

# **5th Grade** CALIFORNIA







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# CALIFORNIA

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Sincerely,

The Authors

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# CALIFORNIA

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# Fluency with Whole Numbers and Decimals



**Critical Area** Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations

# Place Value, Multiplication, and Expressions

3

DomainsOperations and Algebraic Thinking<br/>Number and Operations in Base TenCALIFORNIA COMMON CORE STANDARDS5.0A.1, 5.0A.2, 5.NBT.1, 5.NBT.2, 5.NBT.5, 5.NBT.6

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# **Critical Area**



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# **Chapter 1 Overview**

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you use place value, multiplication, and expressions to represent and solve problems?
- How can you read, write, and represent whole numbers through millions?
- How can you use properties and multiplication to solve problems?
- How can you use expressions to represent and solve a problem?



#### Chapter 2 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you divide whole numbers?
- What strategies have you used to place the first digit in the quotient?
- How can you use estimation to help you divide?
- How do you know when to use division to solve a problem?

# Chapter 3 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you add and subtract decimals?
- What methods can you use to find decimal sums and differences?
- How does using place value help you add and subtract decimals?





# **Divide Whole Numbers**

Domains Number and Operations in Base Ten Number and Operations–Fractions CALIFORNIA COMMON CORE STANDARDS 5.NBT.6, 5.NF.3

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# Add and Subtract Decimals

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**Domain** Number and Operations in Base Ten **CALIFORNIA COMMON CORE STANDARDS** 5.NBT.1, 5.NBT.3a, 5.NBT.3b, 5.NBT.4, 5.NBT.7

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# **Divide Decimals**

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In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you solve decimal multiplication problems?
- How is multiplying with decimals similar to multiplying with whole numbers?
- How can patterns, models, and drawings help you solve decimal multiplication problems?
- How do you know where to place a decimal point in a product?
- How do you know the correct number of decimal places in a product?

# Chapter 5 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you solve decimal division problems?
- How is dividing with decimals similar to dividing with whole numbers?
- How can patterns, models, and drawings help you solve decimal division problems?
- How do you know where to place a decimal point in a quotient?
- How do you know the correct number of decimal places in a quotient?



# **Operations with Fractions**



**Critical Area** Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)

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# **Chapter 6 Overview**

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you add and subtract fractions with unlike denominators?
- How do models help you find sums and differences of fractions?
- When you add and subtract fractions, when do you use the least common denominator?

6 Add and Subtract Fractions with Unlike Denominators

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Domains Operations and Algebraic Thinking Number and Operations–Fractions CALIFORNIA COMMON CORE STANDARDS 5.0A.2.1, 5.NF.1, 5.NF.2

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# **Multiply Fractions**

# **Domain** Number and Operations–Fractions

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In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How do you multiply fractions?
- How can you model fraction multiplication?
- How can you compare fraction factors and products?

# Chapter 8 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- What strategies can you use to solve division problems involving fractions?
- What is the relationship between multiplication and division, and how can you use it to solve division problems?
- How can you use fractions, diagrams, equations, and story problems to represent division?
- When you divide a whole number by a fraction or a fraction by a whole number. how do the dividend, the divisor, and the quotient compare?

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# **Divide Fractions**

# 355

**Domain** Number and Operations–Fractions **CALIFORNIA COMMON CORE STANDARDS** 5.NF.3, 5.NF.7a, 5.NF.7b, 5.NF.7c

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# **Geometry and Measurement**



соммом Critical Area Developing understanding of volume

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# Chapter 9 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you use line plots, coordinate grids, and patterns to help you graph and interpret data?
- How can a line plot help you find an average with data given in fractions?
- How can a coordinate grid help you interpret experimental and real-world data?
- How can you write and graph ordered pairs on a coordinate grid using two numerical patterns?



# Algebra: Patterns and Graphing 387

Domains Operations and Algebraic Thinking Measurement and Data Geometry CALIFORNIA COMMON CORE STANDARDS 5.0A.3, 5.MD.2, 5.G.1, 5.G.2

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10/	<b>Convert Units of Me</b>
	Domain Measurement and Data
	CALIFORNIA COMMON CORE STANDARD 5.MD.1
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**Measure** 



# Chapter 10 Overview

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In this chapter, you will explore and discover answers to the following **Essential Questions**:

- What strategies can you use to compare and convert measurements?
- How can you decide whether to multiply or divide when you are converting measurements?
- How can you organize your solution when you are solving a multistep measurement problem?
- How is converting metric measurements different from converting customary measurements?



# Chapter 11 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How do unit cubes help you build solid figures and understand the volume of a rectangular prism?
- How can you identify, describe, and classify three-dimensional figures?
- How can you find the volume of a rectangular prism?





# Geometry and Volume

# **463**

Domains Measurement and Data Geometry

#### CALIFORNIA COMMON CORE STANDARDS

5.MD.3, 5.MD.3a, 5.MD.3b, 5.MD.4, 5.MD.5a, 5.MD.5b, 5.MD.5c, 5.G.3, 5.G.4

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# Critical Area Fluency with Whole Numbers and Decimals



**(CRITICAL AREA)** Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations

1

Chef preparing lunch in a restaurant

10

# Project

# In the Chef's Kitchen

Restaurant chefs estimate the amount of food they need to buy based on how many diners they expect. They usually use recipes that make enough to serve large numbers of people.

# **Get Started**

Although apples can grow in any of the 50 states, Pennsylvania is one of the top apple-producing states. The ingredients at the right are needed to make 100 servings of Apple Dumplings. Suppose you and a partner want to make this recipe for 25 friends. Adjust the amount of each ingredient to make just 25 servings.

# **Important Facts**

#### Apple Dumplings (100 servings)

- 100 baking apples
- 72 tablespoons sugar  $(4\frac{1}{2} \text{ cups})$
- 14 cups all-purpose flour
- 6 teaspoons baking powder
- 24 eggs
- 80 tablespoons butter (10 sticks of butter)
- 50 tablespoons chopped walnuts  $(3\frac{1}{8} \text{ cups})$

# Apple Dumplings (25 servings)



# Completed by

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# Place Value, Multiplication, and Expressions

# Show What You Know

Check your understanding of important skills.

Name	
Place Value Write the value	of each digit for the given number.
<b>1.</b> 2,904	<b>2.</b> 6,423
2	6
9	4
0	2
4	3
Regroup Through Thousan	nds Regroup. Write the missing numbers.
<b>3.</b> 40 tens = hundreds	<b>4.</b> 60 hundreds = thousands
<b>5.</b> tens 15 ones = 6 tens	5 ones <b>6.</b> 18 tens 20 ones = hundreds
Missing Factors Find the m	nissing factor.
<b>7.</b> 4 × = 24	<b>8.</b> $6 \times \_\_\_= 48$ <b>9.</b> $\_\_ \times 9 = 63$
Detective	Clues
	• This 7-digit number is 8,920,000 when rounded to
Be a Math Detective and use the clues at the right	the nearest ten thousand.
to find the 7-digit number.	• The digits in the tens and hundreds places are the least and same value.
What is the number?	• The value of the thousands digit is double that of
	the ten thousands digit. • The sum of all its digits is 24.
-	Percent Math Trainer

**Online Assessment** 

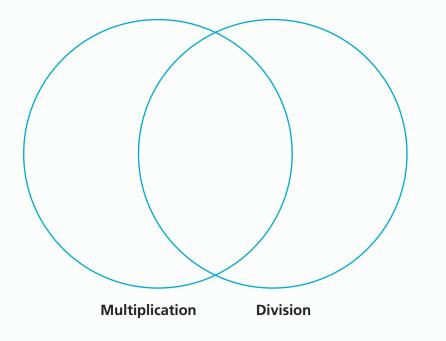
and Intervention

Chapter

# **Vocabulary Builder**

# Visualize It

Sort the review words into the Venn diagram.



# 

1. I am a group of 3 digits separated by commas in a multidigit

number.\_\_\_\_\_

2. I am a mathematical phrase that has numbers and operation signs

but no equal sign. \_\_\_\_\_

- 3. I am operations that undo each other, like multiplication and division.
- **4.** I am the property that states that multiplying a sum by a number is the same as multiplying each addend in the sum by the number and then adding the products.
- 5. I am a number that tells how many times the base is used

as a factor.

	١
60	
DIGITAL	ļ

# estimate factor multiply place value product quotient **Preview Words** base Distributive Property evaluate exponent inverse operations

**Review Words** 

numerical expression order of operations

period

#### Name \_\_\_

# **Place Value and Patterns**

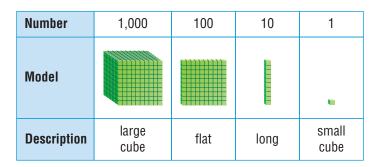
**Essential Question** How can you describe the relationship between two place-value positions?

# Investigate



## Materials base-ten blocks

You can use base-ten blocks to understand the relationships among place-value positions. Use a large cube for 1,000, a flat for 100, a long for 10, and a small cube for 1.



Complete the comparisons below to describe the relationship from one place-value position to the next place-value position.

**A.** • Look at the long and compare it to the small cube.

The long is \_\_\_\_\_\_ times as much as the small cube.

• Look at the flat and compare it to the long.

The flat is \_\_\_\_\_\_ times as much as the long.

• Look at the large cube and compare it to the flat.

The large cube is \_\_\_\_\_ times as much as the flat.

**B.** • Look at the flat and compare it to the large cube.

The flat is \_\_\_\_\_ of the large cube.

• Look at the long and compare it to the flat.

The long is \_\_\_\_\_ of the flat.

• Look at the small cube and compare it to the long.

The small cube is \_\_\_\_\_ of the long.

# Lesson 1.1

Number and Operations in Base Ten—5.NBT.1

MATHEMATICAL PRACTICES MP.5, MP.7





How many times as much is the flat compared to the small cube? the large cube to the small cube? Explain.

# **Draw Conclusions**

1. **Cook for a Pattern** Describe the pattern you see when you move from a lesser place-value position to the next greater place-value position.

2. **MATHEMATICAL Describe the pattern you** see when you move from a greater place-value position to the next lesser place-value position.

# **Make Connections**

You can use your understanding of place-value patterns and a place-value chart to write numbers that are 10 times as much as or  $\frac{1}{10}$  of any given number.

Hundred Thousands	Ten Thousands	One Thousands	Hundreds	Tens	Ones
			3	0	0
		?	300	?	
		10 ti	mes 1		
		as mu		of~	

## Use the steps below to complete the table.

**STEP 1** Write the given number in a place-value chart.

- **STEP 2** Use the place-value chart to write a number that is 10 times as much as the given number.
- **STEP 3** Use the place-value chart to write a number that is  $\frac{1}{10}$  of the given number.

Number	10 times as much as	1/10 of
10		
70		
9,000		

Name Share and Show	)
Complete the sentence.	
<b>1.</b> 500 is 10 times as much as	<b>3.</b> 20,000 is $\frac{1}{10}$ of
<b>3.</b> 900 is $\frac{1}{10}$ of	<b>4.</b> 600 is 10 times as much as

# Use place-value patterns to complete the table.

Number	10 times as much as	$\frac{1}{10}$ of
<b>5.</b> 10		
<b>6.</b> 3,000		
<b>7.</b> 800		
<b>8.</b> 50		

Number	10 times as much as	$\frac{1}{10}$ of
<b>9.</b> 400		
<b>10.</b> 90		
<b>11.</b> 6,000		
<b>12.</b> 200		

# THIMASMARTER Complete the sentence with 100 or 1,000. 13. 200 is \_\_\_\_\_\_ times as much as 2. 14. 4,000 is \_\_\_\_\_\_ times as much as 4.

**15.** 700,000 is \_\_\_\_\_\_ times as much as 700. **16.** 600 is \_\_\_\_\_\_ times as much as 6.

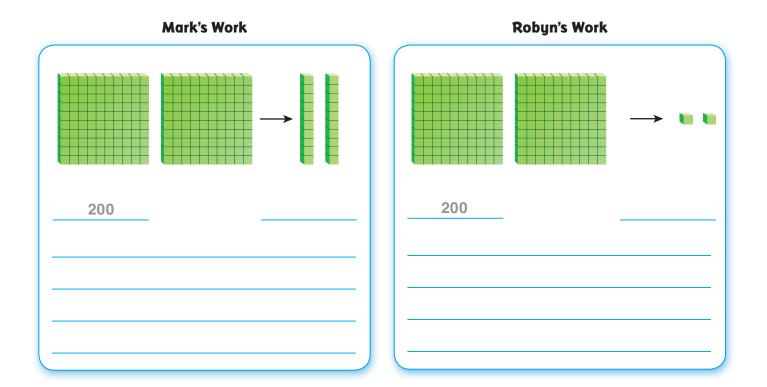
# **Problem Solving • Applications**

- **17. WRITE** *Math* Explain how you can use place-value patterns to describe how 50 and 5,000 compare.
- **18.** MATHEMATICAL **2** Use Reasoning 30,000 is \_\_\_\_\_\_ times as much as 30.
  - So, \_\_\_\_\_\_ is 10 times as much as 3,000.



**19.** Mark and Robyn used base-ten blocks to show that 200 is 100 times as much as 2. Whose model makes sense? Whose model is nonsense? Explain your reasoning.





**20.** Explain how you would help Mark understand why he should have used small cubes instead of longs.

**21.**This MARTER For numbers 21a-21c, choose True or False for each sentence.21a.600 is  $\frac{1}{10}$  of 6,000. $\circ$  True $\circ$  False21b.67 is  $\frac{1}{10}$  of 6,700. $\circ$  True $\circ$  False21c.1,400 is 10 times as much as 140. $\circ$  True $\circ$  False



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# **Place Value of Whole Numbers**

**Essential Question** How do you read, write, and represent whole numbers through hundred millions?

# PUnlock the Problem (

The diameter of the sun is 1,392,000 kilometers. To understand this distance, you need to understand the place value of each digit in 1,392,000.

A place-value chart contains periods. In numbers a **period** is a group of three digits separated by commas in a multidigit number. The millions period is left of the thousands period. One million is 1,000 thousands and is written as 1,000,000.

Periods

	$\mathbf{I}$			•			<b>1</b>	
MILLIONS				THOUSANDS		0	NES	
Hundreds Tens Ones		Hundreds	Tens	Ones	Hundreds	Tens	Ones	
		1,	3	9	2	,0	0	0
		1 × 1,000,000	3 imes100,000	9 imes10,000	2 imes 1,000	0  imes 100	0  imes 10	0  imes 1
		1,000,000	300,000	90,000	2,000	0	0	0

The place value of the digit 1 in 1,392,000 is millions. The value of 1 in 1,392,000 is  $1 \times 1,000,000 = 1,000,000$ .

# Standard Form: 1,392,000

**Word Form:** one million, three hundred ninety-two thousand **Expanded Form:**  $(1 \times 1,000,000) + (3 \times 100,000) + (9 \times 10,000) + (2 \times 1,000)$ 

# Math Idea

When writing a number in expanded form, if no digits appear in a place value, it is not necessary to include them in the expression.

# Try This! Use place value to read and write numbers.

Standard Form: 582,030					
Word Form: five hundred eighty-two		/			
Expanded Form: $(5 \times 100,000) + ($	×	) + (2 × 1,000) + (	×	)	

• The average distance from Jupiter to the sun is four hundred eighty-three million, six hundred thousand miles. Write the

number that shows this distance in miles.

# Number and Operations in Base Ten—5.NBT.1

MATHEMATICAL PRACTICES MP.2, MP.7

# **Place-Value Patterns**

Canada's land area is about 4,000,000 square miles. Iceland has a land area of about 40,000 square miles. Compare the two areas.

# **Example** 1 Use a place-value chart.

**STEP 1** Write the numbers in a place-value chart.

MI	LLIONS	;	THO	USAND	S		ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones	and and

## STEP 2

Count the number of whole number place-value positions.

4,000,000 has \_\_\_\_\_ more whole number places than 40,000.

Think: 2 more places is  $10 \times 10$ , or 100.

4,000,000 is \_\_\_\_\_ times as much as 40,000.

So, Canada's estimated land area is \_\_\_\_\_\_ times as much as Iceland's estimated land area.

You can use place-value patterns to rename a number.

**Example 2** Use place-value patterns.

Rename 40,000 using other place values.

40,000	4 ten thousands	4 × 10,000
40,000	thousands	× 1,000
40,000		

# Remember

Iceland

Canada

The value of each place is 10 times as much as the value of the next place to its right or  $\frac{1}{10}$  of the value of the next place to its left.

# Share and Show



**1.** Complete the place-value chart to find the value of each digit.

	MILLIONS			IOUSANDS	ONES			
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		7,	3	3	3,	8	2	0
		7 × 1,000,000	3 ×	3 × 10,000	× 1,000	8 × 100		0 × 1
				30,000	3,000		20	0
rite the valu	e of the u	underlined dig	git.	1		I		1
<b>2.</b> 1,57 <u>4</u> ,833		<b>3.</b> 598, <u>1</u>	.02	<b>텔 4.</b> 7,0 <u>9</u> 3,	455	<b>5.</b> <u>3</u>	01,256,878	3
rite the num	ber in tv	vo other form	s.					
5. (8×100,0	00) + (4	× 1,000) + (6	× 1)	<b>ð 7.</b> seven	million, twen	ity thousan	ıd, thirty-t	wo
On You	ır Ow	'n						
		n Inderlined dig						
	e of the 1			<b>10.</b> <u>9</u> 6,283	3	<b>11.</b> <u>4</u>	98,354,021	L
rite the valu	e of the 1	underlined dig		<b>10.</b> <u>9</u> 6,283	3	<b>11.</b> <u>4</u> :	98,354,021	L
7 <b>rite the valu</b> <b>8.</b> 8 <u>4</u> 9,567,04	e of the 1	<b>9.</b> 9, <u>4</u> 22	2,850					L
rite the valu	e of the 1	underlined dig	2,850	<b>10.</b> <u>9</u> 6,283 <b>14.</b> 105,9 <u>8</u>			98,354,021 ,26 <u>5</u> ,178	L
7 <b>rite the valu</b> 8. 8 <u>4</u> 9,567,04 2. 791, <u>3</u> 50	e of the u 3	<b>9.</b> 9, <u>4</u> 22 <b>13.</b> 2 <u>7</u> ,91	2,850					L
7 <b>rite the valu</b> <b>3.</b> 8 <u>4</u> 9,567,04 <b>2.</b> 791, <u>3</u> 50 7 <b>rite the num</b>	e of the u 3	<b>9.</b> 9, <u>4</u> 22	2,850	<b>14.</b> 105,9 <u>8</u>	<u>3</u> 0,774			L
7 <b>rite the valu</b> 8. 8 <u>4</u> 9,567,04 2. 791, <u>3</u> 50	e of the u 3	<b>9.</b> 9, <u>4</u> 22 <b>13.</b> 2 <u>7</u> ,91	2,850		<u>3</u> 0,774			L
7 <b>rite the valu</b> <b>3.</b> 8 <u>4</u> 9,567,04 <b>2.</b> 791, <u>3</u> 50 7 <b>rite the num</b>	e of the u 3	<b>9.</b> 9, <u>4</u> 22 <b>13.</b> 2 <u>7</u> ,91	2,850	<b>14.</b> 105,9 <u>8</u>	<u>3</u> 0,774			L
7 <b>rite the valu</b> <b>3.</b> 8 <u>4</u> 9,567,04 <b>2.</b> 791, <u>3</u> 50 7 <b>rite the num</b>	e of the u 3	<b>9.</b> 9, <u>4</u> 22 <b>13.</b> 2 <u>7</u> ,91	2,850	<b>14.</b> 105,9 <u>8</u>	<u>3</u> 0,774			

WRITE Math • Show Your Work

# **Problem Solving • Applications**

#### Use the table for 18-19.

- **18.** Which planet is about 10 times as far as Earth is from the Sun?
- **19. PRACTICE Analyze Relationships** Which planet is about  $\frac{1}{10}$  of the distance Uranus is from the Sun?

Average Distance from the Sun (in thousands of km)							
Mercury	57,910	Jupiter	778,400				
Venus	108,200	Saturn	1,427,000				
Earth	149,600	Uranus	2,871,000				
Mars	227,900	Neptune	4,498,000				

- **20. THINASMARTER** What's the Error? Matt wrote the number four million, three hundred five thousand, seven hundred sixty-two as 4,350,762. Describe and correct his error.
- **21. Explain how you know that the values of the digit 5 in the numbers 150,000 and 100,500 are not the same.**

**22. THINASMARTER** Select other ways to write 400,562. Mark all that apply.

(A)  $(4 \times 100,000) + (50 \times 100) + (6 \times 10) + (2 \times 1)$ 

**B** four hundred thousand, five hundred sixty-two

**C**  $(4 \times 100,000) + (5 \times 100) + (6 \times 10) + (2 \times 1)$ 

**D** four hundred, five hundred sixty-two



# **Properties**

Essential Question How can you use properties of operations to solve problems?

You can use the properties of operations to help you evaluate numerical expressions more easily.

**ALGEBRA** Lesson 1.3



**Operations and Algebraic** Thinking—5.0A.1 **MATHEMATICAL PRACTICES** MP.2, MP.8

Prope	rties of Addition	
Commutative Property of Addition		
If the order of addends changes, the su	m stays the same.	12 + 7 = 7 + 12
Associative Property of Addition		
If the grouping of addends changes, the	e sum stays the same.	5 + (8 + 14) = (5 + 8) + 14
Identity Property of Addition		
The sum of any number and 0 is that nu	ımber.	13 + 0 = 13

Properties of Multiplication					
Commutative Property of Multiplication					
If the order of factors changes, the product stays the same.	$4 \times 9 = 9 \times 4$				
Associative Property of Multiplication					
If the grouping of factors changes, the product stays the same.	11 $ imes$ (3 $ imes$ 6) = (11 $ imes$ 3) $ imes$ 6				
Identity Property of Multiplication					
The product of any number and 1 is that number.	4 × 1 = 4				

Not

**P**Unlock the Problem

The table shows the number of bones in several parts of the human body. What is the total number of bones in the ribs, the skull, and the spine?

