}{6}$ pound of macaroni salad for a picnic. Use the numbers to compare the amounts of potato salad and macaroni salad Elaine bought.

$\frac{\square}{\square} < \frac{\square}{\square}$

4

5

6

8

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare and Order Fractions

Essential Question How can you order fractions?

Number and Operations—Fractions—4.NF.2

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

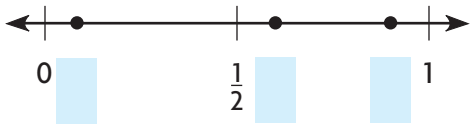
Unlock the Problem

Jody has equal-size bins for the recycling center. She filled $\frac{3}{5}$ of a bin with plastics, $\frac{1}{12}$ of a bin with paper, and $\frac{9}{10}$ of a bin with glass. Which bin is the most full?

- Underline what you need to find.
- Circle the fractions you will compare.

Example 1

Locate and label $\frac{3}{5}$, $\frac{1}{12}$, and $\frac{9}{10}$ on the number line.



Math Idea
Sometimes it is not reasonable to find the exact location of a point on a number line. Benchmarks can help you find approximate locations.

STEP 1 Compare each fraction to $\frac{1}{2}$.

$\frac{3}{5} \bigcirc \frac{1}{2}$ $\quad \frac{1}{12} \bigcirc \frac{1}{2}$ $\quad \frac{9}{10} \bigcirc \frac{1}{2}$

_____ and _____ are both greater than $\frac{1}{2}$.

_____ is less than $\frac{1}{2}$.

Label $\frac{1}{12}$ on the number line above.

STEP 2 Compare $\frac{3}{5}$ and $\frac{9}{10}$.

Think: Use 10 as a common denominator.

$$\frac{3}{5} = \frac{\square \times \square}{\square \times \square} = \frac{\square}{\square}$$

Since $\frac{6}{10} \bigcirc \frac{9}{10}$, you know that $\frac{3}{5} \bigcirc \frac{9}{10}$.

Label $\frac{3}{5}$ and $\frac{9}{10}$ on the number line above.

The fraction the greatest distance from 0 has the greatest value.

The fraction with the greatest value is _____.

So, the bin with _____ is the most full.

Math Talk **Mathematical Practices**

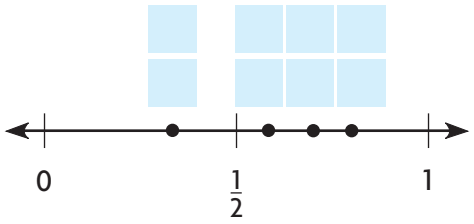
- Compare the distance between $\frac{3}{5}$ and 0 and the distance between $\frac{9}{10}$ and 0. What can you conclude about the relationship between $\frac{3}{5}$ and $\frac{9}{10}$? Explain.

Explain how you know you located $\frac{3}{5}$ on the number line correctly.

_____

_____

Example 2 Write $\frac{7}{10}$, $\frac{1}{3}$, $\frac{7}{12}$, and $\frac{8}{10}$ in order from least to greatest.



STEP 1 Compare each fraction to $\frac{1}{2}$.

List fractions that are less than $\frac{1}{2}$: _____

List fractions that are greater than $\frac{1}{2}$: _____

The fraction with the least value is _____.

Locate and label $\frac{1}{3}$ on the number line above.

STEP 2 Compare $\frac{7}{10}$ to $\frac{7}{12}$ and $\frac{8}{10}$.

Think: $\frac{7}{10}$ and $\frac{7}{12}$ have a common numerator.

$\frac{7}{10} \bigcirc \frac{7}{12}$

Think: $\frac{7}{10}$ and $\frac{8}{10}$ have a common denominator.

$\frac{7}{10} \bigcirc \frac{8}{10}$

Locate and label $\frac{7}{10}$, $\frac{7}{12}$, and $\frac{8}{10}$ on the number line above.

The fractions in order from least to greatest are _____.

So, _____ < _____ < _____ < _____.

Try This! Write $\frac{3}{4}$, $\frac{3}{6}$, $\frac{1}{3}$, and $\frac{2}{12}$ in order from least to greatest.

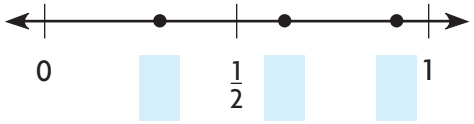
_____ < _____ < _____ < _____

Name _____

Share and Show

MATH BOARD

1. Locate and label points on the number line to help you write $\frac{3}{10}$, $\frac{11}{12}$, and $\frac{5}{8}$ in order from least to greatest.



_____

Write the fraction with the greatest value.

2. $\frac{7}{10}, \frac{1}{5}, \frac{9}{10}$ _____

3. $\frac{5}{6}, \frac{7}{12}, \frac{7}{10}$ _____

4. $\frac{2}{8}, \frac{1}{8}, \frac{2}{4}, \frac{2}{6}$ _____

Write the fractions in order from least to greatest.

5. $\frac{1}{4}, \frac{5}{8}, \frac{1}{2}$ _____

6. $\frac{3}{5}, \frac{2}{3}, \frac{3}{10}, \frac{4}{5}$ _____

7. $\frac{3}{4}, \frac{7}{12}, \frac{5}{12}$ _____

Math Talk — **Mathematical Practices**

Explain how benchmarks can help you order fractions.

On Your Own

Write the fractions in order from least to greatest.

8. $\frac{2}{5}, \frac{1}{3}, \frac{5}{6}$ _____

9. $\frac{4}{8}, \frac{5}{12}, \frac{1}{6}$ _____

10. $\frac{7}{100}, \frac{9}{10}, \frac{4}{5}$ _____

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Write a numerator that makes the statement true.**

11. $\frac{1}{2} < \frac{\square}{10} < \frac{4}{5}$

12. $\frac{1}{4} < \frac{5}{12} < \frac{\square}{6}$

13. $\frac{\square}{8} < \frac{3}{4} < \frac{7}{8}$

Unlock the Problem Real World

14. THINK SMARTER Nancy, Lionel, and Mavis ran in a 5-kilometer race. The table shows their finish times. In what order did Nancy, Lionel, and Mavis finish the race?

5-Kilometer Race Results

Name	Time
Nancy	$\frac{2}{3}$ hour
Lionel	$\frac{7}{12}$ hour
Mavis	$\frac{3}{4}$ hour

a. What do you need to find?

_____

_____

b. What information do you need to solve the problem?

_____

_____

c. What information is not necessary?

_____

d. How will you solve the problem?

_____

_____

e. Show the steps to solve the problem.

f. Complete the sentences.

The runner who finished first is _____.

The runner who finished second is _____.

The runner who finished third is _____.

15. GO DEEPER Alma used 3 beads to make a necklace. The lengths of the beads are $\frac{5}{6}$ inch, $\frac{5}{12}$ inch, and $\frac{1}{3}$ inch. What are the lengths in order from shortest to longest?

_____

16. THINK SMARTER Victor has his grandmother's recipe for making mixed nuts.

$\frac{3}{4}$ cup pecans	$\frac{2}{12}$ cup peanuts
$\frac{1}{2}$ cup almonds	$\frac{7}{8}$ cup walnuts

Order the ingredients used in the recipe from least to greatest.

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 6 Review/Test

1. For numbers 1a–1d, tell whether the fractions are equivalent by selecting the correct symbol.

1a. $\frac{4}{16}$ [$=$ / $\neq$] $\frac{1}{4}$

1b. $\frac{3}{5}$ [$=$ / $\neq$] $\frac{12}{15}$

1c. $\frac{5}{6}$ [$=$ / $\neq$] $\frac{25}{30}$

1d. $\frac{6}{10}$ [$=$ / $\neq$] $\frac{5}{8}$

2. Juan's mother gave him a recipe for trail mix.

$\frac{3}{4}$ cup cereal	$\frac{2}{3}$ cup almonds
$\frac{1}{4}$ cup peanuts	$\frac{1}{2}$ cup raisins

Order the ingredients used in the recipe from least to greatest.

[ ] [ ] [ ] [ ]

3. Taylor cuts $\frac{1}{5}$ sheet of construction paper for an arts and crafts project. Write $\frac{1}{5}$ as an equivalent fraction with the denominators shown.

[ ]/10 [ ]/15 [ ]/25 [ ]/40

4. A mechanic has sockets with the sizes shown below. Write each fraction in the correct box.

$\frac{7}{8}$ in. $\frac{3}{16}$ in. $\frac{1}{4}$ in. $\frac{3}{8}$ in. $\frac{4}{8}$ in. $\frac{11}{16}$ in.

less than $\frac{1}{2}$ in.	equal to $\frac{1}{2}$ in.	greater than $\frac{1}{2}$ in.

GO DIGITAL Assessment Options
Chapter Test

5. Darcy bought $\frac{1}{2}$ pound of cheese and $\frac{3}{4}$ pound of hamburger for a barbecue. Use the numbers to compare the amounts of cheese and hamburger Darcy bought.

$\frac{\square}{\square} < \frac{\square}{\square}$

1	3
2	4

6. Brad is practicing the piano. He spends $\frac{1}{4}$ hour practicing scales and $\frac{1}{3}$ hour practicing the song for his recital. For numbers 6a–6c, select Yes or No to tell whether each of the following is a true statement.

6a. 12 is a common denominator of $\frac{1}{4}$ and $\frac{1}{3}$. ○ Yes ○ No

6b. The amount of time spent practicing scales can be rewritten as $\frac{3}{12}$. ○ Yes ○ No

6c. The amount of time spent practicing the song for the recital can be rewritten as $\frac{6}{12}$. ○ Yes ○ No

7. In the school chorus, $\frac{4}{24}$ of the students are fourth graders. In simplest form, what fraction of the students in the school chorus are fourth graders?

_____ of the students

8. Which pairs of fractions are equivalent? Mark all that apply.

○ $\frac{8}{12}$ and $\frac{2}{3}$ ○ $\frac{4}{5}$ and $\frac{12}{16}$

○ $\frac{3}{4}$ and $\frac{20}{28}$ ○ $\frac{7}{10}$ and $\frac{21}{30}$

9. Sam worked on his science fair project for $\frac{1}{4}$ hour on Friday and $\frac{1}{2}$ hour on Saturday. What are four common denominators for the fractions? Explain your reasoning.

Name _____

10. Morita works in a florist shop and makes flower arrangements. She puts 10 flowers in each vase, and $\frac{2}{10}$ of the flowers are daisies.

Part A

If Morita makes 4 arrangements, how many daisies does she need? Show how you can check your answer.

_____ daisies

Part B

Last weekend, Morita used 10 daisies to make flower arrangements. How many flowers other than daisies did she use to make the arrangements? Explain your reasoning.

_____ other flowers

11. In Mary's homeroom, $\frac{10}{28}$ of the students have a cat, $\frac{6}{12}$ have a dog, and $\frac{2}{14}$ have a pet bird. For numbers 11a–11c, select True or False for each statement.

11a.	In simplest form, $\frac{5}{14}$ of the students have a cat.	○ True	○ False
11b.	In simplest form, $\frac{2}{4}$ of the students have a dog.	○ True	○ False
11c.	In simplest form, $\frac{1}{7}$ of the students have a pet bird.	○ True	○ False

12. Regina, Courtney, and Ellen hiked around Bear Pond. Regina hiked $\frac{7}{10}$ of the distance in an hour. Courtney hiked $\frac{3}{6}$ of the distance in an hour. Ellen hiked $\frac{3}{8}$ of the distance in an hour. Compare the distances hiked by each person by matching the statements to the correct symbol. Each symbol may be used more than once or not at all.

$\frac{7}{10}$ ◯ $\frac{3}{6}$	• $<$
$\frac{3}{8}$ ◯ $\frac{3}{6}$	• $>$
$\frac{7}{10}$ ◯ $\frac{3}{8}$	• $=$

13. Ramon is having some friends over after a baseball game. Ramon's job is to make a vegetable dip. The ingredients for the recipe are given.

Ingredients in Vegetable Dip

$\frac{3}{4}$ cup parsley	$\frac{5}{8}$ cup buttermilk
$\frac{1}{3}$ cup dill	$\frac{1}{2}$ cup cream cheese
$\frac{6}{8}$ cup scallions	$\frac{1}{16}$ cup lemon juice

Part A

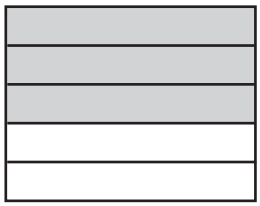
Which ingredient does Ramon use the greater amount of, buttermilk or cream cheese? Explain how you found your answer.

Part B

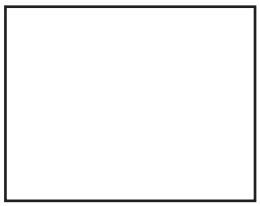
Ramon says that he needs the same amount of two different ingredients. Is he correct? Support your answer with information from the problem.

Name _____

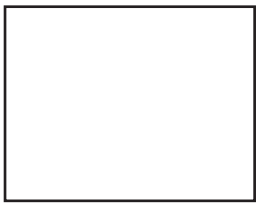
14. Sandy is ordering bread rolls for her party. She wants $\frac{3}{5}$ of the rolls to be whole wheat. What other fractions can represent the part of the rolls that will be whole wheat? Shade the models to show your work.



$\frac{3}{5}$



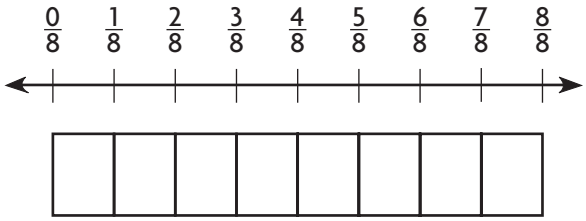
$\frac{\square}{25}$



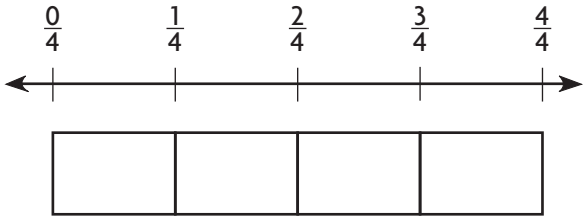
$\frac{\square}{\square}$

15. Angel has $\frac{4}{8}$ yard of ribbon and Lynn has $\frac{3}{4}$ yard of ribbon. Do Angel and Lynn have the same amount of ribbon? Shade the model to show how you found your answer. Explain your reasoning.

Angel's ribbon:



Lynn's ribbon:



16. Ella used $\frac{1}{4}$ yard of red ribbon. Fill in each box with a number from the list to show equivalent fractions for $\frac{1}{4}$. Not all numbers will be used.

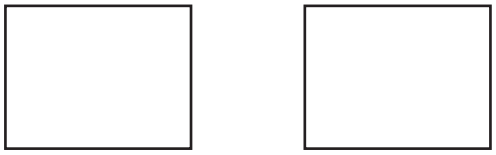
$$\frac{1}{4} = \frac{\square}{8} = \frac{4}{\square} = \frac{\square}{\square}$$

2	3	5	6
12	15	16	20

17. Frank has two same-size rectangles divided into the same number of equal parts. One rectangle has $\frac{3}{4}$ of the parts shaded, and the other has $\frac{1}{3}$ of the parts shaded.

Part A

Into how many parts could each rectangle be divided? Show your work by drawing the parts of each rectangle.



Part B

Is there more than one possible answer to Part A? If so, did you find the least number of parts into which both rectangles could be divided? Explain your reasoning.

18. Suki rode her bike $\frac{4}{5}$ mile. Claire rode her bike $\frac{1}{3}$ mile. They want to compare how far they each rode their bikes using the benchmark $\frac{1}{2}$. For numbers 18a–18c, select the correct answers to describe how to solve the problem.

18a. Compare Suki's distance to the benchmark: $\frac{4}{5}$ [< > =] $\frac{1}{2}$.

18b. Compare Claire's distance to the benchmark: $\frac{1}{3}$ [< > =] $\frac{1}{2}$.

18c. Suki rode her bike [a longer distance than / the same distance as / a shorter distance than] Claire.

Chapter 7

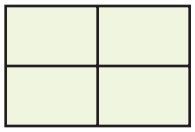
Add and Subtract Fractions

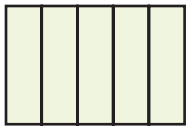
Show What You Know

Check your understanding of important skills.

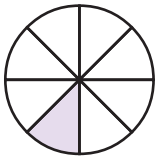
Name _____

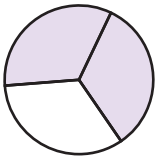
▶ Fractions Equal to 1 Write the fraction that names the whole.

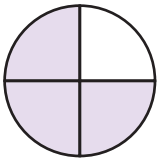
1.  _____

2.  _____

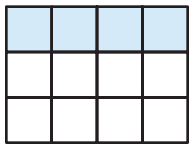
▶ Parts of a Whole Write a fraction that names the shaded part.

3.  _____

4.  _____

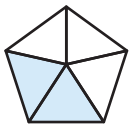
5.  _____

▶ Read and Write Fractions Write a fraction for the shaded part. Write a fraction for the unshaded part.

6. 

shaded: _____

unshaded: _____

7. 

shaded: _____

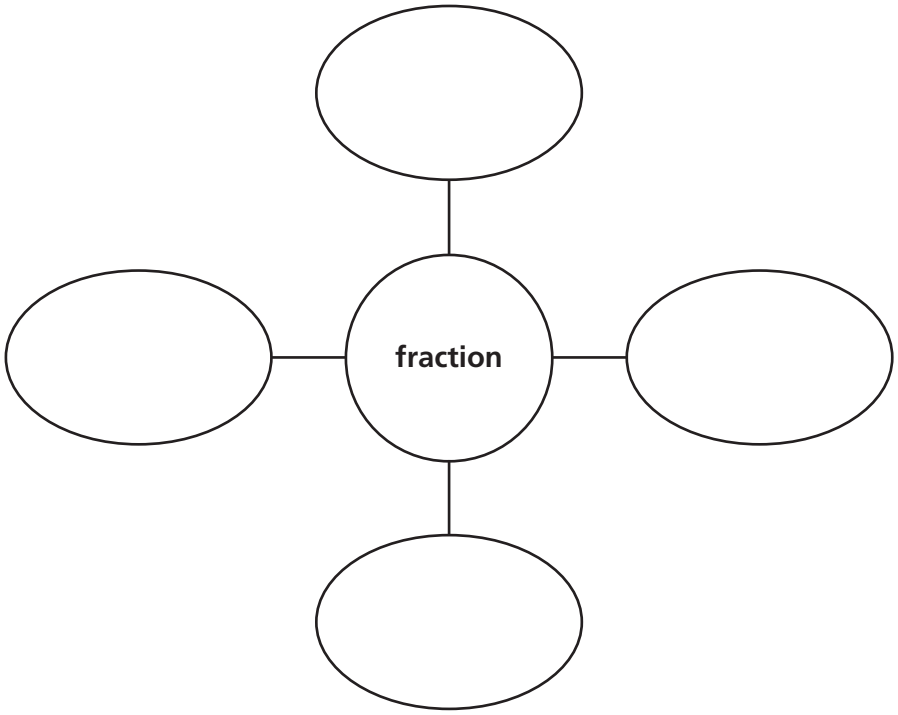
unshaded: _____

The electricity that powers our appliances is converted from many sources of energy. About $\frac{5}{10}$ is made from coal, about $\frac{2}{10}$ from natural gas, and about $\frac{2}{10}$ from nuclear power. Be a Math Detective. About how much of our electricity comes from sources other than coal, natural gas, or nuclear power?

Vocabulary Builder

Visualize It

Complete the bubble map using the words with a ✓.



Review Words

Associative Property of Addition

Commutative Property of Addition

✓ denominator

fraction

✓ numerator

simplest form

Preview Words

✓ mixed number

✓ unit fraction

Understand Vocabulary

Write the word or phrase that matches the description.

1. When the numerator and denominator have only 1 as a common factor

   _____

2. A number that names a part of a whole or part of a group

   _____

3. An amount given as a whole number and a fraction

   _____

4. The number in a fraction that tells how many equal parts are in the whole or in the group _____

5. A fraction that has a numerator of one _____

Name _____

Add and Subtract Parts of a Whole

Essential Question When can you add or subtract parts of a whole?

Numbers and Operations—Fractions—4.NF.3a

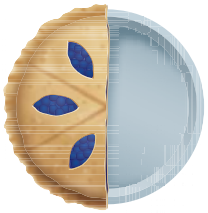
MATHEMATICAL PRACTICES
MP.4, MP.5

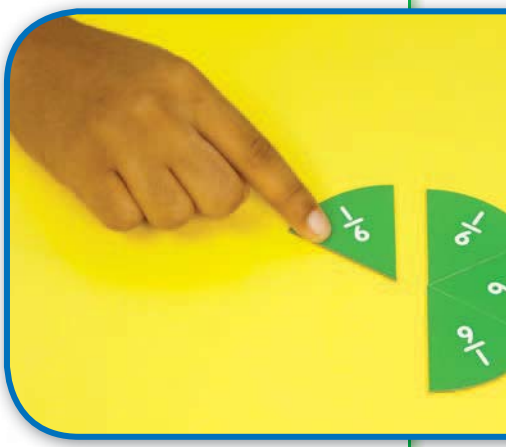
Investigate

Hands On

Materials ■ fraction circles ■ color pencils

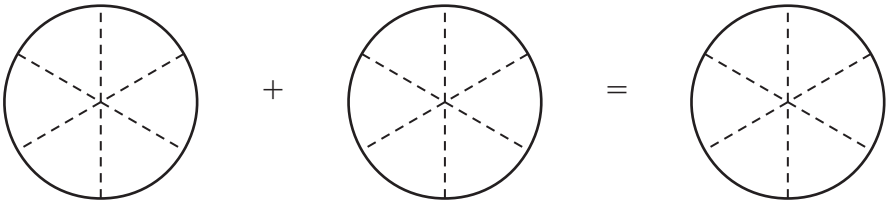
Ms. Clark has the following pie pieces left over from a bake sale.





She will combine the pieces so they are on the same dish. How much pie will be on the dish?

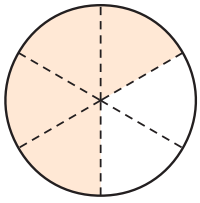
A. Model the problem using fraction circles. Draw a picture of your model. Then write the sum.



_____ + _____ = _____

So, _____ of a pie is on the dish.

B. Suppose Ms. Clark eats 2 pieces of the pie. How much pie will be left on the dish? Model the problem using fraction circles. Draw a picture of your model. Then write the difference.



_____ − _____ = _____

So, _____ of the pie is left on the dish.

Draw Conclusions

1. Kevin says that when you combine 3 pieces of pie and 1 piece of pie, you have 4 pieces of pie. Explain how Kevin's statement is related to the equation $\frac{3}{6} + \frac{1}{6} = \frac{4}{6}$.

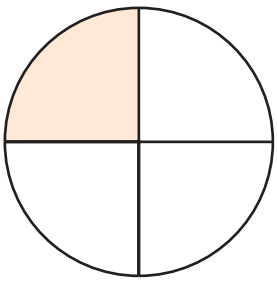
2. Isabel wrote the equation $\frac{1}{2} + \frac{1}{6} = \frac{4}{6}$ and Jonah wrote $\frac{3}{6} + \frac{1}{6} = \frac{4}{6}$ to represent combining the pie pieces. Explain why both equations are correct.

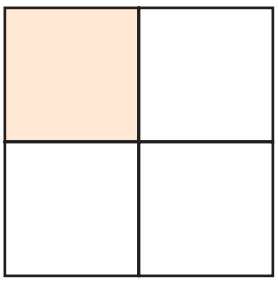
3. THINK SMARTER If there is $\frac{4}{6}$ of a pie on a plate, what part of the pie is missing from the plate? Write an equation to justify your answer.

Make Connections

You can only join or separate parts that refer to the same whole.

Suppose Randy has $\frac{1}{4}$ of a round cake and $\frac{1}{4}$ of a square cake.





Math Talk Mathematical Practices

Give an example of a situation where the equation $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ makes sense. **Explain** your reasoning.

a. Are the wholes the same? Explain.

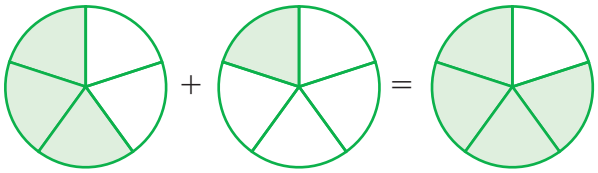
b. Does the sum $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ make sense in this situation? Explain.

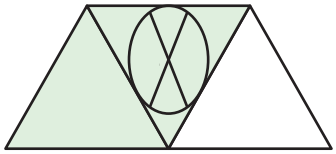
Name _____

Share and Show

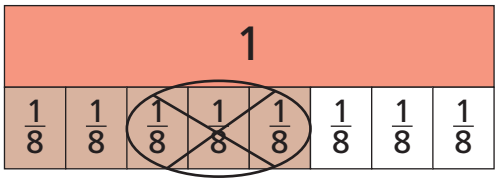
MATH BOARD

Use the model to write an equation.

1. 

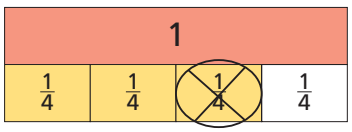
2. 

3. 

4. 

Use the model to solve the equation.