Part	Number of Bones
Ankle	7
Ribs	24
Skull	28
Spine	26

To find the sum of addends using mental math, you can use the Commutative and Associative Properties.

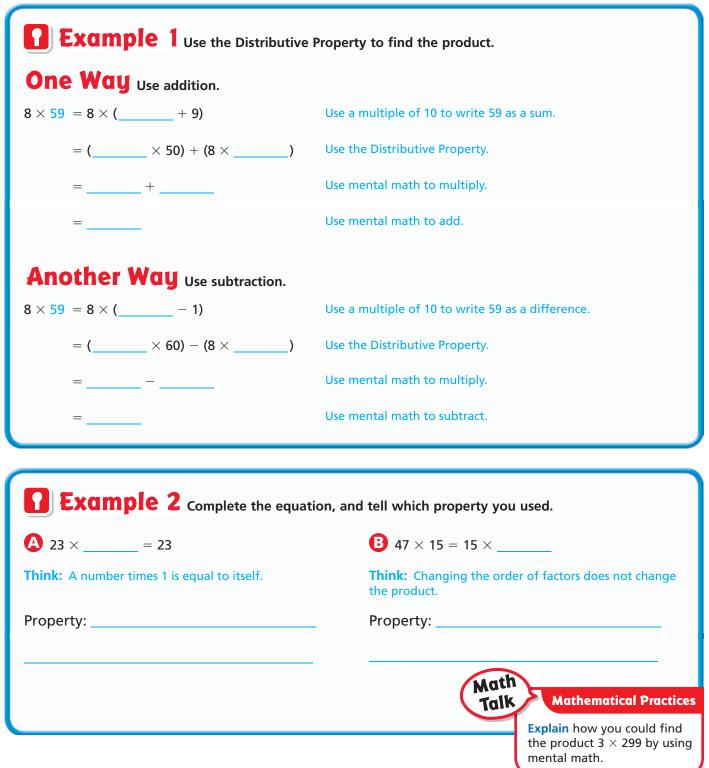
Use properties to find 24 + 28 + 26.

24 + 28 + 26	= 28 + + 26	Use the	Property to reorder the addends.
	= 28 + (24 +)	Use the	Property to group the addends.
	= 28 +	Use mental math to add.	
	=		Math Talk Mathematical Practices
So, there are	bones in the ribs, the sku	ll, and the spine.	<b>Explain</b> why grouping 24 and 26 makes the problem easier to solve.

# **Distributive Property**

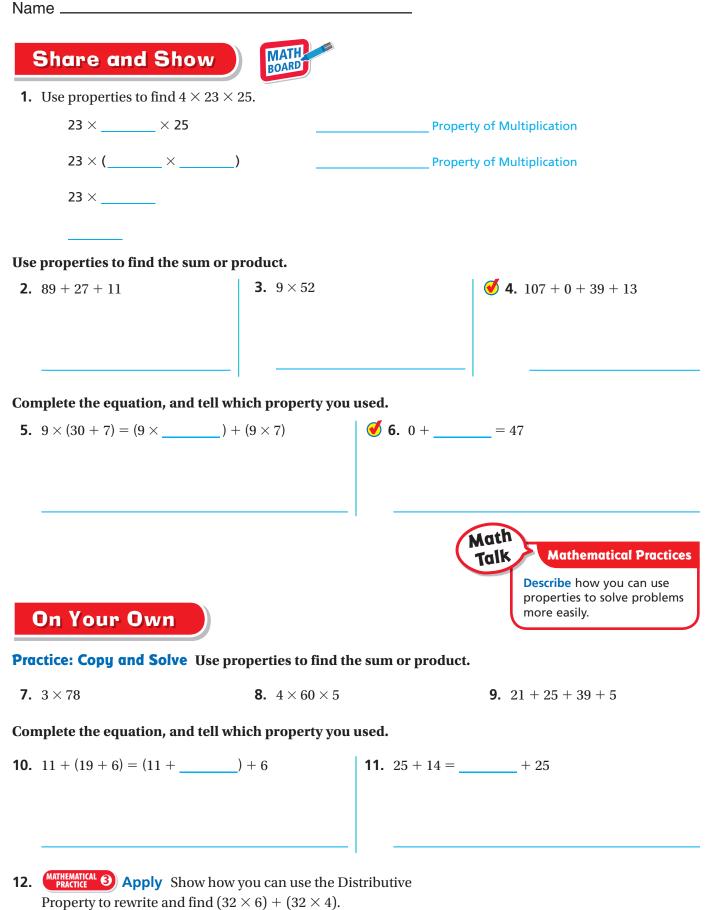
Multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.  $5 \times (7 + 9) = (5 \times 7) + (5 \times 9)$ 

The Distributive Property can also be used with multiplication and subtraction. For example,  $2 \times (10 - 8) = (2 \times 10) - (2 \times 8)$ .



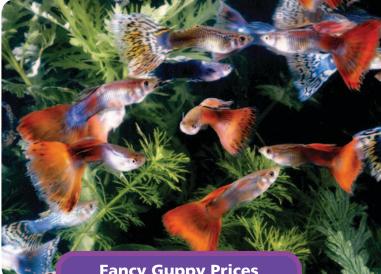
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14



# **Problem Solving • Applications**

- **13. [FODEEPER]** Three friends' meals at a restaurant cost \$13, \$14, and \$11. Use parentheses to write two different expressions to show how much the friends spent in all. Which property does your pair of expressions demonstrate?
- **14.** MATHEMATICAL **2** Use Reasoning Jacob is designing an aquarium for a doctor's office. He plans to buy 6 red blond guppies, 1 blue neon guppy, and 1 yellow guppy. The table shows the price list for the guppies. How much will the guppies for the aquarium cost?
- 15. Sylvia bought 8 tickets to a concert. Each ticket costs \$18. To find the total cost in dollars, she added the product  $8 \times 10$  to the product  $8 \times 8$ , for a total of 144. Which property did Sylvia use?



# **Fancy Guppy Prices**

Blue neon	\$11
Red blond	\$22
Sunrise	\$18
Yellow	\$19

**VRITE** Math • Show Your Work

16. **[HINASMARTER** Sense or Nonsense? Julie wrote (15 - 6) - 3 = 15 - (6 - 3). Is Julie's equation sense or nonsense? Do you think the Associative Property works for subtraction? Explain.



**17. ITHIN ASMARTER** Find the property that each equation shows.

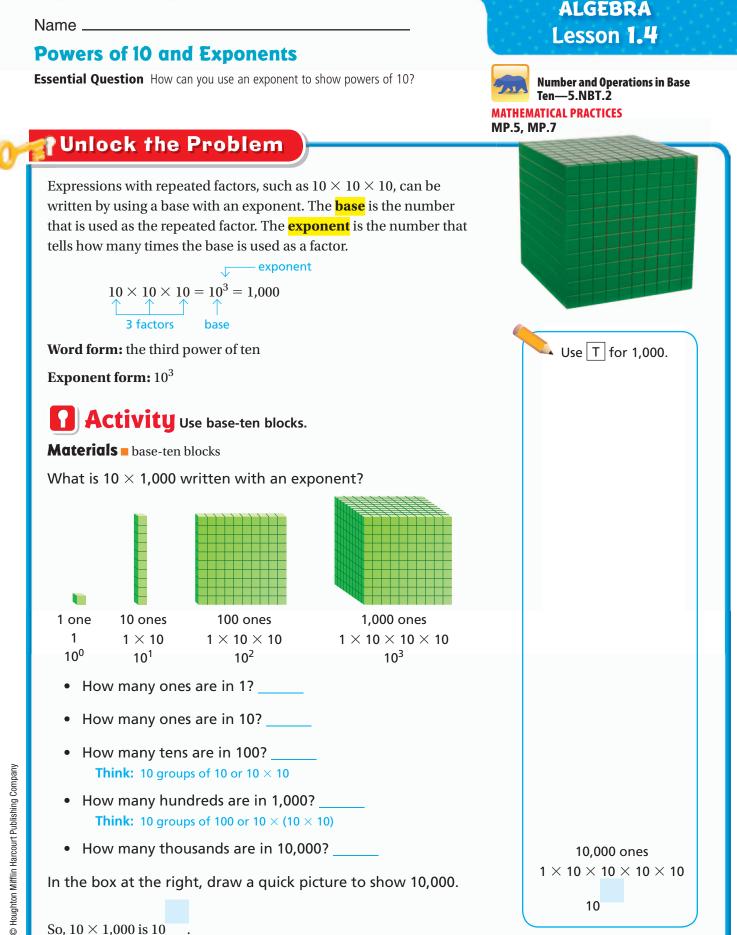
 $14 \times (4 \times 9) = (14 \times 4) \times 9$ 

 $1 \times 3 = 3 \times 1$ 

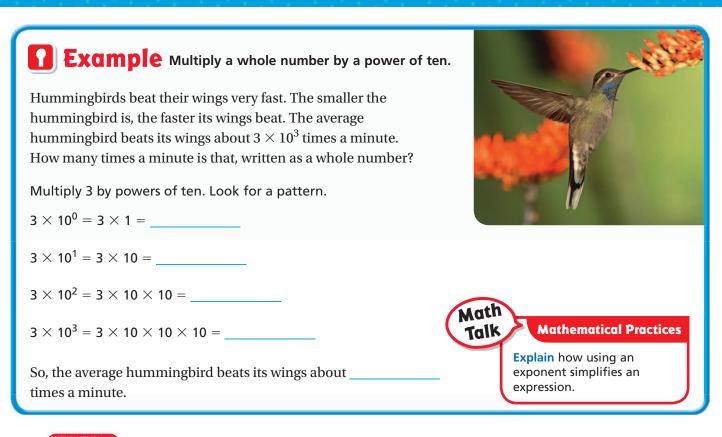
 $7 \times 3 = 3 \times 7$ 

- **Commutative Property of Multiplication**
- Associative Property of Multiplication
- Identity Property of Multiplication

16



So,  $10 \times 1,000$  is 10



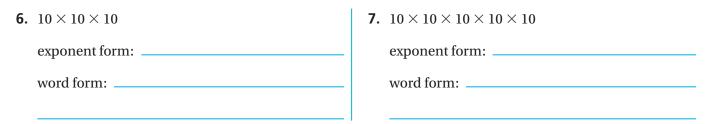
MATHEMATICAL O Look for a Pattern What pattern do you see?

Share and Show	MATH. BOARD		
Write in exponent form and word fo	orm.		
<b>1.</b> $10 \times 10$		<b>Ø</b> 2.	10  imes 10  imes 10  imes 10
Exponent form:			Exponent form:
Word form:			Word form:
<b>Find the value.</b> <b>3.</b> 10 <sup>2</sup>	<b>● 4.</b> 4 × 10 <sup>2</sup>		<b>5.</b> $7 \times 10^3$

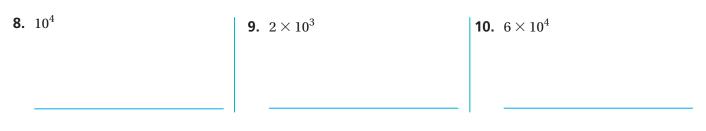
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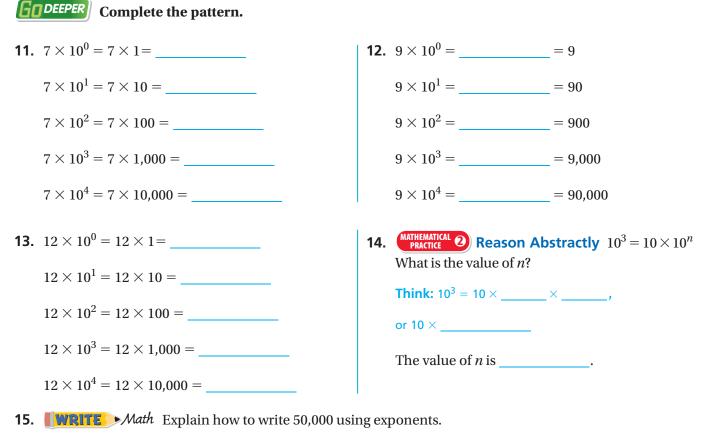
# On Your Own

## Write in exponent form and word form.



## Find the value.





6. <b>THINASMARTER</b> L the largest of the Gre		2	m	Lake		
covers a surface area		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	fx	6	3	
30,000 square miles. you show the estima		Math	E	Jun 5	Lake	ake
Lake Superior as a w		Spor		Lake		tario
multiplied by a pow	er of ten?		5	Michigan	Lake	
a. What are you asked	to find?			Ĭ		
	<b>A 1 1</b>					
<b>b.</b> How can you use a p	oattern to find the a	answer?				
c. Write a pattern using	g the whole numb	er 3 and powers	of ten.			
$3 \times 10^{0} = 3 \times 1 =$						
$3 \times 10^1 = 3 \times 10 = 1$						
$3 \times 10^2 =$	=					
$3 \times 10^3 =$	=					
$3  imes 10^4 =$	=					
<b>d.</b> Complete the senter						
The estimated area	of Lake Superior is		•			

**18.** THINKSMARTER Yolanda says  $10^5$  is the same as 50 because  $10 \times 5$  equals 50. What was Yolanda's mistake?

FOR MORE PRACTICE: Standards Practice Book

# **Multiplication Patterns**

**Essential Question** How can you use a basic fact and a pattern to multiply by a 2-digit number?

# PUnlock the Problem 🌘

How close have you been to a bumblebee?

The actual length of a queen bumblebee is about 20 millimeters. The photograph shows part of a bee under a microscope, at 10 times its actual size. What would the length of the bee appear to be at a magnification of 300 times its actual size?

# Use a basic fact and a pattern.

Multiply.  $300 \times 20$ 

 $3 \times 2 = 6 \leftarrow \text{basic fact}$ 

 $30 \times 2 = (3 \times 2) \times 10^1 = 60$ 

 $300 \times 2 = (3 \times 2) \times 10^2 =$ 

 $300 \times 20 = (3 \times 2) \times (100 \times 10) = 6 \times 10^3 =$ 

So, the length of the bee would appear to be

about \_\_\_\_\_\_ millimeters.

• What would the length of the bee shown in the photograph appear to be if the microscope shows it at 10 times its actual size?

# **Example** Use mental math and a pattern.

Multiply. 50 imes 8,000

# ALGEBRA Lesson 1.5



**Mathematical Practices** 

What pattern do you see in

the number sentences and

the exponents?

Math

Talk

# **Share and Show**



# Use mental math and a pattern to find the product.

- **1.**  $30 \times 4,000 =$ 
  - What basic fact can you use to help you find 30 imes 4,000?

# Use mental math to complete the pattern.

<b>2.</b> $1 \times 1 = 1$	<b>3.</b> $7 \times 8 = 56$	<b>4.</b> $6 \times 5 =$
$1 \times 10^{1} = $	$(7 \times 8) \times 10^1 = \_$	$(6 \times 5) \times \_$ = 300
$1 \times 10^2 =$	$(7 \times 8) \times 10^2 = \_$	$(6 \times 5) \times \_$ = 3,000
$1 \times 10^3 =$	$(7 \times 8) \times 10^3 = \_$	$(6 \times 5) \times \_$ = 30,000
<b>On Your Own</b> Use mental math to complete the	pattern.	Math Talk Explain how to find 50 × 9,000 by using a basic fact and pattern.
<b>5.</b> $9 \times 5 = 45$	<b>6.</b> $3 \times 7 = 21$	<b>7.</b> $5 \times 4 =$
$(9 \times 5) \times 10^1 =$	$(3\times7)\times10^1 = \_$	$(5 \times 4) \times \_\_= 200$
$(9\times5)\times10^2 = \_$	$(3\times7)\times10^2 = \_$	$(5 \times 4) \times \_\_= 2,000$
$(9\times5)\times10^3 = \_$	$(3\times7)\times10^3 = \_$	$(5 \times 4) \times \_\_= 20,000$
Use mental math and a pattern to	find the product.	
<b>8.</b> $(6 \times 6) \times 10^1 =$	<b>9.</b> $(7 \times 4) \times 10^3 =$	<b>10.</b> $(9 \times 8) \times 10^2 =$
<b>11.</b> $(4 \times 3) \times 10^2 =$	<b>12.</b> $(2 \times 5) \times 10^3 =$	<b>13.</b> $(2 \times 8) \times 10^2 =$
<b>14.</b> $(6 \times 5) \times 10^3 =$	<b>15.</b> $(8 \times 8) \times 10^4 =$	<b>16.</b> $(7 \times 8) \times 10^4 =$
<b>17. THINKISMARTER</b> What does the multiplied by 100 always have?	he product of any whole-number fac Explain.	ctor

#### Use mental math to complete the table.

**18.** 1 roll = 50 dimes **Think:** 50 dimes per roll  $\times$  20 rolls = (5  $\times$  2)  $\times$  (10  $\times$  10)

Rolls	20	30	40	50	60	70	80	90	100
Dimes	10 × 10 <sup>2</sup>								

#### **19.** 1 roll = 40 quarters **Think:** 40 quarters per roll $\times$ 20 rolls = (4 $\times$ 2) $\times$ (10 $\times$ 10)

Rolls	20	30	40	50	60	70	80	90	100
Quarters	8 × 10 <sup>2</sup>								

	×	6	70	800	9,000
20.	80			64 × 10 <sup>3</sup>	
21.	90				81 × 10 <sup>4</sup>

# **Problem Solving • Applications**

#### Use the table for 22-24.

- 22. What if you magnified the image of a cluster fly by  $9 \times 10^3$ ? What would the length appear to be?
- **23. GODEEPER** If you magnified the images of a fire ant by  $4 \times 10^3$  and a tree hopper by  $3 \times 10^3$ , which insect would appear longer? How much longer?
- 24. **PRACTICE Reason Quantitatively** John wants to magnify the image of a fire ant and a crab spider so they appear to be the same length. How many times their actual sizes would he need to magnify each image?

Arthropo	od Lengths	
Arthropod	Length (in millimeters)	
Cluster Fly	9	S ABUS
Crab Spider	5	
Fire Ant	4	200 7/10
Tree Hopper	6	1 pop

WRITE Math • Show Your Work

# Connect to Health

# **Blood Cells**

Blood is necessary for all human life. It contains red blood cells and white blood cells that nourish and cleanse the body and platelets that stop bleeding. The average adult has about 5 liters of blood.

#### Use patterns and mental math to solve.

**25. DEEPER** A human body has about 30 times as many platelets as white blood cells. A small sample of blood has  $8 \times 10^3$  white blood cells. About how many platelets are in the sample?

27. Lymphocytes and eosinophils are types of white blood cells. A blood sample has about 10 times as many lymphocytes as eosinophils. If there are  $2 \times 10^2$  eosinophils in the sample, about how many lymphocytes are there?

- Single red blood cell
   Platelet
   White blood cell
  - 26. Basophils and monocytes are types of white blood cells. A blood sample has about 5 times as many monocytes as basophils. If there are 60 basophils in the sample, about how many monocytes are there?

**28. THINKSMARTER** An average person has  $6 \times 10^2$  times as many red blood cells as white blood cells. A small sample of blood has  $7 \times 10^3$  white blood cells. About how many red blood cells are in the sample?



**29. THINASMARTER** Kyle says  $20 \times 10^4$  is the same as 20,000. He reasoned that since he saw 4 as the exponent he should write 4 zeros in his answer. Is Kyle correct?

24

# 🧖 💞 Mid-Chapter Checkpoint

Vocabulary

### Choose the best term for the box.

**1.** A group of three digits separated by commas in a multidigit

number is a \_\_\_\_\_. (p. 9)

**2.** An \_\_\_\_\_\_ is the number that tells how many times a base is used as a factor. (p. 17)

# **Concepts and Skills**

# Complete the sentence. (5.NBT.1)

**3.**  $7 \text{ is } \frac{1}{10} \text{ of } \_$ .

**4.** 800 is 10 times as much as \_\_\_\_\_.

## Write the value of the underlined digit. (5.NBT.1)

**5.** 6,581,678

**6.** 125,634

7. 34,634,803

# 8. 2,764,835

Vocabulary

base

exponent

period

Complete the equation, and tell which property you used. (5.0A.1)

**9.**  $8 \times (14 + 7) = + (8 \times 7)$ 

**10.** 7 + (8 + 12) = - + 12

### Find the value. (5.NBT.2)

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<b>11.</b> 10 <sup>3</sup>	<b>12.</b> $6 \times 10^2$	<b>13.</b> $4 \times 10^4$
Use mental math and a pattern to find the product. (5.NBT.2)		

<b>14.</b> 70 × 300 =	<b>15.</b> $(3 \times 4) \times 10^3 =$

**16.** DVDs are on sale for \$24 each. Felipe writes the expression  $4 \times 24$  to find the cost in dollars of buying 4 DVDs. How can you rewrite Felipe's expression using the Distributive Property? (5.0A.1)

**17.** The Muffin Shop chain of bakeries sold 745,305 muffins last year. Write this number in expanded form. (5.NBT.1)

**18.** The soccer field at Mario's school has an area of 6,000 square meters. How can Mario show the area as a whole number multiplied by a power of ten? (5.NBT.2)

**19.** Ms. Alonzo ordered 4,000 markers for her store. Only  $\frac{1}{10}$  of them arrived. How many markers did she receive? (5.NBT.1)

**20.** Mark wrote the highest score he made on his new video game as the product of  $70 \times 6,000$ . What was his score? (5.NBT.2)

Name \_

# **Multiply by 1-Digit Numbers**

Essential Question How do you multiply by 1-digit numbers?