5. $\frac{3}{4} - \frac{1}{4} =$ _____



6. $\frac{5}{6} + \frac{1}{6} =$ _____

Problem Solving • Applications

Real World

7. MATHEMATICAL PRACTICE 2 **Reason Abstractly** Sean has $\frac{1}{5}$ of a cupcake and $\frac{1}{5}$ of a large cake.

   a. Are the wholes the same? Explain.

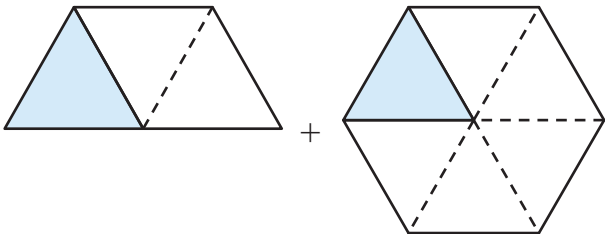
   b. Does the sum $\frac{1}{5} + \frac{1}{5} = \frac{2}{5}$ make sense in this situation? Explain.

8. GO DEEPER Carrie's dance class learned $\frac{1}{5}$ of a new dance on Monday, and $\frac{2}{5}$ of the dance on Tuesday. What fraction of the dance is left for the class to learn on Wednesday?

Sense or Nonsense?

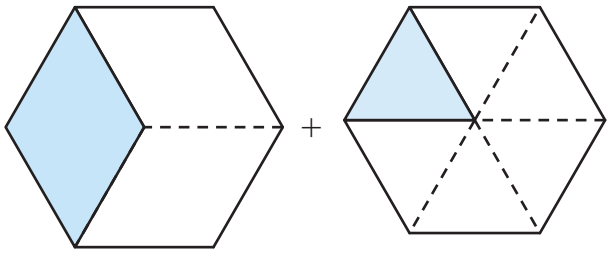
9. THINK SMARTER Samantha and Kim used different models to help find $\frac{1}{3} + \frac{1}{6}$. Whose model makes sense? Whose model is nonsense? Explain your reasoning below each model.

Samantha's Model



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

Kim's Model



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

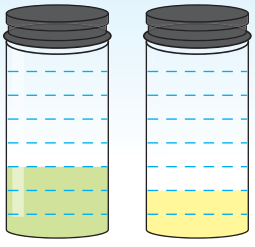
10. GO DEEPER Draw a model you could use to add $\frac{1}{4} + \frac{1}{2}$.

Personal Math Trainer

11. THINK SMARTER + Cindy has two jars of paint. One jar is $\frac{3}{8}$ full. The other jar is $\frac{2}{8}$ full.

Use the fractions to write an equation that shows the amount of paint Cindy has.

$\frac{3}{8}$ $\frac{2}{8}$



$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$

____ + ____ = ____

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Write Fractions as Sums

Essential Question How can you write a fraction as a sum of fractions with the same denominators?

Numbers and Operations—Fractions—4.NF.3b

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.8

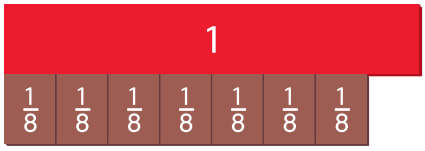
Unlock the Problem

Real World

Emilio cut a sandwich into 8 equal pieces and ate 1 piece. He has $\frac{7}{8}$ of the sandwich left. Emilio put each remaining piece on a snack plate. How many snack plates did he use? What part of the sandwich did he put on each plate?

Each piece of the sandwich is $\frac{1}{8}$ of the whole. $\frac{1}{8}$ is called a **unit fraction** because it tells the part of the whole that 1 piece represents. A unit fraction always has a numerator of 1.

Example 1 Write $\frac{7}{8}$ as a sum of unit fractions.



$\frac{7}{8}$ = _____ + _____ + _____ + _____ + _____ + _____ + _____

The number of addends represents the number of plates used.

The unit fractions represent the part of the sandwich on each plate.

So, Emilio used _____ plates. He put _____ of a sandwich on each plate.

1. What if Emilio ate 3 pieces of the sandwich instead of 1 piece? How many snack plates would he need? What part of the sandwich would be on each plate? Explain.

_____

_____

_____

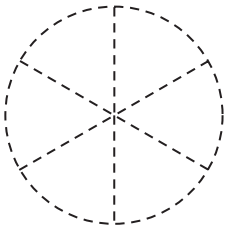
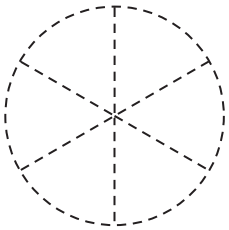
_____

Example 2 Write a fraction as a sum.

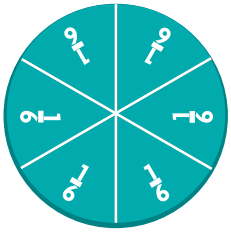
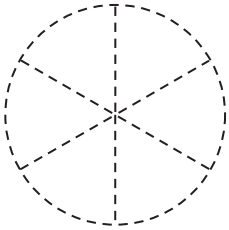
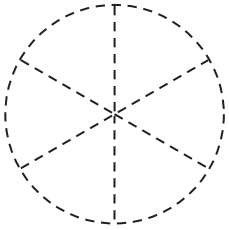
Kevin and Isabel are going to share a whole pizza. The pizza is cut into 6 equal slices. They will put the slices on two separate dishes. What part of the whole pizza could be on each dish?

Shade the models to show three different ways Kevin and Isabel could share the pizza. Write an equation for each model.

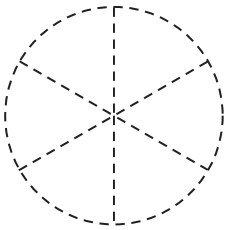
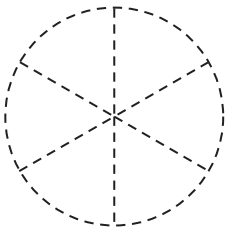
Think: $\frac{6}{6} = 1$ whole pizza.

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_ + \_\_\_\_$

Math Talk **Mathematical Practices**

If there were 8 dishes, could $\frac{1}{6}$ of the whole pizza be on each dish? **Explain.**

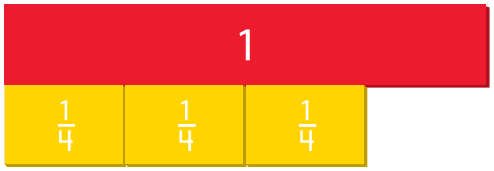
2. What if 3 friends share the pizza and they put the pizza slices on three separate dishes? What part of the pizza could be on each dish? Write equations to support your answer.

Name _____

Share and Show

MATH BOARD

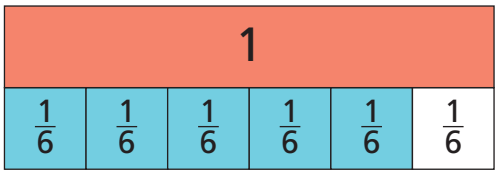
1. Write $\frac{3}{4}$ as a sum of unit fractions.



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

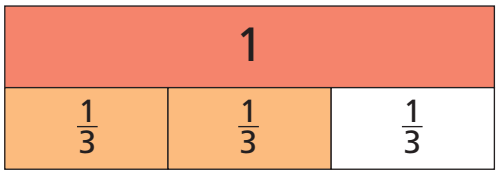
Write the fraction as a sum of unit fractions.

2.



$\frac{5}{6} =$ _____

3.



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

Math Talk — **Mathematical Practices**

Explain how the numerator in $\frac{5}{6}$ is related to the number of addends in the sum of its unit fractions.

On Your Own

Write the fraction as a sum of unit fractions.

4. $\frac{4}{12} =$ _____

5. $\frac{6}{8} =$ _____

Write the fraction as a sum of fractions three different ways.

6. $\frac{8}{10}$

_____

_____

_____

7. $\frac{6}{6}$

_____

_____

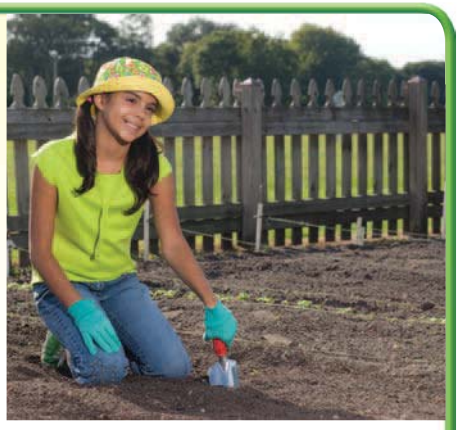
_____

8. MATHEMATICAL PRACTICE 3 **Compare Representations** How many different ways can you write a fraction that has a numerator of 2 as a sum of fractions? Explain.

_____

_____

Unlock the Problem Real World



9. THINK SMARTER Holly's garden is divided into 5 equal sections. She will fence the garden into 3 areas by grouping some equal sections together. What part of the garden could each fenced area be?

a. What information do you need to use?

_____

_____

b. How can writing an equation help you solve the problem? _____

_____

_____

c. How can drawing a model help you write an equation?

_____

_____

d. Show how you can solve the problem.

e. Complete the sentence.

The garden can be fenced into _____,

_____, and _____ parts or _____,

_____, and _____ parts.

10. GO DEEPER Leena walked $\frac{2}{3}$ of a mile. What is $\frac{2}{3}$ written as a sum of unit fractions with a denominator of 9?

_____

11. THINK SMARTER Ellie's mom sells toys. She sold $\frac{7}{10}$ of the toys. Select a way $\frac{7}{10}$ can be written as a sum of fractions. Mark all that apply.

(A) $\frac{4}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10}$

(B) $\frac{4}{10} + \frac{3}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10}$

(C) $\frac{1}{10} + \frac{2}{10} + \frac{3}{10} + \frac{1}{10}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Add Fractions Using Models

Essential Question How can you add fractions with like denominators using models?

Numbers and Operations—Fractions—4.NF.3d *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.5

Unlock the Problem

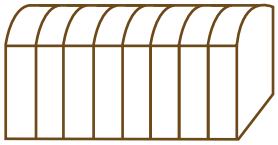
Ms. Clark made a loaf of bread. She used $\frac{1}{8}$ of the bread for a snack and $\frac{5}{8}$ of the bread for lunch. How much did she use for a snack and lunch?

One Way Use a picture.

$\frac{1}{8}$ is _____ eighth-size piece of bread.

$\frac{5}{8}$ is _____ eighth-size pieces of bread.

Shade 1 eighth-size piece. Then shade 5 eighth-size pieces.



snack lunch

Think: The pieces you shaded represent the pieces Ms. Clark used.

So, Ms. Clark used _____ eighth-size pieces, or $\frac{\square}{8}$ of the bread.

Another Way Use fraction strips.

The 1 strip represents the whole loaf.

Each $\frac{1}{8}$ part represents 1 eighth-size piece of bread.

Shade $\frac{1}{8}$. Then shade $\frac{5}{8}$.

1							
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{8}$ $\frac{5}{8}$

Think: The model shows $\frac{1}{8} + \frac{5}{8}$.

How many $\frac{1}{8}$ -size parts are shaded? _____

Write the sum. $\frac{1}{8} + \frac{5}{8} = \frac{\square}{8}$

So, Ms. Clark used _____ of the bread.

Math Talk **Mathematical Practices**

Explain why $\frac{1}{8} + \frac{5}{8} \neq \frac{6}{16}$.

1. Explain how the numerator of the sum is related to the fraction strip model.

_____

_____

2. Explain how the denominator of the sum is related to the fraction strip model.

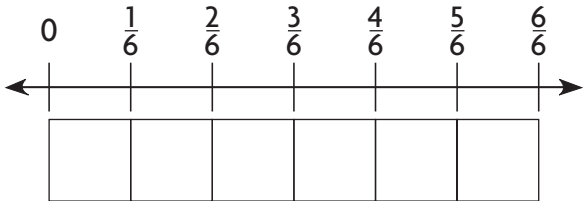
_____

_____

Example

Jacob needs two strips of wood to make masts for a miniature sailboat. One mast will be $\frac{3}{6}$ foot long. The other mast will be $\frac{2}{6}$ foot long. He has a strip of wood that is $\frac{4}{6}$ foot long. Is this strip of wood long enough to make both masts?

Shade the model to show $\frac{3}{6} + \frac{2}{6}$.



Write the sum. $\frac{3}{6} + \frac{2}{6} = \frac{\square}{6}$

Is the sum less than or greater than $\frac{4}{6}$? _____

So, the strip of wood _____ long enough to make both masts.

3. Explain how you used the number line to determine if the sum was less than $\frac{4}{6}$.

_____

_____

4. What if each mast was $\frac{2}{6}$ foot long? Could Jacob use the strip of wood to make both masts? Explain.

_____

Share and Show

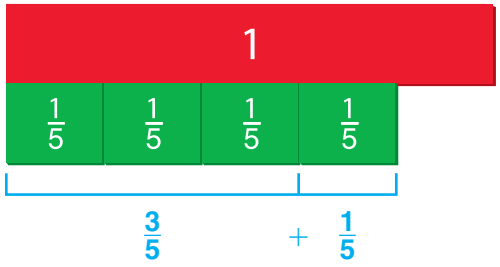
MATH BOARD

1. Adrian's cat ate $\frac{3}{5}$ of a bag of cat treats in September and $\frac{1}{5}$ of the same bag of cat treats in October. What part of the bag of cat treats did Adrian's cat eat in both months?

Use the model to find the sum $\frac{3}{5} + \frac{1}{5}$.

How many fifth-size pieces are shown? _____

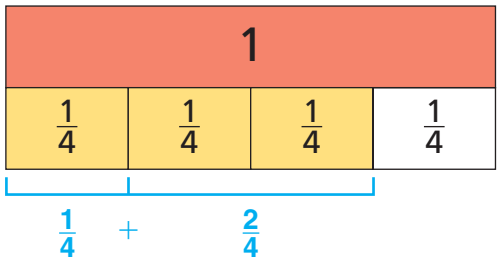
$\frac{3}{5} + \frac{1}{5} = \frac{\square}{5}$ of a bag



Name _____

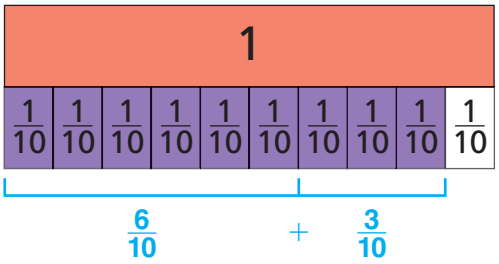
Use the model to find the sum.

2.



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

3.



$\frac{6}{10} + \frac{3}{10} =$ _____

Find the sum. Use models to help.

4. $\frac{3}{6} + \frac{3}{6} =$ _____

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

6. $\frac{1}{3} + \frac{1}{3} =$ _____

On Your Own

Math Talk — **Mathematical Practices**

Explain how to add $\frac{2}{6} + \frac{3}{6}$.

Find the sum. Use models to help.

7. $\frac{5}{8} + \frac{2}{8} =$ _____

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

9. $\frac{4}{6} + \frac{1}{6} =$ _____

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

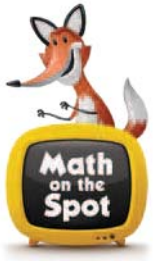
11. $\frac{1}{4} + \frac{1}{4} =$ _____

12. $\frac{5}{12} + \frac{5}{12} =$ _____

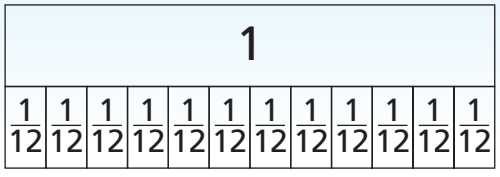
Problem Solving • Applications

13. THINK SMARTER A sum has five addends. Each addend is a unit fraction. The sum is 1. What are the addends?

_____



14. THINK SMARTER In a survey, $\frac{4}{12}$ of the students chose Friday and $\frac{5}{12}$ chose Saturday as their favorite day of the week. What fraction shows the students who chose Friday or Saturday as their favorite day? Shade the model to show your answer.



_____ of the students chose Friday or Saturday.

15. MATHEMATICAL PRACTICE 4 **Model Mathematics** Jin is putting colored sand in a jar. She filled $\frac{2}{10}$ of the jar with blue sand and $\frac{4}{10}$ of the jar with pink sand. Describe one way to model the part of the jar filled with sand.

Connect to Art

Stained Glass Windows

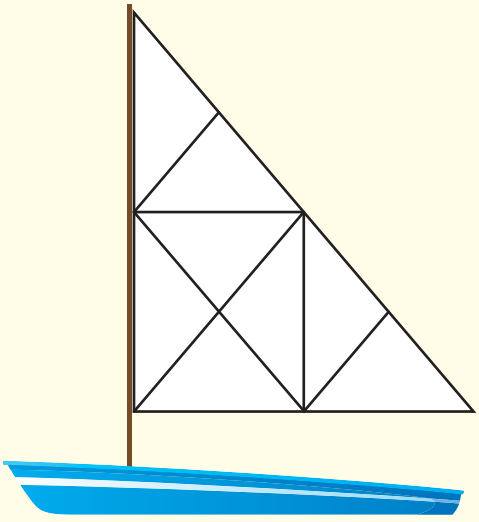
Have you ever seen a stained glass window in a building or home? Artists have been designing stained glass windows for thousands of years.

Help design the stained glass sail on the boat below.

Materials ■ color pencils

Look at the eight triangles in the sail. Use the guide below to color the triangles:

- $\frac{2}{8}$ blue
- $\frac{3}{8}$ red
- $\frac{2}{8}$ orange
- $\frac{1}{8}$ yellow



16. MATHEMATICAL PRACTICE 4 **Write an Equation** Write an equation that shows the fraction of triangles that are red or blue.

17. GO DEEPER What color is the greatest part of the sail? Write a fraction for that color. How do you know that fraction is greater than the other fractions? Explain.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Subtract Fractions Using Models

Essential Question How can you subtract fractions with like denominators using models?

Numbers and Operations—Fractions—4.NF.3d *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.5

Unlock the Problem

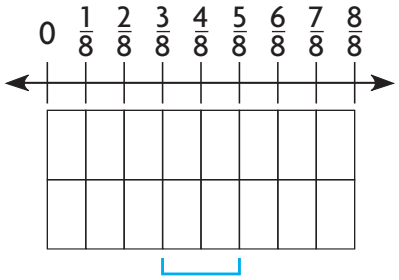
A rover needs to travel $\frac{5}{8}$ mile to reach its destination. It has already traveled $\frac{3}{8}$ mile. How much farther does the rover need to travel?

Compare fractions to find the difference.

STEP 1 Shade the model.

Shade the model to show the total distance.

Then shade the model to show how much distance the rover has already covered.



Total distance

Distance traveled

Think: The difference is _____.

STEP 2 Write the difference.

$\frac{5}{8} - \frac{3}{8} = \frac{\square}{8}$

So, the rover needs to travel _____ mile farther.

1. Explain how the model shows how much farther the rover needs to travel.

_____

_____

2. Explain how you can use the model to find $\frac{6}{8} - \frac{2}{8}$.

_____

_____

Example

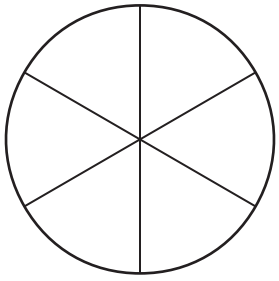
Sam ordered a small pizza, which was cut into 6 equal slices. He ate $\frac{2}{6}$ of the pizza and put the rest away for later. How much of the pizza did he put away for later?

Find $1 - \frac{2}{6}$.

- How much pizza did Sam begin with? _____
- How many slices are in the whole? _____
- How many slices did Sam eat? _____

One Way Use a picture.

Shade 1 whole.



Cross out the parts Sam ate.

Think: He ate $\frac{2}{6}$ of the pizza, or 2 sixth-size parts.

How many sixth-size parts are left? _____

So, Sam put _____ of the pizza away for later.

Another Way Use fraction strips.

Use six $\frac{1}{6}$-size parts to model the whole pizza.

1					
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

How many $\frac{1}{6}$-size parts should you cross out to model the slices Sam ate? _____

How many $\frac{1}{6}$-size parts are left? _____

Write the difference.

$1 - \frac{\quad}{\quad} = \frac{\quad}{\quad}$

Math Talk Mathematical Practices

Explain why it makes sense to think of 1 whole as $\frac{6}{6}$ in this problem.

3. Explain how the equation $\frac{6}{6} - \frac{2}{6} = \frac{4}{6}$ is related to the problem situation.

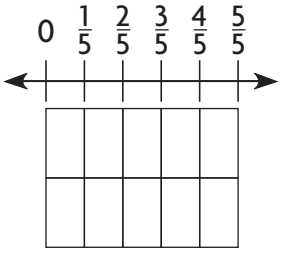
4. Sam ate $\frac{2}{3}$ of the pizza and put the rest away for later. Explain how you can use the circle to find how much of the pizza Sam put away for later.

Name _____

Share and Show

MATH BOARD

1. Lisa needs $\frac{4}{5}$ pound of shrimp to make shrimp salad. She has $\frac{1}{5}$ pound of shrimp. How much more shrimp does Lisa need to make the salad?



Subtract $\frac{4}{5} - \frac{1}{5}$. Use the model to help.

Shade the model to show how much shrimp Lisa needs.

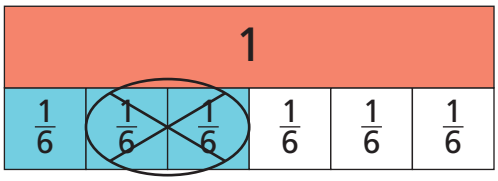
Then shade the model to show how much shrimp Lisa has. Compare the difference between the two shaded rows.

$\frac{4}{5} - \frac{1}{5} = \frac{\square}{5}$ pound

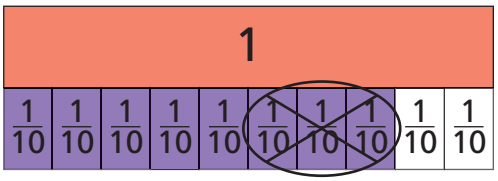
Lisa needs _____ pound more shrimp.

Use the model to find the difference.

2. $\frac{3}{6} - \frac{2}{6} = \frac{\square}{6}$



3. $\frac{8}{10} - \frac{3}{10} = \frac{\square}{10}$



Subtract. Use models to help.

4. $\frac{5}{8} - \frac{2}{8} =$ _____

5. $\frac{7}{12} - \frac{2}{12} =$ _____

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

On Your Own

Math Talk

Mathematical Practices

Explain why the numerator changes when you subtract fractions with like denominators, but the denominator doesn't.

Subtract. Use models to help.

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

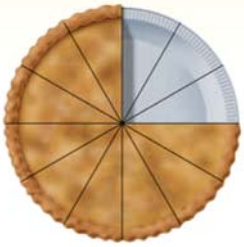
8. $\frac{7}{8} - \frac{5}{8} =$ _____

9. THINK SMARTER Explain how you could find the unknown addend in $\frac{2}{6} +$ _____ $= 1$ without using a model.

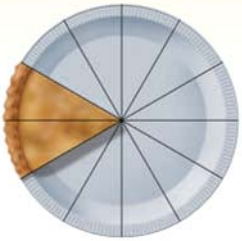
Unlock the Problem Real World

10. GO DEEPER Mrs. Ruiz served a pie for dessert two nights in a row. The drawings below show the pie after her family ate dessert on each night. What fraction of the pie did they eat on the second night?

First night



Second night



a. What do you need to know? _____

_____

b. How can you find the number of pieces eaten on the second night? _____

_____

c. Explain the steps you used to solve the problem.

_____

_____

_____

d. Complete the sentences.

After the first night, _____ pieces were left.

After the second night, _____ pieces were left.

So, _____ of the pie was eaten on the second night.

11. MATHEMATICAL PRACTICE 6 **Make Connections Between Models** Judi ate $\frac{7}{8}$ of a small pizza and Jack ate $\frac{2}{8}$ of a second small pizza. How much more of a pizza did Judi eat?

_____

12. THINK SMARTER Keiko sewed $\frac{3}{4}$ yard of lace on her backpack. Pam sewed $\frac{1}{4}$ yard of lace on her backpack. Shade the model to show how much more lace Keiko sewed on her backpack than Pam.

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

Keiko sewed _____ yard more lace on her backpack than Pam.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Add and Subtract Fractions

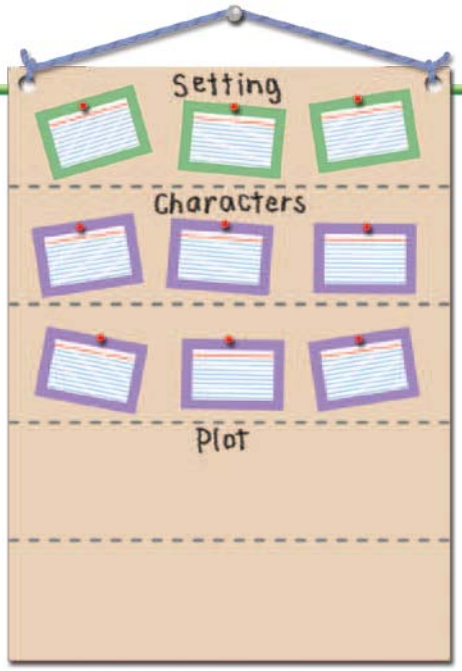
Essential Question How can you add and subtract fractions with like denominators?

Numbers and Operations—Fractions—4.NF.3d

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4

Unlock the Problem

Julie is making a poster for a book report. The directions say to use $\frac{1}{5}$ of the poster to describe the setting, $\frac{2}{5}$ of the poster to describe the characters, and the rest of the poster to describe the plot. What part of the poster will she use to describe the plot?



Example Use a model.

Shade _____ to represent the part for the setting.

Shade _____ to represent the part for the characters.

1				
$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

- Write an equation for the part of the poster used for the setting and characters. _____
- What does the part of the model that is not shaded represent?

_____

- Write an equation for the part of the poster she will use for the plot.

_____

So, Julie will use _____ of the poster to describe the plot.

Math Talk **Mathematical Practices**

Why should Julie divide her poster into 5 equal parts instead of 3 equal parts? **Explain.**

1. What's the Error? Luke says $\frac{1}{5} + \frac{2}{5} = \frac{3}{10}$. Describe his error.

_____

_____

_____

Common Denominators Fractions with common denominators represent wholes divided into the same number of equal-size parts. To add or subtract fractions with the same denominator, you can add or subtract the number of parts given in the numerators.

Example Complete each equation.

Words	Fractions
1 fourth-size part + 2 fourth-size parts = _____ fourth-size parts	$\frac{1}{4} + \frac{2}{4} = \frac{\square}{4}$
3 sixth-size parts + 2 sixth-size parts = _____	$\frac{3}{6} + \frac{2}{6} = \frac{\square}{\square}$
7 tenth-size parts − 4 tenth-size parts = _____	$\frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square}$

Share and Show

MATH BOARD

Math Talk Mathematical Practices

Explain why $\frac{11}{12} - \frac{5}{6} \neq \frac{6}{6}$.

1. 9 twelfth-size parts − 5 twelfth-size parts = _____

$\frac{9}{12} - \frac{5}{12} =$ _____

Find the sum or difference.

2. $\frac{3}{12} + \frac{8}{12} =$ _____

3. $\frac{1}{3} + \frac{1}{3} =$ _____

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

5. $\frac{2}{6} + \frac{2}{6} =$ _____

6. $\frac{3}{8} + \frac{1}{8} =$ _____

7. $\frac{6}{10} - \frac{2}{10} =$ _____

On Your Own

Find the sum or difference.

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

9. $\frac{5}{6} - \frac{4}{6} =$ _____

10. $\frac{4}{5} - \frac{2}{5} =$ _____

11. $\frac{1}{10} + \frac{3}{10} =$ _____

12. $\frac{5}{12} - \frac{1}{12} =$ _____

13. $\frac{3}{8} + \frac{2}{8} =$ _____

Practice: Copy and Solve **Find the sum or difference.**

14. $\frac{1}{4} + \frac{1}{4} =$ _____

15. $\frac{9}{10} - \frac{5}{10} =$ _____

16. $\frac{1}{12} + \frac{7}{12} =$ _____

Name _____

Problem Solving • Applications

17. MATHEMATICAL PRACTICE 6 A city worker is painting a stripe down the center of Main Street. Main Street is $\frac{8}{10}$ mile long. The worker painted $\frac{4}{10}$ mile of the street. **Explain** how to find what part of a mile is left to paint.

18. THINK SMARTER **Sense or Nonsense?** Brian says that when you add or subtract fractions with the same denominator, you can add or subtract the numerators and keep the same denominator. Is Brian correct? Explain.

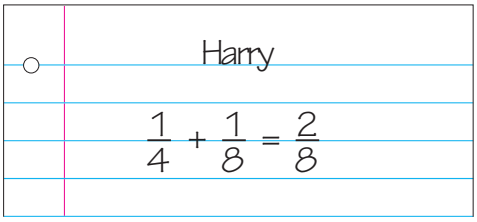
19. GO DEEPER The length of a rope was $\frac{6}{8}$ yard. Jeff cut the rope into 3 pieces. Each piece is a different length measured in eighths of a yard. What is the length of each piece of rope?

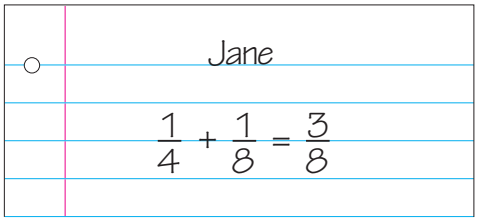
20. THINK SMARTER For 20a–20d, choose Yes or No to show if the sum or difference is correct.

20a.	$\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$	○ Yes	○ No
20b.	$\frac{1}{4} + \frac{2}{4} = \frac{3}{8}$	○ Yes	○ No
20c.	$\frac{5}{8} - \frac{4}{8} = \frac{1}{8}$	○ Yes	○ No
20d.	$\frac{4}{9} - \frac{2}{9} = \frac{6}{9}$	○ Yes	○ No

Sense or Nonsense?

21. Harry says that $\frac{1}{4} + \frac{1}{8} = \frac{2}{8}$. Jane says $\frac{1}{4} + \frac{1}{8} = \frac{3}{8}$. Whose answer makes sense? Whose answer is nonsense? Explain your reasoning. Draw a model to help.





Model

Harry

Jane

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
fraction
simplest form
unit fraction

1. A _____ always has a numerator of 1. (p. 283)

Concepts and Skills

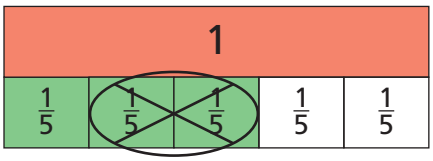
Write the fraction as a sum of unit fractions. (4.NF.3b)

2. $\frac{3}{10} =$ _____

3. $\frac{6}{6} =$ _____

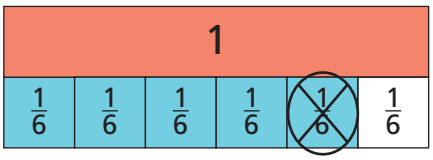
Use the model to write an equation. (4.NF.3a)

4.



_____

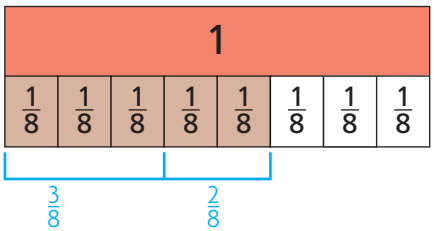
5.



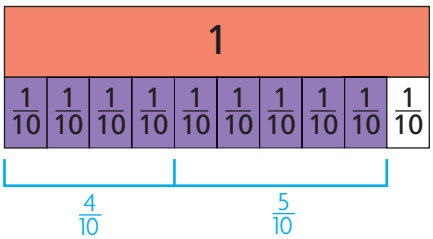
_____

Use the model to solve the equation. (4.NF.3a)

6. $\frac{3}{8} + \frac{2}{8} =$ _____



7. $\frac{4}{10} + \frac{5}{10} =$ _____



Find the sum or difference. (4.NF.3d)

8. $\frac{9}{12} - \frac{7}{12} =$ _____

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

10. $\frac{1}{5} + \frac{3}{5} =$ _____

11. $\frac{2}{6} + \frac{2}{6} =$ _____

12. $\frac{4}{4} - \frac{2}{4} =$ _____

13. $\frac{7}{8} - \frac{4}{8} =$ _____

14. Tyrone mixed $\frac{7}{12}$ quart of red paint with $\frac{1}{12}$ quart of yellow paint. How much paint does Tyrone have in the mixture? (4.NF.3d)

15. Jorge lives $\frac{6}{8}$ mile from school and $\frac{2}{8}$ mile from a ballpark. How much farther does Jorge live from school than from the ballpark? (4.NF.3d)

16. Su Ling started an art project with 1 yard of felt. She used $\frac{5}{6}$ yard. How much felt does Su Ling have left? (4.NF.3d)

17. Eloise hung artwork on $\frac{2}{5}$ of a bulletin board. She hung math papers on $\frac{1}{5}$ of the same bulletin board. What part of the bulletin board has artwork or math papers? (4.NF.3d)

Name _____

Rename Fractions and Mixed Numbers

Essential Question How can you rename mixed numbers as fractions greater than 1 and rename fractions greater than 1 as mixed numbers?

Numbers and Operations—Fractions—4.NF.3b *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.1, MP.4

Unlock the Problem

Mr. Fox has $2\frac{3}{6}$ loaves of corn bread. Each loaf was cut into $\frac{1}{6}$-size pieces. If he has 14 people over for dinner, is there enough bread for each person to have 1 piece?

- What is the size of 1 piece of bread relative to the whole?

_____

- How much bread does Mr. Fox need for 14 people?

_____

A **mixed number** is a number represented by a whole number and a fraction. You can write a mixed number as a fraction.

To find how many $\frac{1}{6}$-size pieces are in $2\frac{3}{6}$, write $2\frac{3}{6}$ as a fraction.

Example Write a mixed number as a fraction.

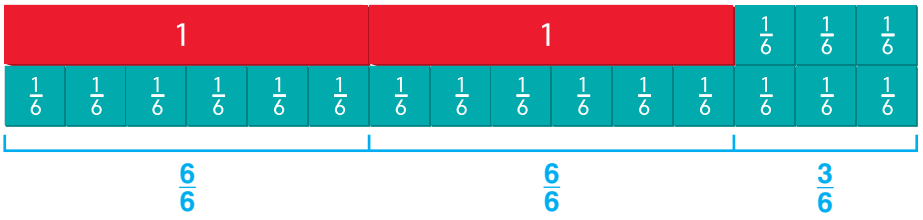
THINK

STEP 1 Model $2\frac{3}{6}$.

MODEL AND RECORD

$2\frac{3}{6} =$ _____ + _____ + ___

STEP 2 Find how many $\frac{1}{6}$-size pieces are in each whole. Model $2\frac{3}{6}$ using only $\frac{1}{6}$-size pieces.



$2\frac{3}{6} =$ ___ + ___ + ___

STEP 3 Find the total number of $\frac{1}{6}$-size pieces in $2\frac{3}{6}$.

Think: Find $\frac{6}{6} + \frac{6}{6} + \frac{3}{6}$.

$2\frac{3}{6} =$ ___

There are _____ sixth-size pieces in $2\frac{3}{6}$.

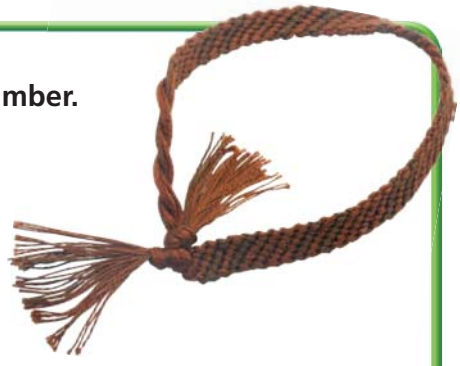
So, there is enough bread for 14 people to each have 1 piece.

Math Talk

Mathematical Practices

Explain how to write $1\frac{1}{4}$ as a fraction without using a model.

Example Write a fraction greater than 1 as a mixed number.



To weave a bracelet, Charlene needs 7 pieces of brown thread. Each piece of thread must be $\frac{1}{3}$ yard long. How much thread should she buy to weave the bracelet?

Write $\frac{7}{3}$ as a mixed number.

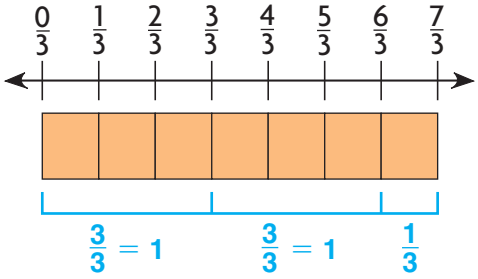
THINK

STEP 1 Model $\frac{7}{3}$.

MODEL AND RECORD

$\frac{7}{3} = \frac{\quad} + \frac{\quad} + \frac{\quad} + \frac{\quad} + \frac{\quad} + \frac{\quad} + \frac{\quad}$

STEP 2 Find how many wholes are in $\frac{7}{3}$, and how many thirds are left over.



$\frac{7}{3} = \_\_\_\_ + \_\_\_\_ + \frac{\quad}$

STEP 3 Write $\frac{7}{3}$ as a mixed number.

$\frac{7}{3} = \quad\frac{\quad}$

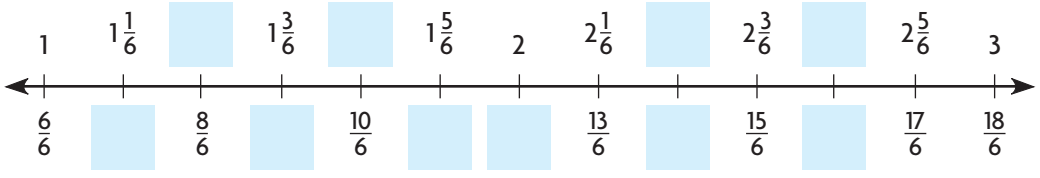
So, Charlene should buy _____ yards of thread.

Share and Show

MATH BOARD

Write the unknown numbers. Write mixed numbers above the number line and fractions greater than one below the number line.

1.



Name _____

Write the mixed number as a fraction.

2. $1\frac{1}{8}$

3. $1\frac{3}{5}$

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

Write the fraction as a mixed number.

5. $\frac{11}{4}$

6. $\frac{6}{5}$

7. $\frac{13}{10}$

Math Talk **Mathematical Practices**

Describe how you can compare $1\frac{3}{5}$ and $\frac{7}{5}$.

On Your Own

Write the mixed number as a fraction.

8. $2\frac{7}{10}$

9. $3\frac{2}{3}$

10. $4\frac{2}{5}$

Write the fraction as a mixed number.

11. $\frac{9}{5}$

12. $\frac{11}{10}$

13. $\frac{12}{2}$

MATHEMATICAL PRACTICE 8 **Use Repeated Reasoning** **Algebra** **Find the unknown numbers.**

14. $\frac{13}{7} = 1\frac{\square}{7}$

15. $\frac{\square}{6} = \frac{23}{6}$

16. $\frac{57}{11} = \frac{\square}{11}$

Problem Solving • Applications

Use the recipe to solve 17–19.

17. MATHEMATICAL PRACTICE 2 **Reason Quantitatively** Cal is making energy squares. How many $\frac{1}{2}$ cups of peanut butter are used in the recipe?

18. THINK SMARTER Suppose Cal wants to make 2 times as many energy squares as the recipe makes. How many cups of bran cereal should he use? Write your answer as a mixed number and as a fraction greater than 1 in simplest form.

WRITE Math • Show Your Work

19. Cal added $2\frac{3}{8}$ cups of raisins. Write this mixed number as a fraction greater than 1 in simplest form.

20. GO DEEPER Jenn is preparing brown rice. She needs $1\frac{1}{2}$ cups of brown rice and 2 cups of water. Jenn has only a $\frac{1}{8}$-cup measuring cup. How many $\frac{1}{8}$ cups each of rice and water will Jenn use to prepare the rice?

21. THINK SMARTER Draw a line to show the mixed number and fraction that have the same value.

$1\frac{2}{5}$	$2\frac{3}{8}$	$4\frac{1}{3}$	$1\frac{2}{3}$
$\frac{30}{3}$	$\frac{13}{3}$	$\frac{4}{3}$	$\frac{8}{5}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Add and Subtract Mixed Numbers

Essential Question How can you add and subtract mixed numbers with like denominators?

Numbers and Operations—Fractions—4.NF.3c *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.8

Unlock the Problem

Real World

After a party, there were $1\frac{4}{6}$ quesadillas left on one tray and $2\frac{3}{6}$ quesadillas left on another tray. How many quesadillas were left?

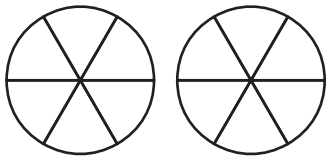
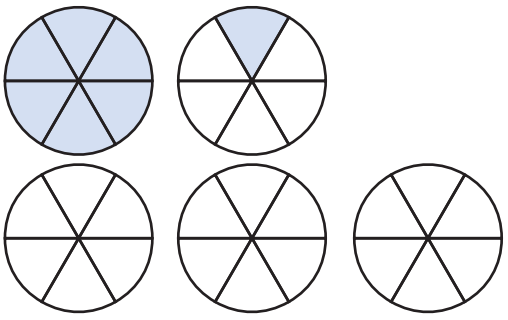
- What operation will you use?

_____

- Is the sum of the fractional parts of the mixed numbers greater than 1?

_____

Example Add mixed numbers.

THINK	MODEL	RECORD
STEP 1 Add the fractional parts of the mixed numbers.	**Think:** Shade to model $\frac{4}{6} + \frac{3}{6}$. 	$1\frac{4}{6}$ $+ 2\frac{3}{6}$ _____ $\frac{\square}{\square}$
STEP 2 Add the whole-number parts of the mixed numbers.	**Think:** Shade to model 1 + 2. 	$1\frac{4}{6}$ $+ 2\frac{3}{6}$ _____ $\square\frac{7}{6}$
STEP 3 Rename the sum.	**Think:** $\frac{7}{6}$ is greater than 1. Group the wholes together to rename the sum. The model shows a total of $\square$ wholes and $\frac{\square}{\square}$ left over.	$3\frac{7}{6} = 3 + \frac{6}{6} + \frac{\square}{\square}$ $= 3 + 1 + \frac{\square}{\square} = \square\frac{\square}{\square}$

So, _____ quesadillas were left.

Math Talk **Mathematical Practices**

When modeling sums such as $\frac{4}{6}$ and $\frac{3}{6}$, why is it helpful to combine parts into wholes when possible? **Explain.**

Example Subtract mixed numbers.

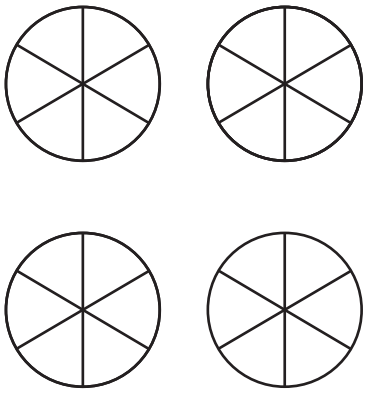
Alejandro had $3\frac{4}{6}$ quesadillas. His family ate $2\frac{3}{6}$ of the quesadillas. How many quesadillas are left?

Find $3\frac{4}{6} - 2\frac{3}{6}$.

MODEL

Shade the model to show $3\frac{4}{6}$.

Then cross out $2\frac{3}{6}$ to model the subtraction.



The difference is _____.

RECORD

Subtract the fractional parts of the mixed numbers.

Then subtract the whole-number parts of the mixed numbers.

$$\begin{array}{r} 3\frac{4}{6} \\ -\ 2\frac{3}{6} \\ \hline \square\ \frac{\square}{\square} \end{array}$$

So, there are _____ quesadillas left.

Share and Show

MATH BOARD

Write the sum as a mixed number with the fractional part less than 1.

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

Add whole numbers. ☐ + ☐ = ☐

Add fractions. ☐ + ☐ = ☐

☐ + ☐ = _____

2. $1\frac{4}{5} + 7\frac{2}{5}$

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

Name _____

Find the difference.

4. $3\frac{7}{12} - 2\frac{5}{12}$

5. $4\frac{2}{3} - 3\frac{1}{3}$

6. $6\frac{9}{10} - 3\frac{7}{10}$

Math Talk **Mathematical Practices**

Explain how adding and subtracting mixed numbers is different from adding and subtracting fractions.

On Your Own

Write the sum as a mixed number with the fractional part less than 1.

7. $7\frac{4}{6} + 4\frac{3}{6}$

8. $8\frac{1}{3} + 3\frac{2}{3}$

9. $5\frac{4}{8} + 3\frac{5}{8}$

10. $3\frac{5}{12} + 4\frac{2}{12}$

Find the difference.

11. $5\frac{7}{8} - 2\frac{3}{8}$

12. $5\frac{7}{12} - 4\frac{1}{12}$

13. $3\frac{5}{10} - 1\frac{3}{10}$

14. $7\frac{3}{4} - 2\frac{2}{4}$

Practice: Copy and Solve **Find the sum or difference.**

15. $1\frac{3}{8} + 2\frac{7}{8}$

16. $6\frac{5}{8} - 4$

17. $9\frac{1}{2} + 8\frac{1}{2}$

18. $6\frac{3}{5} + 4\frac{3}{5}$

19. $8\frac{7}{10} - \frac{4}{10}$

20. $7\frac{3}{5} - 6\frac{3}{5}$

Problem Solving • Applications Real World

Solve. Write your answer as a mixed number.

WRITE Math
Show Your Work

21. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** The driving distance from Alex's house to the museum is $6\frac{7}{10}$ miles. What is the round-trip distance?

22. THINK SMARTER The driving distance from the sports arena to Kristina's house is $10\frac{9}{10}$ miles. The distance from the sports arena to Luke's house is $2\frac{7}{10}$ miles. How much greater is the driving distance between the sports arena and Kristina's house than between the sports arena and Luke's house?

23. Pedro biked from his house to the nature preserve, a distance of $23\frac{4}{5}$ miles. Sandra biked from her house to the lake, a distance of $12\frac{2}{5}$ miles. How many fewer miles did Sandra bike than Pedro?

24. GO DEEPER During the Martinez family trip, they drove from home to a ski lodge, a distance of $55\frac{4}{5}$ miles, and then drove an additional $12\frac{4}{5}$ miles to visit friends. If the family drove the same route back home, what was the distance traveled during their trip?

25. THINK SMARTER For 25a–25d, select True or False for each statement.

25a.	$2\frac{3}{8} + 1\frac{6}{8}$ is equal to $4\frac{1}{8}$.	○ True	○ False
25b.	$3\frac{6}{12} + 1\frac{4}{12}$ is equal to $2\frac{2}{12}$.	○ True	○ False
25c.	$5\frac{5}{6} - 2\frac{4}{6}$ is equal to $1\frac{3}{6}$.	○ True	○ False
25d.	$5\frac{5}{8} - 3\frac{2}{8}$ is equal to $2\frac{3}{8}$.	○ True	○ False

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Subtraction with Renaming

Essential Question How can you rename a mixed number to help you subtract?

Numbers and Operations—Fractions—4.NF.3c *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.3, MP.4

Unlock the Problem

Ramon, Chandler, and Chase go bike riding on weekends. On one weekend, Chase rode his bike for 3 hours, Chandler rode her bike for $2\frac{1}{4}$ hours, and Ramon rode his bike for $1\frac{3}{4}$ hours. How much longer did Chandler ride her bike than Ramon did?

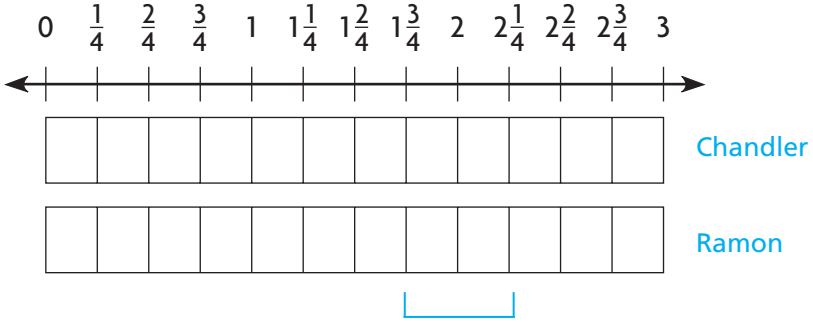
- Which operation will you use?

_____

- In the problem, circle the numbers that you need to use to find a solution.

Use a model. Find $2\frac{1}{4} - 1\frac{3}{4}$.

Shade the model to show how long Chandler rode her bike. Then shade the model to show how long Ramon rode his bike.



Think: The difference is _____.

So, Chandler rode her bike _____ hour longer than Ramon did.

1. If you have 1 fourth-size part, can you take away 3 fourth-size parts? Explain.

_____

_____

2. If you have 1 whole and 1 fourth-size part, can you take away 3 fourth-size parts? Explain.

_____

_____

Math Talk **Mathematical Practices**

Explain how you can find how much longer Chase rode his bike than Chandler did.

One Way Rename the first mixed number.

Find the difference. $5\frac{1}{8} - 3\frac{3}{8}$

STEP 1

Rename $5\frac{1}{8}$ as a mixed number with a fraction greater than 1.

Think:

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

$$= 4 + \frac{\square}{8} + \frac{1}{8}$$

$$= \square$$

STEP 2

Subtract the mixed numbers.

$$5\frac{1}{8} = \square$$

$$-3\frac{3}{8} = -3\frac{3}{8}$$

$$\square$$

Math Talk **Mathematical Practices**

Explain why you need to rename $5\frac{1}{8}$.

Another Way Rename both mixed numbers.

Find the difference. $3\frac{4}{12} - 1\frac{6}{12}$

STEP 1

Rename both mixed numbers as fractions greater than 1.

$$3\frac{4}{12} = \frac{\square}{12} \qquad 1\frac{6}{12} = \frac{\square}{12}$$

STEP 2

Subtract the fractions greater than 1.

$$\frac{\square}{12}$$

$$-\frac{\square}{12}$$

$$\square$$

- Explain how you could rename 5 to subtract $3\frac{1}{4}$.

Name _____

Share and Show

MATH BOARD

1. Rename both mixed numbers as fractions. Find the difference.

$$3\frac{3}{6} = \frac{\square}{6}$$
$$-1\frac{4}{6} = -\frac{\square}{6}$$

Find the difference.