Tunlock the Problem Real

# Each day an airline flies 9 commercial jets from New York to London, England. Each plane holds 293 passengers. If every seat is taken on all flights, how many passengers fly on this airline from New York to London in 1 day? Use place value and regrouping. **STEP 1** Estimate: $293 \times 9$ **Think:** 300 × 9 = \_\_\_\_\_ The Queen's Guard protects Britain's **STEP 2** Multiply the ones. Royal Family and their residences. 2 293 9 × 3 ones = \_\_\_\_\_ ones Math $\frac{\times 9}{7}$ **Mathematical Practices** Talk Write the ones and the regrouped tens. Explain how you record the 27 ones when you multiply **STEP 3** Multiply the tens. 3 by 9 in Step 2. 82 293 $9 \times 9$ tens = \_\_\_\_ tens $\frac{\times 9}{37}$ Add the regrouped tens. tens + 2 tens = \_\_\_\_\_ tens Write the tens and the regrouped hundreds. STEP 4 Multiply the hundreds. 82 293 $9 \times 2$ hundreds = hundreds Add the regrouped hundreds. hundreds + 8 hundreds = \_ hundreds Write the hundreds. So, in 1 day, \_\_\_\_\_\_ passengers fly from New York to London.

MATHEMATICAL 1 Evaluate Reasonableness How can you tell if your answer is reasonable?

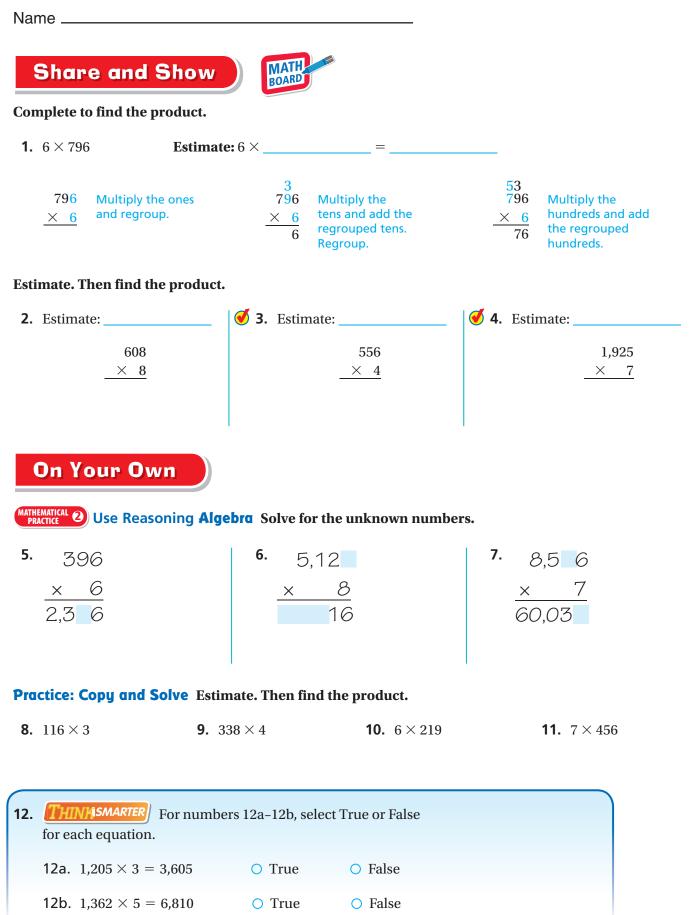
Number and Operations in Base

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

Ten—5.NBT.5

Lesson 1.6

Example				
A commercial airline makes to Paris, France. If the airlin how many meals are served				
repeat the process of mu	To multiply a greater number by a 1-digit number, repeat the process of multiplying and regrouping until every place value is multiplied.			
<b>STEP 1</b> Estimate. 1,978 $\times$ 7		NE CARACTER STREET		
<b>Think:</b> 2,000 × 7 =		APRIL -		
<b>STEP 2</b> Multiply the ones.		A Contra		
5 1,978 <u>× 7</u> 6	$7 \times 8$ ones = ones Write the ones and the regrouped tens.	The Eiffel Tower in Paris, France, built for the 1889 World's Fair, was the world's tallest man-made structure for 40 years.		
<b>STEP 3</b> Multiply the tens.		ioi 40 years.		
1,978 <u>× 7</u> 46	7 × 7 tens = tens Add the regrouped tens. tens + 5 tens = tens Write the tens and the regrouped hundreds.			
<b>STEP 4</b> Multiply the hundre	ds.			
6 55 1,978 <u>× 7</u> 846	7 × 9 hundreds = hundreds Add the regrouped hundreds. hundreds + 5 hundreds = h Write the hundreds and the regrouped thousands.			
<b>STEP 5</b> Multiply the thousar	nds.			
6 55 1,978 × 7	$7 \times 1$ thousand = thousands			
13,846	$\frac{\times 7}{13,846}$ Add the regrouped thousands.			
	thousands + 6 thousands = Write the thousands. Compare your answer to the estimate to see if it is reasonable.	thousands		
So, in 1 week, New York to Paris.	meals are served on flights from			



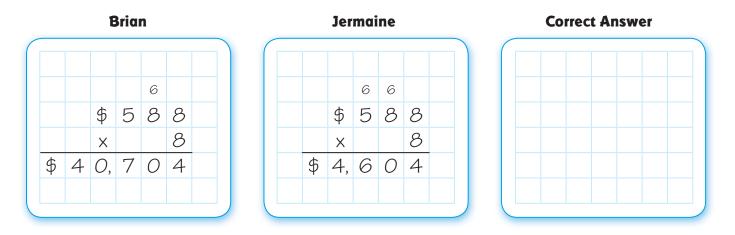
# **Problem Solving • Applications**

**13. (HINMASMARTER)** What's the Error? The Plattsville Glee Club is sending 8 of its members to a singing contest in Cincinnati, Ohio. The cost will be \$588 per person. How much will it cost for the entire group of 8 students to attend?

Both Brian and Jermaine solve the problem. Brian says the answer is \$40,704. Jermaine's answer is \$4,604.

Estimate the cost. A reasonable estimate is \_\_\_\_\_.

Although Jermaine's answer seems reasonable, neither Brian nor Jermaine solved the problem correctly. Find the errors in Brian's and Jermaine's work. Then, solve the problem correctly.



- MATHEMATICAL ③ Verify the Reasoning of Others What error did Brian make? Explain.
- What error did Jermaine make? Explain.

**14. IDEEPER** How could you predict that Jermaine's answer might be incorrect

using your estimate? \_

FOR MORE PRACTICE:

**Standards Practice Book** 



### Name \_\_\_

# **Multiply by 2-Digit Numbers**

Essential Question How do you multiply by 2-digit numbers?

# Lesson 1.7



**Number and Operations in Base** Ten—5.NBT.5

**MATHEMATICAL PRACTICES** MP.4, MP.5, MP.6



A tiger can eat as much as 40 pounds of food at a time but it may go for several days without eating anything. Suppose a Siberian tiger in the wild eats an average of 18 pounds of food per day. How much food will the tiger eat in 28 days if he eats that amount each day?





Use place value and regrouping.

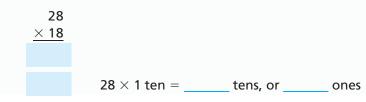




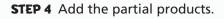
**STEP 2** Multiply by the ones.

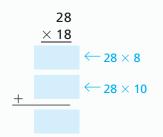
28  $\times$  18

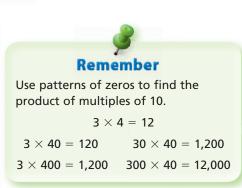




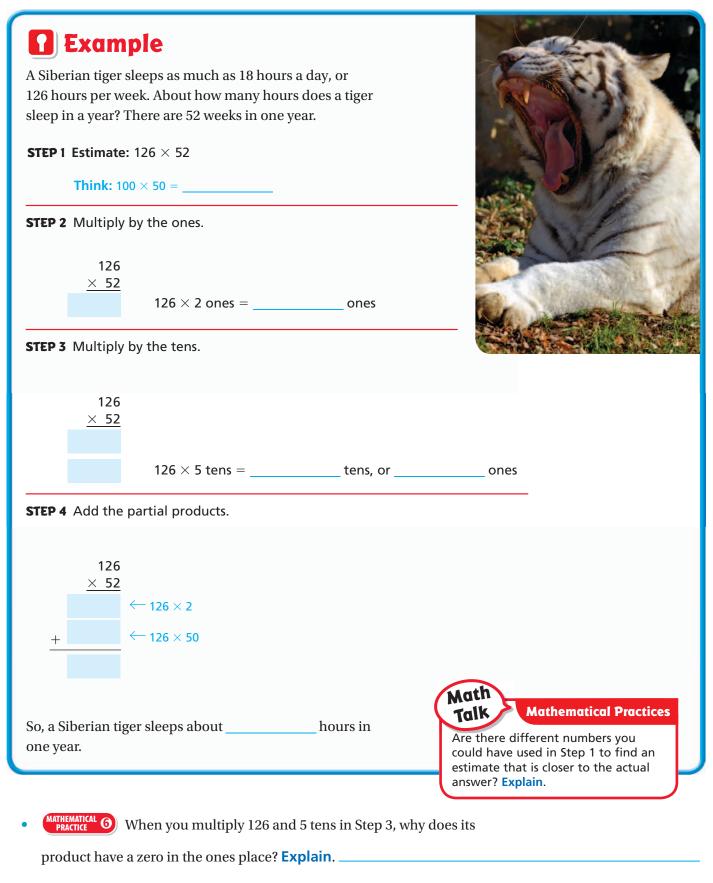
 $28 \times 8 \text{ ones} = \_$  ones







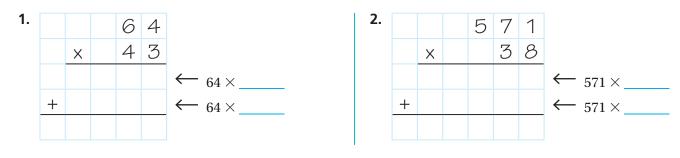
So, on average, a Siberian tiger may eat \_\_\_\_\_ pounds of food in 28 days.



Share and Show



Complete to find the product.



# Estimate. Then find the product.

<b>3.</b> Estimate:	<b>🥑 4.</b> Estim	ate:	<b>ਓ 5.</b> Estimate:
24 <u>× 15</u>		$37 \\ \underline{\times 63}$	$\frac{384}{\times 45}$
<b>On Your Own</b> Estimate. Then find the pr			<b>9</b> Estimator
<b>6.</b> Estimate:	<b>7.</b> Estim	ate:	<b>8.</b> Estimate:
$\frac{28}{\times 22}$		93 <u>×76</u>	295 <u>× 51</u>
<b>Practice: Copy and Solve</b> Estimate. Then find the product.			
<b>9.</b> 54 × 31	<b>10.</b> 42 × 26	<b>11.</b> 38 × 64	<b>12.</b> 63 × 16
<b>13.</b> 204 × 41	<b>14.</b> 534 × 25	<b>15.</b> 722 × 39	<b>16.</b> 957 × 43

# 6

# Problem Solving • Applications 🎇

### Use the table for 17-19.

- **17.** How much sleep does a jaguar get in 1 year?
- **18. THINKASMARTER** In 1 year, how many more hours of sleep does a giant armadillo get than a platypus?



Owl monkeys sleep during the day, waking about 15 minutes after sundown to find food. At midnight, they rest for an hour or two, then continue to feed until sunrise. They live about 27 years. How many hours of sleep does an owl monkey that lives 27 years get in its lifetime?

**20. CODEEPER** Tickets to a museum cost \$17 each. For a field trip, the museum offers a \$4 discount on each ticket. How much will tickets for 32 students cost?

**21. THINASMARTER** Rachel earns \$21 per day. For numbers 21a–21d, select True or False for each statement.

21a. Rachel earns \$421 for 20 days of work.

○ True ○ False

- 21b. Rachel earns \$315 for 15 days of work.
  - True
- 21c. Rachel earns \$273 for 13 days of work.
  - O True
- 21d. Rachel earns \$250 for 13 days of work.

O False

○ False

○ False



MATHEMATICAL PRACTICES



Animal Sleep Amounts			
Animal Amount (usual hours per we			
Jaguar	77		
Giant Armadillo	127		
Owl Monkey	119		
Platypus	98		
Three-Toed Sloth	101		

**VRITE** Math • Show Your Work

FOR MORE PRACTICE: Standards Practice Book

○ True

34

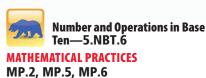
### Name \_\_\_\_\_

# **Relate Multiplication to Division**

Essential Question How is multiplication used to solve a division problem?

You can use the relationship between multiplication and division to solve a division problem. Using the same numbers, multiplication and division are opposite, or **inverse operations**.





Lesson 1.8



Joel and 5 friends collected 126 marbles. They shared the marbles equally. How many marbles will each person get?

# One Way Make an array.

 Outline a rectangular array on the grid to model 126 squares arranged in 6 rows of the same length. Shade each row a different color.

- How many squares are shaded in each row? \_\_\_\_\_
- Use the array to complete the multiplication sentence. Then, use the multiplication sentence to complete the division sentence.
  - 6 × \_\_\_\_\_ = 126

126 ÷ 6 =

So, each of the 6 friends will get \_\_\_\_\_ marbles.

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Underline the dividend.

• What is the divisor? \_\_\_\_\_

# Another Way Use the Distributive Property.

**Divide.** 52 ÷ 4

You can use the Distributive Property and an area model to solve division problems. Remember that the Distributive Property states that multiplying a sum by a number is the same as multiplying each addend in the sum by the number and then adding the products.

### STEP 1

Write a related multiplication sentence for the division problem.

**Think:** Use the divisor as a factor and the dividend as the product. The quotient will be the unknown factor.

### STEP 2

Use the Distributive Property to break apart the large area into smaller areas for partial products that you know.

(	40	+	12	) = 52
(4	×	) + (4	$\times$	) = 52

	?	?
4	40	12
	$(4 \times ?) + (4 \times ?) = 52$	

?

52

 $4 \times ? = 52$ 

### STEP 3

Find the sum of the unknown factors of the smaller areas.

### STEP 4

4

Write the multiplication sentence with the unknown factor that you found. Then, use the multiplication sentence to find the quotient.

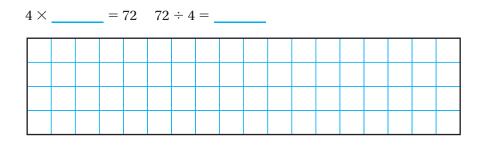
• **MATHEMATICAL (b) Explain** how you can use the Distributive Property to find the quotient of  $96 \div 8$ .

=

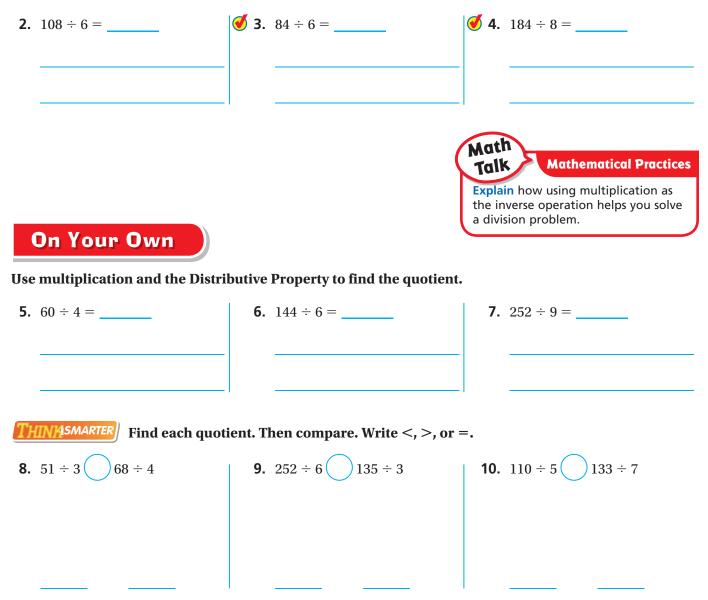
### Name \_\_\_\_\_



**1.** Brad has 72 toy cars that he puts into 4 equal groups. How many cars does Brad have in each group? Use the array to show your answer.



Use multiplication and the Distributive Property to find the quotient.



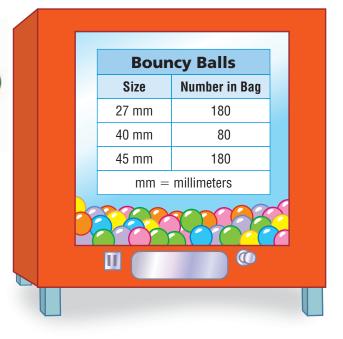
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MATHEMATICAL PRACTICES

# **Problem Solving • Applications**

Use the table to solve 11-12.

- **11. THINASMARTER** Mr. Henderson has 2 bouncy-ball vending machines. He buys one bag of the 27-millimeter balls and one bag of the 40-millimeter balls. He puts an equal number of each in the 2 machines. How many bouncy balls does he put in each machine?
- **12. GODEEPER** Lindsey buys a bag of each size of bouncy ball. She wants to put the same number of each size of bouncy ball into 5 party-favor bags. How many of each size of bouncy ball will she put in a bag?



**TE** Math • Show Your Work

**Personal Math Trainer** 

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**13. MATHEMATICAL (a)** Verify the Reasoning of **Others** Sandra writes  $(4 \times 30) + (4 \times 2)$  and says the quotient for  $128 \div 4$  is 8. Is she correct? Explain.

**14.** THINASMARTER J Joe collected 45 seashells. Joe wants to share his seashells with 5 of his friends equally. How many seashells will each friend get? Use the array to show your answer.

Use the multiplication sentence to complete the division sentence.





### Name \_

# **Problem Solving • Multiplication and Division**

lem

**Essential Question** How can you use the strategy *solve a simpler problem* to help you solve a division problem?

# **PROBLEM SOLVING** Lesson 1.9



**Number and Operations in Base** Ten—5.NBT.6 **MATHEMATICAL PRACTICES** MP.1, MP.2, MP.4

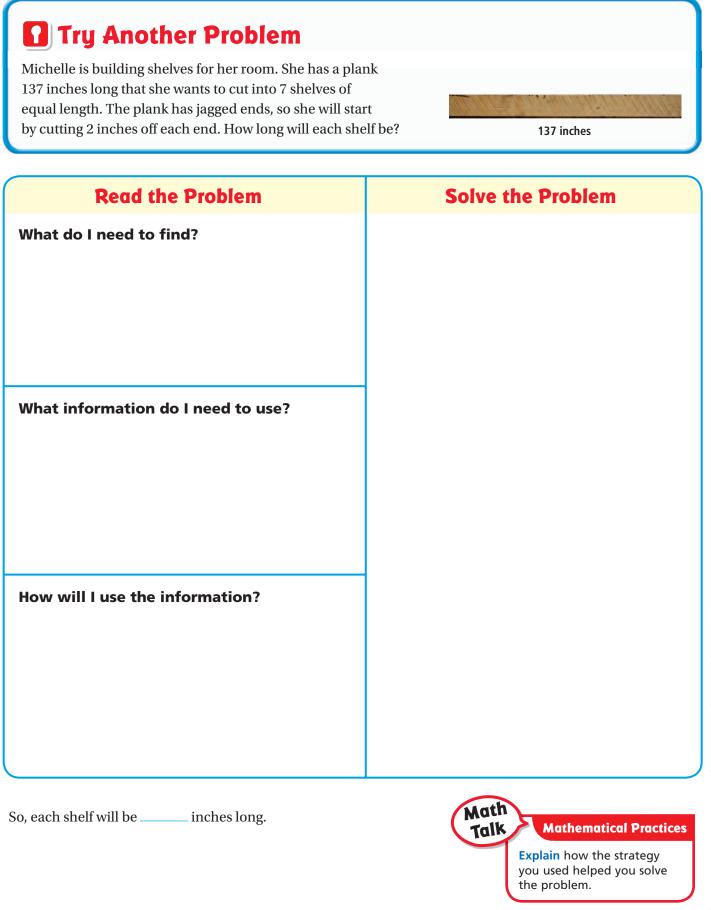
1	Un	lock	the	Prob

Mark works at an animal shelter. To feed 9 dogs, Mark empties eight 18-ounce cans of dog food into a large bowl. If he divides the food equally among the dogs, how many ounces of food will each dog get?

Use the graphic organizer below to help you solve the problem.

Read the Problem	Solve the Problem
What do I need to find? I need to find	<ul> <li>First, multiply to find the total number of ounces of dog food.</li> <li>8 × 18 =</li> </ul>
What information do I need to use? I need to use the number of, the number of in each can, and the number of dogs that need to be fed.	<ul> <li>To find the number of ounces each dog gets, I'll need to divide.</li> <li>144 ÷ = </li> <li>To find the quotient, I break 144 into two simpler numbers that are easier to divide.</li> </ul>
How will I use the information? I can to find the total number of ounces. Then I can solve a simpler problem to that total by 9.	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$

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### Name

# Share and Show



 To make concrete mix, Monica pours 34 pounds of cement, 68 pounds of sand, 14 pounds of small pebbles, and 19 pounds of large pebbles into a large wheelbarrow. If she pours the mixture into 9 equal-size bags, how much will each bag weigh?

First, find the total weight of the mixture.

**Then**, divide the total by the number of bags. Break the total into two simpler numbers to make the division easier, if necessary.