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

3. $4\frac{7}{10} - 1\frac{9}{10}$

4. $3\frac{5}{12} - \frac{8}{12}$

Math Talk **Mathematical Practices**

Describe how you would model $\frac{13}{6} - \frac{8}{6}$.

On Your Own

Find the difference.

5. $8\frac{1}{10} - 2\frac{9}{10}$

6. $2 - 1\frac{1}{4}$

7. $4\frac{1}{5} - 3\frac{2}{5}$

Practice: Copy and Solve **Find the difference.**

8. $4\frac{1}{6} - 2\frac{5}{6}$

9. $6\frac{9}{12} - 3\frac{10}{12}$

10. $3\frac{3}{10} - \frac{7}{10}$

11. $4 - 2\frac{3}{5}$

12. $5\frac{1}{4} - 2\frac{3}{4}$

13. $3\frac{9}{12} - 1\frac{11}{12}$

14. $7\frac{3}{10} - 4\frac{7}{10}$

15. $2\frac{3}{8} - 1\frac{5}{8}$

Problem Solving • Applications

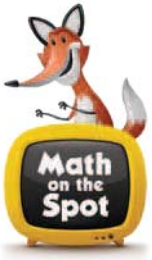
Rename the fractions to solve.

Many instruments are coiled or curved so that they are easier for the musician to play, but they would be quite long if straightened out completely.

16. MATHEMATICAL PRACTICE 1 **Analyze Relationships** Trumpets and cornets are brass instruments. Fully stretched out, the length of a trumpet is $5\frac{1}{4}$ feet and the length of a cornet is $4\frac{2}{4}$ feet. The trumpet is how much longer than the cornet?

_____

17. THINK SMARTER Tubas, trombones, and French horns are brass instruments. Fully stretched out, the length of a tuba is 18 feet, the length of a trombone is $9\frac{11}{12}$ feet, and the length of a French horn is $17\frac{1}{12}$ feet. The tuba is how much longer than the French horn? The French horn is how much longer than the trombone?



_____

18. GO DEEPER The pitch of a musical instrument is related to its length. In general, the greater the length of a musical instrument, the lower its pitch. Order the brass instruments identified on this page from lowest pitch to the highest pitch.

_____

WRITE Math • Show Your Work

Personal Math Trainer

19. THINK SMARTER + Alicia had $3\frac{1}{6}$ yards of fabric. After making a tablecloth, she had $1\frac{4}{6}$ yards of fabric. Alicia said she used $2\frac{3}{6}$ yards of fabric for the tablecloth. Do you agree? Explain.

_____

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Fractions and Properties of Addition

Essential Question How can you add fractions with like denominators using the properties of addition?

Numbers and Operations—Fractions—4.NF.3c

MATHEMATICAL PRACTICES
MP.2, MP.7

CONNECT The Associative and Commutative Properties of Addition can help you group and order addends to find sums mentally. You can use mental math to combine fractions that have a sum of 1.

- The Commutative Property of Addition states that when the order of two addends is changed, the sum is the same. For example, $4 + 5 = 5 + 4$.
- The Associative Property of Addition states that when the grouping of addends is changed, the sum is the same. For example, $(5 + 8) + 4 = 5 + (8 + 4)$.

Unlock the Problem

Real World

The map shows four lighthouses in the Florida Keys and their distances apart in miles. The Dry Tortugas Lighthouse is the farthest west, and the Alligator Reef Lighthouse is the farthest east.

What is the distance from the Dry Tortugas Lighthouse to the Alligator Reef Lighthouse, traveling between the four lighthouses?

Use the properties to order and group.

Add. $70\frac{5}{10} + 43\frac{6}{10} + 34\frac{5}{10}$

$70\frac{5}{10} + 43\frac{6}{10} + 34\frac{5}{10} =$ _____ + _____ + _____

$=$ (_____ + _____) + _____

$=$ (_____) + _____

$=$ _____

Use the Commutative Property to order the addends so that the fractions with a sum of 1 are together.

Use the Associative Property to group the addends that you can add mentally.

Add the grouped numbers, and then add the other mixed number.

Write the sum.

So, the distance from the Dry Tortugas Lighthouse to the Alligator Reef Lighthouse, traveling between the four lighthouses,

is _____ miles.

Try This! **Use the properties and mental math to solve. Show each step, and name the property used.**

$1\frac{1}{3} + (2 + 3\frac{2}{3})$

Share and Show

1. Complete. Name the property used.

$$\left(3\frac{4}{10} + 5\frac{2}{10}\right) + \frac{6}{10} = \left(5\frac{2}{10} + 3\frac{4}{10}\right) + \underline{\quad}$$

$$= 5\frac{2}{10} + \left(3\frac{4}{10} + \underline{\quad}\right)$$

$$= 5\frac{2}{10} + \underline{\quad}$$

$$= \underline{\quad}$$

_____

_____

_____

Math Talk **Mathematical Practices**

Describe how you could use the properties to find the sum $1\frac{1}{3} + 2\frac{5}{8} + 1\frac{2}{3}$.

Use the properties and mental math to find the sum.

2. $\left(2\frac{7}{8} + 3\frac{2}{8}\right) + 1\frac{1}{8}$

3. $1\frac{2}{5} + \left(1 + \frac{3}{5}\right)$

4. $5\frac{3}{6} + (5\frac{5}{6} + 4\frac{3}{6})$

5. $(1\frac{1}{4} + 1\frac{1}{4}) + 2\frac{3}{4}$

6. $(12\frac{4}{9} + 1\frac{2}{9}) + 3\frac{5}{9}$

7. $\frac{3}{12} + (1\frac{8}{12} + \frac{9}{12})$

Name _____

On Your Own

Use the properties and mental math to find the sum.

8. $\left(45\frac{1}{3} + 6\frac{1}{3}\right) + 38\frac{2}{3}$

9. $\frac{1}{2} + \left(103\frac{1}{2} + 12\right)$

10. $\left(3\frac{5}{10} + 10\right) + 11\frac{5}{10}$

11. $1\frac{4}{10} + \left(37\frac{3}{10} + \frac{6}{10}\right)$

12. $\left(\frac{3}{12} + 10\frac{5}{12}\right) + \frac{9}{12}$

13. $5\frac{7}{8} + \left(6\frac{3}{8} + \frac{1}{8}\right)$

Problem Solving • Applications

Use the expressions in the box for 14–15.

14. Which property of addition would be best to solve Expression A?

_____

15. THINK SMARTER Which two expressions have the same value?

_____

A	$\frac{1}{8} + \left(\frac{7}{8} + \frac{4}{8}\right)$
B	$\frac{1}{2} + 2$
C	$\frac{3}{7} + \left(\frac{1}{2} + \frac{4}{7}\right)$
D	$\frac{1}{3} + \frac{4}{3} + \frac{2}{3}$

16. THINK SMARTER Match the equation with the property used.

$\frac{6}{12} + (\frac{6}{12} + \frac{3}{12}) = (\frac{6}{12} + \frac{6}{12}) + \frac{3}{12}$ •

$3\frac{2}{5} + (5\frac{4}{5} + 2\frac{1}{5}) = 3\frac{2}{5} + (2\frac{1}{5} + 5\frac{4}{5})$ •

$(4\frac{1}{6} + 3\frac{5}{6}) + 2\frac{2}{6} = (3\frac{5}{6} + 4\frac{1}{6}) + 2\frac{2}{6}$ •

$(1\frac{1}{8} + \frac{5}{8}) + 3\frac{3}{8} = 1\frac{1}{8} + (\frac{5}{8} + 3\frac{3}{8})$ •

- Commutative Property
- Associative Property

Pose a Problem

17. GO DEEPER Costumes are being made for the high school musical. The table at the right shows the amount of fabric needed for the costumes of the male and female leads. Alice uses the expression $7\frac{3}{8} + 1\frac{5}{8} + 2\frac{4}{8}$ to find the total amount of fabric needed for the costume of the female lead.

Costume Fabric (in Yards)

Material	Female Lead Costume	Male Lead Costume
Silk	$7\frac{3}{8}$	$1\frac{2}{8}$
Felt	$1\frac{5}{8}$	$2\frac{3}{8}$
Cotton	$2\frac{4}{8}$	$5\frac{6}{8}$

To find the value of the expression using mental math, Alice used the properties of addition.

$$7\frac{3}{8} + 1\frac{5}{8} + 2\frac{4}{8} = \left(7\frac{3}{8} + 1\frac{5}{8}\right) + 2\frac{4}{8}$$

Alice added $7 + 1$ and was able to quickly add $\frac{3}{8}$ and $\frac{5}{8}$ to the sum of 8 to get 9. She added $2\frac{4}{8}$ to 9, so her answer was $11\frac{4}{8}$.

So, the amount of fabric needed for the costume of the female lead actor is $11\frac{4}{8}$ yards.

Write a new problem using the information for the costume for the male lead actor.

Pose a Problem

Solve your problem. Check your solution.

- MATHEMATICAL PRACTICE 7 **Identify Relationships** Explain how using the properties of addition makes both problems easier to solve.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Multistep Fraction Problems

Essential Question How can you use the strategy *act it out* to solve multistep problems with fractions?

Numbers and Operations—Fractions—4.NF.3d *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.1, MP.7

Unlock the Problem

A gift shop sells walnuts in $\frac{3}{4}$-pound bags. Ann will buy some bags of walnuts and repackage them into 1-pound bags. What is the least number of $\frac{3}{4}$-pound bags Ann could buy, if she wants to fill each 1-pound bag, without leftovers?

Read the Problem

What do I need to find?

I need to find how many

_____ bags of walnuts Ann needs to make 1-pound bags of walnuts, without leftovers.

What information do I need to use?

The bags she will buy contain

_____ pound of walnuts. She will repackage the walnuts into

_____ -pound bags.

How will I use the information?

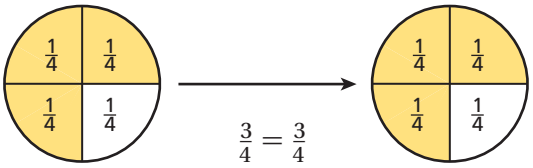
I can use fraction circles to

_____ the problem.

Solve the Problem

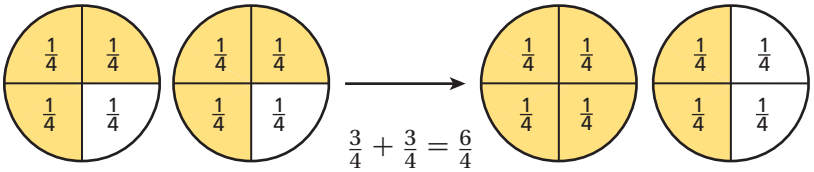
Describe how to act it out. Use fraction circles.

One $\frac{3}{4}$-pound bag



Not enough for a 1-pound bag

Two $\frac{3}{4}$-pound bags



One 1-pound bag with $\frac{2}{4}$ pound left over

Three $\frac{3}{4}$-pound bags have $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{\square}{4}$ pounds of walnuts. This makes _____ 1-pound bags with _____ pound left over.

Four $\frac{3}{4}$-pound bags have $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{\square}{4}$-pounds of walnuts.

This makes _____ 1-pound bags with _____ left over.

So, Ann could buy _____ $\frac{3}{4}$-pound bags of walnuts.

Try Another Problem

At the end of dinner, a restaurant had several dishes of quiche, each with 2 sixth-size pieces of quiche. The chef was able to combine these pieces to make 2 whole quiches, with no leftovers. How many dishes did the chef combine?

Read the Problem	Solve the Problem
What do I need to find?	**Describe how to act it out.**
What information do I need to use?	
How will I use the information?	

So, the chef combined _____ dishes each with $\frac{2}{6}$ quiche.

Name _____

Share and Show

MATH BOARD

1. Last week, Sia ran $1\frac{1}{4}$ miles each day for 5 days and then took 2 days off. Did she run at least 6 miles last week?

First, model the problem. Describe your model.

_____

_____

_____

_____

Then, regroup the parts in the model to find the number of whole miles Sia ran.

Sia ran _____ whole miles and _____ mile.

Finally, compare the total number of miles she ran to 6 miles.

$6\frac{1}{4}$ miles ◯ 6 miles

So, Sia _____ run at least 6 miles last week.

2. What if Sia ran only ran $\frac{3}{4}$ mile each day. Would she have run at least 6 miles last week? Explain.

_____

_____

3. A quarter is $\frac{1}{4}$ dollar. Noah has 20 quarters. How much money does he have? Explain.

_____

_____

_____

4. THINK SMARTER How many $\frac{2}{5}$ parts are in 2 wholes?

_____

Unlock the Problem

- Underline the question.
- Circle the important facts.
- Cross out unneeded information.

WRITE Math • Show Your Work

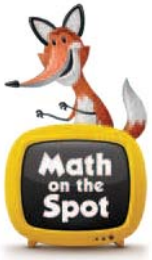
On Your Own

WRITE Math • Show Your Work

5. A company shipped 15,325 boxes of apples and 12,980 boxes of oranges. How many more boxes of apples than oranges did the company ship?

6. MATHEMATICAL PRACTICE 1 **Analyze** A fair sold a total of 3,300 tickets on Friday and Saturday. It sold 100 more on Friday than on Saturday. How many tickets did the fair sell on Friday?

7. THINK SMARTER Emma walked $\frac{1}{4}$ mile on Monday, $\frac{2}{4}$ mile on Tuesday, and $\frac{3}{4}$ mile on Wednesday. If the pattern continues, how many miles will she walk on Friday? Explain how you found the number of miles.



8. GO DEEPER Jared painted a mug $\frac{5}{12}$ red and $\frac{4}{12}$ blue. What part of the mug is **not** red or blue?

9. THINK SMARTER Choose the number that correctly completes the sentence.

Each day, Mrs. Hewes knits $\frac{1}{3}$ of a scarf in the morning and $\frac{1}{3}$ of a scarf in the afternoon.

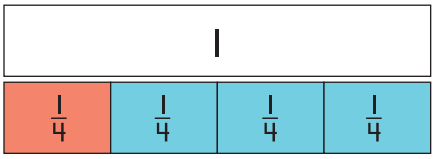
It will take Mrs. Hewes [2 / 3 / 4] days to knit 2 scarves.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 7 Review/Test

1. A painter mixed $\frac{1}{4}$ quart of red paint with $\frac{3}{4}$ blue paint to make purple paint.



How much purple paint did the painter make?

_____ quart of purple paint

2. Ivan biked $1\frac{2}{3}$ hours on Monday, $2\frac{1}{3}$ hours on Tuesday, and $2\frac{2}{3}$ hours on Wednesday. What is the total number of hours Ivan spent biking?

Ivan spent _____ hours biking.

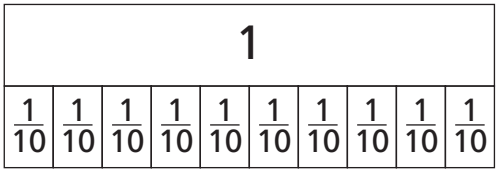
3. Tricia had $4\frac{1}{8}$ yards of fabric to make curtains. When she finished she had $2\frac{3}{8}$ yards of fabric left. She said she used $2\frac{2}{8}$ yards of fabric for the curtains. Do you agree? Explain.

GO DIGITAL Assessment Options
Chapter Test

4. Miguel's class went to the state fair. The fairground is divided into sections. Rides are in $\frac{6}{10}$ of the fairground. Games are in $\frac{2}{10}$ of the fairground. Farm exhibits are in $\frac{1}{10}$ of the fairground.

Part A

Use the model. What fraction of the fairground is rides and games?



The fraction of the fairground with games and rides is ☐.

Part B

How much greater is the part of the fairground with rides than with farm exhibits? Explain how the model could be used to find the answer.

5. Rita is making chili. The recipe calls for $2\frac{3}{4}$ cups of tomatoes. How many cups of tomatoes, written as a fraction greater than one, are used in the recipe?

☐ cups

6. Lamar's mom sells sports equipment online. She sold $\frac{9}{10}$ of the sports equipment. Select a way $\frac{9}{10}$ can be written as a sum of fractions. Mark all that apply.

Ⓐ $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{2}{10}$

Ⓑ $\frac{3}{10} + \frac{2}{10} + \frac{3}{10} + \frac{1}{10}$

Ⓒ $\frac{2}{10} + \frac{2}{10} + \frac{2}{10} + \frac{2}{10}$

Ⓓ $\frac{4}{10} + \frac{1}{10} + \frac{1}{10} + \frac{3}{10}$

Ⓔ $\frac{4}{10} + \frac{3}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10}$

Ⓕ $\frac{2}{10} + \frac{2}{10} + \frac{2}{10} + \frac{3}{10}$

Name _____

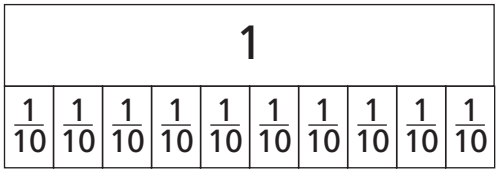
7. Bella brought $\frac{8}{10}$ gallon of water on a hiking trip. She drank $\frac{6}{10}$ gallon of water. How much water is left?

☐ gallon

8. In a survey, $\frac{6}{10}$ of the students chose Saturday and $\frac{1}{10}$ chose Monday as their favorite day of the week. What fraction shows the students who chose Saturday or Monday as their favorite day?

Part A

Shade the model to show your answer.



☐ of the students chose Monday or Saturday.

Part B

How are the numerator and denominator of your answer related to the model? Explain.

9. Match the equation with the property used.

$\frac{6}{10} + \left(\frac{4}{10} + \frac{3}{10}\right) = \left(\frac{6}{10} + \frac{4}{10}\right) + \frac{3}{10}$ •

$1\frac{1}{4} + \left(3 + 2\frac{1}{4}\right) = 1\frac{1}{4} + \left(2\frac{1}{4} + 3\right)$ •

$\left(2\frac{6}{10} + \frac{1}{10}\right) + 3\frac{9}{10} = 2\frac{6}{10} + \left(\frac{1}{10} + 3\frac{9}{10}\right)$ •

$\left(3\frac{4}{7} + 2\frac{1}{7}\right) + 6\frac{3}{7} = \left(2\frac{1}{7} + 3\frac{4}{7}\right) + 6\frac{3}{7}$ •

- Commutative Property
- Associative Property

10. For numbers 10a–10e, select Yes or No to show if the sum or difference is correct.

10a.	$\frac{2}{8}+\frac{1}{8}=\frac{3}{8}$	○ Yes	○ No
10b.	$\frac{4}{5}+\frac{1}{5}=\frac{5}{5}$	○ Yes	○ No
10c.	$\frac{4}{6}+\frac{1}{6}=\frac{5}{12}$	○ Yes	○ No
10d.	$\frac{6}{12}-\frac{4}{12}=\frac{2}{12}$	○ Yes	○ No
10e.	$\frac{7}{9}-\frac{2}{9}=\frac{9}{9}$	○ Yes	○ No

11. Gina has $5\frac{2}{6}$ feet of silver ribbon and $2\frac{4}{6}$ of gold ribbon. How much more silver ribbon does Gina have than gold ribbon?

[ ] feet more silver ribbon

12. Jill is making a long cape. She needs $4\frac{1}{3}$ yards of blue fabric for the outside of the cape. She needs $3\frac{2}{3}$ yards of purple fabric for the lining of the cape.

Part A

Jill incorrectly subtracted the two mixed numbers to find how much more blue fabric than purple fabric she should buy. Her work is shown below.

$4\frac{1}{3}-3\frac{2}{3}=\frac{12}{3}-\frac{9}{3}=\frac{3}{3}$

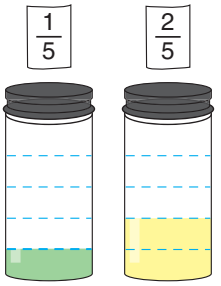
Why is Jill's work incorrect?

Part B

How much more blue fabric than purple fabric should Jill buy? Show your work.

Name _____

13. Russ has two jars of glue. One jar is $\frac{1}{5}$ full. The other jar is $\frac{2}{5}$ full.

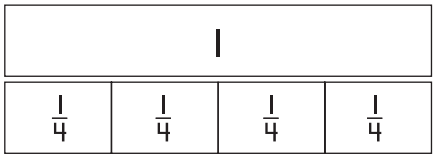


Use the fractions to write an equation to find the amount of glue Russ has.

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

$\square + \square = \square$

14. Gertie ran $\frac{3}{4}$ mile during physical education class. Sarah ran $\frac{2}{4}$ mile during the same class. How much farther did Gertie run than Sarah? Shade the model to show your answer.



Gertie ran $\square$ mile farther than Sarah.

15. Teresa planted marigolds in $\frac{2}{8}$ of her garden and petunias in $\frac{3}{8}$ of her garden. What fraction of the garden has marigolds and petunias?

Teresa's garden has $\square$ marigolds and petunias.

16. Draw a line to show the mixed number and fraction that have the same value.

- $3\frac{2}{7}$
- $4\frac{5}{8}$
- $2\frac{3}{5}$
- $2\frac{3}{8}$
- $\frac{21}{8}$
- $\frac{37}{3}$
- $\frac{21}{7}$
- $\frac{37}{8}$

17. Each day, Tally's baby sister eats $\frac{1}{4}$ cup of rice cereal in the morning and $\frac{1}{4}$ cup of rice cereal in the afternoon.

It will take Tally's sister [2 / 3 / 4] days to eat 2 cups of rice cereal.

18. Three girls are selling cases of popcorn to earn money for a band trip. In week 1, Emily sold $2\frac{3}{4}$ cases, Brenda sold $4\frac{1}{4}$ cases, and Shannon sold $3\frac{1}{2}$ cases.

Part A

How many cases of popcorn have the girls sold in all? Explain how you found your answer.

Part B

The girls must sell a total of 35 cases in order to have enough money for the trip. Suppose they sell the same amount in week 2 and week 3 of the sale as in week 1. Will the girls have sold enough cases of popcorn to go on the trip? Explain.

19. Henry ate $\frac{3}{8}$ of a sandwich. Keith ate $\frac{4}{8}$ of the same sandwich. How much more of the sandwich did Keith eat than Henry?

☐ of the sandwich

20. For numbers 20a–20d, choose True or False for each sentence.

20a.	$1\frac{4}{9} + 2\frac{6}{9}$ is equal to $4\frac{1}{9}$.	○ True	○ False
20b.	$3\frac{5}{6} + 2\frac{3}{6}$ is equal to $5\frac{2}{6}$.	○ True	○ False
20c.	$4\frac{5}{8} - 2\frac{4}{8}$ is equal to $2\frac{3}{8}$.	○ True	○ False
20d.	$5\frac{5}{8} - 3\frac{2}{8}$ is equal to $2\frac{3}{8}$.	○ True	○ False

21. Justin lives $4\frac{3}{5}$ miles from his grandfather's house. Write the mixed number as a fraction greater than one.

$4\frac{3}{5} =$ ☐

Chapter 8

Multiply Fractions by Whole Numbers

Show What You Know

Check your understanding of important skills.

Name _____

Relate Addition to Multiplication Complete.

1. 

_____ + _____ + _____ + _____ = _____

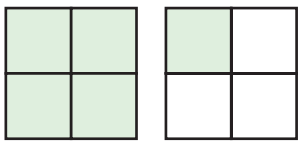
_____ × _____ = _____

2. 

_____ + _____ + _____ = _____

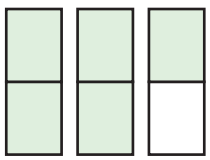
_____ × _____ = _____

Read and Write Mixed Numbers Write a mixed number for the shaded part. Write a fraction for the unshaded part.

3. 

Shaded: _____

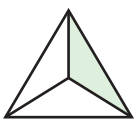
Unshaded: _____

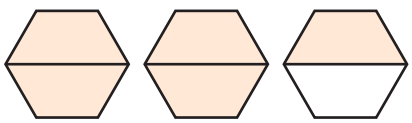
4. 

Shaded: _____

Unshaded: _____

Model Fractions and Mixed Numbers Write a fraction or mixed number for the model.

5.  _____

6.  _____

Math Detective

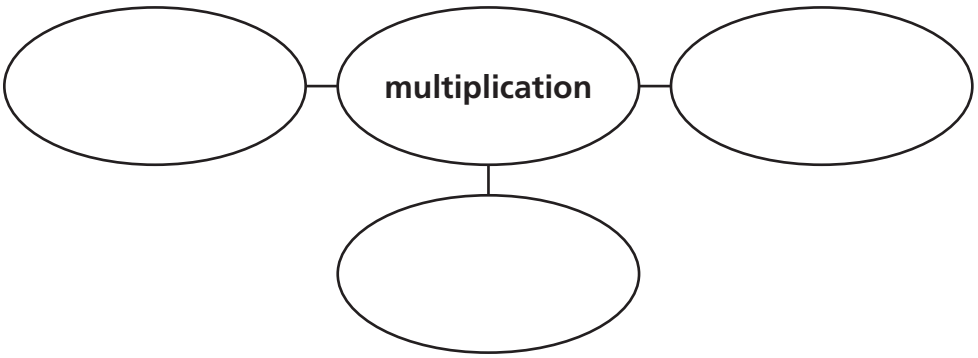
The budget for Carter Museum's annual party is $10,000. Food accounts for $\frac{1}{2}$ of the budget, beverages for $\frac{1}{4}$, and decorations for $\frac{1}{10}$ of the budget. The remainder is spent on staffing the party. Be a Math Detective. How much money is spent on staffing the party?

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the bubble map using the review words.



Review Words

fraction
Identity Property of Multiplication
multiple
product
unit fraction

Understand Vocabulary

Write the word or phrase that matches the description.

1. A _____ can name a part of a group or a whole.
2. You can write _____ of 10 such as 10, 20, 30, and so on.
3. _____ have one as the numerator.
4. The answer to a multiplication problem is called the _____.
5. _____ states that the product of any number and 1 is that number.

Name _____

Multiples of Unit Fractions

Essential Question How can you write a fraction as a product of a whole number and a unit fraction?

Numbers and Operations—Fractions—4.NF.4a

MATHEMATICAL PRACTICES
MP.2, MP.5

Unlock the Problem

At a pizza party, each pizza was cut into 6 equal slices. At the end of the party, there was $\frac{5}{6}$ of a pizza left. Roberta put each of the leftover slices in its own freezer bag. How many bags did she use? What part of a pizza did she put in each bag?

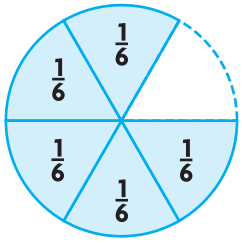
- How many slices of pizza were eaten?

_____

- What fraction of the pizza is 1 slice?

_____

Example Write $\frac{5}{6}$ as the product of a whole number and a unit fraction.



The picture shows $\frac{5}{6}$ or _____ sixth-size parts.

Each sixth-size part of the pizza can be shown by the unit fraction _____.

You can use unit fractions to show $\frac{5}{6}$ in two ways.

$\frac{5}{6} =$ _____ + _____ + _____ + _____ + _____

$\frac{5}{6} =$ _____ $\times \frac{1}{6}$

The number of addends, or the multiplier, represents the number of bags used.

The unit fractions represent the part of a pizza in each bag.

So, Roberta used _____ bags. She put _____ of a pizza in each bag.

Remember

You can use multiplication to show repeated addition.

3×4 means $4 + 4 + 4$.

4×2 means $2 + 2 + 2 + 2$.

Math Talk **Mathematical Practices**

Explain how you can write $\frac{3}{2}$ as a mixed number.

- Explain how you can write $\frac{3}{2}$ as the product of a whole number and a unit fraction.

_____

_____

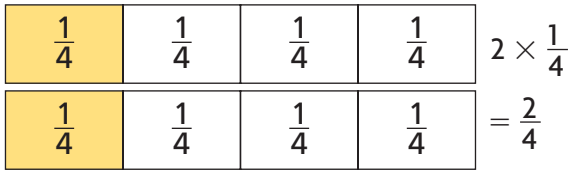
_____

Multiples The product of a number and a counting number is a multiple of the number. You have learned about multiples of whole numbers.

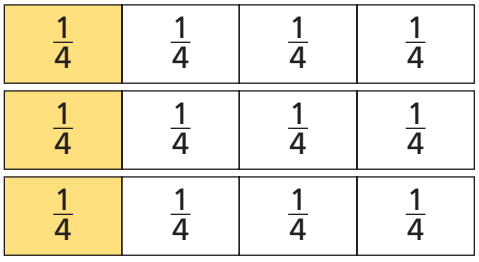
The products 1×4, 2×4, 3×4, and so on are multiples of 4. The numbers 4, 8, 12, and so on are multiples of 4.

You can also find multiples of unit fractions.

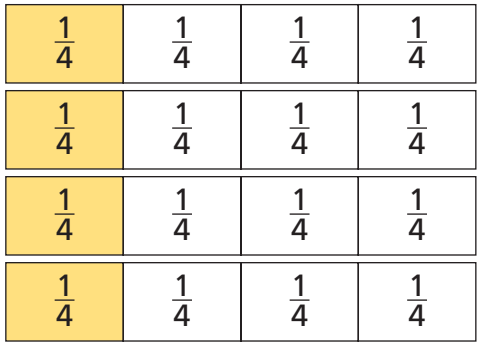
$1 \times \frac{1}{4}$ is $\frac{1}{4}$. Use models to write the next four multiples of $\frac{1}{4}$. Complete the last model.



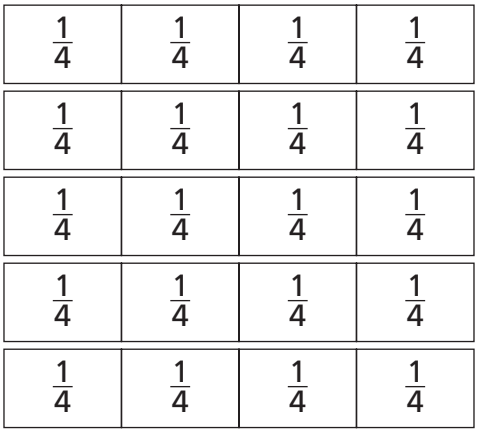
$2 \times \frac{1}{4} = \frac{2}{4}$



$3 \times \frac{\square}{\square} = \frac{\square}{4}$



$4 \times \frac{\square}{\square} = \frac{\square}{4}$



$\square \times \frac{\square}{\square} = \frac{\square}{\square}$

Multiples of $\frac{1}{4}$ are $\frac{1}{4}$, $\square$, $\square$, $\square$, and $\square$.

Use a number line to write multiples of $\frac{1}{5}$.

$\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{\square}{\square}$ $\frac{\square}{\square}$

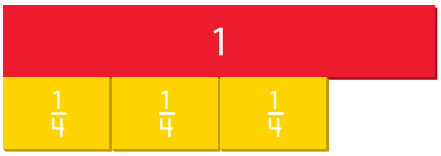
Multiples of $\frac{1}{5}$ are $\frac{1}{5}$, $\square$, $\square$, $\square$, and $\square$.

Name _____

Share and Show

MATH BOARD

1. Use the picture to complete the equations.



$\frac{3}{4} = \_\_\_\_ + \_\_\_\_ + \_\_\_\_$

$\frac{3}{4} = \_\_\_\_ \times \frac{1}{4}$

Write the fraction as a product of a whole number and a unit fraction.

2. $\frac{4}{5} =$ _____

3. $\frac{3}{10} =$ _____

4. $\frac{8}{3} =$ _____

List the next four multiples of the unit fraction.

5. $\frac{1}{6}$, ____, ____, ____, ____

6. $\frac{1}{3}$, ____, ____, ____, ____

Math Talk — **Mathematical Practices**

Explain why $\frac{8}{5}$ is a multiple of $\frac{1}{5}$.

On Your Own

Write the fraction as a product of a whole number and a unit fraction.

7. $\frac{5}{6} =$ _____

8. $\frac{9}{4} =$ _____

9. $\frac{3}{100} =$ _____

List the next four multiples of the unit fraction.

10. $\frac{1}{10}$, ____, ____, ____, ____

11. $\frac{1}{8}$, ____, ____, ____, ____

Problem Solving • Applications

Real World

12. MATHEMATICAL PRACTICE 6 Robyn uses $\frac{1}{2}$ cup of blueberries to make each loaf of blueberry bread. **Explain** how many loaves of blueberry bread she can make with $2\frac{1}{2}$ cups of blueberries.

_____

13. GO DEEPER Nigel cut a loaf of bread into 12 equal slices. His family ate some of the bread and now $\frac{5}{12}$ of the loaf is left. Nigel wants to put each of the leftover slices in its own bag. How many bags does Nigel need?

_____

14. THINK SMARTER Which fraction is a multiple of $\frac{1}{5}$? Mark all that apply.

- ○ $\frac{4}{5}$
- ○ $\frac{5}{9}$
- ○ $\frac{5}{7}$
- ○ $\frac{3}{5}$

Sense or Nonsense?

15. THINK SMARTER Whose statement makes sense? Whose statement is nonsense? Explain your reasoning.

There is no multiple of $\frac{1}{6}$ between $\frac{3}{6}$ and $\frac{4}{6}$.

$\frac{4}{5}$ is a multiple of $\frac{1}{4}$.

Gavin

Abigail

- For the statement that is nonsense, write a new statement that makes sense.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Multiples of Fractions

Essential Question How can you write a product of a whole number and a fraction as a product of a whole number and a unit fraction?

Numbers and Operations—Fractions—4.NF.4b *Also 4.NF.4c*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4

Unlock the Problem

Jen is making 4 pans of baked ziti. For each pan, she needs $\frac{2}{3}$ cup cheese. Her measuring cup can scoop $\frac{1}{3}$ cup of cheese. How many scoops of cheese does she need for the 4 pans?

Example 1 Use a model to write the product of $4 \times \frac{2}{3}$ as the product of a whole number and a unit fraction.

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

Think: $\frac{2}{3}$ is 2 third-size parts.

$\frac{2}{3} =$ _____ + _____ or $2 \times$ _____ .

There are 4 pans of baked ziti. Each pan needs $\frac{2}{3}$ cup cheese.

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

← 1 pan: $2 \times \frac{1}{3} = \frac{2}{3}$

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

← 2 pans: $2 \times 2 \times \frac{1}{3} = 4 \times \frac{1}{3} = \frac{4}{3}$

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

← 3 pans: $3 \times 2 \times \frac{1}{3} = 6 \times \frac{1}{3} = \frac{6}{3}$

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

← 4 pans: $4 \times 2 \times \frac{1}{3} = 8 \times \frac{1}{3} = \frac{8}{3}$

$4 \times \frac{2}{3} = 4 \times$ _____ $\times \frac{1}{3} =$ _____ $\times \frac{1}{3} = \frac{\square}{3}$

So, Jen needs _____ third-size scoops of cheese for 4 pans of ziti.

Math Talk **Mathematical Practices**

Explain how this model of $4 \times \frac{2}{3}$ is related to a model of 4×2.

1. What if Jen decides to make 10 pans of ziti? Describe a pattern you could use to find the number of scoops of cheese she would need.

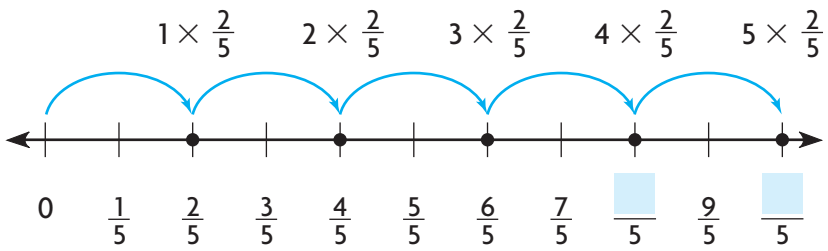
_____

_____

_____

Multiples You have learned to write multiples of unit fractions. You can also write multiples of non-unit fractions.

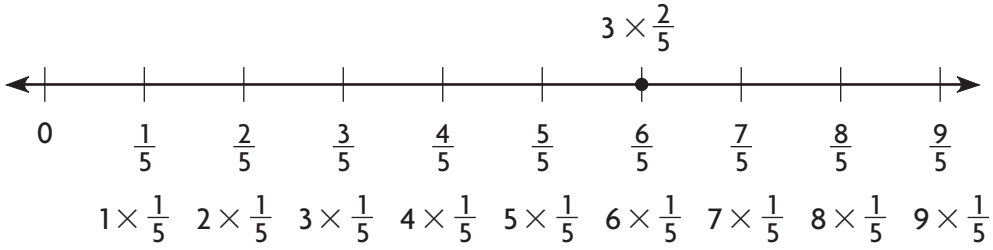
Example 2 Use a number line to write multiples of $\frac{2}{5}$.



Think: Multiply $\frac{2}{5}$ by counting numbers.

Multiples of $\frac{2}{5}$ are $\frac{2}{5}$, ____, ____, ____, and ____.

$3 \times \frac{2}{5} = \frac{6}{5}$. Write $\frac{6}{5}$ as a product of a whole number and a unit fraction.



$3 \times \frac{2}{5} = \frac{6}{5} =$ _____ × _____

2. Explain how to use repeated addition to write the multiple of a fraction as the product of a whole number and a unit fraction.

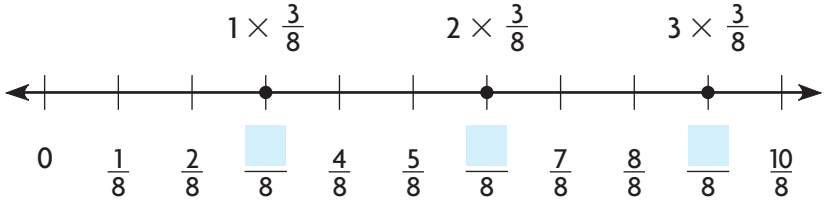
_____

_____

Share and Show

MATH BOARD

1. Write three multiples of $\frac{3}{8}$.



$1 \times \frac{3}{8} =$ _____

$2 \times \frac{3}{8} =$ _____

$3 \times \frac{3}{8} =$ _____

Multiples of $\frac{3}{8}$ are _____, _____, and _____.

Name _____

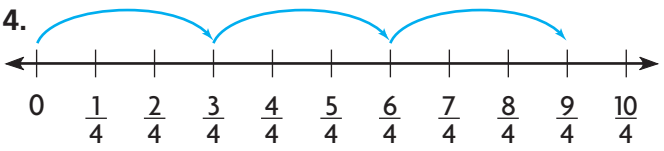
List the next four multiples of the fraction.

2. $\frac{3}{6}$, ____, ____, ____, ____

3. $\frac{2}{10}$, ____, ____, ____, ____

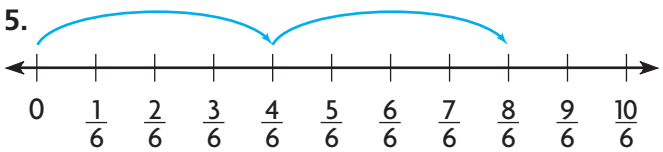
Write the product as the product of a whole number and a unit fraction.

4.



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

5.



$2 \times \frac{4}{6} =$ _____

Math Talk — **Mathematical Practices**

Explain how to write a product of a whole number and a fraction as a product of a whole number and a unit fraction.

On Your Own

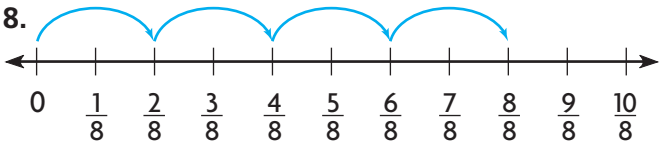
List the next four multiples of the fraction.

6. $\frac{4}{5}$, ____, ____, ____, ____

7. $\frac{2}{4}$, ____, ____, ____, ____

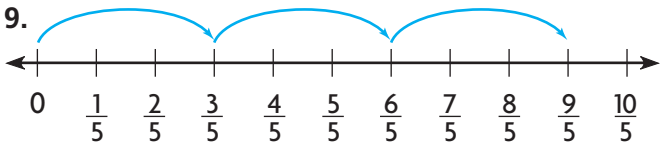
Write the product as the product of a whole number and a unit fraction.

8.



$4 \times \frac{2}{8} =$ _____

9.



$3 \times \frac{3}{5} =$ _____

10. MATHEMATICAL PRACTICE 8 **Use Repeated Reasoning** Are $\frac{6}{10}$ and $\frac{6}{30}$ multiples of $\frac{3}{10}$? Explain.

_____

_____

11. GO DEEPER Which is greater, the fourth multiple of $\frac{2}{7}$ or the third multiple of $\frac{3}{7}$? Explain.

_____

Unlock the Problem

12. THINK SMARTER Josh is watering his plants. He gives each of 2 plants $\frac{3}{5}$ pint of water. His watering can holds $\frac{1}{5}$ pint. How many times will he fill his watering can to water both plants?

a. What do you need to find?

_____

b. What information do you need to use?

_____

_____

c. How can drawing a model help you solve the problem?

_____

_____

_____

_____

_____

_____

_____

d. Show the steps you use to solve the problem.

e. Complete the sentence.

Josh will fill his watering can _____ times.

Personal Math Trainer

13. THINK SMARTER + Alma is making 3 batches of tortillas. She adds $\frac{3}{4}$ cup of water to each batch. The measuring cup holds $\frac{1}{4}$ cup. How many times must Alma measure $\frac{1}{4}$ cup of water to have enough for the tortillas? Shade the model to show your answer.

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

Alma must measure $\frac{1}{4}$ cup ☐ times.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Vocabulary
multiple
product
unit fraction

Choose the best term from the box.

1. A _____ of a number is the product of the number and a counting number. (p. 330)

2. A _____ always has a numerator of 1. (p. 329)

Concepts and Skills

List the next four multiples of the unit fraction. (4.NF.4a)

3. $\frac{1}{2}$, ____, ____, ____, ____

4. $\frac{1}{5}$, ____, ____, ____, ____

Write the fraction as a product of a whole number and a unit fraction. (4.NF.4a)

5. $\frac{4}{10} =$ _____

6. $\frac{8}{12} =$ _____

7. $\frac{3}{4} =$ _____

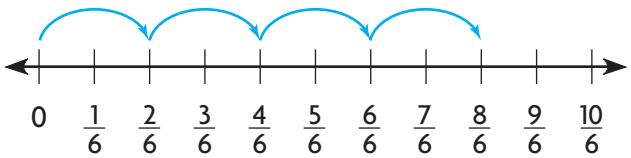
List the next four multiples of the fraction. (4.NF.4b)

8. $\frac{2}{5}$, ____, ____, ____, ____

9. $\frac{5}{6}$, ____, ____, ____, ____

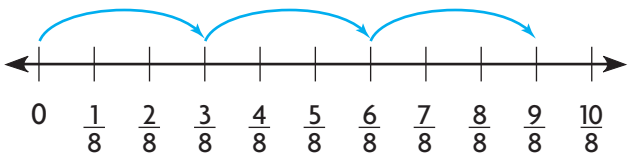
Write the product as the product of a whole number and a unit fraction. (4.NF.4b)

10.



$4 \times \frac{2}{6} =$ _____

11.



$3 \times \frac{3}{8} =$ _____

12. Pedro cut a sheet of poster board into 10 equal parts. His brother used some of the poster board and now $\frac{8}{10}$ is left. Pedro wants to make a sign from each remaining part of the poster board. How many signs can he make? (4.NF.4a)

13. Ella is making 3 batches of banana milkshakes. She needs $\frac{3}{4}$ gallon of milk for each batch. Her measuring cup holds $\frac{1}{4}$ gallon. How many times will she need to fill the measuring cup to make all 3 batches of milkshakes? (4.NF.4b)

14. Darren cut a lemon pie into 8 equal slices. His friends ate some of the pie and now $\frac{5}{8}$ is left. Darren wants to put each slice of the leftover pie on its own plate. What part of the pie will he put on each plate? (4.NF.4a)

15. Beth is putting liquid fertilizer on the plants in 4 flowerpots. Her measuring spoon holds $\frac{1}{8}$ teaspoon. The directions say to put $\frac{5}{8}$ teaspoon of fertilizer in each pot. How many times will Beth need to fill the measuring spoon to fertilize the plants in the 4 pots? (4.NF.4b)

Name _____

Multiply a Fraction by a Whole Number Using Models

Essential Question How can you use a model to multiply a fraction by a whole number?

Numbers and Operations—Fractions—4.NF.4b *Also 4.NF.4c*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4

Unlock the Problem

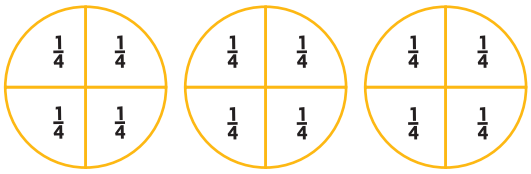
Rafael practices the violin for $\frac{3}{4}$ hour each day. He has a recital in 3 days. How much time will he practice in 3 days?

- How many equal groups of $\frac{3}{4}$ should you model?

_____

Example 1 Use a model to multiply $3 \times \frac{3}{4}$.

Think: $3 \times \frac{3}{4}$ is 3 groups of $\frac{3}{4}$ of a whole. Shade the model to show 3 groups of $\frac{3}{4}$.



1 group of $\frac{3}{4}$ = _____

2 groups of $\frac{3}{4}$ = _____

3 groups of $\frac{3}{4}$ = _____

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

So, Rafael will practice for _____ hours in all.

Math Talk **Mathematical Practices**

If you multiply $4 \times \frac{2}{6}$, is the product greater than or less than 4? **Explain**.

1. Explain how you can use repeated addition with the model to find the product $3 \times \frac{3}{4}$.

_____

_____

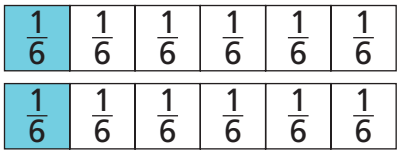
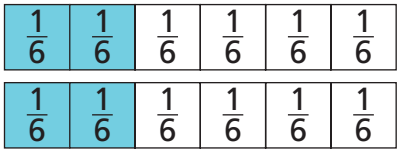
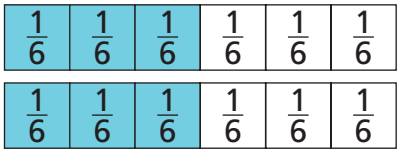
2. Rafael's daily practice of $\frac{3}{4}$ hour is in sessions that last for $\frac{1}{4}$ hour each. Describe how the model shows the number of practice sessions Rafael has in 3 days.

_____

_____

Example 2 Use a pattern to multiply.

You know how to use a model and repeated addition to multiply a fraction by a whole number. Look for a pattern in the table to discover another way to multiply a fraction by a whole number.

Multiplication Problem	Whole Number (Number of Groups)	Fraction (Size of Groups)	Product
 $2 \times \frac{1}{6}$	2	$\frac{1}{6}$ of a whole	$\frac{2}{6}$
 $2 \times \frac{2}{6}$	2	$\frac{2}{6}$ of a whole	$\frac{4}{6}$
 $2 \times \frac{3}{6}$	2	$\frac{3}{6}$ of a whole	$\frac{6}{6}$

When you multiply a fraction by a whole number, the numerator in the product is the product of the _____ and the _____ of the fraction. The denominator in the product is the same as the _____ of the fraction.

3. How do you multiply a fraction by a whole number without using a model or repeated addition?

4. Describe two different ways to find the product $4 \times \frac{2}{3}$.

Name _____

Share and Show

MATH BOARD

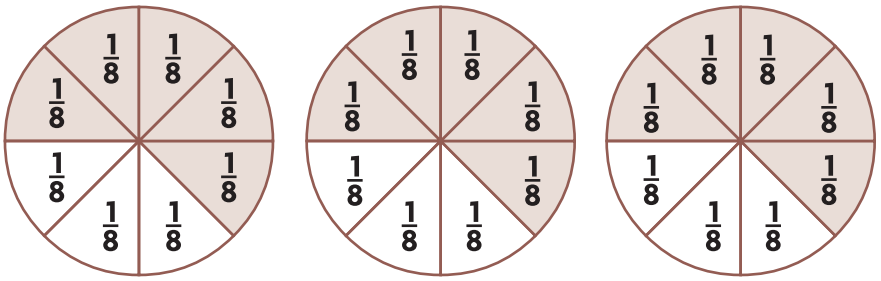
1. Find the product of $3 \times \frac{5}{8}$.

1 group of $\frac{5}{8} = \frac{\square}{8}$

2 groups of $\frac{5}{8} = \frac{\square}{8}$

3 groups of $\frac{5}{8} = \frac{\square}{8}$

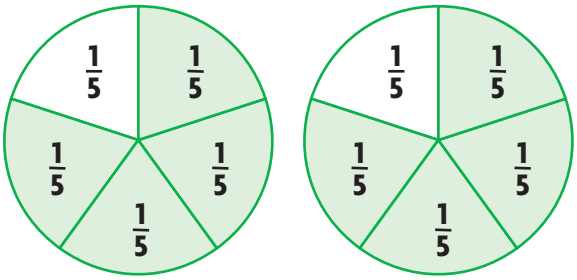
$3 \times \frac{5}{8} =$ _____



3 groups of $\frac{5}{8}$

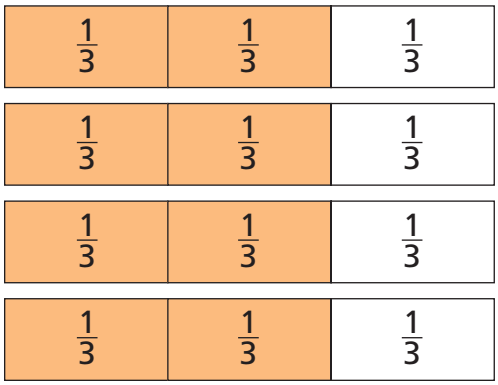
Multiply.

2.



$2 \times \frac{4}{5} =$ _____

3.



$4 \times \frac{2}{3} =$ _____

4. $5 \times \frac{3}{10} =$ _____

5. $4 \times \frac{5}{6} =$ _____

Math Talk **Mathematical Practices**

Describe how to model Exercise 5.

On Your Own

Multiply.

6. $2 \times \frac{7}{12} =$ _____

7. $6 \times \frac{3}{8} =$ _____

8. $5 \times \frac{2}{4} =$ _____

9. $3 \times \frac{4}{6} =$ _____

10. $2 \times \frac{5}{10} =$ _____

11. $4 \times \frac{2}{5} =$ _____

MATHEMATICAL PRACTICE 7 **Look for a Pattern** **Algebra** **Write the unknown number.**

12. $\square \times \frac{2}{3} = \frac{12}{3}$

13. $5 \times \frac{\square}{4} = \frac{10}{4}$

14. $2 \times \frac{7}{\square} = \frac{14}{8}$

Unlock the Problem Real World

15. THINK SMARTER Lisa makes clothes for pets. She needs $\frac{5}{6}$ yard of fabric to make 1 dog coat. How much fabric does she need to make 3 dog coats?

a. What do you need to find?