Finally, find the quotient and solve the problem.

So, each bag will weigh \_\_\_\_\_ pounds.

- **2. What if** Monica pours the mixture into 5 equal-size bags? How much will each bag weigh?
- 3. Taylor is building doghouses to sell. Each doghouse requires 3 full sheets of plywood which Taylor cuts into new shapes. The plywood is shipped in bundles of 14 full sheets. How many doghouses can Taylor make from 12 bundles of plywood?
- 4. Eileen is planting a garden. She has seeds for 60 tomato plants, 55 sweet corn plants, and 21 cucumber plants. She plants them in 8 rows, with the same number of plants in each row. How many seeds are planted in each row?

# **Unlock the Problem**

✓ Underline what you need to find.

✓ Circle the numbers you need to use.

WRITE Math • Show Your Work •

# **On Your Own**

- **5. CONTINUES** Starting on day 1 with 1 jumping jack, Keila doubles the number of jumping jacks she does every day. How many jumping jacks will Keila do on day 10?
- 6. **MATHEMATICAL O Represent a Problem** Starting in the blue square, in how many different ways can you draw a line that passes through every square without picking up your pencil or crossing a line you've already drawn? Show the ways.

- **7.** On April 11, Millie bought a lawn mower with a 50-day guarantee. If the guarantee begins on the date of purchase, what is the first day on which the mower will no longer be guaranteed?
- 8. The teacher of a jewelry-making class had a supply of 236 beads. Her students used 29 beads to make earrings and 63 beads to make bracelets. They will use the remaining beads to make necklaces with 6 beads on each necklace. How many necklaces will the students make?
- **9. <u><b>IHINASMARTER**</u> Susan is making 8 casseroles. She uses 9 cans of beans. Each can is 16-ounces. If she divides the beans equally among 8 casseroles, how many ounces of beans will be in each casserole? Show your work.





### Name \_

# **Numerical Expressions**

**Essential Question** How can you use a numerical expression to describe a situation?

# ALGEBRA Lesson 1.10



**Operations and Algebraic** Thinking—5.0A.1, 5.0A.2 MATHEMATICAL PRACTICES MP.1, MP.2, MP.4

# Tullock the Problem

A **numerical expression** is a mathematical phrase that has numbers and operation signs but does not have an equal sign.

Tyler caught 15 small bass, and his dad caught 12 small bass in the Memorial Bass Tourney in Tidioute, PA. Write a numerical expression to represent how many fish they caught in all.



# Choose which operation to use.

You need to join groups of different sizes, so use addition.

15 small bass	plus	12 small bass
$\downarrow$	$\downarrow$	$\downarrow$
15	1	12
15	Ŧ	12

So, 15 + 12 represents how many fish they caught in all.

#### **Example 1** Write an expression to match the words. Addition B Subtraction Emma has 11 fish in her Lucia has 128 stamps. She uses aquarium. She buys 4 more fish. 38 stamps on party invitations. fish plus more fish stamps minus stamps used $\downarrow$ Ţ ↓ $\downarrow$ +4 128 11 **G** Multiplication Division Karla buys 5 books. Four players share 52 cards Each book costs \$3. equally. multiplied divided books cost per cards players by book by L . . Math **Mathematical Practices** Talk Х **Describe** what each expression represents.

**Expressions with Parentheses** The meaning of the words in a problem will tell you where to place the parentheses in an expression.

Example 2 Which expression matcher the meaning of the words? Doug went fishing for 3 days. Each day he put \$15 in At the end of each day, he had \$5 left. How much me Doug spend by the end of the trip? Think: Each day he took \$15 and had \$5 left. He did this for	<ul> <li>Underline the events for each day.</li> <li>Circle the number of days these events happened.</li> </ul>		
(\$15 - \$5) ← Think: What expression can you write to show how much money Doug spends in one day? <b>Example 3</b> Which problem matches	3 × (\$15 - \$5) ← Think: What expression can you write to show how much money Doug spends in three days? Mathematical Practices Explain how the expression of what Doug spent in three days compares to the expression of what he spent in one day?		
the expression $20 - (12 + 3)$ ?			
Kim has \$20 to spend for her fishing trip. She spends \$12 on a fishing pole. Then she finds \$3. How much money does Kim have now?	Kim has \$20 to spend for her fishing trip. She spends \$12 on a fishing pole and \$3 on bait. How much money does Kim have now?		
List the events in order.	List the events in order.		
First: Kim has \$20.	First: Kim has \$20.		
Next:	Next:		
Then:	Then:		
Do these words match the expression?	Do these words match the expression?		

Share and Show



Circle the expression that matches the words.

**1.** Teri had 18 worms. She gave 4 worms to Susie and 3 worms to Jamie.

$$(18-4)+3$$
  $18-(4+3)$ 

**2.** Rick had \$8. He then worked 4 hours for \$5 each hour.

 $8 + (4 \times 5)$  (\$8 + 4) × \$5

### Name \_

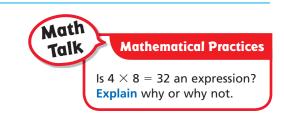
# Write an expression to match the words.

**3.** Greg drives 26 miles on Monday and 90 miles on Tuesday.

# Write words to match the expression.

**5.** 34 - 17

4. Lynda has 27 fewer fish than Jack. Jack has 80 fish.



- **8.** Braden has 14 baseball cards. He finds 5 more baseball cards.
- **10.** Monique had \$20. She spent \$5 on lunch and \$10 at the bookstore.

**12.** 35 - (16 + 11)

On Your Own

### Write an expression to match the words.

- **7.** José shared 12 party favors equally among 6 friends.
- **9.** Isabelle bought 12 bottles of water at \$2 each.

### Write words to match the expression.

**11.** 36 ÷ 9

### Draw a line to match the expression with the words.

- **13.** Fred catches 25 fish. Then he releases 10 fish and catches 8 more.
  - Nick has 25 pens. He gives 10 pens to one friend and 8 pens to another friend.
  - Jan catches 15 fish and lets 6 fish go.

Libby catches 15 fish and lets 6 fish go of three days in a row.

- $3 \times (15 6)$
- 15 6
- 25 (10 + 8)
- (25 10) + 8

# Chapter 1 • Lesson 10 45

# **Problem Solving • Applications**

### Use the rule and the table for 14-15.

- **14.** MATHEMATICAL **Write an Expression** to represent the total number of lemon tetras that could be in a 20-gallon aquarium.
- **15. There are tiger** barbs in a 15-gallon aquarium and giant danios in a 30-gallon aquarium. Write a numerical expression to represent the greatest total number of fish that could be in both aquariums.



**16. GODEEPER** Write a word problem for an expression that is three times as great as (15 + 7). Then write the expression.

**17. THINKSMARTER** Daniel bought 30 tokens when he arrived at the festival. He won 8 more tokens for getting the highest score at the basketball contest, but lost 6 tokens at the ring toss game. Write an expression to find the number of tokens Daniel has left.

Aquari	um Fish
Type of Fish	Length (in inches)
Lemon Tetra	2
Strawberry Tetra	3
Giant Danio	5
Tiger Barb	3
Swordtail	5

E Math • Show Your Work

The rule for the number of fish in an aquarium is to allow 1 gallon of water for each inch of length.

### Name \_

# **Evaluate Numerical Expressions**

**Essential Question** In what order must operations be evaluated to find the solution to a problem?

**CONNECT** Remember that a numerical expression is a mathematical phrase that uses only numbers and operation symbols.

 $(5-2) \times 7$   $72 \div 9 + 16$  (24-15) + 32

To **evaluate**, or find the value of, a numerical expression with more than one operation, you must follow rules called the **order of operations**. The order of operations tells you in what order you should evaluate an expression.

# ALGEBRA Lesson 1.11



### Order of Operations

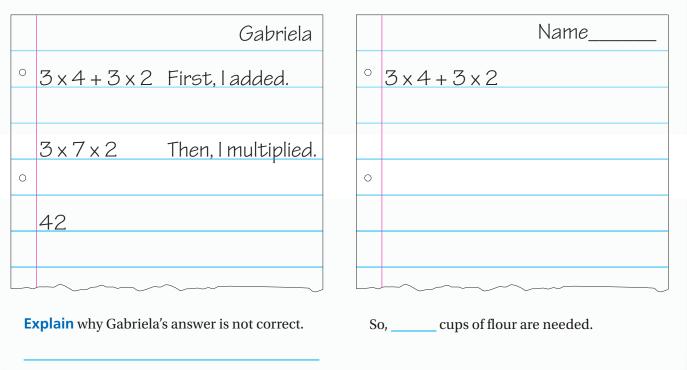
- 1. Perform operations in parentheses.
- 2. Multiply and divide from left to right.
- 3. Add and subtract from left to right.



A bread recipe calls for 4 cups of wheat flour and 2 cups of rye flour. To triple the recipe, how many cups of flour are needed in all?

Evaluate  $3 \times 4 + 3 \times 2$  to find the total number of cups.

- Gabriela did not follow the order of operations correctly.
- B Follow the order of operations by multiplying first and then adding.



**Evaluate Expressions with Parentheses** To evaluate an expression with parentheses, follow the order of operations. Perform the operations in parentheses first. Multiply from left to right. Then add and subtract from left to right.

# 🛛 Example

Each batch of granola Lena makes uses 3 cups of oats, 1 cup of raisins, and 2 cups of nuts. Lena wants to make 5 batches of granola. How many cups of oats, raisins, and nuts will she need in all?

Write the expression.

First, perform the operations in parentheses.  $5 \times ($  )

Then multiply.

So, Lena will use \_\_\_\_\_ cups of oats, raisins, and nuts in all.

• MATHEMATICAL **2** Reason Quantitatively What if Lena makes 4 batches? Will this change the numerical expression? Explain.

 $5 \times (3 + 1 + 2)$ 

# **Try This!** Rewrite the expression with parentheses to equal the given value.

▲ 6 + 12 × 8 - 3; value: 141

- Evaluate the expression without the parentheses. \_\_\_\_\_
- Try placing the parentheses in the expression so the value is 141.

**Think:** Will the placement of the parentheses increase or decrease the value of the expression?

• Use order of operations to check your work.

 $6 + 12 \times 8 - 3$ 

■ 5 + 28 ÷ 7 – 4; value: 11

- Evaluate the expression without the parentheses.
- Try placing the parentheses in the expression so that the value is 11.

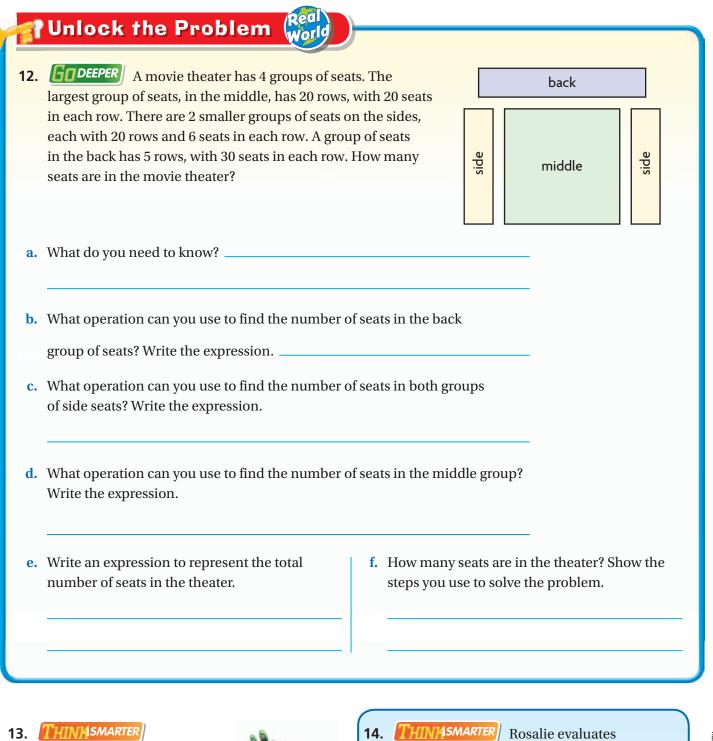
**Think:** Will the placement of the parentheses increase or decrease the value of the expression?

• Use order of operations to check your work.

$$5\,+\,28\ \div\ 7\,-\,4$$

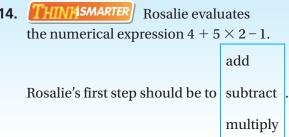
how MATH BOARD			
expression.			
<b>✓ 2.</b> 10 + (25 − 1	10) ÷ 5	<b>∛ 3.</b> 9−(	$3 \times 2) + 8$
first.			
			_
		Math Talk	Mathematical Practice
		Raina evalu $5 \times 2 + 2$ b	nated the expression by adding first and then . Will her answer be plain.
expression.			
		5)	<b>7.</b> 125 – (68 + 7)
	C	<b>10.</b> 9 + 5 value	
	) — 30 ÷ 5 with		
	expression. first. <b>2.</b> $10 + (25 - 1)$ first. <b>5.</b> $5 + 17 - 100 \div 5$ with parentheses to equal the set of equal the s	expression. first. 5. $5 + 17 - 100 \div 5$ 6. $36 - (8 + 12)$ with parentheses to equal the given value. 9. $12 + 17 - 3 \times 2$	Expression. first. <b>2.</b> $10 + (25 - 10) \div 5$ first. <b>3.</b> $9 - (10)$ <b>5.</b> $5 + 17 - 100 \div 5$ <b>6.</b> $36 - (8 + 5)$ <b>7.</b> $5 + 17 - 100 \div 5$ <b>6.</b> $36 - (8 + 5)$ with parentheses to equal the given value. <b>9.</b> $12 + 17 - 3 \times 2$ <b>10.</b> $9 + 5$

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Write and evaluate two equivalent numerical expressions that show the Distributive Property of Multiplication.





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### Name \_\_\_

# **Grouping Symbols**

**Essential Question** In what order must operations be evaluated to find a solution when there are parentheses within parentheses?

# **TUnlock the Problem**

Mary's weekly allowance is \$8 and David's weekly allowance is \$5. Every week they each spend \$2 on lunch. Write a numerical expression to show how many weeks it will take them together to save enough money to buy a video game for \$45.

# ALGEBRA Lesson 1.12



Operations and Algebraic Thinking—5.0A.1

**MATHEMATICAL PRACTICES** MP.2, MP.4

- Underline Mary's weekly allowance and how much she spends.
- Circle David's weekly allowance and how much he spends.

How much money does David save each week?

Think: Each week David gets \$5 and spends \$2.

( )



### Use parentheses and brackets to write an expression.

Norla

You can use parentheses and brackets to group operations that go together. Operations in parentheses and brackets are performed first.

**STEP 1** Write an expression to represent how much Mary and David save each week.

• How much money does Mary save each week?

Think: Each week Mary gets \$8 and spends \$2.



 How much money do Mary and David save together each week? \_\_\_\_\_

**STEP 2** Write an expression to represent how many weeks it will take Mary and David to save enough money for the video game.

 How many weeks will it take Mary and David to save enough for a video game?

**Think:** I can use brackets to group operations a second time. \$45 is divided by the total amount of money saved each week.

÷[\_\_\_\_]

Math Talk Explain why brackets are placed around the part of the expression

that represents the amount of money Mary and David save each week.

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Chapter 1 51

# **Evaluate Expressions with Grouping Symbols** When evaluating an expression with different grouping symbols (parentheses, brackets, and braces), perform the operation in the innermost set of grouping symbols first, evaluating the expression from the inside out.

# 🛛 Example

Juan gets \$6 for his weekly allowance and spends \$4 of it. His sister Tina gets \$7 for her weekly allowance and spends \$3 of it. Their mother's birthday is in 4 weeks. If they spend the same amount each week, how much money can they save together in that time to buy her a present?

- Write the expression using parentheses and brackets.
- Perform the operations in the parentheses first.
- Next perform the operations in the brackets.
- Then multiply.

So, Juan and Tina will be able to save \_\_\_\_\_\_ for their mother's birthday present.

• MATHEMATICAL O Connect Symbols and Words What if only Tina saves any money? Will this change the numerical expression? Explain.

# **Try This!** Follow the order of operations.

A $\times \{[(5-2) \times 3] + [(2+4) \times 2]\}$	
• Perform the operations in the parentheses.	$4 \times \{[3 \times 3] + [\_\_\_ \times \_\_]\}$
• Perform the operations in the brackets.	4 × {9 +}
• Perform the operations in the braces.	4 ×
• Multiply.	
<b>B</b> 32 ÷ {[(3 × 2) + 7] − [(6 − 4) + 7]}	
• Perform the operations in the parentheses.	32 ÷ {[+]-[+]}
• Perform the operations in the brackets.	32 ÷ {}
• Perform the operations in the braces.	32 ÷
• Divide.	



 $4 \times [(\$6 - \$4) + (\$7 - \$3)]$ 

4 × [\_\_\_\_\_ + \_\_\_\_]

 $4 \times$ 

Name		
Share and Show	MATH BOARD	
Evaluate the numerical express	ion.	
<b>1</b> . $12 + [(15 - 5) + (9 - 3)]$	<b>6 2</b> . $5 \times [(26 - 4) - (4 + 6)]$	<b>3.</b> $36 \div [(18 - 10) - (8 - 6)]$
12 + [10 +]		
12 +		
On Your Own		
Evaluate the numerical express	ion.	
<b>4.</b> $4 + [(16 - 4) + (12 - 9)]$	<b>5.</b> $24 - [(10 - 7) + (16 - 9)]$	6. $3 \times \{[(12 - 8) \times 2] + [(11 - 9) \times 3]\}$

# **Problem Solving • Applications**

- 7. **MATHEMATICAL** Use Symbols Write the expression  $2 \times 8 + 20 12 \div 6$  with parentheses and brackets two different ways so one value is less than 10 and the other value is greater than 50.
- 8. Wilma works at a bird sanctuary and stores birdseed in plastic containers. She has 3 small containers that hold 8 pounds of birdseed each and 6 large containers that hold 12 pounds of birdseed each. Each container was full until she used 4 pounds of bird seed. She wants to put some of the remaining birdseed into 30 bird feeders that can hold 2 pounds each. How much birdseed does she have left over? Show the expression you used to find your answer.

### MATHEMATICAL PRACTICES

# l Unlock the Problem 👹

9. **THINASMARTER** Dan has a flower shop. Each day he displays 24 roses. He gives away 10 and sells the rest. Each day he displays 36 carnations. He gives away 12 and sells the rest. What expression can you use to find out how many roses and carnations Dan sells in a week?



- a. What information are you given?
- b. What are you being asked to do?
- c. What expression shows how many roses Dan sells in one day?
- d. What expression shows how many carnations Dan sells in one day?
- e. Write an expression to represent the total number
  - of roses and carnations Dan sells in one day.
- f. Write the expression that shows how many

roses and carnations Dan sells in a week.

### Personal Math Trainer

**10. THINASMARTER** A gift shop had 500 coloring pencils. The shop sold 3 sets of 20 coloring pencils, 6 sets of 12 coloring pencils, and 10 sets of 18 coloring pencils. Write a numerical expression to show how many coloring pencils are left. Evaluate the numerical expression using order of operations. Show your work.

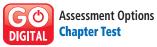


**1.** Find the property that each equation shows. Write the equation in the correct box.

$15 \times (7 \times 9) = (15 \times 7) \times 9$	23 + 4 + 109 = 4 + 23 + 109	
13 + (3 + 7) = (13 + 3) + 7	$87 \times 3 = 3 \times 87$	
$1 \times 9 = 9$	0 + 16 = 16	
Identity Property of Addition	Commutative Property of Multiplication	Identity Property of Multiplication
Associative Property of Multiplication	Commutative Property of Addition	Associative Property of Addition

**2.** For numbers 2a–2d, select True or False for each statement.

2a.	$170 \text{ is } \frac{1}{10} \text{ of } 17$	○ True	○ False
2b.	660 is 10 times as much as 600	○ True	○ False
2c.	900 is $\frac{1}{10}$ of 9,000	○ True	○ False
2d.	4,400 is 10 times as much as 440	O True	○ False



- **3.** Select other ways to write 700,562. Mark all that apply.
  - (A)  $(7 \times 100,000) + (5 \times 1,000) + (6 \times 10) + (2 \times 1)$
  - **B** seven hundred thousand, five hundred sixty-two
  - **(C)** 700,000 + 500 + 60 + 2
  - **(D)** 7 hundred thousands + 5 hundreds + 62 tens
- **4.** Carrie has 140 coins. She has 10 times as many coins as she had last month. How many coins did Carrie have last month?

coins

- **5.** Valerie earns \$24 per hour. Which expression can be used to show how much money she earns in 7 hours?
  - (A) (7+20) + (7+4)
  - **B**  $(7 \times 20) + (7 \times 4)$
  - (7 + 20) × (7 + 4)
  - **D**  $(7 \times 20) \times (7 \times 4)$
- 6. The table shows the equations Ms. Valez discussed in math class today.

Equations
$6 \times 10^{0} = 6$
$6 \times 10^{1} = 60$
$6 \times 10^2 = 600$
$6 \times 10^3 = 6,000$

Explain the pattern of zeros in the product when multiplying by powers of 10.

**7.** It is 3,452 miles round trip to Craig's aunt's house. If he travels to her house 3 times this year, how many miles did he travel in all?

miles

**8.** Lindsey earns \$33 per day at her part-time job. Complete the table to show the total amount Lindsey earns.

Lindsey's Earnings								
Number of Days	Total Amount							
3								
8								
14								

**9.** Jackie followed these steps to evaluate the expression  $15 - (37 + 8) \div 3$ .

37 + 8 = 45

45 - 15 = 30

 $30\div3=10$ 

Mark looks at Jackie's work and says she made a mistake. He says she should have divided by 3 before she subtracted.

### Part A

Which student is correct? Explain how you know.

### Part B

Evaluate the expression.

- **10.** Carmine buys 8 plates for \$1 each. He also buys 4 bowls. Each bowl costs twice as much as each plate. The store is having a sale that gives Carmine \$3 off the bowls. Which numerical expression shows how much he spent?
  - (8 × 1) + [(4 × 16) 3]
  - **B**  $(8 \times 1) + [4 \times (16 3)]$
  - **(** $8 \times 1$ **)** + [(4 × 2) 3]
  - **D**  $(8 \times 4) + [(4 \times 2) 3]$
- **11.** Evaluate the numerical expression.
  - $2 + (65 + 7) \times 3 =$
- **12.** An adult elephant eats about 300 pounds of food each day. Write an expression to represent the number of pounds of food a herd of 12 elephants eat in 5 days.
- **13.** Jason is solving a homework problem.

Arianna buys 5 boxes of granola bars. Each box contains 12 granola bars. Arianna eats 4 bars.

Jason writes a numerical expression to represent the situation. His expression,  $(12-4) \times 5$ , has a mistake.

# Part A

Explain Jason's mistake.

# Part B

Write an expression to show how many granola bars are left, and then solve it.

Name \_

**14.** Paula collected 75 stickers. She shares her stickers with 5 of her friends equally. How many stickers will each friend get?

### Part A

Use the array to show your answer.

| <br> |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

# Part B

Use the multiplication sentence to complete the division sentence.

$5 \times$ = 75 $75 \div 5$	=
-----------------------------	---

**15.** Mario is making dinner for 9 people. Mario buys 6 containers of soup. Each container is 18 ounces. If everyone gets the same amount of soup, how much soup will each person get? How can you solve a simpler problem to help you find the solution?

**16.** Jill wants to find the quotient. Use multiplication and the Distributive Property to help Jill find the quotient.

$144 \div 8 =$	
Multiplication	
Distributive Property	

**17.** Jeannette eats a breakfast sandwich that has 345 calories. If she eats the same kind of sandwich every day for 12 days, how many calories would she have for breakfast?

calories

**18.** There are 8 teachers going to the science museum. If each teacher pays \$15 to get inside, how much did the teachers pay?

\$

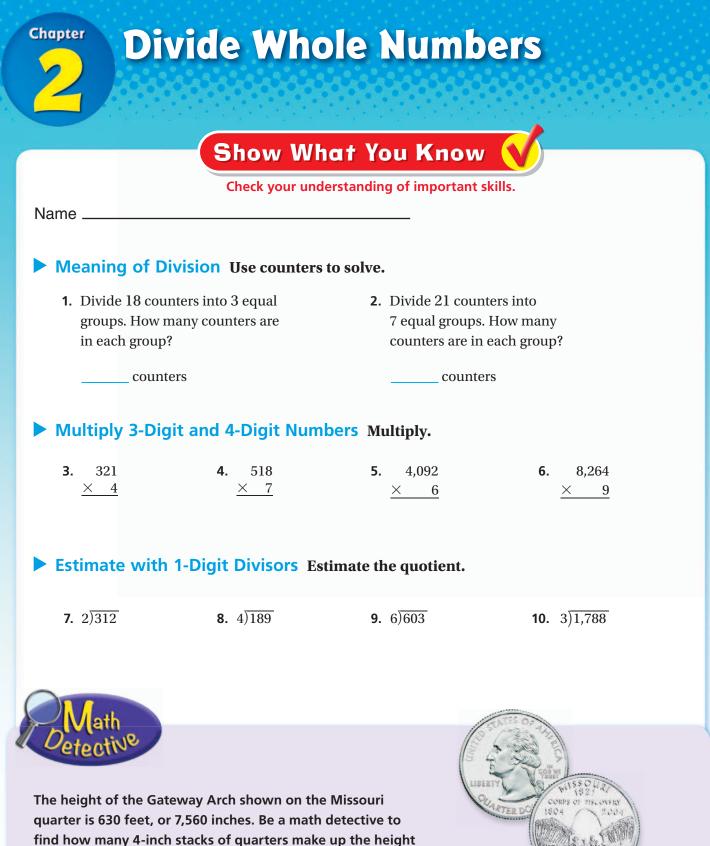
- **19.** Select other ways to write 50,897. Mark all that apply.
  - (A)  $(5 \times 10,000) + (8 \times 100) + (9 \times 10) + (7 \times 1)$
  - **B** 50,000 + 800 + 90 + 7
  - $(\mathbf{C})$  5,000 + 800 + 90 + 7
  - **D** fifty thousand, eight hundred ninety-seven
- **20.** For numbers 20a–20b, select True or False.

20a.	55 - (12 + 2), value: 41	○ True	○ False
20b.	$25 + (14 - 4) \div 5$ , value: 27	○ True	○ False

**21.** Tara bought 2 bottles of juice a day for 15 days. On the 16th day, Tara bought 7 bottles of juice.

Write an expression that matches the words.

- **22.** Select other ways to express  $10^2$ . Mark all that apply.
  - **(A)** 20
  - **B** 100
  - (C) 10 + 2
  - $(\mathbf{D})$  10  $\times$  2
  - **E** 10 + 10
  - $(\mathbf{F})$  10  $\times$  10

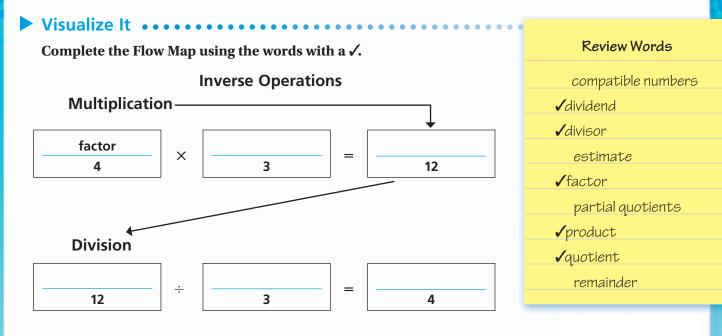


stack, how many quarters high is the arch?

of the Gateway Arch. If there are 58 quarters in a 4-inch



# **Vocabulary Builder**



# 

### Use the review words to complete each sentence.

- **1.** You can to find a number that is close to the exact amount.
- 2. Numbers that are easy to compute with mentally are called
- **3.** The is the amount left over when a number cannot be divided evenly.
- 4. A method of dividing in which multiples of the divisor are subtracted from the dividend and then the quotients are

added together is called \_\_\_\_\_\_

- 5. The number that is to be divided in a division problem is the
- **6.** The \_\_\_\_\_\_\_ is the number, not including the remainder, that results from dividing.



. . . . . . . . . . . . .

### Name \_\_\_\_

# **Place the First Digit**

**Essential Question** How can you tell where to place the first digit of a quotient without dividing?

01

**Purplet and Problem** 

Number and Operations in Base Ten--5.NBT.6 MATHEMATICAL PRACTICES

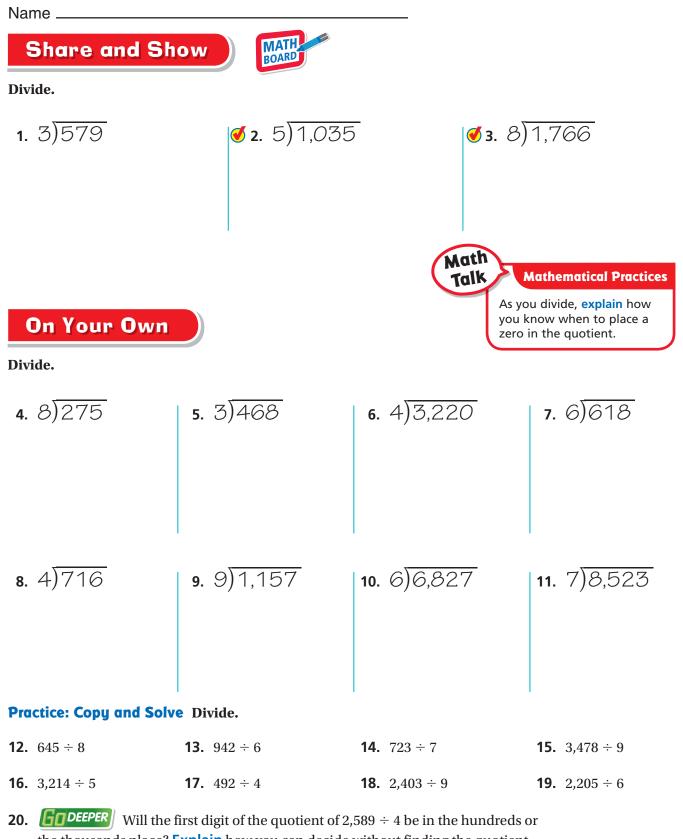
MATHEMATICAL PRAC MP.1, MP.6

Tania has 8 purple daisies. In all, she counts 128 petals on her flowers. If each flower has the same number of petals, how many petals are on one flower?		<ul> <li>Underline the sentence that tells you what you are trying to find.</li> <li>Circle the numbers you need to use.</li> <li>How will you use these numbers to solve the problem?</li> </ul>
D	Divide. 128 ÷ 8	
STEP 1	Use an estimate to place the first digit in the quotient.	
	Estimate. 160 ÷ =	
	The first digit of the quotient will be i	n hitez
	the place.	
STEP 2	Divide the tens. $ \begin{array}{c} 1 \\ 8 \overline{)128} \\ \hline  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\ $	shared uping.
STEP 3	Regroup any tens left as ones. Then, divid 3)128 $-8$ Divide. 48 ones ÷ 8 Multiply. 8 × 6 ones Subtract. 48 ones – o Check ones cannot b shared among 8 groups.	nes

Since 16 is close to the estimate of \_\_\_\_\_, the answer is reasonable.

So, there are 16 petals on one flower.

_					
Ð	xamp	le		3	
Divide.	Use place v	alue to place the	first digit. 4,236 ÷ 5	Remember	
STEP 1	Use place	value to place	the first digit.	Remember to estimate the quotient first.	e
	5)4,236	Look at the thou 4 thousands can without regroup	not be shared among 5 group	Estimate: 4,000 ÷ 5 =	
		Look at the hund	dreds.		
		hundred	ds can be shared among 5 gro	ups.	
	The first o	digit is in the	place.		
STEP 2	Divide the	e hundreds.			
	8 5) <mark>4,236</mark>	Divide.	_ hundreds ÷		
	-	Multiply.	_ × hundreds		4
		Subtract	_ hundreds – hundre	eds	7
			_ hundreds cannot be shared os without regrouping.	among	
STEP 3	Divide the				TAN
	84				
	5)4,236				
	$-40 \downarrow$ 23 -20				
	<u>-20</u> 3	Subtract			
		Check.			
STEP 4	Divide the	e ones.			5
	847	Divide.			1
	5) <del>4,236</del> 40	Multiply.			
	<u>-40</u> 23 -20				
	<u>-20</u> 36 <u>-35</u> 1				
So, 4,230	6 ÷ 5 is	r		Turi I	ematical Practices
					w you know if er is reasonable.



the thousands place? Explain how you can decide without finding the quotient.

	Unlock the Problem (Real )-	
21	MATHEMATICAL O Interpret a Result Rosa has a garden divinto sections. She has 125 daisy plants. If she plants ar number of the daisy plants in each of 3 sections, how the daisy plants will be in each section? How many daisy privile be left over?	nany
a	What information will you use to solve the problem?	Violet Daisy Periwinkle
b	How will you use division to find the number of daisy plants left over?	Periwinkle Daisy Violet
С	Show the steps you use to solve the problem. <b>d.</b> Estimate: $120 \div 3 =$	Complete the sentences: Rosa has daisy plants. She puts an equal number in each of sections. Each section has plants. Rosa has
		daisy plants left over.
22.	<b>THINASMARTER</b> One case can hold 3 boxes. Each box of How many cases are needed to hold 126 binders?	an hold 3 binders.
23.	<b>THIN ASMARTER</b> For numbers 23a–23b, choose Yes or I to indicate whether the first digit of the quotient is in the	
	23a. 1,523 ÷ 23 • Yes • No	
	23b. $2,315 \div 9$ • Yes • No	

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FOR MORE PRACTICE:

**Standards Practice Book** 

### Name \_

# **Divide by 1-Digit Divisors**

Essential Question How do you solve and check division problems?

Lesson 2.2

**Number and Operations in Base** Ten—5.NBT.6 **MATHEMATICAL PRACTICES** 

MP.1, MP.2

# Unlock the Problem Jenna's family is planning a trip to Oceanside, Underline the sentence that tells you California. They will begin their trip in Scranton, what you are trying to find. Pennsylvania, and will travel 2,754 miles over • Circle the numbers you need to use. 9 days. If the family travels an equal number of miles every day, how far will they travel each day? **Divide.** 2,754 ÷ 9 **STEP 1** Use an estimate to place the first digit in the quotient. Estimate. 2,700 ÷ 9 = \_\_\_\_ 9 2, 7 5 4 The first digit of the quotient is in the place. \_ **STEP 2** Divide the hundreds. STEP 3 Divide the tens. STEP 4 Divide the ones. Since \_\_\_\_\_\_ is close to the estimate of \_\_\_\_\_, the answer is reasonable. So, Jenna's family will travel \_\_\_\_\_ miles each day. Math Talk

Real



quotient is 306 and not 36.

**CONNECT** Division and multiplication are inverse operations. Inverse operations are opposite operations that undo each other. You can use multiplication to check your answer to a division problem.

### **Example** Divide. Check your answer. To check your answer to a division problem, multiply the quotient by the divisor. If there is a remainder, add it to the product. The result should equal the dividend. 102 r2 102 $\leftarrow$ quotient 6)614 $\times$ 6 $\leftarrow$ divisor <u>-6</u> 01 $\leftarrow$ remainder \_0 $\leftarrow$ dividend 14 <u>-12</u> 2 Since the result of the check is equal to the dividend, the division is correct.



So, 614 ÷ 6 is \_\_\_\_\_.

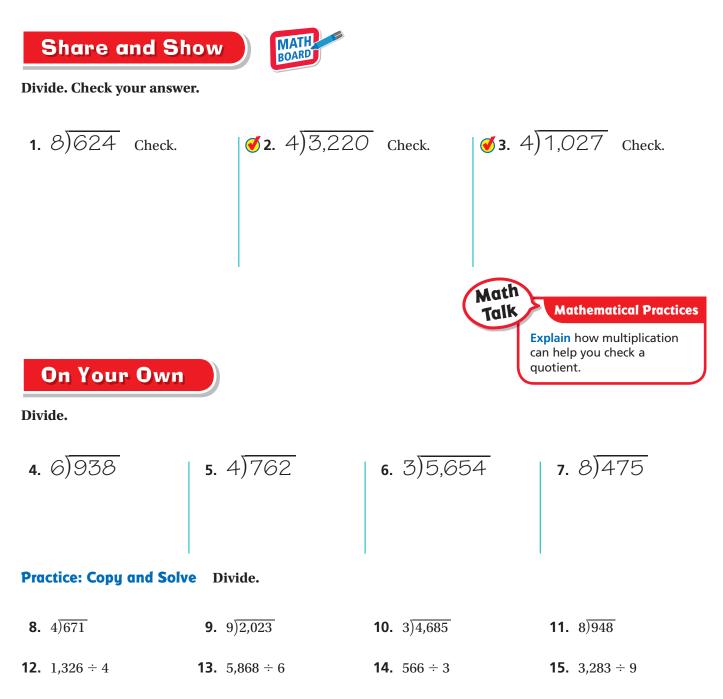
You can use what you know about checking division to find an unknown value.

### **Try This!** Find the unknown number by finding the value of *n* in the related equation.

	■ 125 r 6)752
$n = 7 \times 63$ dividend divisor quotient	$752 = 6 \times 125 + n$ $\uparrow \qquad \uparrow \qquad \checkmark$ dividend divisor quotient remainder
Multiply the divisor and the quotient. $n = \_\_\_$	Multiply the divisor and the quotient. 752 = 750 + n Think: What number added to 750 equals 752?
	n =

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**MATHEMATICAL 2** Use Reasoning **Algebra** Find the value of n in each equation. Write what n represents in the related division problem.

**16.**  $n = 4 \times 58$  **17.**  $589 = 7 \times 84 + n$  **18.**  $n = 5 \times 67 + 3$ 
 $n = \_$   $n = \_$   $n = \_$ 

Chapter 2 • Lesson 2 69

# **Problem Solving • Applications**

### Use the table to solve 19-21.

- **19.** If the Welcome gold nugget were turned into 3 equal-sized gold bricks, how many troy ounces would each brick weigh?
- **20.** Pose a Problem Look back at Problem 19. Write a similar problem by changing the nugget and the number of bricks. Then solve the problem.

Large Gold Nuggets Found				
Name	Weight	Location		
Welcome Stranger	2,284 troy ounces	Australia		
Welcome	2,217 troy ounces	Australia		
Willard	788 troy ounces	California		
B. C.				



- **21. CODEFFER** Suppose the Willard gold nugget was turned into 4 equal-sized gold bricks. If one of the bricks was sold, how many troy ounces of the Willard nugget would be left?
- **22.** There are 246 students going on a field trip to pan for gold. If they are going in vans that hold 9 students each, how many vans are needed? How many students will ride in the van that isn't full?



**23.** *[HIN] SMARTER* Lily's teacher wrote the division problem on the board. Using the vocabulary box, label the parts of the division problem. Then, using the vocabulary, explain how Lily can check whether her teacher's quotient is correct.

	quotient	divisor	dividend
		82	
		9)738	
FOR MORE PRACTIC	CE.		

**Standards Practice Book** 

# **Division with 2-Digit Divisors**

Essential Question How can you use base-ten blocks to model and understand division of whole numbers?

# Lesson 2.3



Number and Operations in Base Ten—5.NBT.6

MATHEMATICAL PRACTICES MP.4, MP.5, MP.6

# Investigate

Materials base-ten blocks

There are 156 students in the Carville Middle School chorus. The music director wants the students to stand with 12 students in each row for the next concert. How many rows will there be?

- **A.** Use base-ten blocks to model the dividend, 156.
- **B.** Place 2 tens below the hundred to form a rectangle. How many groups of 12 does the rectangle show? How much of the dividend is not shown in this rectangle?
- **C.** Combine the remaining tens and ones into as many groups of 12 as possible. How many groups of 12 are there?
- **D.** Place these groups of 12 on the right side of the rectangle to make a larger rectangle.
- The final rectangle shows \_\_\_\_\_ groups of 12. E.

So, there will be \_\_\_\_\_ rows of 12 students.

## **Draw Conclusions**

ATHEMATICAL 6 Explain why you still need to make groups of 12 after Step B. 1.

 $\frac{\text{ATHEMATICAL}}{\text{PRACTICE}} \mathbf{0} \quad \text{Describe} \text{ how you can use base-ten blocks to find the quotient } 176 \div 16.$ 

2.



The two sets of groups of 12 that you found in the Investigate are partial quotients. First you found 10 groups of 12 and then you found 3 more groups of 12. Sometimes you may need to regroup before you can show a partial quotient.

You can use a quick picture to record the partial products.

**Divide.** 180 ÷ 15

**MODEL** Use base-ten blocks.

STEP 1 Model the dividend, 180, as 1 hundred 8 tens.

Model the first partial quotient by making a rectangle with the hundred and 5 tens. In the Record section, cross out the hundred and tens you use.

The rectangle shows \_\_\_\_\_ groups of 15.

**STEP 2** Additional groups of 15 cannot be made without regrouping.

Regroup 1 ten as 10 ones. In the Record section, cross out the regrouped ten.

There are now \_\_\_\_\_ tens and \_\_\_\_\_ ones.

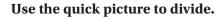
**STEP 3** Decide how many additional groups of 15 can be made with the remaining tens and ones. The number of groups is the second partial quotient.

Make your rectangle larger by including these groups of 15. In the Record section, cross out the tens and ones you use.

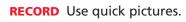
There are now \_\_\_\_\_ groups of 15.

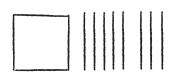
So, 180 ÷ 15 is \_\_\_\_\_.

# Share and Show



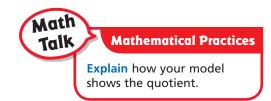
**1.** 143 ÷ 13

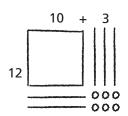




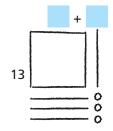
Draw the first partial quotient.

Draw the first and second partial quotients.









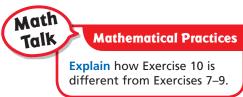
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### Divide. Use base-ten blocks.

### Divide. Draw a quick picture.

**6.** 216 ÷ 18 **5.** 165 ÷ 11 **7.** 196 ÷ 14 **8.** 195 ÷ 15 **ਓ** 9. 182 ÷ 13 **10.** 228 ÷ 12



# Connect to Social Studies

### **Pony Express**

The Pony Express used men riding horses to deliver mail between St. Joseph, Missouri, and Sacramento, California, from April, 1860 to October, 1861. The trail between the cities was approximately 2,000 miles long. The first trip from St. Joseph to Sacramento took 9 days 23 hours. The first trip from Sacramento to St. Joseph took 11 days 12 hours.



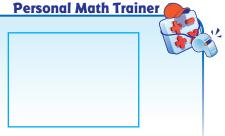
### Solve.

**11. THINASMARTER** Two Pony Express riders each rode part of a 176-mile trip. Each rider rode the same number of miles. They changed horses every 11 miles. How many horses did each rider use?