_____

b. What information do you need?

_____

c. Show the steps you use to solve the problem.

d. Complete the sentence.

Lisa needs _____ yards of fabric to make 3 dog coats.

16. GO DEEPER Manuel's small dog eats $\frac{1}{2}$ bag of dog food in 1 month. His large dog eats $\frac{3}{4}$ bag of dog food in 1 month. How many bags do both dogs eat in 6 months?

_____

17. THINK SMARTER Select the correct product for the equation.

$\frac{24}{12}$	$\frac{18}{12}$	$\frac{24}{7}$	$\frac{18}{7}$

$9 \times \frac{2}{12} = \square$ $\quad$ $3 \times \frac{6}{7} = \square$

$6 \times \frac{4}{7} = \square$ $\quad$ $8 \times \frac{3}{12} = \square$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply a Fraction or Mixed Number by a Whole Number

Essential Question How can you multiply a fraction by a whole number to solve a problem?

Numbers and Operations—Fractions—4.NF.4c

MATHEMATICAL PRACTICES
MP.1, MP.4

Unlock the Problem

Christina is planning a dance routine. At the end of each measure of music, she will make a $1\frac{1}{4}$ turn. How many turns will she make after the first 3 measures of music?

- Will Christina make more or less than $1\frac{1}{4}$ turns in 3 measures of music?

_____

- What operation will you use to solve the problem?

_____

You can multiply a mixed number by a whole number.

Example

STEP 1 Write and solve an equation.

$3 \times 1\frac{1}{4} = 3 \times \frac{\square}{\square} = \frac{\square}{\square}$ Write $1\frac{1}{4}$ as a fraction. Multiply.

STEP 2 Write the product as a mixed number.

$\frac{15}{4} = \underbrace{\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}}_{1} + \underbrace{\square + \square + \square + \square}_{1} + \underbrace{\square + \square + \square + \square}_{1} + \frac{\square}{4} + \frac{\square}{4} + \frac{\square}{4}$

$= \square + \frac{\square}{\square}$ Combine the wholes. Then combine the remaining parts.

$= \square\ \frac{\square}{\square}$ Write the mixed number.

So, Christina will make _____ turns.

Math Talk **Mathematical Practices**

Explain how writing the mixed number as a fraction in Step 2 is related to division.

1. If you multiply $3 \times \frac{1}{4}$, is the product greater than or less than 3? Explain.

_____

_____

2. Explain how you can tell that $3 \times 1\frac{1}{4}$ is greater than 3 without finding the exact product.

_____

Rename Mixed Numbers and Fractions You can use multiplication and division to rename fractions and mixed numbers.

Remember
The Identity Property of Multiplication states that the product of any number and 1 is that number.

Write $8\frac{1}{5}$ as a fraction.

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

$= (8 \times \_\_\_\_\_) + \frac{1}{5}$ Use the Identity Property of Multiplication.

$= \left(8 \times \frac{\square}{\square}\right) + \frac{1}{5}$ Rename 1.

$= \frac{\square}{\square} + \frac{\square}{\square}$ Multiply.

$= \frac{\square}{\square}$ Add.

Write $\frac{32}{5}$ as a mixed number.

Find how many groups of $\frac{5}{5}$ are in $\frac{32}{5}$.

- Divide 32 by 5.
- The quotient is the number of wholes in $\frac{32}{5}$.
- The remainder is the number of fifths left over.

$5\overline{)32}$ quotient $\square$ r $\square$

$-\ \square$

$\square$

There are 6 groups of $\frac{5}{5}$, or 6 wholes.
There are 2 fifths, or $\frac{2}{5}$ left over.

$\frac{32}{5} = \square\ \frac{\square}{\square}$

Try This! **Find $5 \times 2\frac{2}{3}$. Write the product as a mixed number.**

$5 \times 2\frac{2}{3} = 5 \times \_\_\_\_\_$ Write $2\frac{2}{3}$ as a fraction.

$= \_\_\_\_\_$ Multiply.

$= \_\_\_\_\_$ Divide the numerator by 3.

3. Explain why your solution to $5 \times 2\frac{2}{3} = 13\frac{1}{3}$ is reasonable.

4. Sense or Nonsense? To find $5 \times 2\frac{2}{3}$, Dylan says he can find $(5 \times 2) + \left(5 \times \frac{2}{3}\right)$. Does this make sense? Explain.

Name _____

Share and Show

1. $2 \times 3\frac{2}{3} = 2 \times$ _____

$=$ _____

$=$ _____

Multiply. Write the product as a mixed number.

2. $6 \times \frac{2}{5} =$ _____

3. $3 \times 2\frac{3}{4} =$ _____

4. $2 \times 1\frac{5}{6} =$ _____

On Your Own

Math Talk **Mathematical Practices**

Explain how you know your answer to Exercise 3 is reasonable.

Multiply. Write the product as a mixed number.

5. $4 \times \frac{5}{8} =$ _____

6. $6 \times \frac{5}{12} =$ _____

7. $3 \times 2\frac{1}{2} =$ _____

8. $2 \times 2\frac{2}{3} =$ _____

9. $5 \times 1\frac{2}{4} =$ _____

10. $4 \times 2\frac{2}{5} =$ _____

MATHEMATICAL PRACTICE 7 **Look for a Pattern** **Algebra** **Write the unknown number.**

11. $\square \times 2\frac{1}{3} = 9\frac{1}{3}$

12. $3 \times 2\frac{2}{\square} = 7\frac{2}{4}$

13. $3 \times \square \frac{3}{8} = 4\frac{1}{8}$

14. Describe two different ways to write $\frac{7}{3}$ as a mixed number.

Problem Solving • Applications

Use the recipe for 15–18.

15. Otis plans to make 3 batches of sidewalk chalk. How much plaster of Paris does he need?

16. **What's the Question?** The answer is $\frac{32}{3}$.

17. THINK SMARTER Patty has 2 cups of warm water. Is that enough water to make 4 batches of sidewalk chalk? Explain how you know without finding the exact product.

18. GO DEEPER Rita makes sidewalk chalk 2 days a week. Each of those days, she spends $1\frac{1}{4}$ hours making the chalk. How much time does Rita spend making sidewalk chalk in 3 weeks?

Personal Math Trainer

19. THINK SMARTER + Oliver has music lessons Monday, Wednesday, and Friday. Each lesson is $\frac{3}{4}$ of an hour. Oliver says he will have lessons for $3\frac{1}{2}$ hours this week. Without multiplying, explain how you know Oliver is incorrect.

Sidewalk Chalk Recipe

$\frac{3}{4}$ cup warm water

$1\frac{1}{2}$ cups plaster of Paris

$2\frac{2}{3}$ tablespoons powdered paint

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Comparison Problems with Fractions

Essential Question How can you use the strategy *draw a diagram* to solve comparison problems with fractions?

Numbers and Operations—Fractions—4.NF.4c

MATHEMATICAL PRACTICES
MP.1, MP.2

Unlock the Problem

Real World

The deepest part of the Grand Canyon is about $1\frac{1}{6}$ miles deep. The deepest part of the ocean is located in the Mariana Trench, in the Pacific Ocean. The deepest part of the ocean is almost 6 times as deep as the deepest part of the Grand Canyon. About how deep is the deepest part of the ocean?

Read the Problem

What do I need to find?

I need to find _____

_____

_____

What information do I need to use?

The deepest part of the Grand Canyon is about _____ miles deep.

The deepest part of the ocean is about _____ times as deep.

How will I use the information?

I can _____ to compare the depths.

Solve the Problem

Draw a bar model. Compare the depth of the deepest part of the Grand Canyon and the deepest part of the ocean, in miles.

_____ $1\frac{1}{6}$

_____ _____ _____ _____ _____ _____ _____

m

Write an equation and solve.

m is the deepest part of _____, in miles.

$m =$ _____ _____ Write an equation.

$m =$ _____ _____ Write the mixed number as a fraction.

$m =$ _____ Multiply.

$m =$ _____ Write the fraction as a whole number.

So, the deepest part of the ocean is about _____ miles deep.

Try Another Problem

Mountains are often measured by the distance they rise above sea level. Mount Washington rises more than $1\frac{1}{10}$ miles above sea level. Mount Everest rises about 5 times as high. About how many miles above sea level does Mount Everest rise?

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

So, Mount Everest rises about _____ miles above sea level.

- How did drawing a diagram help you solve the problem?

_____

_____

Math Talk

Mathematical Practices

Explain how you could use the strategy *act it out* to find the height of Mount Everest.

Name _____

Share and Show

MATH BOARD

1. Komodo dragons are the heaviest lizards on earth. A baby Komodo dragon is $1\frac{1}{4}$ feet long when it hatches. Its mother is 6 times as long. How long is the mother?

First, draw a bar model to show the problem.

Then, write the equation you need to solve.

_____

Finally, find the length of the mother Komodo dragon.

The mother Komodo dragon is _____ feet long.

2. THINK SMARTER What if a male Komodo dragon is 7 times as long as the baby Komodo dragon? How long is the male? How much longer is the male than the mother?

_____

3. The smallest hummingbird is the Bee hummingbird. It has a mass of about $1\frac{1}{2}$ grams. A Rufous hummingbird's mass is 3 times the mass of the Bee hummingbird. What is the mass of a Rufous hummingbird?

_____

4. Sloane needs $\frac{3}{4}$ hour to drive to her grandmother's house. It takes her 5 times as long to drive to her cousin's house. How long does it take to drive to her cousin's house?

_____

Unlock the Problem

- Use the Problem Solving MathBoard.
- Underline important facts.

WRITE Math
Show Your Work

On Your Own

Use the table for 5 and 6.

Payton has a variety of flowers in her garden. The table shows the average height of the flowers.

Flower	Height
tulip	$1\frac{1}{4}$ feet
daisy	$2\frac{1}{2}$ feet
tiger lily	$3\frac{1}{3}$ feet
sunflower	$7\frac{3}{4}$ feet

5. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** What is the difference between the tallest flower and the shortest flower in Payton's garden?

WRITE Math
Show Your Work

6. THINK SMARTER Payton says her average sunflower is 7 times the height of her average tulip. Do you agree or disagree with her statement? Explain your reasoning.

7. GO DEEPER Miguel ran $1\frac{3}{10}$ miles on Monday. On Friday, Miguel ran 3 times as far as he did on Monday. How much farther did Miguel run on Friday than he did on Monday?

Personal Math Trainer

8. THINK SMARTER + The table shows the lengths of different types of turtles at a zoo.

Turtle Name	Type of Turtle	Length
Tuck	Common Snapping Turtle	$1\frac{1}{6}$ feet
Lolly	Leatherback Sea Turtle	$5\frac{5}{6}$ feet
Daisy	Loggerhead Sea Turtle	$3\frac{1}{2}$ feet

For numbers 8a–8d, select True or False for each statement.

8a. Daisy is 4 times as long as Tuck. ○ True ○ False

8b. Lolly is 5 times as long as Tuck. ○ True ○ False

8c. Daisy is 3 times as long as Tuck. ○ True ○ False

8d. Lolly is 2 times as long as Daisy. ○ True ○ False

FOR MORE PRACTICE:
Standards Practice Book

Name ________________________________

Chapter 8 Review/Test

1. What are the next four multiples of $\frac{1}{8}$?

2. Marta is making 3 servings of fruit salad. She adds $\frac{3}{8}$ cup blueberries for each serving. Her measuring cup holds $\frac{1}{8}$ cup. How many times must Marta measure $\frac{1}{8}$ cup of blueberries to have enough for the fruit salad? Shade the models to show your answer.

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Marta must measure $\frac{1}{8}$ cup ________ times.

3. Mickey exercises $\frac{3}{4}$ hour every day. How many hours does he exercise in 8 days?

________ hours

GO DIGITAL Assessment Options
Chapter Test

4. Molly is baking for the Moms and Muffins event at her school. She will bake 4 batches of banana muffins. She needs $1\frac{3}{4}$ cups of bananas for each batch of muffins.

Part A

Molly completed the multiplication below and said she needed 8 cups of bananas for 4 batches of muffins. What is Molly's error?

$$4 \times 1\frac{3}{4} = 4 \times \frac{8}{4} = \frac{32}{4} = 8$$

Part B

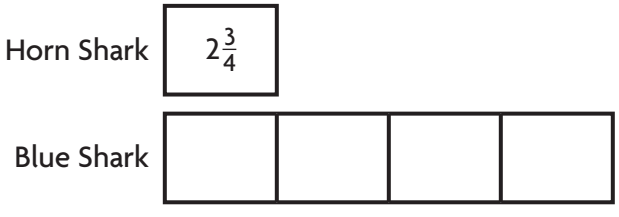
What is the correct number of cups Molly needs for 4 batches of muffins? Explain how you found your answer.

5. Which fraction is a multiple of $\frac{1}{9}$? Mark all that apply.

- ○ $\frac{3}{9}$
- ○ $\frac{9}{12}$
- ○ $\frac{2}{9}$
- ○ $\frac{4}{9}$
- ○ $\frac{9}{10}$
- ○ $\frac{9}{9}$

6. Mimi recorded a soccer game that lasted $1\frac{2}{3}$ hours. She watched it 3 times over the weekend to study the plays. How many hours did Mimi spend watching the soccer game? Show your work.

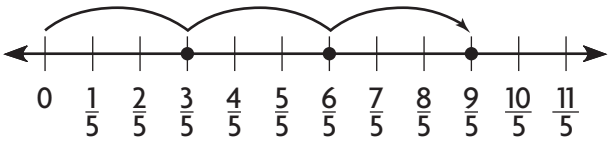
7. Theo is comparing shark lengths. He learned that a horn shark is $2\frac{3}{4}$ feet long. A blue shark is 4 times as long. Complete the model. Then find the length of a blue shark.



A blue shark is ____ feet long.

Name _____

8. Joel made a number line showing the multiples of $\frac{3}{5}$.



The product $2 \times \frac{3}{5}$ is shown by the fraction ☐ on the number line.

9. Bobby has baseball practice Monday, Wednesday, and Friday. Each practice is $2\frac{1}{2}$ hours. Bobby says he will have practice for 4 hours this week.

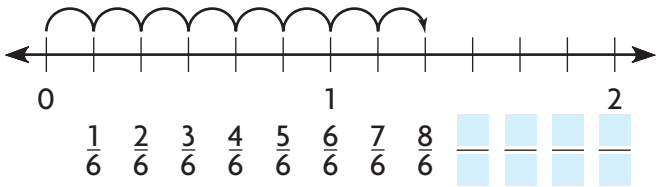
Part A

Without multiplying, explain how you know Bobby is incorrect.

Part B

How long will Bobby have baseball practice this week? Write your answer as a mixed number. Show your work.

10. Look at the number line. Write the missing fractions.

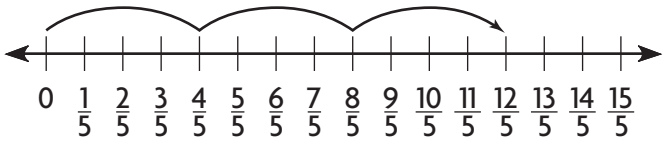


11. Ana's dachshund weighed $5\frac{5}{8}$ pounds when it was born. By age 4, the dog weighed 6 times as much. Fill each box with a number or symbol from the list to show how to find the weight of Ana's dog at age 4. Not all numbers and symbols may be used.

$5\frac{5}{8}$	4	5	6
$6\frac{5}{8}$	+	=	×

weight = ☐ ☐ ☐

12. Asta made a fraction number line to help her find $3 \times \frac{4}{5}$.



Select a way to write $3 \times \frac{4}{5}$ as the product of a whole number and a unit fraction.

$3 \times \frac{4}{5} =$ $4 \times \frac{3}{5}$ | $12 \times \frac{1}{5}$ | $6 \times \frac{1}{5}$

13. Yusif wanted to give $\frac{1}{3}$ of his total toy car collection to 2 of his friends. How many of his toy cars will he give away?

14. Select the correct product for the equation.

$\frac{8}{16}$ $\frac{32}{8}$ $\frac{16}{8}$ $\frac{20}{8}$

$4 \times \frac{5}{8} =$ ☐ $4 \times \frac{4}{8} =$ ☐

Name _____

15. The lengths of different types of snakes at a zoo are shown in the table.

Snake's Name	Type of Snake	Length
Kenny	Kenyan Sand Boa	$1\frac{1}{2}$ feet
Bobby	Ball Python	$4\frac{1}{2}$ feet
Puck	Blood Python	$7\frac{1}{2}$ feet

For numbers 15a–15d, select True or False for the statement.

15a. Bobby is 4 times as long as Kenny. ○ True ○ False

15b. Bobby is 3 times as long as Kenny. ○ True ○ False

15c. Puck is 5 times as long as Kenny. ○ True ○ False

15d. Puck is 2 times as long as Bobby. ○ True ○ False

16. Hank used $3\frac{1}{2}$ bags of seed to plant grass in his front yard. He used 3 times as much seed to plant grass in his back yard. How much seed did Hank need for the backyard?

_____ bags

17. Jess made a big kettle of rice and beans. He used $1\frac{1}{2}$ cups of beans. He used 4 times as much rice.

Part A

Draw a model to show the problem.

Part B

Use your model to write an equation. Then solve the equation to find the amount of rice Jess needs.

18. Mrs. Burnham is making modeling clay for her class. She needs $\frac{2}{3}$ cup of warm water for each batch.

Part A

Mrs. Burnham has a 1-cup measure that has no other markings. Can she make 6 batches of modeling clay using only the 1-cup measure? Describe two ways you can find the answer.

Part B

The modeling clay recipe also calls for $\frac{1}{2}$ cup of cornstarch. Nikki says Mrs. Burnham will also need 4 cups of cornstarch. Do you agree or disagree? Explain.

19. Donna buys some fabric to make place mats. She needs $\frac{1}{5}$ yard of each type of fabric. She has 9 different types of fabrics to make her design. Use the following equation. Write the number in the box to make the statement true.

$$\frac{9}{5} = \_\_\_\_\_ \times \frac{1}{5}$$

20. Mr. Tuyen uses $\frac{5}{8}$ of a tank of gas each week to drive to and from his job. How many tanks of gas does Mr. Tuyen use in 5 weeks? Write your answer two different ways.

Mr. Tuyen uses _____ or _____ tanks of gas.

21. Rico is making 4 batches of salsa. Each batch needs $\frac{2}{3}$ cup of corn. He only has a $\frac{1}{3}$-cup measure. How many times must Rico measure $\frac{1}{3}$ cup of corn to have enough for all of the salsa?

_____ times

Chapter 9

Relate Fractions and Decimals

Show What You Know

Check your understanding of important skills.

Name _____

Count Coins Find the total value.

1. 

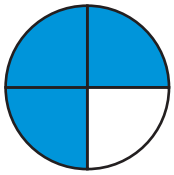
Total value: _____

2. 

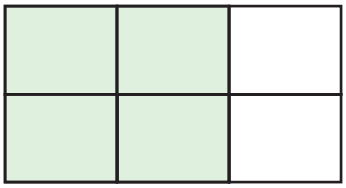
Total value: _____

Equivalent Fractions

Write two equivalent fractions for the picture.

3. 

_____

4. 

_____

Fractions with Denominators of 10

Write a fraction for the words. You may draw a picture.

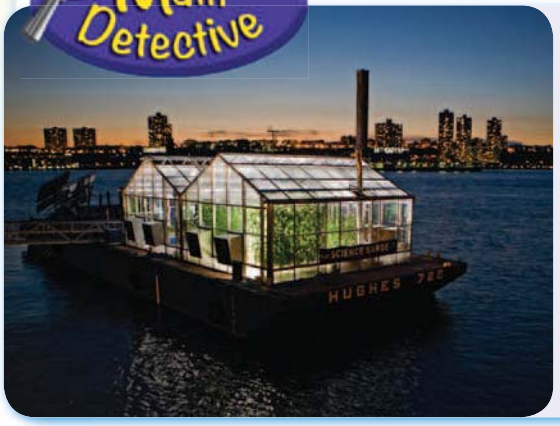
5. three tenths _____

6. six tenths _____

7. eight tenths _____

8. nine tenths _____

Math Detective



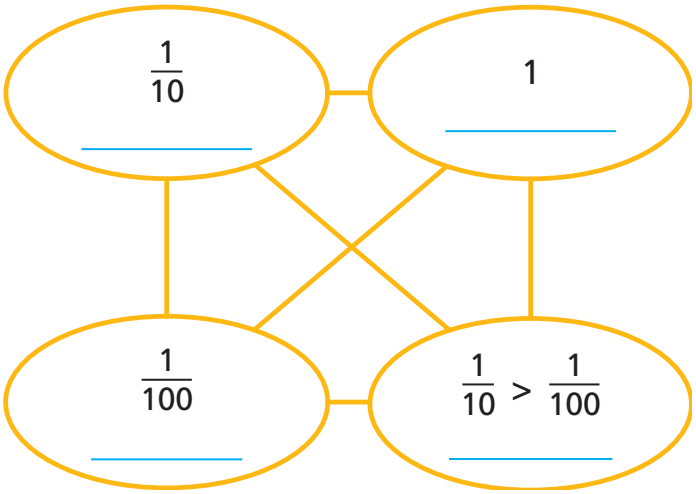
The Hudson River Science Barge, docked near New York City, provides a demonstration of how renewable energy can be used to produce food for large cities. Vegetables grown on the barge require _____ of the water needed by field crops. Be a Math Detective. Use these clues to find the fraction and decimal for the missing amount.

- The number is less than one and has two decimal places.
- The digit in the hundredths place has a value of $\frac{5}{100}$.
- The digit in the tenths place has a value of $\frac{2}{10}$.

Vocabulary Builder

Visualize It

Complete the Semantic Map by using words with a ✓.



Review Words

- ✓ compare
- equivalent fractions
- fraction
- place value
- ✓ whole

Preview Words

- decimal
- decimal point
- equivalent decimals
- ✓ hundredth
- ✓ tenth

Understand Vocabulary

Draw a line to match each word with its definition.

Word	Definition
1. decimal	• Two or more decimals that name the same amount
2. decimal point	• One part out of one hundred equal parts
3. tenth	• A number with one or more digits to the right of the decimal point
4. hundredth	• One part out of ten equal parts
5. equivalent decimals	• A symbol used to separate dollars from cents in money amounts and to separate the ones and the tenths places in decimals

Name _____

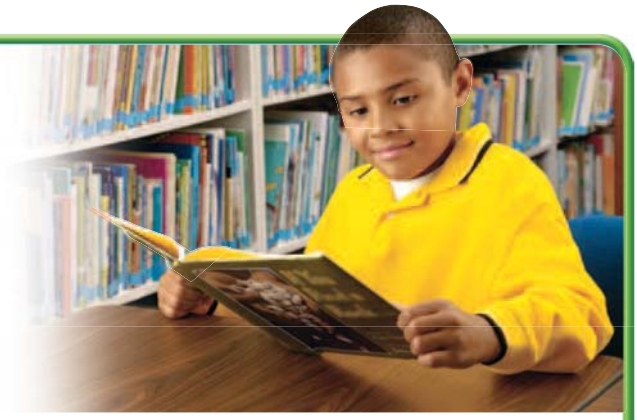
Relate Tenths and Decimals

Essential Question How can you record tenths as fractions and decimals?

Number and Operations—Fractions—4.NF.6

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.4

Unlock the Problem



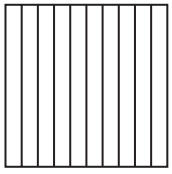
Ty is reading a book about metamorphic rocks. He has read $\frac{7}{10}$ of the book. What decimal describes the part of the book Ty has read?

A **decimal** is a number with one or more digits to the right of the **decimal point**. You can write tenths and hundredths as fractions or decimals.

One Way Use a model and a place-value chart.

Fraction

Shade $\frac{7}{10}$ of the model.



Think: The model is divided into 10 equal parts. Each part represents one **tenth**.

Write: _____

Read: seven tenths

Decimal

$\frac{7}{10}$ is 7 tenths.

Ones	.	Tenths	Hundredths
	.		

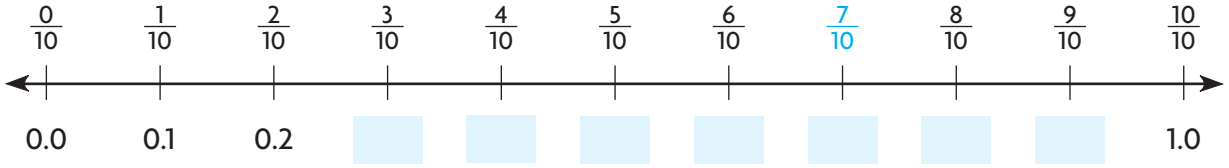
↑ decimal point

Write: _____

Read: _____

Another Way Use a number line.

Label the number line with decimals that are equivalent to the fractions. Locate the point $\frac{7}{10}$.



_____ names the same amount as $\frac{7}{10}$.

So, Ty read 0.7 of the book.

Math Talk

Mathematical Practices

Explain how the size of one whole is related to the size of one tenth.

- How can you write 0.1 as a fraction? Explain.