- **12. GODEEPER** Suppose a Pony Express rider was paid \$192 for 12 weeks of work. If he was paid the same amount each week, how much was he paid for 3 weeks of work?
- **13. (MATHEMATICAL 1) Analyze** Suppose three riders rode a total of 240 miles. If they used a total of 16 horses, and rode each horse the same number of miles, how many miles did they ride before replacing each horse?
- **14. THIMASMARTER** Suppose it took 19 riders a total of 11 days 21 hours to ride from St. Joseph to Sacramento. If they all rode the same number of hours, how many hours did each rider ride?

**15. The samples will be divided among 12 teams of scientists for analysis.** Draw a quick picture to show how the samples can be divided among the 12 teams.



74

### Name \_\_\_\_\_

# **Partial Quotients**

**Essential Question** How can you use partial quotients to divide by 2-digit divisors?

# **PUnlock the Problem**

People in the United States eat about 23 pounds of pizza per person every year. If you ate that much pizza each year, how many years would it take you to eat 775 pounds of pizza?

 Rewrite in one sentence the problem you are asked to solve.



### Divide by using partial quotients.

 $775 \div 23$ 

### STEP 1

Subtract multiples of the divisor from the dividend until the remaining number is less than the multiple. The easiest partial quotients to use are multiples of 10.

### STEP 2

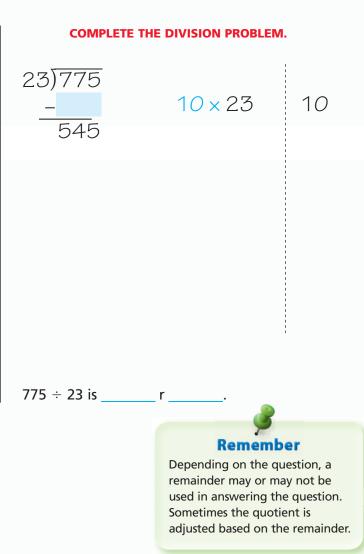
Subtract smaller multiples of the divisor until the remaining number is less than the divisor. Then add the partial quotients to find the quotient.

So, it would take you more than 33 years to eat 775 pounds of pizza.

Ten—5.NBT.6

**MATHEMATICAL PRACTICES** 

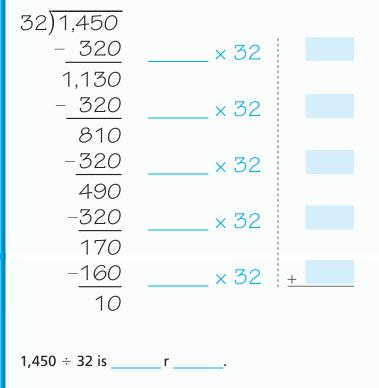
MP.3, MP.8



Number and Operations in Base

# 🛛 Example

Myles is helping his father with the supply order for his pizza shop. For next week, the shop will need 1,450 ounces of mozzarella cheese. Each package of cheese weighs 32 ounces. Complete Myles's work to find how many packages of mozzarella cheese he needs to order.



So, he needs to order \_\_\_\_\_ packages of mozzarella cheese.

**Try This!** Use different partial quotients to solve the problem above.

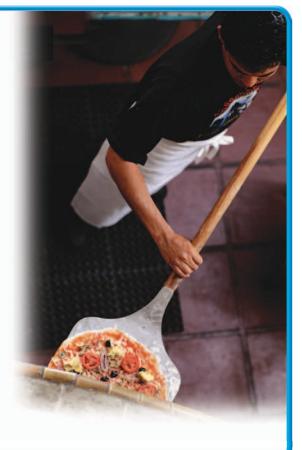
Math Talk What does the remainder represent?

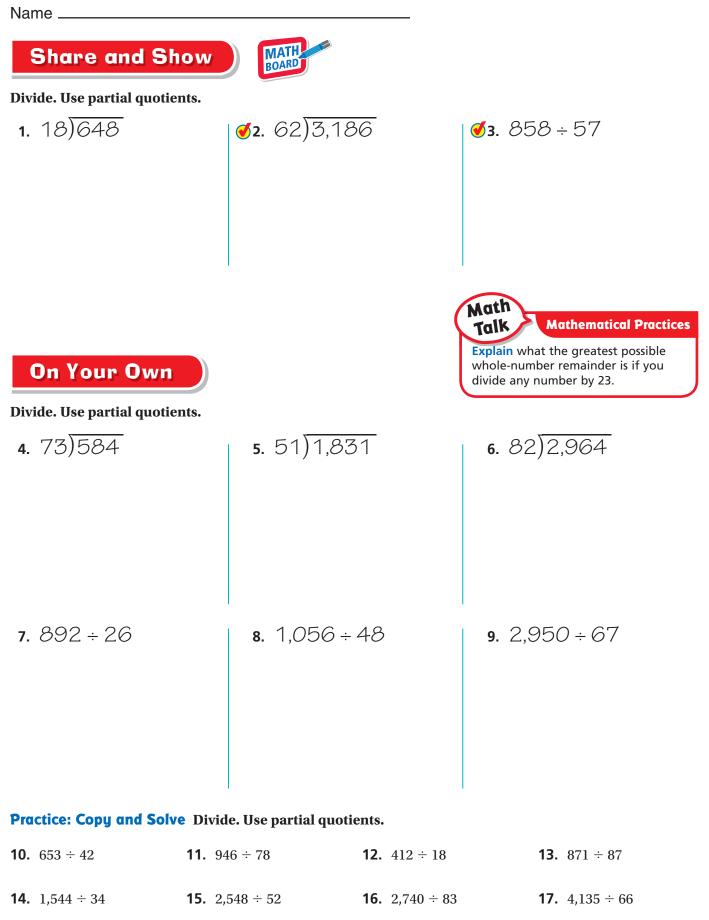
**Explain** how the remainder will affect your answer.

32)1,450

### **Math Idea**

Using different multiples of the divisor to find partial quotients provides many ways to solve a division problem. Some ways are quicker, but all result in the same answer.





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### MATHEMATICAL PRACTICES

# **Problem Solving • Applications**

Use the table to solve 18-21.

- **18.** How many years would it take for a person in the United States to eat 855 pounds of apples?
- **19.** How many years would it take for a person in the United States to eat 1,120 pounds of turkey?

Each year each person in the U.S. eats about... •68 quarts of popcorn •53 pounds of bread •19 pounds of apples •14 pounds of turkey

- **20. GODEEPER** If 6 people in the United States each eat the average amount of popcorn for 5 years, how many quarts of popcorn will they eat?
- 21. Mathematical ① Make Sense of Problems In the United States, a person eats more than 40,000 pounds of bread in a lifetime if he or she lives to be 80 years old. Does this statement make sense, or is it nonsense? Explain.

**22. THINASMARTER** In a study, 9 people ate a total of 1,566 pounds of potatoes in 2 years. If each person ate the same amount each year, how many pounds of potatoes did each person eat in 1 year?

ur, Mathon the Spot

**23. DHIMASMARTER** Nyree divided 495 by 23 using partial quotients. Find the quotient and remainder. Explain your answer using numbers and words.



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# **Concepts and Skills**

- **1.** Explain how estimating the quotient helps you place the first digit in the quotient of a division problem. (5.NBT.6)
- **2.** Explain how to use multiplication to check the answer to a division problem. (5.NBT.6)

### Divide. (5.NBT.6)

<b>3.</b> 633 ÷ 3	<b>4.</b> 487 ÷ 8	<b>5.</b> 1,641 ÷ 4	<b>6.</b> 2,765 ÷ 9

### Divide. Use partial quotients. (5.NBT.6)

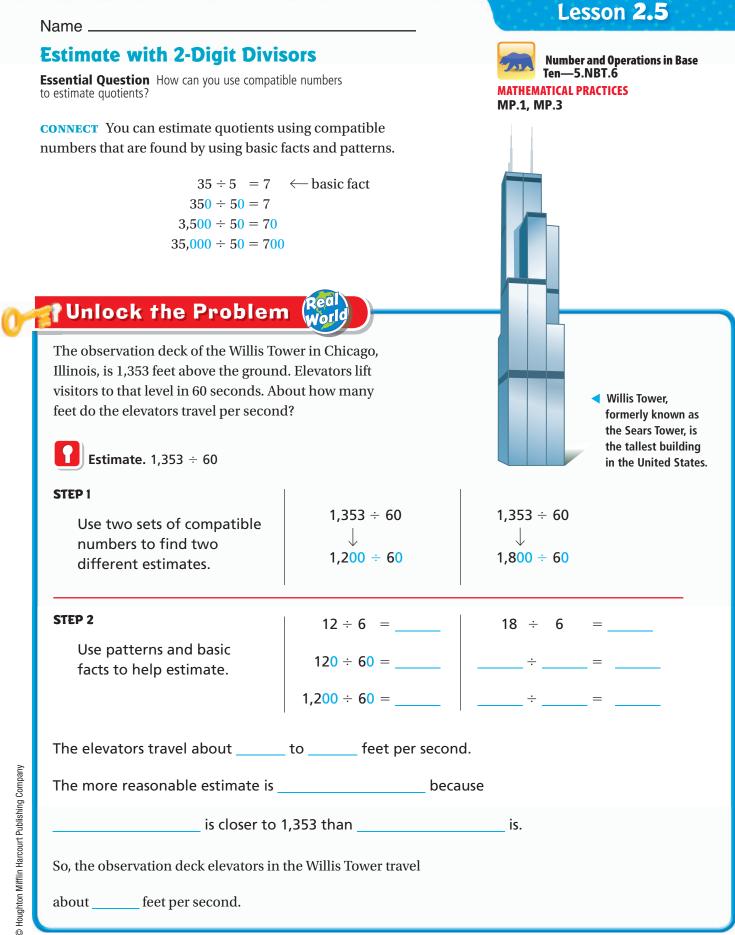
 7. 156 ÷ 13
 8. 318 ÷ 53
 9. 1,562 ÷ 34
 10. 4,024 ÷ 68

**11.** Emma is planning a party for 128 guests. If 8 guests can be seated at each table, how many tables will be needed for seating at the party? (5.NBT.6)

**12.** Tickets for the basketball game cost \$14 each. If the sale of the tickets brought in \$2,212, how many tickets were sold? (5.NBT.6)

**13.** Margo used 864 beads to make necklaces for the art club. She made 24 necklaces with the beads. If each necklace has the same number of beads, how many beads did Margo use for each necklace? (5.NBT.6)

**14.** Angie needs to buy 156 candles for a party. Each package has 8 candles. How many packages should Angie buy? (5.NBT.6)



# **Example** Estimate money. AN A DESCRIPTION OF A D Miriam saved \$650 to spend during her 18-day trip to Chicago. She doesn't want to run out of money before the trip is over, so she plans to spend about the same amount each day. Estimate how much she can spend each day. Estimate. 18)\$650 \$600 ÷ = \$30 or ÷ 20 = \$40 Math So, Miriam can spend about \_\_\_\_\_\_ to \_\_\_\_\_ each day. **Mathematical Practices** Talk Would it be more reasonable to have an estimate or an exact answer for this example? Explain your reasoning. PRACTICE **O** Use Reasoning Which estimate do you think is the better one for Miriam to use? Explain your reasoning.

### **Try This!** Use compatible numbers.

Find tv	o estimates.	
52)415		

Estimate the quotient.

38)\$2,764

# Share and Show



### Use compatible numbers to find two estimates.

 1.  $22\overline{)154}$  2.  $68\overline{)503}$  3.  $81\overline{)7,052}$ 
 $140 \div 20 = \______
 160 \div 20 = \_____
 6. <math>19\overline{)5,312}$  

 (4.  $33\overline{)291}$  (5.  $58\overline{)2,365}$  6.  $19\overline{)5,312}$ 

Name	è
------	---

# On Your Own

Use compatible numbers to find two estimates.

<b>7.</b> 42)396	<b>8.</b> 59)413	<b>9.</b> 28)232
<b>10.</b> 22)368	<b>11.</b> 78)375	<b>12.</b> 88)6,080

### Use compatible numbers to estimate the quotient.

<b>13.</b> 19)228	<b>14.</b> 25)\$595	<b>15.</b> 86)7,130
<b>16.</b> 83)462	<b>17.</b> 27)9,144	<b>18.</b> 68)710

- **19.** A store owner bought a large box of 5,135 paper clips. He wants to repackage the paper clips into 18 smaller boxes. Each box should contain about the same number of paper clips. About how many paper clips should the store owner put into each box?
- **20.** Explain how you can use compatible numbers to estimate the quotient of  $925 \div 29$ .

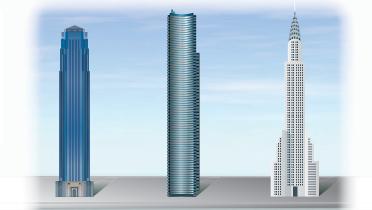
# **Problem Solving • Applications**

### Use the picture to solve 21-22.

**21. ITHINASMARTER** Use estimation to decide which building has the tallest floors. About how many meters is each floor?



22. Mathematical ③ Make Arguments About how many meters tall is each floor of the Chrysler Building? Use what you know about estimating quotients to justify your answer.



275 meters, 64 floors, Williams Tower, Texas 295 meters, 76 floors, Columbia Center, Washington

319 meters, 77 floors, Chrysler Building, New York

**WRITE** Math Show Your Work

- **23. WRITE** Math Explain how you know whether the quotient of 298 ÷ 31 is closer to 9 or to 10.
- **24. Eli** needs to save \$235. To earn money, he plans to mow lawns and charge \$21 for each. Write two estimates Eli could use to determine the number of lawns he needs to mow. Decide which estimate you think is the better one for Eli to use. Explain your reasoning.

**25.** [THINASMARTER] Anik built a tower of cubes. It was 594 millimeters tall. The height of each cube was 17 millimeters. About how many cubes did Anik use? Explain your answer.

84

### Name \_\_\_\_\_

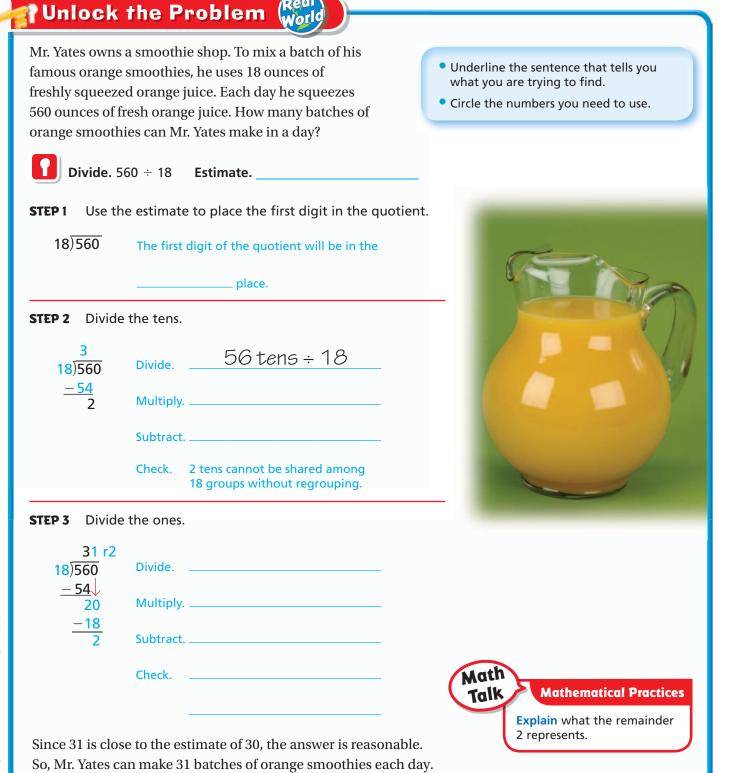
### **Divide by 2-Digit Divisors**

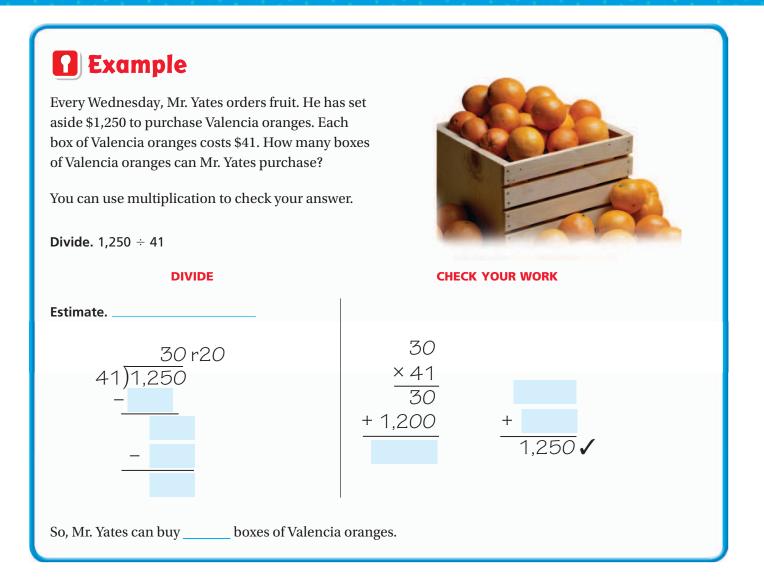
Essential Question How can you divide by 2-digit divisors?

# **MP.1, MP.8**

Lesson 2.6

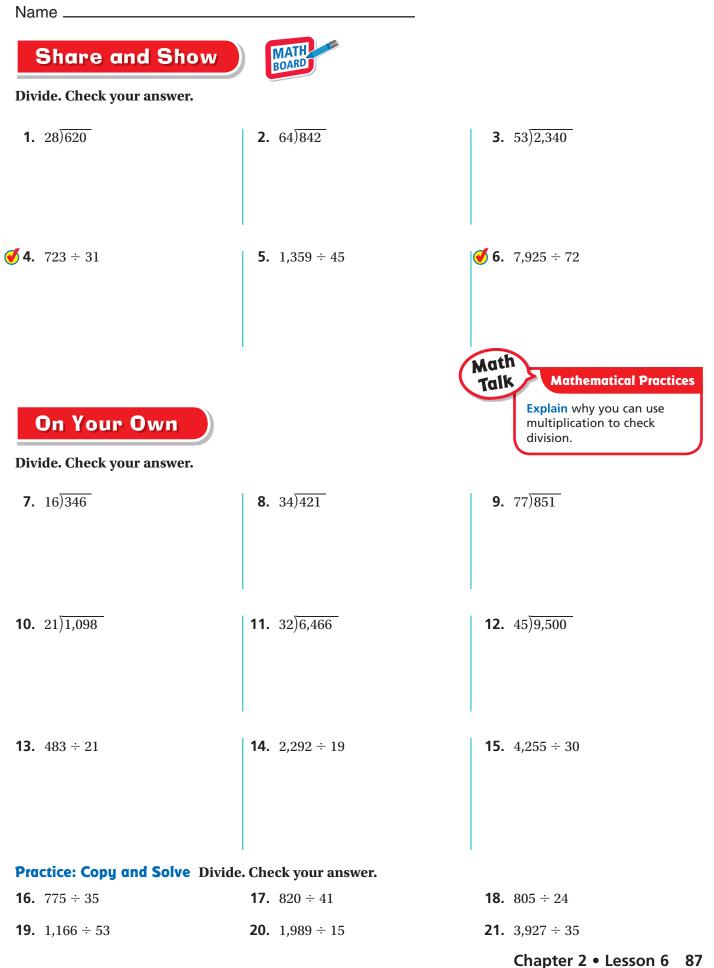
**Number and Operations in Base** Ten—5.NBT.6 MATHEMATICAL PRACTICES





### **Try This!** Divide. Check your answer.

▲ 63)756	<b>B</b> 22)4,692



# Problem Solving • Applications 🕃

### Use the list at the right to solve 22-24.

- **22. CODEEPER** A smoothie shop receives a delivery of 968 ounces of grape juice and 720 ounces of orange juice. How many more Royal Purple smoothies than Orange Tango smoothies can be made with the shipment of juices?
- 23. **THIN ASMARTER** The shop has 1,260 ounces of cranberry juice and 650 ounces of passion fruit juice. If the juices are used to make Crazy Cranberry smoothies, which juice will run out first? How much of the other initia will be left a

much of the other juice will be left over?

24. **WATHEMATICAL 2** Use Reasoning In the refrigerator, there are 680 ounces of orange juice and 410 ounces of mango juice. How many Orange Tango smoothies can be made? Explain your reasoning.

		Per	sonal Math <sup>•</sup>	Trainer 🔵
25.		For r True or False for each		-25b,
	25a.	1,585 ÷ 16 is 99 r1.	⊖ True	○ False
	25b.	1,473 ÷ 21 is 70 r7.	⊖ True	O False
	E			

**Standards Practice Book** 

# Smoothie Main Ingredients Orange Tango Smoothie 18 ounces orange juice 12 ounces mango juice Crazy Cranberry Crazy Cranberry

20 ounces cranberry juice 10 ounces passion fruit juice

**Smoothie** 

•• **WRITE** Math • Show Your Work

### Name \_\_\_

### **Interpret the Remainder**

**Essential Question** When solving a division problem, when do you write the remainder as a fraction?

## Lesson 2.7



Number and Operations–Fractions– 5.NF.3 Also 5.NBT.6

**MATHEMATICAL PRACTICES** MP.2, MP.4

# Tulock the Problem

Scott and his family want to hike a trail that is 1,365 miles long. They will hike equal parts of the trail on 12 different hiking trips. How many miles will Scott's family hike on each trip?

When you solve a division problem with a remainder, the way you interpret the remainder depends on the situation and the question. Sometimes you need to use both the quotient and the remainder. You can do that by writing the remainder as a fraction.

# **One Way** Write the remainder as a fraction.

First, divide to find the quotient and remainder.

Then, decide how to use the quotient and remainder to answer the question.

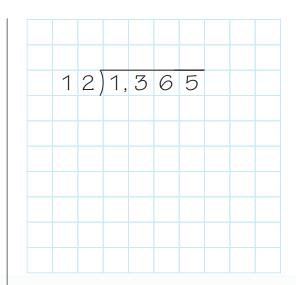
- The \_\_\_\_\_ represents the number of trips Scott and his family plan to take.
- The \_\_\_\_\_ represents the whole-number part of the number of miles Scott and his family will hike on each trip.
- The \_\_\_\_\_ represents the number of miles left over.
- The remainder represents 9 miles, which can also be divided into 12 parts and written as a fraction.

 $\frac{\text{remainder}}{\text{divisor}} \rightarrow$ 

• Write the quotient with the remainder written as a fraction in simplest form.

So, Scott and his family will hike \_\_\_\_\_ miles on each trip.

- Circle the dividend you will use to solve the division problem.
- Underline the divisor you will use to solve the division problem.



# Another Way Use only the quotient.

The segment of the Appalachian Trail that runs through Pennsylvania is 232 miles long. Scott and his family want to hike 9 miles each day on the trail. How many days will they hike exactly 9 miles?

- Divide to find the quotient and the remainder.
- Since the remainder shows that there are not enough miles left for another 9-mile day, it is not used in the answer.

So, they will hike exactly 9 miles on each of \_\_\_\_\_ days.

# 🚹 Other Ways

Add 1 to the quotient.

What is the total number of days that Scott will need to hike 232 miles?

• To hike the 7 remaining miles, he will need 1 more day.

So, Scott will need \_\_\_\_\_ days to hike 232 miles.

## **B** Use the remainder as the answer.

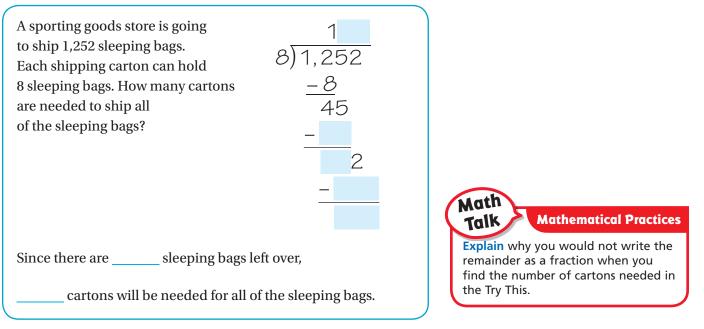
9)2 3 2

If Scott hikes 9 miles each day except the last day, how many miles will he hike on the last day?

• The remainder is 7.

So, Scott will hike \_\_\_\_\_ miles on the last day.

### Try This!

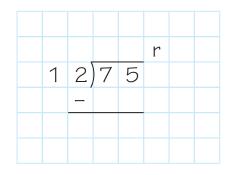


# Share and Show



### Interpret the remainder to solve.

- 1. Erika and Bradley want to hike the Big Cypress Trail. They will hike a total of 75 miles. If Erika and Bradley plan to hike for 12 days, how many miles will they hike each day?
  - **a.** Divide to find the quotient and remainder.
  - **b.** Decide how to use the quotient and remainder to answer the question.



- Vhat if Erika and Bradley want to hike 14 miles each day? How many days will they hike exactly 14 miles?
- Julan's hiking club is planning to stay overnight at a camping lodge. Each large room can hold 15 hikers. There are 154 hikers. How many rooms will they need?

# On Your Own

### Interpret the remainder to solve.

- **4. GODEEPER** The students in a class of 24 share 48 apple slices and 36 orange slices equally among them. How many pieces of fruit did each student get?
- **6.** A total of 123 fifth-grade students are going to Fort Verde State Historic Park. Each bus holds 38 students. All of the buses are full except one. How many students will be in the bus that is not full?
- 5. A campground has cabins that can each hold 28 campers. There are 148 campers visiting the campground. How many cabins are full if 28 campers are in each cabin?
- 7. **MATHEMATICAL 3** Verify the Reasoning of Others Sheila is going to divide a 36-inch piece of ribbon into 5 equal pieces. She says each piece will be 7 inches long. What is Sheila's error?

of ounces in each of 15 bags. How many ounces of Maureen have left over?	equal number of trail mix does
. What do you need to find?	
. How will you use division to find how many ounc	ces of trail mix are left over?
. Show the steps you use to solve the problem.	<b>d.</b> Complete the sentences.
	Maureen has ounces of trail mix.
	She puts an equal number of ounces in each
	of bags.
	Each bag has ounces.
	Maureen has ounces of
	trail mix left over.

**10. INVESSIONARTER** Rory works at a produce packing plant. She packed 2,172 strawberries last week and put them in containers with 8 strawberries in each one. How many containers of strawberries did Rory fill with 8 strawberries? Explain how you used the quotient and the remainder to answer the question.

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### Name \_\_\_\_\_

# **Adjust Quotients**

**Essential Question** How can you adjust the quotient if your estimate is too high or too low?

**CONNECT** When you estimate to decide where to place the first digit, you can also try using the first digit of your estimate to find the first digit of your quotient. Sometimes an estimate is too low or too high.

Divide. 3,382 ÷ 48

**Estimate.** 3,000 ÷ 50 = 60

Try 6 tens.

If an estimate is too low, the difference will be greater than the divisor.

6 48)3,382 <u>-2 88</u> 50 Since the estimate is too low, adjust by increasing the number in the quotient. Divide. 453 ÷ 65

**Estimate.** 490 ÷ 70 = 7

75)6,127

Try 7 ones.

If an estimate is too high, the product with the first digit will be too large and cannot be subtracted.

7 65)453 -455

Since the estimate is too high, adjust by decreasing the number in the quotient.

# Tunlock the Problem 🖁

A new music group makes 6,127 copies of its first CD. The group sells 75 copies of the CD at each of its shows. How many shows does it take the group to sell all of the CDs?

**Divide.** 6,127 ÷ 75 **Estimate.** 6,300 ÷ 70 = 90

**STEP 1** Use the estimate, 90. Try 9 tens.

- Is the estimate too high, too low, or correct?
- Adjust the number in the quotient if needed.

**STEP 2** Estimate the next digit in the quotient. Divide the ones. Estimate:  $140 \div 70 = 2$ . Try 2 ones.

- Is the estimate too high, too low, or correct?
- Adjust the number in the quotient if needed.

So, it takes the group \_\_\_\_\_\_ shows to sell all of the CDs.

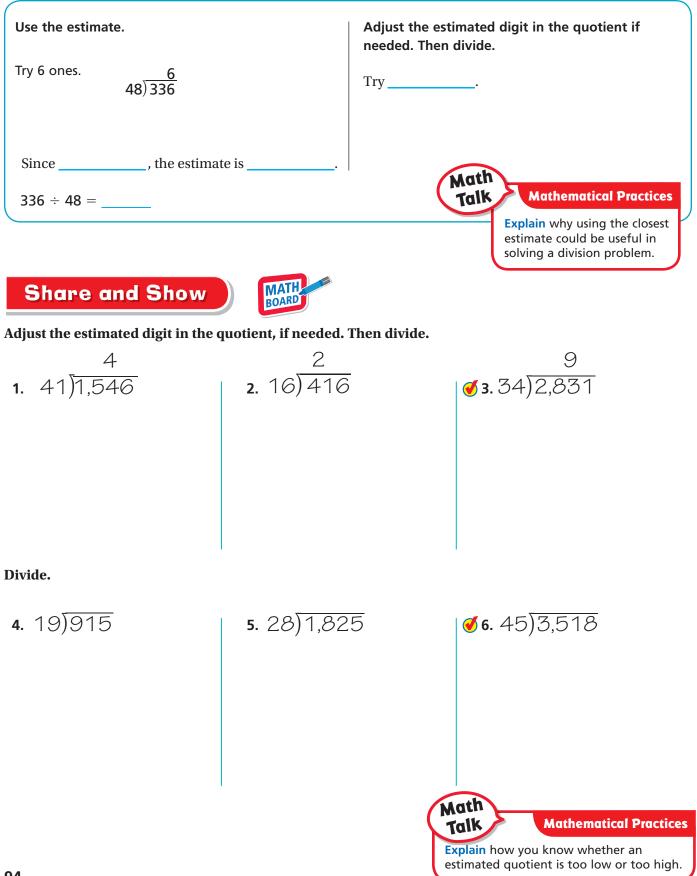
Number and Operations in Base Ten—5.NBT.6

MATHEMATICAL PRACTICES MP.1, MP.2

# Try This! When the difference is equal to or greater than the divisor,

the estimate is too low.

**Divide.**  $336 \div 48$  **Estimate.**  $300 \div 50 = 6$ 



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Name
------

# On Your Own

Divide.

### Practice: Copy and Solve Divide.

<b>10.</b> 452 ÷ 31	<b>11.</b> 592 ÷ 74	<b>12.</b> 785 ÷ 14
<b>13.</b> 601 ÷ 66	<b>14.</b> 1,067 ÷ 97	<b>15.</b> 2,693 ÷ 56
<b>16.</b> 1,488 ÷ 78	<b>17.</b> 2,230 ÷ 42	<b>18.</b> 4,295 ÷ 66

MATHEMATICAL <b>1</b> Identify Relationship	os Algebra Write the unknown nun	nber for each
<b>19.</b> ÷ 33 = 11	<b>20.</b> 1,092 ÷ 52 =	<b>21.</b> 429 ÷ = 33
	=	=

**22.** MATHEMATICAL **(6)** Explain a Method A deli served 1,288 sandwiches in 4 weeks. If they serve the same number of sandwiches each day, how many sandwiches do they serve in 1 day? Explain how you found your answer.

**23. THINASMARTER** Kainoa collects trading cards. He has 1,025 baseball cards, 713 basketball cards, and 836 football cards. He wants to put all of them in albums. Each page in the albums holds 18 cards. How many pages will he need to hold all of his cards?



	MATHEMATICAL PRACTICES
Unlock the Problem	
<b>24. CODEFFER</b> A banquet hall serves 2,394 pounturkey during a 3-week period. If the same amore served each day, how many pounds of turkey debanquet hall serve each day?	ount is
a. What do you need to find?	
<b>b.</b> What information are you given?	
c. What other information will you use?	e. Divide to solve the problem.
d. Find how many days there are in 3 weeks.	
There are days in 3 weeks.	f. Complete the sentence. The banquet hall serves of turkey each day.

25. Marcos mixes 624 ounces of lemonade. He wants to fill the 52 cups he has with equal amounts of lemonade. How much lemonade should he put in each cup?

26. 🕖	HINHSMARTER Oliver estimates the first	digit in the quotien	ıt.
	9		
	75)6,234	correct.	
	Oliver's estima	ate is too high	
		too low	
96	FOR MORE PRACTICE: Standards Practice Book		

# **Problem Solving • Division**

**Essential Question** How can the strategy *draw a diagram* help you solve a division problem?

0

# Vnlock the Problem 👫

Sean and his family chartered a fishing boat for the day. Sean caught a blue marlin and an amberjack. The weight of the blue marlin was 12 times as great as the weight of the amberjack. The combined weight of both fish was 273 pounds. How much did each fish weigh?

# PROBLEM SOLVING Lesson 2.9



Number and Operations in Base Ten—5.NBT.6

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



Read the Problem			
What do I need to find? I need to find	What information do I need to use?	How will I use the information?	
	I need to know that Sean caught a	I can use the strategy	
	total of pounds of fish and		
	the weight of the blue	and then divide. I can draw and use a bar model to write	
	marlin was times as great	the division problem that	
	as the weight of the amberjack.	helps me find the weight of each fish.	
Solve the Problem			
Solve the Problem         Solve the Problem         I will draw one box to show the weight of the amberjack. Then I will draw a bar of 12 boxes of the same size to show the weight of the blue marlin. I can divide the total weight of the two fish by the total number of boxes.         amberjack       2         blue marlin       13)273         blue marlin       -26         write the quotient in each box. Multiply it by 12 to find the weight of the blue marlin.			
So, the amberjack weighed pounds and the			
blue marlin weighed pounds.			

Try Another Problem

Jason, Murray, and Dana went fishing. Dana caught a red snapper. Jason caught a tuna with a weight 3 times as great as the weight of the red snapper. Murray caught a sailfish with a weight 12 times as great as the weight of the red snapper. If the combined weight of the three fish was 208 pounds, how much did the tuna weigh?



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			
Solve the Problem			
So, the tuna weighed pounds.			
How can you check if your answer is correct?			



problem.

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#### Name \_

## Share and Show



1. Paula caught a tarpon with a weight that was 10 times as great as the weight of a permit fish she caught. The total weight of the two fish was 132 pounds. How much did each fish weigh?

**First,** draw one box to represent the weight of the permit fish and ten boxes to represent the weight of the tarpon.

**Next,** divide the total weight of the two fish by the total number of boxes you drew. Place the quotient in each box.

Last, find the weight of each fish.

The permit fish weighed \_\_\_\_\_ pounds.

The tarpon weighed \_\_\_\_\_ pounds.

2. What if the weight of the tarpon was 11 times the weight of the permit fish, and the total weight of the two fish was 132 pounds? How much would each fish weigh?

permit fish: \_\_\_\_\_ pounds

tarpon: \_\_\_\_\_ pounds

✓ 3. Jon caught four fish that weighed a total of 252 pounds. The kingfish weighed twice as much as the amberjack and the white marlin weighed twice as much as the kingfish. The weight of the tarpon was 5 times the weight of the amberjack. How much did each fish weigh?

amberjack: \_\_\_\_\_ pounds

kingfish:	pounds
-----------	--------

marlin: \_\_\_\_\_ pounds

tarpon: \_\_\_\_\_ pounds

## •••• WRITE Math • Show Your Work

## **On Your Own**

Use the table to solve 4–5.

- 4. **THINKSMARTER** Kevin bought 3 bags of gravel to cover the bottom of his fish tank. He has 8 pounds of gravel left over. How much gravel did Kevin use to cover the bottom of the tank?
- 5. MATHEMATICAL <sup>(1)</sup> Apply Look back at Problem 4. Write a similar problem by changing the number of bags of gravel and the amount of gravel left.

## **Kevin's Supply List for** a Saltwater Aquarium

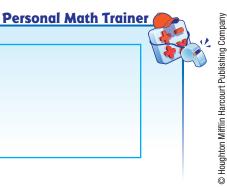
40-gal tank	\$170
Aquarium light	\$30
Filtration system	\$65
Thermometer	\$2
15-lb bag of gravel	\$13
Large rocks	\$3 per Ib
Clown fish	\$20 each
Damselfish	\$7 each

THIMASMARTER | The crew on a 6. fishing boat caught four fish that weighed a total of 1,092 pounds. The tarpon weighed twice as much as the amberjack and the white marlin weighed twice as much as the tarpon. The weight of the tuna was 5 times the weight of the amberjack. How much did each fish weigh?



**GODEEPER** A fish market bought 7. two swordfish at a rate of \$13 per pound. The cost of the larger fish was 3 times as great as the cost of the smaller fish. The total cost of the two fish was \$3,952. How much did each fish weigh?

**8. THINKASMARTER** + Eric and Stephanie took their younger sister Melissa to pick apples. Eric picked 4 times as many apples as Melissa. Stephanie picked 6 times as many apples as Melissa. Eric and Stephanie picked 150 apples together. Draw a diagram to find the number of apples Melissa picked.



Name \_



1. Choose the word that makes the sentence true. The first digit in the quotient of 1,875  $\div$  9

will be in the	ones tens	place.
	hundreds thousands	placer

**2.** For numbers 2a–2d, select True or False to indicate whether the quotient is correct.

2a.	$225 \div 9 = 25$	⊖ True	○ False
2b.	$154 \div 7 = 22$	○ True	○ False
2c.	$312 \div 9 = 39$	○ True	○ False
2d.	$412 \div 2 = 260$	○ True	○ False

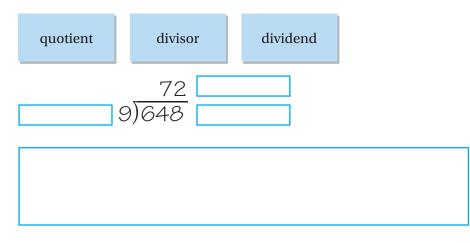
**3.** Chen is checking a division problem by doing the following:

 $\begin{array}{r}
152 \\
\times 4 \\
\hline
608 \\
+ 2 \\
\hline
610
\end{array}$ 

What problem is Chen checking?



**4.** Isaiah wrote this problem in his notebook. Using the vocabulary box, label the parts of the division problem. Then, using the vocabulary, explain how Isaiah can check whether his quotient is correct.



**5.** Tammy says the quotient of  $793 \div 6$  is 132 r1. Use multiplication to show if Tammy's answer is correct.

**6.** Jeffery wants to save the same amount of money each week to buy a new bike. He needs \$252. If he wants the bike in 14 weeks, how much money should Jeffery save each week?

\$

7. Dana is making a seating chart for an awards banquet. There are 184 people coming to the banquet. If 8 people can be seated at each table, how many tables will be needed for the awards banquet?

tables

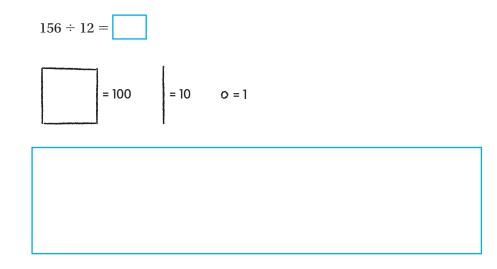
Name \_

**8.** Divide 575 by 14 by using partial quotients. What is the quotient? Explain your answer using numbers and words.

- **9.** For numbers 9a–9c, choose Yes or No to indicate whether the statement is correct.
  - 9a. 5,210 ÷ 17 is 306 r8.
     Yes
     No

     9b. 8,808 ÷ 42 is 209 r30.
     Yes
     No

     9c. 1,248 ÷ 24 is 51.
     Yes
     No
- **10.** Divide. Draw a quick picture.

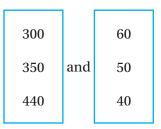


## **11.** Divide. Show your work.

17)5,210



**12.** Choose the compatible numbers that will give the best estimate for  $429 \div 36$ .



**13.** Samuel needs 233 feet of wood to build a fence. The wood comes in lengths of 11 feet.

## Part A

How many total pieces of wood will Samuel need? Explain your answer.

## Part B

Theresa needs twice as many feet of wood as Samuel. How many pieces of wood does Theresa need? Explain your answer.

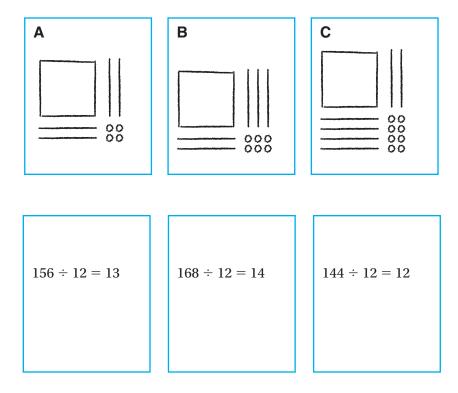
Name \_\_\_\_

**14.** Russ and Vickie are trying to solve this problem:

There are 146 students taking buses to the museum. If each bus holds 24 students, how many buses will they need?

Russ says the students need 6 buses. Vickie says they need 7 buses. Who is correct? Explain your reasoning.

**15.** Write the letter for each quick picture under the division problem it represents.



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**16.** Steve is buying apples for the fifth grade. Each bag holds 12 apples. If there are 75 students total, how many bags of apples will Steve need to buy if he wants to give one apple to each student?

bags

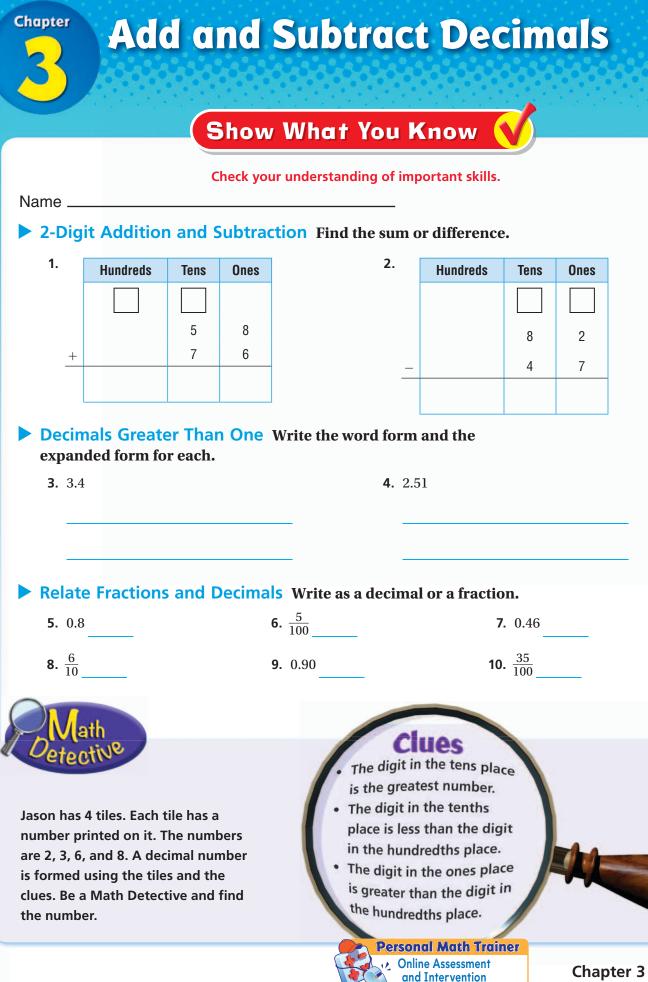
**17.** Rasheed needs to save \$231. To earn money, he plans to wash cars and charge \$12 per car. Write two estimates Rasheed could use to determine how many cars he needs to wash.