_____

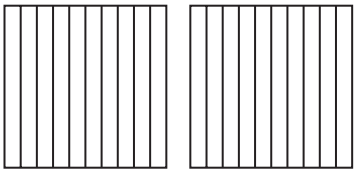
Tara rode her bicycle $1\frac{6}{10}$ miles. What decimal describes how far she rode her bicycle?

You have already written a fraction as a decimal. You can also write a mixed number as a decimal.

One Way Use a model and a place-value chart.

Fraction

Shade $1\frac{6}{10}$ of the model.



Write: _____

Read: one and six tenths

Decimal

$1\frac{6}{10}$ is 1 whole and 6 tenths.

Think: Use the ones place to record wholes.

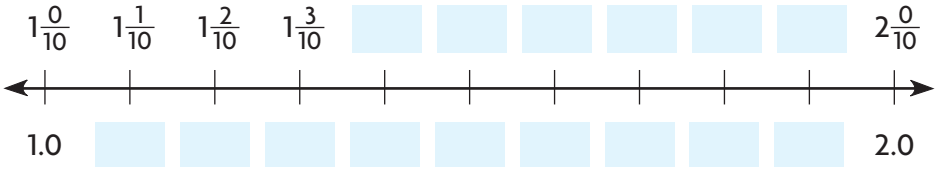
Ones	.	Tenths	Hundredths
	.		

Write: _____

Read: _____

Another Way Use a number line.

Label the number line with equivalent mixed numbers and decimals. Locate the point $1\frac{6}{10}$.

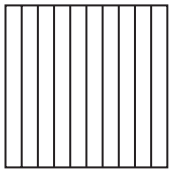


_____ names the same amount as $1\frac{6}{10}$.

So, Tara rode her bicycle _____ miles.

Try This! Write 1 as a fraction and as a decimal.

Shade the model to show 1.



Fraction: _____

Think: 1 is 1 whole and 0 tenths.

Ones	.	Tenths	Hundredths
	.		

Decimal: _____

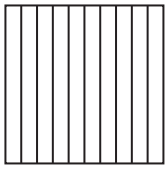
Name _____

Share and Show

MATH BOARD

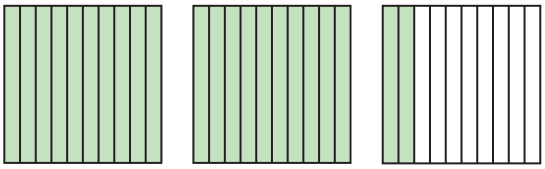
1. Write five tenths as a fraction and as a decimal.

Fraction: _____ Decimal: _____

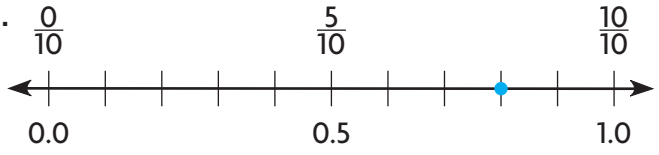


Ones	.	Tenths	Hundredths
	.		

Write the fraction or mixed number and the decimal shown by the model.

2. 

_____ _____

3. 

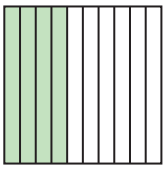
_____ _____

Math Talk **Mathematical Practices**

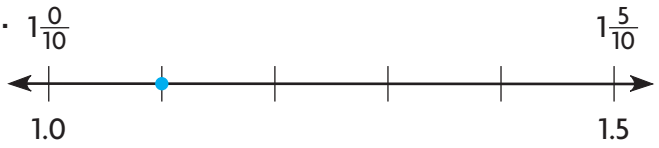
How can you write $1\frac{3}{10}$ as a decimal? **Explain.**

On Your Own

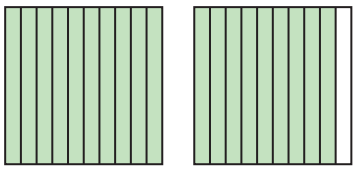
Write the fraction or mixed number and the decimal shown by the model.

4. 

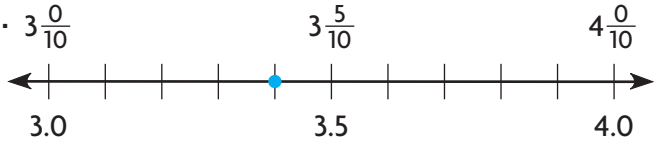
_____ _____

5. 

_____ _____

6. 

_____ _____

7. 

_____ _____

Practice: Copy and Solve **Write the fraction or mixed number as a decimal.**

8. $5\frac{9}{10}$

9. $\frac{1}{10}$

10. $\frac{7}{10}$

11. $8\frac{9}{10}$

12. $\frac{6}{10}$

13. $6\frac{3}{10}$

14. $\frac{5}{10}$

15. $9\frac{7}{10}$

Problem Solving • Applications

Use the table for 16–19.

Ramon's Rock Collection

Name	Type
Basalt	Igneous
Rhyolite	Igneous
Granite	Igneous
Peridotite	Igneous
Scoria	Igneous
Shale	Sedimentary
Limestone	Sedimentary
Sandstone	Sedimentary
Mica	Metamorphic
Slate	Metamorphic

▲ Granite– Igneous

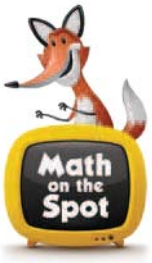
▲ Mica–Metamorphic

▲ Sandstone– Sedimentary

16. What part of the rocks listed in the table are igneous? Write your answer as a decimal.

17. Sedimentary rocks make up what part of Ramon's collection? Write your answer as a fraction and in word form.

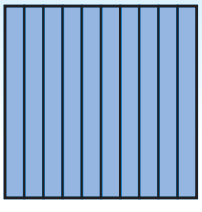
18. THINK SMARTER What part of the rocks listed in the table are metamorphic? Write your answer as a fraction and as a decimal.

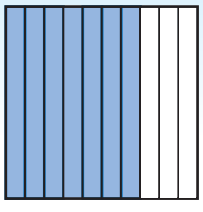


19. MATHEMATICAL PRACTICE 5 **Communicate** Niki wrote the following sentence in her report: "Metamorphic rocks make up 2.0 of Ramon's rock collection." Describe her error.

20. GO DEEPER Josh paid for three books with two $20 bills. He received $1 in change. Each book was the same price. How much did each book cost?

21. THINK SMARTER Select a number shown by the model. Mark all that apply.





$1\frac{7}{10}$	$\frac{70}{10}$	1.7
7	0.7	$\frac{17}{10}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Relate Hundredths and Decimals

Essential Question How can you record hundredths as fractions and decimals?

Number and Operations—Fractions—4.NF.6

MATHEMATICAL PRACTICES
MP.4, MP.6, MP.7

Unlock the Problem

In the 2008 Summer Olympic Games, the winning time in the men's 100-meter butterfly race was only $\frac{1}{100}$ second faster than the second-place time. What decimal represents this fraction of a second?

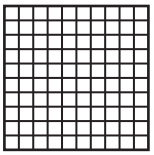
- Circle the numbers you need to use.

You can write hundredths as fractions or decimals.

One Way Use a model and a place-value chart.

Fraction

Shade $\frac{1}{100}$ of the model.



Think: The model is divided into 100 equal parts. Each part represents one **hundredth**.

Write: _____

Read: one hundredth

Decimal

Complete the place-value chart. $\frac{1}{100}$ is 1 hundredth.

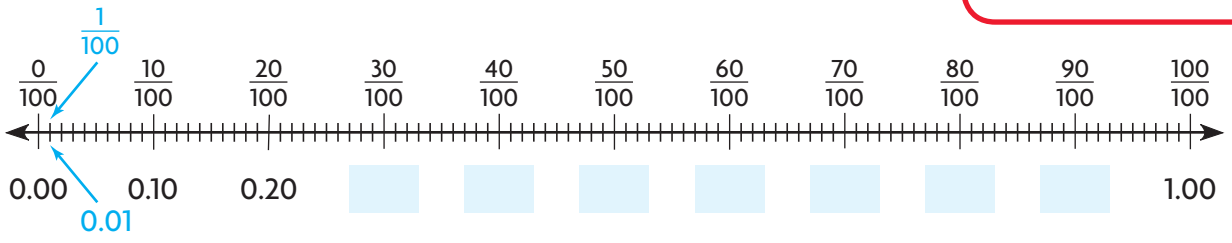
Ones	.	Tenths	Hundredths
0	.	0	1

Write: _____

Read: one hundredth

Another Way Use a number line.

Label the number line with equivalent decimals.
Locate the point $\frac{1}{100}$.



_____ names the same amount as $\frac{1}{100}$.

So, the winning time was _____ second faster.

Math Talk **Mathematical Practices**

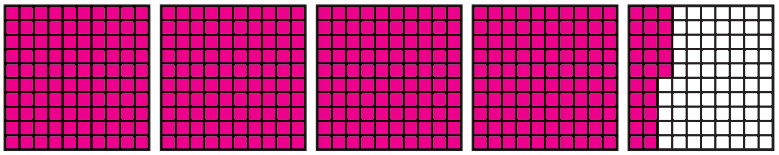
Explain how the size of one tenth is related to the size of one hundredth.

Alicia won her 400-meter freestyle race by $4\frac{25}{100}$ seconds. How can you write this mixed number as a decimal?

One Way Use a model and a place-value chart.

Mixed Number

Shade the model to show $4\frac{25}{100}$.



Write: _____

Read: four and twenty-five hundredths

Decimal

Complete the place-value chart.

Think: Look at the model above. $4\frac{25}{100}$ is 4 wholes and 2 tenths 5 hundredths.

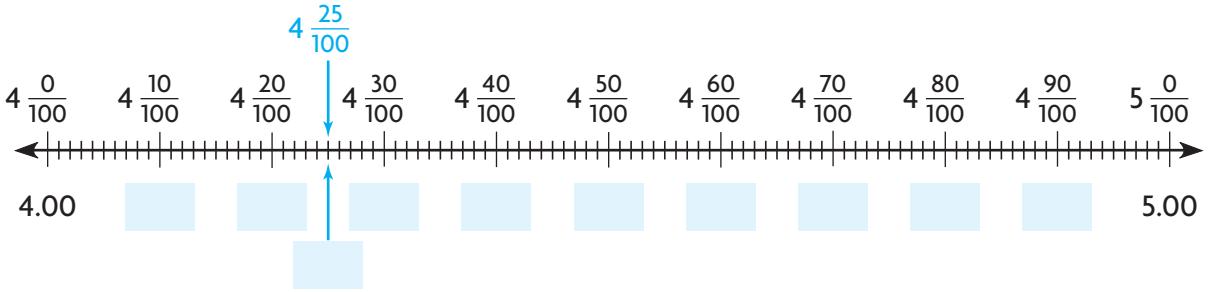
Ones	.	Tenths	Hundredths
	.		

Write: _____

Read: _____

Another Way Use a number line.

Label the number line with equivalent mixed numbers and decimals. Locate the point $4\frac{25}{100}$.



_____ names the same amount as $4\frac{25}{100}$.

So, Alicia won her race by _____ seconds.

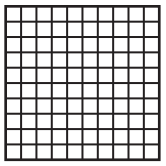
Name _____

Share and Show

MATH BOARD

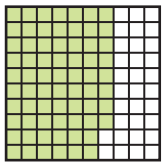
1. Shade the model to show $\frac{31}{100}$.

Write the amount as a decimal. _____

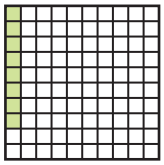


Ones	.	Tenths	Hundredths
	.		

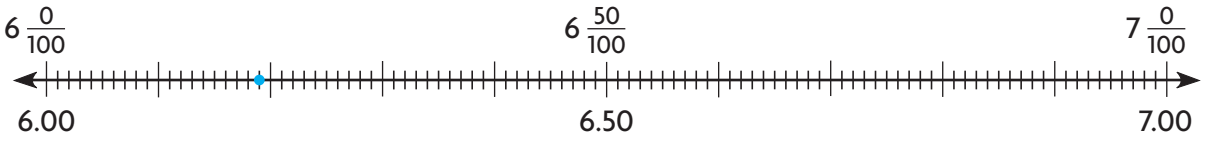
Write the fraction or mixed number and the decimal shown by the model.

2. 

_____ _____

3. 

_____ _____

4. 

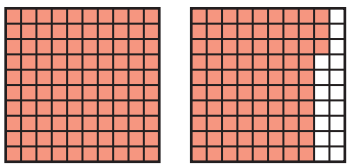
_____ _____

Math Talk — **Mathematical Practices**

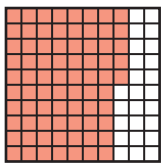
Are 0.5 and 0.50 equivalent? **Explain**.

On Your Own

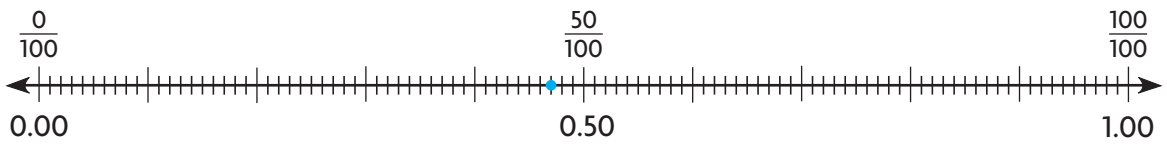
Write the fraction or mixed number and the decimal shown by the model.

5. 

_____ _____

6. 

_____ _____

7. 

_____ _____

Practice: Copy and Solve **Write the fraction or mixed number as a decimal.**

8. $\frac{9}{100}$

9. $4\frac{55}{100}$

10. $\frac{10}{100}$

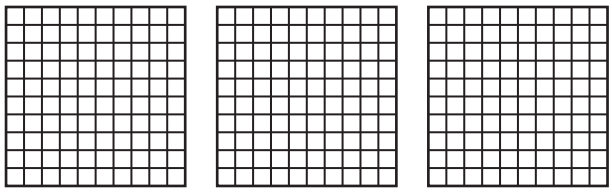
11. $9\frac{33}{100}$

12. $\frac{92}{100}$

13. $14\frac{16}{100}$

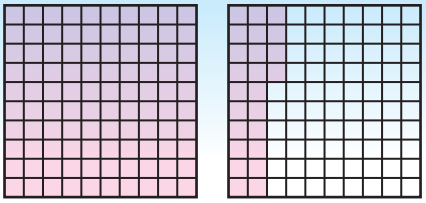
Problem Solving • Applications

14. THINK SMARTER Shade the grids to show three different ways to represent $\frac{16}{100}$ using models.



15. MATHEMATICAL PRACTICE 1 **Describe Relationships**
Describe how one whole, one tenth, and one hundredth are related.

16. THINK SMARTER Shade the model to show $1\frac{24}{100}$. Then write the mixed number in decimal form.



Sense or Nonsense?

17. GO DEEPER The Memorial Library is 0.3 mile from school. Whose statement makes sense? Whose statement is nonsense? Explain your reasoning.

Gabe said he was going to walk 3 tenths mile to the Memorial Library after school.

Tara said she was going to walk 3 miles to the Memorial Library after school.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Equivalent Fractions and Decimals

Essential Question How can you record tenths and hundredths as fractions and decimals?

Number and Operations—Fractions—4.NF.5 *Also 4.NF.6*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6, MP.8

Unlock the Problem

Real World

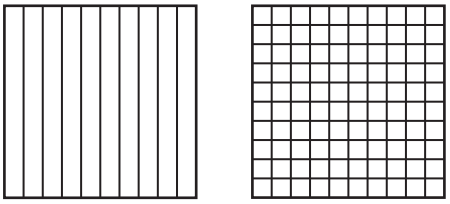
Daniel spent a day hiking through a wildlife preserve. During the first hour of the hike, he drank $\frac{6}{10}$ liter of water. How many hundredths of a liter did he drink?

- Underline what you need to find.
- How can you represent hundredths?

_____

One Way Write $\frac{6}{10}$ as an equivalent fraction with a denominator of 100.

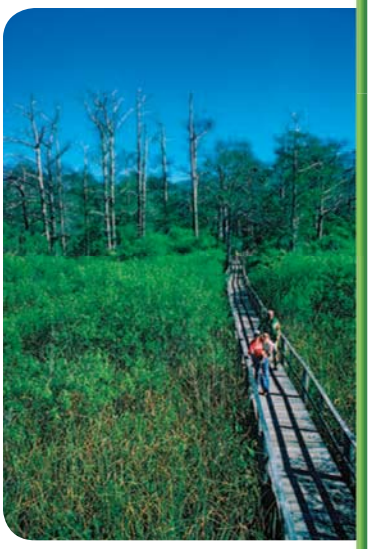
MODEL



$\frac{6}{10} = \frac{\square}{100}$

RECORD

$\frac{6}{10} = \frac{6 \times \square}{10 \times \square} = \frac{\square}{100}$



Another Way Write $\frac{6}{10}$ as a decimal.

Think: 6 tenths is the same as 6 tenths 0 hundredths.

Ones	.	Tenths	Hundredths

So, Daniel drank _____, or _____ liter of water.

Math Talk **Mathematical Practices**

Explain how you can write 0.2 as hundredths.

- Explain why 6 tenths is equivalent to 60 hundredths.

_____

_____

Jasmine collected 0.30 liter of water in a jar during a rainstorm. How many tenths of a liter did she collect?

Equivalent decimals are decimals that name the same amount. You can write 0.30 as a decimal that names tenths.

One Way Write 0.30 as an equivalent decimal.

Show 0.30 in the place-value chart.

Ones	.	Tenths	Hundredths

Think: There are no hundredths.

0.30 is equivalent to _____ tenths.

Write 0.30 as _____.

Another Way Write 0.30 as a fraction with a denominator of 10.

STEP 1 Write 0.30 as a fraction.

0.30 is _____ hundredths.

30 hundredths written as a fraction is _____.

STEP 2 Write $\frac{30}{100}$ as an equivalent fraction with a denominator of 10.

Think: 10 is a common factor of the numerator and the denominator.

$$\frac{30}{100} = \frac{30 \div \square}{100 \div \square} = \frac{\square}{10}$$

So, Jasmine collected _____, or _____ liter of water.

Share and Show

MATH BOARD

1. Write $\frac{4}{10}$ as hundredths.

Write $\frac{4}{10}$ as an equivalent fraction.

$$\frac{4}{10} = \frac{4 \times \square}{10 \times \square} = \frac{\square}{100}$$

Fraction: _____

Write $\frac{4}{10}$ as a decimal.

Ones	.	Tenths	Hundredths
	.		

Decimal: _____

Name _____

Write the number as hundredths in fraction form and decimal form.

2. $\frac{7}{10}$

3. 0.5

4. $\frac{3}{10}$

Write the number as tenths in fraction form and decimal form.

5. 0.40

6. $\frac{80}{100}$

7. $\frac{20}{100}$

On Your Own

Practice: Copy and Solve **Write the number as hundredths in fraction form and decimal form.**

8. $\frac{8}{10}$

9. $\frac{2}{10}$

10. 0.1

Math Talk **Mathematical Practices**

Can you write 0.25 as tenths? Explain.

Practice: Copy and Solve **Write the number as tenths in fraction form and decimal form.**

11. $\frac{60}{100}$

12. $\frac{90}{100}$

13. 0.70

THINK SMARTER **Write the number as an equivalent mixed number with hundredths.**

14. $1\frac{4}{10}$

15. $3\frac{5}{10}$

16. $2\frac{9}{10}$

Problem Solving • Applications

17. THINK SMARTER Carter says that 0.08 is equivalent to $\frac{8}{10}$. Describe and correct Carter's error.

18. THINK SMARTER For numbers 18a–18e, choose True or False for the statement.

18a. 0.6 is equivalent to $\frac{6}{100}$. ○ True ○ False

18b. $\frac{3}{10}$ is equivalent to 0.30. ○ True ○ False

18c. $\frac{40}{100}$ is equivalent to $\frac{4}{10}$. ○ True ○ False

18d. 0.40 is equivalent to $\frac{4}{100}$. ○ True ○ False

18e. 0.5 is equivalent to 0.50. ○ True ○ False

Connect to Science

Inland Water

How many lakes and rivers does your state have? The U.S. Geological Survey defines inland water as water that is surrounded by land. The Atlantic Ocean, the Pacific Ocean, and the Great Lakes are not considered inland water.

19. WRITE Math Just over $\frac{2}{100}$ of the entire United States is inland water. Write $\frac{2}{100}$ as a decimal.

20. MATHEMATICAL PRACTICE 6 Can you write 0.02 as tenths? **Explain.**

21. About 0.17 of the area of Rhode Island is inland water. Write 0.17 as a fraction.

22. GO DEEPER Louisiana's lakes and rivers cover about $\frac{1}{10}$ of the state. Write $\frac{1}{10}$ as hundredths in words, fraction form, and decimal form.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Relate Fractions, Decimals, and Money

Essential Question How can you relate fractions, decimals, and money?

Number and Operations—Fractions—4.NF.6

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

Together, Julie and Sarah have $1.00 in quarters. They want to share the quarters equally. How many quarters should each girl get? How much money is this?

Remember

1 dollar = 100 cents
1 quarter = 25 cents
1 dime = 10 cents
1 penny = 1 cent

Use the model to relate money, fractions, and decimals.

4 quarters = 1 dollar = $1.00

$0.25 $0.25 $0.25 $0.25

1 quarter is $\frac{25}{100}$, or $\frac{1}{4}$ of a dollar.

2 quarters are $\frac{50}{100}$, $\frac{2}{4}$, or $\frac{1}{2}$ of a dollar.

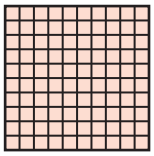
$\frac{1}{2}$ of a dollar = $0.50, or 50 cents.

Circle the number of quarters each girl should get.

So, each girl should get 2 quarters, or $ _____.

Examples Use money to model decimals.

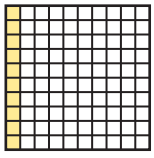
1 dollar



$1.00, or

_____ cents

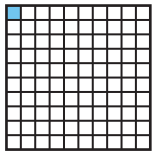
10 dimes = 1 dollar



1 dime = $\frac{1}{10}$, or 0.10 of a dollar

$ _____, or 10 cents

100 pennies = 1 dollar



1 penny = $\frac{1}{100}$, or 0.01 of a dollar

$ _____, or 1 cent

Math Talk **Mathematical Practices**

If you have 68 pennies, what part of a dollar do you have? **Explain**.

Relate Money and Decimals Think of dollars as ones, dimes as tenths, and pennies as hundredths.

$1.56

Dollars	.	Dimes	Pennies
1	.	5	6

Think: $1.56 = 1 dollar and 56 pennies

There are 100 pennies in 1 dollar.
So, $1.56 = 156 pennies.

1.56 dollars

Ones	.	Tenths	Hundredths
1	.	5	6

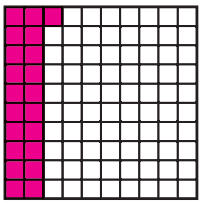
Think: 1.56 = 1 one and 56 hundredths

There are 100 hundredths in 1 one.
So, 1.56 = 156 hundredths.

More Examples

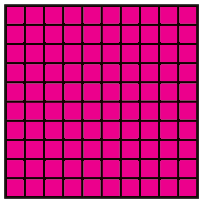
Shade the decimal model to show the money amount. Then write the money amount and a fraction in terms of dollars.

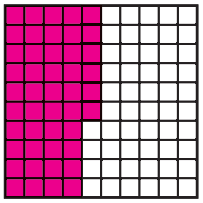
A



_____, or $\frac{21}{100}$ of a dollar

B





$1.46, or $1\frac{\quad}{100}$ dollars

Try This! **Complete the table to show how money, fractions, mixed numbers, and decimals are related.**

$ Bills and Coins	Money Amount	Fraction or Mixed Number	Decimal
	$0.03		0.03
	$0.25	$\frac{25}{100}$, or $\frac{1}{4}$	
2 quarters 1 dime		$\frac{60}{100}$, or $\frac{6}{10}$	
2 $1 bills 5 nickels			

Math Talk **Mathematical Practices**

Would you rather have $0.25 or $\frac{3}{10}$ of a dollar? **Explain.**

Name _____

Share and Show

MATH BOARD

1. Write the amount of money as a decimal in terms of dollars.

5 pennies = $\frac{5}{100}$ of a dollar = _____ of a dollar.

Write the total money amount. Then write the amount as a fraction or a mixed number and as a decimal in terms of dollars.

2.

_____ _____ _____

3.

_____ _____ _____

Write as a money amount and as a decimal in terms of dollars.

4. $\frac{92}{100}$ _____ _____

5. $\frac{7}{100}$ _____ _____

6. $\frac{16}{100}$ _____ _____

7. $\frac{53}{100}$ _____ _____

Math Talk — **Mathematical Practices**

Explain how \$0.84 and $\frac{84}{100}$ of a dollar are related.

On Your Own

Write the total money amount. Then write the amount as a fraction or a mixed number and as a decimal in terms of dollars.

8.

_____ _____ _____

9.

_____ _____ _____

Write as a money amount and as a decimal in terms of dollars.

10. $\frac{27}{100}$ _____ _____

11. $\frac{4}{100}$ _____ _____

12. $\frac{75}{100}$ _____ _____

13. $\frac{100}{100}$ _____ _____

Write the total money amount. Then write the amount as a fraction and as a decimal in terms of dollars.

14. 1 quarter 6 dimes 8 pennies

_____ _____ _____

15. 3 dimes 5 nickels 20 pennies

_____ _____ _____

MATHEMATICAL PRACTICE 6 **Make Connections** **Algebra** **Complete to tell the value of each digit.**

16. \$1.05 = _____ dollar + _____ pennies, 1.05 = _____ one + _____ hundredths

17. \$5.18 = _____ dollars + _____ dime + _____ pennies

5.18 = _____ ones + _____ tenth + _____ hundredths

Problem Solving • Applications

Real World

Use the table for 18–19.

18. The table shows the coins three students have. Write Nick's total amount as a fraction in terms of dollars.

_____

Pocket Change				
Name	**Quarters**	**Dimes**	**Nickels**	**Pennies**
Kim	1	3	2	3
Tony	0	6	1	6
Nick	2	4	0	2

19. THINK SMARTER Kim spent $\frac{40}{100}$ of a dollar on a snack. Write as a money amount the amount she has left.

_____

20. GO DEEPER Travis has $\frac{1}{2}$ of a dollar. He has at least two different types of coins in his pocket. Draw two possible sets of coins that Travis could have.

21. THINK SMARTER Complete the table.

\$ Bills and Coins	Money Amount	Fraction or Mixed Number	Decimal
6 pennies		$\frac{6}{100}$	0.06
	\$0.50		0.50
		$\frac{70}{100}$ or $\frac{7}{10}$	0.70
3 \$1 bills 9 pennies			3.09

Name _____

Problem Solving • Money

Essential Question How can you use the strategy *act it out* to solve problems that use money?

Measurement and Data—4.MD.2

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5

Unlock the Problem

Together, Marnie and Serena have $1.20. They want to share the money equally. How much money will each girl get?



Use the graphic organizer to solve the problem.

Read the Problem

What do I need to find?

I need to find the _____

_____

What information do I need to use?

I need to use the total amount, _____, and divide the amount into _____ equal parts.

How will I use the information?

I will use coins to model the _____ and act out the problem.

Solve the Problem

You can make $1.20 with 4 quarters and 2 _____.

Circle the coins to show two sets with equal value.

So, each girl gets _____ quarters and _____ dime. Each girl gets $_____.

- Describe another way you could act out the problem with coins.

_____

_____

Try Another Problem

Josh, Tom, and Chuck each have $0.40. How much money do they have together?

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

- How can you solve the problem using dimes and nickels?

Math Talk **Mathematical Practices**

What other strategy might you use to solve the problem? **Explain.**

Name _____

Share and Show

MATH BOARD

1. Juan has $3.43. He is buying a paint brush that costs $1.21 to paint a model race car. How much will Juan have after he pays for the paint brush?

First, use bills and coins to model $3.43.

Next, you need to subtract. Remove bills and coins that have a value of $1.21. Mark Xs to show what you remove.

Last, count the value of the bills and coins that are left. How much will Juan have left?

_____

2. What if Juan has $3.43, and he wants to buy a paint brush that costs $2.28? How much money will Juan have left then? Explain.

_____

_____

_____

_____

_____

3. Sophia has $2.25. She wants to give an equal amount to each of her 3 young cousins. How much will each cousin receive?

_____

Unlock the Problem

- Circle the question.
- Underline the important facts.
- Cross out unneeded information.

WRITE Math
Show Your Work

On Your Own

4. Marcus saves $13 each week. In how many weeks will he have saved at least $100?

5. MATHEMATICAL PRACTICE 1 **Analyze Relationships** Hoshi has $50. Emily has $23 more than Hoshi. Karl has $16 less than Emily. How much money do they have all together?

6. THINK SMARTER Four girls have $5.00 to share equally. How much money will each girl get? Explain.

WRITE Math
Show Your Work

7. GO DEEPER What if four girls want to share $5.52 equally? How much money will each girl get? Explain.

Personal Math Trainer

8. THINK SMARTER + Aimee and three of her friends find three quarters and one nickel on the ground. If Aimee and her friends share the money equally, how much will each person get? Explain how you found your answer.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

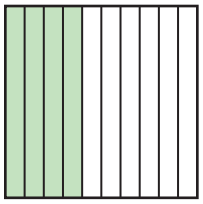
Choose the best term from the box to complete the sentence.

Vocabulary
decimal
decimal point
hundred
hundredth

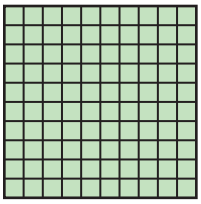
1. A symbol used to separate the ones and the tenths place is called a _____. (p. 359)
2. The number 0.4 is written as a _____. (p. 359)
3. A _____ is one of one hundred equal parts of a whole. (p. 363)

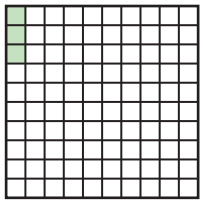
Concepts and Skills

Write the fraction or mixed number and the decimal shown by the model. (4.NF.6)

4. 

_____ _____

5. 



_____ _____

Write the number as hundredths in fraction form and decimal form. (4.NF.5)

6. $\frac{8}{10}$ _____

7. 0.5 _____

8. $\frac{6}{10}$ _____

Write the fraction or mixed number as a money amount, and as a decimal in terms of dollars. (4.NF.6)

9. $\frac{65}{100}$ _____

10. $1\frac{48}{100}$ _____

11. $\frac{4}{100}$ _____

12. Ken's turtle competed in a 0.50-meter race. His turtle had traveled $\frac{49}{100}$ meter when the winning turtle crossed the finish line. What is $\frac{49}{100}$ written as a decimal? (4.NF.6)

13. Alex lives eight tenths of a mile from Sarah. What is eight tenths written as a decimal? (4.NF.6)

14. What fraction, in hundredths, is equivalent to $\frac{1}{10}$? (4.NF.5)

15. Elaine found the following in her pocket. How much money was in her pocket? (4.NF.6)

16. Three girls share $0.60. Each girl gets the same amount. How much money does each girl get? (4.MD.2)

17. The deli scale weighs meat and cheese in hundredths of a pound. Sam put $\frac{5}{10}$ pound of pepperoni on the deli scale. What weight does the deli scale show? (4.NF.5)

Name _____

Add Fractional Parts of 10 and 100

Essential Question How can you add fractions when the denominators are 10 or 100?

Number and Operations—Fractions—4.NF.5 *Also 4.MD.2*

MATHEMATICAL PRACTICES
MP.2, MP.6, MP.7, MP.8

Unlock the Problem

The fourth grade classes are painting designs on tile squares to make a mural. Mrs. Kirk's class painted $\frac{3}{10}$ of the mural. Mr. Becker's class painted $\frac{21}{100}$ of the mural. What part of the mural is painted?

You know how to add fractions with parts that are the same size. You can use equivalent fractions to add fractions with parts that are not the same size.

Example 1

Find $\frac{3}{10} + \frac{21}{100}$.

STEP 1 Write $\frac{3}{10}$ and $\frac{21}{100}$ as a pair of fractions with a common denominator.

Think: 100 is a multiple of 10. Use 100 as the common denominator.

$$\frac{3}{10} = \frac{3 \times \square}{10 \times \square} = \frac{\square}{100}$$

Think: $\frac{21}{100}$ already has 100 in the denominator.

So, $\frac{\square}{100}$ of the mural is painted.

STEP 2 Add.

Think: Write $\frac{3}{10} + \frac{21}{100}$ using fractions with a common denominator.

$$\frac{30}{100} + \frac{21}{100} = \frac{\square}{100}$$

Math Talk **Mathematical Practices**

When adding tenths and hundredths, can you always use 100 as a common denominator? **Explain.**

Try This!

Find $\frac{4}{100} + \frac{1}{10}$.

A Write $\frac{1}{10}$ as $\frac{10}{100}$.

$$\frac{1}{10} = \frac{1 \times \square}{10 \times \square} = \frac{\square}{100}$$

B Add.

$$\frac{\square}{100} + \frac{10}{100} = \frac{\square}{100}$$

So, $\frac{4}{100} + \frac{10}{100} = \frac{14}{100}$

Example 2 Add decimals.

Sean lives 0.5 mile from the store. The store is 0.25 mile from his grandmother's house. Sean is going to walk to the store and then to his grandmother's house. How far will he walk?

Find 0.5 + 0.25.

STEP 1 Write 0.5 + 0.25 as a sum of fractions.

Think: 0.5 is 5 tenths. **Think:** 0.25 is 25 hundredths.

$0.5 = \frac{\square}{\square}$ $0.25 = \frac{\square}{\square}$

Write 0.5 + 0.25 as $\frac{\square}{\square} + \frac{\square}{\square}$

STEP 2 Write $\frac{5}{10} + \frac{25}{100}$ as a sum of fractions with a common denominator.

Think: Use 100 as a common denominator. Rename $\frac{5}{10}$.

$$\frac{5}{10} = \frac{5 \times \square}{10 \times \square} = \frac{\square}{100}$$

Write $\frac{5}{10} + \frac{25}{100}$ as $\frac{\square}{\square} + \frac{\square}{\square}$.

STEP 3 Add.

$$\frac{50}{100} + \frac{25}{100} = \frac{\square}{\square}$$

STEP 4 Write the sum as a decimal.

$$\frac{75}{100} = \_\_\_\_$$

So, Sean will walk _____ mile.

Math Talk **Mathematical Practices**

Explain why you can think of \$0.25 as either $\frac{1}{4}$ dollar or $\frac{25}{100}$ dollar.

Try This! **Find \$0.25 + \$0.40.**

\$0.25 + \$0.40 = _____

Remember

A money amount less than a dollar can be written as a fraction of a dollar.

Name _____

Share and Show

MATH BOARD

1. Find $\frac{7}{10} + \frac{5}{100}$.

Think: Write the addends as fractions with a common denominator.

$\frac{\square}{100} + \frac{\square}{100} = \frac{\square}{\square}$

Find the sum.

2. $\frac{1}{10} + \frac{11}{100} =$ _____

3. $\frac{36}{100} + \frac{5}{10} =$ _____

4. $\$0.16 + \$0.45 = \$$_____

5. $\$0.08 + \$0.88 = \$$_____

On Your Own

6. $\frac{6}{10} + \frac{25}{100} =$ _____

7. $\frac{7}{10} + \frac{7}{100} =$ _____

8. $\frac{19}{100} + \frac{4}{10} =$ _____

9. $\frac{3}{100} + \frac{9}{10} =$ _____

10. $\$0.55 + \$0.23 = \$$_____

11. $\$0.19 + \$0.13 = \$$_____

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** Write the number that makes the equation true.

12. $\frac{20}{100} + \frac{\square}{10} = \frac{60}{100}$

13. $\frac{2}{10} + \frac{\square}{100} = \frac{90}{100}$

Problem Solving • Applications

Use the table for 14–17.

Paving Stone Center	
Style	**Length (in meters)**
Rustic	$\frac{15}{100}$
Teakwood	$\frac{3}{10}$
Buckskin	$\frac{41}{100}$
Rainbow	$\frac{6}{10}$
Rose	$\frac{8}{100}$

14. THINK SMARTER Dean selects Teakwood stones and Buckskin stones to pave a path in front of his house. How many meters long will each set of one Teakwood stone and one Buckskin stone be?

15. The backyard patio at Nona's house is made from a repeating pattern of one Rose stone and one Rainbow stone. How many meters long is each pair of stones?

16. GO DEEPER For a stone path, Emily likes the look of a Rustic stone, then a Rainbow stone, and then another Rustic stone. How long will the three stones in a row be? Explain.

17. WRITE *Math* Which two stones can you place end-to-end to get a length of 0.38 meters? Explain how you found your answer.

18. THINK SMARTER Christelle is making a dollhouse. The dollhouse is $\frac{6}{10}$ meter high without the roof. The roof is $\frac{15}{100}$ meter high. What is the height of the dollhouse with the roof? Choose a number from each column to complete an equation to solve.

$\frac{6}{10} + \frac{15}{100} =$ [$\frac{6}{100}$ / $\frac{60}{100}$ / $\frac{61}{100}$] + [$\frac{15}{10}$ / $\frac{5}{100}$ / $\frac{15}{100}$] = [$\frac{65}{100}$ / $\frac{7}{10}$ / $\frac{75}{100}$] meter high.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare Decimals

Essential Question How can you compare decimals?

Number and Operations—Fractions—4.NF.7

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

The city park covers 0.64 square mile. About 0.18 of the park is covered by water, and about 0.2 of the park is covered by paved walkways. Is more of the park covered by water or paved walkways?

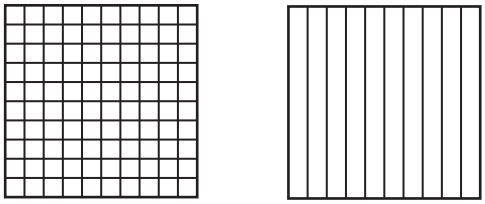
- Cross out unnecessary information.
- Circle numbers you will use.
- What do you need to find?

_____

_____

One Way Use a model.

Shade 0.18. Shade 0.2.



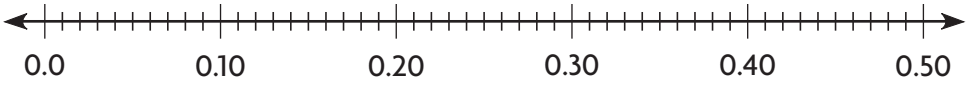
0.18 ◯ 0.2

Other Ways

A Use a number line.

Locate 0.18 and 0.2 on a number line.

Think: 2 tenths is equivalent to 20 hundredths.



_____ is closer to 0, so 0.18 ◯ 0.2.

B Compare equal-size parts.

- 0.18 is _____ hundredths.
- 0.2 is 2 tenths, which is equivalent to _____ hundredths.

18 hundredths ◯ 20 hundredths, so 0.18 ◯ 0.2.

So, more of the park is covered by _____.

Math Talk **Mathematical Practices**

How does the number of tenths in 0.18 compare to the number of tenths in 0.2? **Explain**.

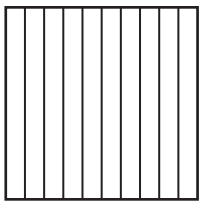
Place Value You can compare numbers written as decimals by using place value. Comparing decimals is like comparing whole numbers. Always compare the digits in the greatest place-value position first.

Example Use place value.

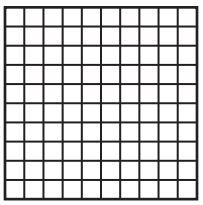
Tim has 0.5 dollar, and Sienna has 0.05 dollar. Who has more money?

MODEL

Tim



Sienna



So, _____ has more money.

RECORD

Ones	.	Tenths	Hundredths
	.		
	.		

← Tim

← Sienna

Think: The digits in the ones place are the same. Compare the digits in the tenths place.

5 tenths ◯ 0 tenths, so 0.5 ◯ 0.05.

- Compare the size of 1 tenth to the size of 1 hundredth. How could this help you compare 0.5 and 0.05? Explain.

_____

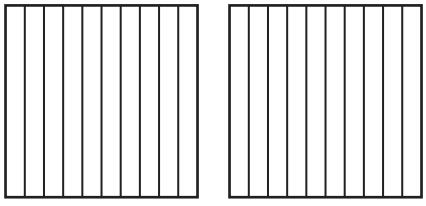
_____

_____

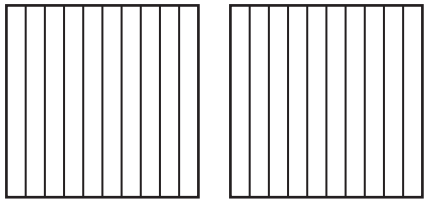
Try This! **Compare 1.3 and 0.6. Write <, >, or =.**

1.3 ◯ 0.6

Shade to model 1.3.



Shade to model 0.6.



Math Talk **Mathematical Practices**

Explain how you could use place value to compare 1.3 and 0.6.

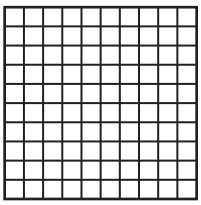
Name _____

Share and Show

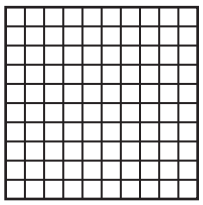
MATH BOARD

1. Compare 0.39 and 0.42. Write <, >, or =. Shade the model to help.

0.39 ◯ 0.42



0.39



0.42

Compare. Write <, >, or =.

2. 0.26 ◯ 0.23

Ones	.	Tenths	Hundredths
	.		
	.		

3. 0.7 ◯ 0.54

Ones	.	Tenths	Hundredths
	.		
	.		

4. 1.15 ◯ 1.3

Ones	.	Tenths	Hundredths
	.		
	.		

5. 4.5 ◯ 2.89

Ones	.	Tenths	Hundredths
	.		
	.		

Math Talk — **Mathematical Practices**

Can you compare 0.39 and 0.42 by comparing only the tenths? **Explain.**

On Your Own

Compare. Write <, >, or =.

6. 0.9 ◯ 0.81

7. 1.06 ◯ 0.6

8. 0.25 ◯ 0.3

9. 2.61 ◯ 3.29

10. 0.38 ◯ 0.83

11. 1.9 ◯ 0.99

12. 1.11 ◯ 1.41

13. 0.8 ◯ 0.80

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Compare. Write <, >, or =.**

14. 0.30 ◯ $\frac{3}{10}$

15. $\frac{4}{100}$ ◯ 0.2

16. 0.15 ◯ $\frac{1}{10}$

17. $\frac{1}{8}$ ◯ 0.8

Unlock the Problem Real World

18. THINK SMARTER Ricardo and Brandon ran a 1500-meter race. Ricardo finished in 4.89 minutes. Brandon finished in 4.83 minutes. What was the time of the runner who finished first?

a. What are you asked to find? _____

b. What do you need to do to find the answer? _____

_____

c. Solve the problem.

d. What was the time of the runner who finished first?

_____

e. Look back. Does your answer make sense? Explain.

_____

_____

_____

_____

19. GO DEEPER The Venus flytrap closes in 0.3 second and the waterwheel plant closes in 0.2 second. What decimal is halfway between 0.2 and 0.3? Explain.

_____

_____

_____

_____

Personal Math Trainer

20. THINK SMARTER + For numbers 20a–20c, select True or False for the inequality.

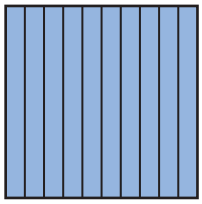
20a.	$0.5 > 0.53$	○ True	○ False
20b.	$0.35 < 0.37$	○ True	○ False
20c.	$\$1.35 > \$0.35$	○ True	○ False

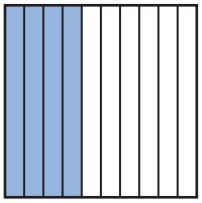
FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 9 Review/Test

1. Select a number shown by the model. Mark all that apply.





$\frac{14}{10}$	$\frac{40}{10}$	1.4
$1\frac{4}{10}$	14	4.1

2. Rick has one dollar and twenty-seven cents to buy a notebook. Which names this money amount in terms of dollars? Mark all that apply.

- (A) 12.7
- (B) 1.027
- (C) $1.27
- (D) 1.27
- (E) $1\frac{27}{100}$
- (F) $\frac{127}{10}$

3. For numbers 3a–3e, select True or False for the statement.

3a.	0.9 is equivalent to 0.90.	○ True	○ False
3b.	0.20 is equivalent to $\frac{2}{100}$.	○ True	○ False
3c.	$\frac{80}{100}$ is equivalent to $\frac{8}{10}$.	○ True	○ False
3d.	$\frac{6}{10}$ is equivalent to 0.60.	○ True	○ False
3e.	0.3 is equivalent to $\frac{3}{100}$.	○ True	○ False

GO DIGITAL Assessment Options
Chapter Test

4. After selling some old books and toys, Gwen and her brother Max had 5 one-dollar bills, 6 quarters, and 8 dimes. They agreed to divide the money equally.

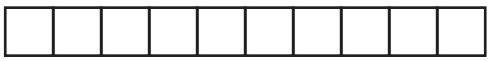
Part A

What is the total amount of money that Gwen and Max earned? Explain.

Part B

Max said that he and Gwen cannot get equal amounts of money because 5 one-dollar bills cannot be divided evenly. Do you agree with Max? Explain.

5. Harrison rode his bike $\frac{6}{10}$ of a mile to the park. Shade the model. Then write the decimal to show how far Harrison rode his bike.



Harrison rode his bike _____ mile to the park.

6. Amaldo spent $\frac{88}{100}$ of a dollar on a souvenir pencil from Zion National Park in Utah. What is $\frac{88}{100}$ written as a decimal in terms of dollars?

7. Tran has $5.82. He is saving for a video game that costs $8.95.

Tran needs _____ more to have enough money for the game.

Name _____

8. Cheyenne lives $\frac{7}{10}$ mile from school. A fraction in hundredths equal to $\frac{7}{10}$ is _____.

9. Write a decimal in tenths that is **less** than 2.42 but **greater** than 2.0.

_____

10. Kylee and two of her friends are at a museum. They find two quarters and one dime on the ground.

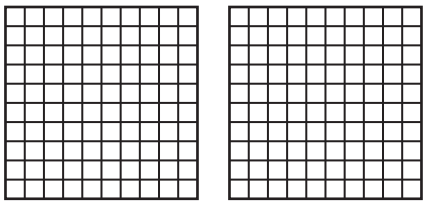
Part A

If Kylee and her friends share the money equally, how much will each person get? Explain how you found your answer.

Part B

Kylee says that each person will receive $\frac{2}{10}$ of the money that was found. Do you agree? Explain.

11. Shade the model to show $1\frac{52}{100}$. Then write the mixed number in decimal form.



12. Henry is making a recipe for biscuits. A recipe calls for $\frac{5}{10}$ kilogram flour and $\frac{9}{100}$ kilogram sugar.

Part A

If Henry measures correctly and combines the two amounts, how much flour and sugar will he have? Show your work.

Part B

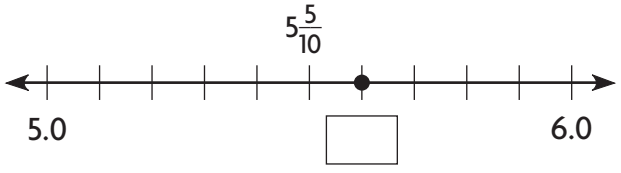
How can you write your answer as a decimal?

13. An orchestra has 100 musicians. $\frac{4}{10}$ of them play string instruments—violin, viola, cello, double bass, guitar, lute, and harp. What decimal is equivalent to $\frac{4}{10}$?

14. Complete the table.

$ Bills and Coins	Money Amount	Fraction or Mixed Number	Decimal
8 pennies		$\frac{8}{100}$	0.08
	$0.50		0.50
		$\frac{90}{100}$ or $\frac{9}{10}$	0.90
4 $1 bills 5 pennies			4.05

15. The point on the number line shows the number of seconds it took an athlete to run the forty-yard dash. Write the decimal that correctly names the point.

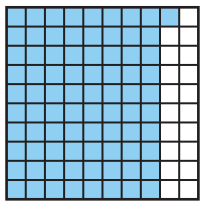


Name _____

16. Ingrid is making a toy car. The toy car is $\frac{5}{10}$ meter high without the roof. The roof is $\frac{18}{100}$ meter high. What is the height of the toy car with the roof? Choose a number from each column to complete an equation to solve.

$\frac{5}{10} + \frac{18}{100} =$ [$\frac{5}{100}$ / $\frac{15}{100}$ / $\frac{50}{100}$] + [$\frac{18}{100}$ / $\frac{81}{100}$ / $\frac{18}{10}$] = [$\frac{68}{10}$ / $\frac{32}{100}$ / $\frac{68}{100}$] meter high.

17. Callie shaded the model to represent the questions she answered correctly on a test. What decimal represents the part of the model that is shaded?



represents ☐

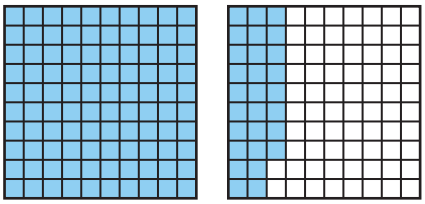
18. For numbers 18a–18f, select True or False for the inequality.

18a.	$0.21 < 0.27$	○ True	○ False
18b.	$0.4 > 0.45$	○ True	○ False
18c.	$\$3.21 > \$0.2$	○ True	○ False
18d.	$1.9 < 1.90$	○ True	○ False
18e.	$0.41 = 0.14$	○ True	○ False
18f.	$6.2 > 6.02$	○ True	○ False

19. Fill in the numbers to find the sum.

$\frac{4}{10} + \frac{\square}{100} = \frac{8}{\square}$

20. Steve is measuring the growth of a tree. He drew this model to show the tree's growth in meters. Which fraction, mixed number, or decimal does the model show? Mark all that apply.



(A) 1.28

(B) 12.8

(C) 0.28

(D) $2\frac{8}{100}$

(E) $1\frac{28}{100}$

(F) $1\frac{28}{10}$

21. Luke lives 0.4 kilometer from a skating rink. Mark lives 0.25 kilometer from the skating rink.

Part A

Who lives closer to the skating rink? Explain.

Part B

How can you write each distance as a fraction? Explain.

Part C

Luke is walking to the skating rink to pick up a practice schedule. Then he is walking to Mark's house. Will he walk more than a kilometer or less than a kilometer? Explain.