**18.** Paula has a dog that weighs 3 times as much as Carla's dog. The total weight of the dogs is 48 pounds. How much does Paula's dog weigh?

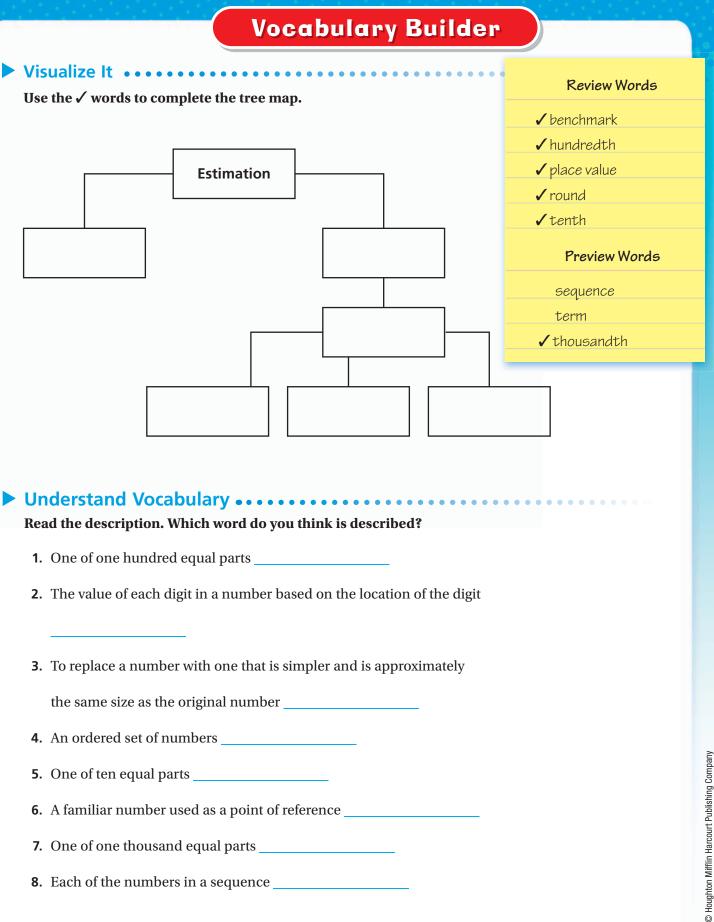
Draw a diagram to find the weight of Paula's dog.

**19.** Dylan estimates the first digit in the quotient.

Dylan's estimate is	too high.
5	too low



Chapter 3 107



### Name \_\_\_

## Thousandths

**Essential Question** How can you describe the relationship between two decimal place-value positions?

# Investigate

**Materials** color pencils straightedge

Thousandths are smaller parts than hundredths. If one hundredth is divided into ten equal parts, each part is one **thousandth**.

Use the model at the right to show tenths, hundredths, and thousandths.

- **A.** Divide the larger square into 10 equal columns or rectangles. Shade one rectangle. What part of the whole is the shaded rectangle? Write that part as a decimal and a fraction.
- **B.** Divide each rectangle into 10 equal squares. Use a second color to shade in one of the squares. What part of the whole is the shaded square? Write that part as a decimal and a fraction.
- **C.** Divide the enlarged hundredths square into 10 equal columns or rectangles. If each hundredths square is divided into ten equal rectangles, how many parts will the model have?

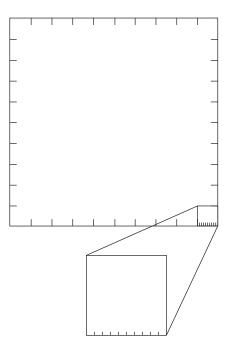
Use a third color to shade one rectangle of the enlarged hundredths square. What part of the whole is the shaded rectangle? Write that part as a decimal and a fraction. Lesson 3.1



Number and Operations in Base Ten—5.NBT.1 Also 5.NBT.3a

MATHEMATICAL PRACTICES MP.5, MP.6, MP.7





**Mathematical Practices** 

Math

Talk

There are 10 times as many hundredths as there are tenths. **Explain** how the model shows this.

# **Draw Conclusions**



**1.** Explain what each shaded part of your model in the Investigate section shows. What fraction can you write that relates each shaded

part to the next greater shaded part?

2. MATHEMATICAL O Use a Concrete Model Identify and describe a part of your model that shows one thousandth. Explain how you know.

# **Make Connections**

The relationship of a digit in different place-value positions is the same with decimals as it is with whole numbers. You can use your understanding of place-value patterns and a place-value chart to write decimals that are 10 times as much as or  $\frac{1}{10}$  of a decimal.

Ones of	• Tenths	Hundredths	Thousandths
0 0	0	4	
	?	0.04	?
		times <u>1</u> nuch 10	of

## Use the steps below to complete the table.

- **STEP 1** Write the given decimal in a place-value chart.
- **STEP 2** Use the place-value chart to write a decimal that is 10 times as much as the given decimal.
- **STEP 3** Use the place-value chart to write a decimal that is  $\frac{1}{10}$  of the given decimal.

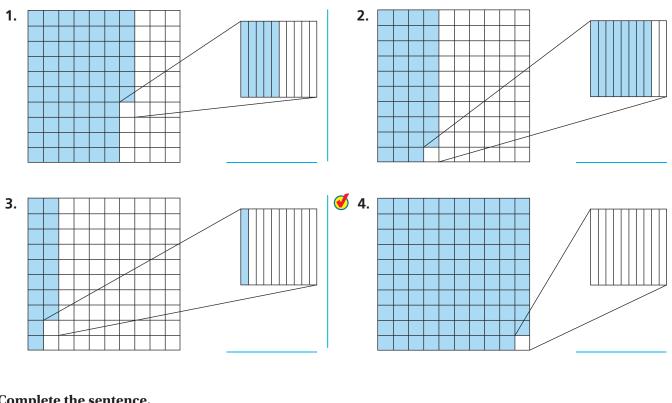
Decimal	10 times as much as	1 10 of
0.03		
0.1		
0.07		



**Explain** the pattern you see when you move one decimal place value to the right and one decimal place value to the left. **Share and Show** 



Write the decimal shown by the shaded parts of each model.



## Complete the sentence.

- **5.** 0.6 is 10 times as much as \_\_\_\_\_.
- **7.** 0.008 is  $\frac{1}{10}$  of \_\_\_\_\_.

- **6.** 0.007 is  $\frac{1}{10}$  of \_\_\_\_\_.
  - **8.** 0.5 is 10 times as much as \_\_\_\_\_.

	Decimal	10 times as much as	10 of
9.	0.2		
10.	0.07		
11.	0.05		
12.	0.4		

## Use place-value patterns to complete the table.

	Decimal	10 times as much as	$\frac{1}{10}$ of
13.	0.06		
14.	0.9		
15.	0.3		
16.	0.08		

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# Problem Solving • Applications 🎇

Use the table for 17 and 20.

- **17. GODEEPER** A science teacher showed an image of a carpenter bee on a wall. The image is 10 times as large as the actual bee. Then he showed another image of the bee that is 10 times as large as the first image. What is the length of the bee in the second image?
- **18. WRITE** *Math* Explain how you can use place value to describe how 0.05 and 0.005 compare.

## **Bee Lengths (in meters)**

Bumblebee	0.019
Carpenter Bee	0.025
Leafcutting Bee	0.014
Orchid Bee	0.028
Sweat Bee	0.006

• **WRITE** Math • Show Your Work

- **19. WATHEMATICAL 3 Use Repeated Reasoning** Terry, Sasha, and Harry each chose a number. Terry's number is ten times as much as Sasha's. Harry's number is  $\frac{1}{10}$  of Sasha's. Sasha's number is 0.4. What number did each person choose?
- **20. THINKISMARTER** An atlas beetle is about 0.14 of a meter long. How does the length of the atlas beetle compare to the length of a leafcutting bee?



**21. THINK SMARTER** Choose the numbers that make the statement true.

 0.065

 0.65 is 10 times as much as

 0.65

 6.5

 6.5

 65.0

#### Name \_

## **Place Value of Decimals**

**Essential Question** How do you read, write, and represent decimals through thousandths?

# Lesson 3.2



LINE STREET

Number and Operations in Base Ten—5.NBT.3a Also 5.NBT.1

MATHEMATICAL PRACTICES MP.2, MP.7

# PUnlock the Problem

The Brooklyn Battery Tunnel in New York City is 1.726 miles long. It is the longest underwater tunnel for vehicles in the United States. To understand this distance, you need to understand the place value of each digit in 1.726.

You can use a place-value chart to understand decimals. Whole numbers are to the left of the decimal point. Decimals are to the right of the decimal point. The thousandths place is to the right of the hundredths place.

H
A CONTRACT

The Brooklyn Battery Tunnel passes under the East River.

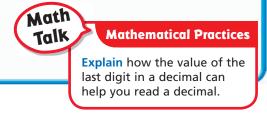
Tens	Ones o	Tenths	Hundredths	Thousandths
	1	7	2	6
	1 × 1	$7  imes rac{1}{10}$	$2  imes rac{1}{100}$	$6 imesrac{1}{1,000}$
	1.0	0.7	0.02	0.006

The place value of the digit 6 in 1.726 is thousand ths. The value of 6 in 1.726 is 6  $\times \frac{1}{1.000}$  , or 0.006.

## Standard Form: 1.726

Word Form: one and seven hundred twenty-six thousandths

**Expanded Form:**  $1 \times 1 + 7 \times \left(\frac{1}{10}\right) + 2 \times \left(\frac{1}{100}\right) + 6 \times \left(\frac{1}{1,000}\right)$ 



## Try This! Use place value to read and write decimals.

Standard Form: 2.35	
Word Form: two and	
Expanded Form: $2 \times 1 + $	
Standard Form:	
Word Form: three and six hundred fourteen thousandths	
<b>Expanded Form:</b> + 6 × $\left(\frac{1}{10}\right)$ + +	
	Word Form: two and Expanded Form: 2 × 1+ Standard Form: Word Form: three and six hundred fourteen thousandths

A common garden spider spins a web with its silk that is about 0.003 millimeter thick. A commonly used sewing thread is about 0.3 millimeter thick. How does the thickness of the spider silk and the thread compare?



**STEP1** Write the numbers in a place-value chart.

Ones d	Tenths	Hundredths	Thousandths

## STEP 2

Count the number of decimal place-value positions to the digit 3 in 0.3 and 0.003.

0.3 has \_\_\_\_\_ fewer decimal places than 0.003

2 fewer decimal places:  $10 \times 10 =$ 

0.3 is \_\_\_\_\_\_ times as much as 0.003

0.003 is \_\_\_\_\_ of 0.3

So, the thread is \_\_\_\_\_\_ times as thick as the garden spider's silk. The thickness of the garden spider's silk is

\_ that of the thread.

You can use place-value patterns to rename a decimal.

## Try This! Use place-value patterns.

## Rename 0.3 using other place values.

0. <mark>3</mark> 00	3 tenths	$3  imes rac{1}{10}$
0.300	hundredths	× 1/100
0.300		

# Share and Show



**1.** Complete the place-value chart to find the value of each digit.

Ones o	Tenths	Hundredths	Thousandths	
3 .	5	2	4	
3 × 1		$2  imes rac{1}{100}$		) Value
	0.5			Juliac

## Write the value of the underlined digit.

<b>2.</b> 0.5 <u>4</u> 3	<b>3.</b> 6. <u>2</u> 34	<b>ĕ 4.</b> 3.95 <u>4</u>
Write the number in two	o other forms.	
<b>5.</b> 0.253		<b>6.</b> 7.632
On Your Own		
Write the value of the un	derlined digit.	
<b>7.</b> 0.4 <u>9</u> 6	<b>8.</b> 2. <u>7</u> 26	<b>9.</b> 1.06 <u>6</u>
<b>10.</b> 6. <u>3</u> 99	<b>11.</b> 0.00 <u>2</u>	<b>12.</b> 14.37 <u>1</u>
Write the number in two	other forms.	
<b>13.</b> 0.489		<b>14.</b> 5.916

# **Problem Solving • Applications**

#### Use the table for 15-16.

- 15. What is the value of the digit 7 in New Mexico's average annual rainfall?
- **16. [GODEEPER]** Which of the states has an average annual rainfall with the least number in the thousandths place? What is another way to write the total annual rainfall in this state?

Average Annual	Rainfall (in meters)
California	0.564
New Mexico	0.372
New York	1.041
Wisconsin	0.820
Maine	1.074

▶ Math **Show Your Work** 

- 17. Mathematical <sup>(1)</sup> Verify the Reasoning of Others Damian wrote the number four and twenty-three thousandths as 4.23. Describe and correct his error.
- **18. THINASMARTER** Dan used a meter stick to measure some seedlings in his garden. One day, a corn stalk was 0.85 m tall. A tomato plant was 0.850 m. A carrot top was 0.085 m. Which plant was shortest?



**19. WRITE** Math Explain how you know that the digit 6 does not have the same value in the numbers 3.675 and 3.756.

**20. THINASMARTER** What is the value of the underlined digit? Mark all that apply.

0.589

- 0.8 o eight hundredths  $\bigcirc$  8 × ( $\frac{1}{10}$ )
- 0.08

116

o eight tenths

FOR MORE PRACTICE: **Standards Practice Book** 

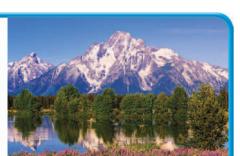
# **Compare and Order Decimals**

Essential Question How can you use place value to compare and order decimals?

# **PUNIOCK the Problem**

The table lists some of the mountains in the United States that are over two miles high. How does the height of Cloud Peak in Wyoming compare to the height of Boundary Peak in Nevada?

Mountain Heights		
Mountain and State	Height (in miles)	
Boundary Peak, Nevada	2.488	
Cloud Peak, Wyoming	2.495	
Grand Teton Peak, Wyoming	2.607	
Wheeler Peak, New Mexico	2.493	



The Tetons are located in Grand Teton National Park.

# One Way Use place value.

Line up the decimal points. Start at the left. Compare the digits in each placevalue position until the digits are different.

**STEP 1** Compare the ones. **STEP 2** Compare the tenths. 2.495 2.495 2 4 9 5 2 = 2 2.488 2.488 2.488 Since 9 ( )8, then 2.495 ( 2.488, and 2.488 ( ) 2.495. So, the height of Cloud Peak is the height of Boundary Peak. **Another Way** Use a place-value chart to compare.

Compare the height of Cloud Peak to Wheeler Peak.

Ones	• Tenths	Hundredths	Thousandths
2	• 4	9	5
2	• 4	9	3
$2 = 2$ $4 = \_$ $9 = \_$ $5 > \_$			
Since 5 3, then 2.495 2.493, and 2.493 2.495.			

So, the height of Cloud Peak is	the height
of Wheeler Peak.	

## **STEP 3** Compare the hundredths.



Explain why it is important to line up the decimal points when comparing decimals.

# Lesson 3.3

Number and Operations in Base

Ten—5.NBT.3b

MATHEMATICAL PRACTICES

MP.2, MP.6

**Order Decimals** You can use place value to order decimal numbers.

# 🚹 Example

Mount Whitney in California is 2.745 miles high, Mount Rainier in Washington is 2.729 miles high, and Mount Harvard in Colorado is 2.731 miles high. Order the heights of these mountains from least to greatest. Which mountain has the least height? Which mountain has the greatest height?

## **STEP 1**

So,

Line up the decimal points. There are the same number of ones. Circle the tenths and compare.

2.745	Whitney
2.729	Rainier

2.731 Harvard

There are the same number of tenths.

	STEP 2		
p the decimal points. There are me number of ones. Circle the	Underline the hundredths and compare. Order from least to greatest.		
and compare.	2.745 Whitney		
Whitney	2.729 Rainier		
Rainier	2.731 Harvard		
Harvard	Since $\bigcirc < \bigcirc < \bigcirc$ , the heights in order from least to		
are the same number of tenths.	greatest are,		
has the least height and Mathematical Practi			
has the greatest l	height. <b>Explain</b> why you do not have to compare the digits in the thousandths place to		

## Try This! Use a place-value chart.

What is the order of 1.383, 1.321, 1.456, and 1.32 from greatest to least?

- Write each number in the place-value chart. Compare the digits, beginning with the greatest place value.
- Compare the ones. The ones are the same. ٠
- Compare the tenths. 4 > 3. ۰

The greatest number is Circle the greatest number in the place-value chart.

Compare the remaining hundredths. 8 > 2.

The next greatest number is \_\_\_\_\_. Draw a rectangle around the number.

• Compare the remaining thousandths. 1 > 0.

So, the order of the numbers from greatest to least is:

Ones	• Tenths	Hundredths	Thousandths
1	• 3	8	3
1	•		
1	•		
1	•		

order the heights of the 3 mountains.

### MATH. BOARD **Share and Show 1.** Use the place-value chart to compare the two Ones • Tenths Hundredths Thousandths numbers. What is the greatest place-value 3 7 2 4 position where the digits differ? 3 4 4 5 Compare. Write $\langle , \rangle$ , or =. **2.** 4.563 **3.** 5.640 **√ 4.** 8.673 ( )8.637 4.536 5.64 Name the greatest place-value position where the digits differ. Name the greater number. **7.** 4.159; 4.152 **5.** 3.579; 3.564 **6.** 9.572; 9.637 Order from least to greatest. **8.** 4.08; 4.3; 4.803; 4.038 **9.** 1.703; 1.037; 1.37; 1.073 **On Your Own** Compare. Write <, >, or =. **10.** 8.72 5.243 8.720 **11.** 5.4 **12.** 1.036 1.306 **13.** 2.573 2.753 **14.** 9.300 9.3 **15.** 6.76 6.759 Order from greatest to least. **16.** 2.007; 2.714; 2.09; 2.97 **17.** 0.386; 0.3; 0.683; 0.836 **18.** 5.249; 5.43; 5.340; 5.209 **19.** 0.678; 1.678; 0.587; 0.687 MATHEMATICAL 2 Use Reasoning Algebra Find the unknown digit to make each statement true. **21.** 6.837 > 6.83 > 6.835 **20.** 3.59 > 3.5 1 > 3.572 **22.** 2.45 < 2. 6 < 2.461

# Problem Solving • Applications 🞇

Use the table for 23-26.

- **23.** In comparing the height of the mountains, which is the greatest place value where the digits differ?
- 24. MATHEMATICAL <sup>(6)</sup> Use Math Vocabulary How does the height of Mount Steele compare to the height of Mount Blackburn? Compare the heights using words.



Mountains Over Three Miles High				
Mountain and Location	Height (in miles)			
Mount Blackburn, Alaska	3.104			
Mount Bona, Alaska	3.134			
Mount Steele, Yukon	3.152			

**25. Explain** how to order the heights of the mountains from greatest to least.

**26.** What if the height of Mount Blackburn were 0.05 mile greater? Would it then be the mountain with the greatest height? Explain.



3.75
4.42
4.09
3.09
4.04

**Standards Practice Book** 

#### Name \_\_\_\_\_

# **Round Decimals**

**Essential Question** How can you use place value to round decimals to a given place?

# **White Problem**

The Gold Frog of South America is one of the smallest frogs in the world. It is 0.386 of an inch long. What is this length rounded to the nearest hundredth of an inch?

# **One Way** Use a place-value chart.

- Write the number in a place-value chart and circle the digit in the place to which you want to round.
- In the place-value chart, underline the digit to the right of the place to which you are rounding.
- If the digit to the right is less than 5, the digit in the place to which you are rounding stays the same. If the digit to the right is 5 or greater, the digit in the rounding place increases by 1.
- Drop the digits after the place to which you are rounding.

So, to the nearest hundredth of an inch, a Gold Frog is

about \_\_\_\_\_ of an inch long.

# Another Way Use place value.

The Little Grass Frog is the smallest frog in North America. It is 0.437 of an inch long.

```
A What is the length of the frog to the nearest hundredth of an inch?
```

```
0.437 7 > 5
↓
0.44
```

So, to the nearest hundredth of an inch, the frog

is about \_\_\_\_\_\_ of an inch long.

## • Underline the length of the Gold Frog.

Ten—5.NBT.4

MATHEMATICAL PRACTICES

MP.2, MP.7

 Is the frog's length about the same as the length or the width of a large paper clip?



**Think:** Does the digit in the rounding place stay the same or increase by 1?

**B** What is the length of the frog to the nearest tenth of an inch?

0.437 3 < 5 ↓ 0.4

So, to the nearest tenth of an inch, the frog is

about \_\_\_\_\_\_ of an inch long.

## Lesson 3.4

Number and Operations in Base

# 🖸 Example

The Goliath Frog is the largest frog in the world. It is found in the country of Cameroon in West Africa. The Goliath Frog can grow to be 11.815 inches long. How long is the Goliath Frog to the nearest inch?

**STEP 1** Write 11.815 in the place-value chart.

Tens	Ones	<ul> <li>Tenths</li> </ul>	Hundredths	Thousandths	
		•			
STEP 2 Find the place to which you want to round. Circle the digit. Mathematical Practices					
			it to the right . Then round.	t of the place	
<b>Think:</b> Does the digit in the rounding place stay the same or increase by 1?					
			e Goliath Fro		

**Generalize** Explain why any number less than 12.5 and greater than or equal to 11.5 would round to 12 when rounded to the nearest whole number.

Try This! Round. 14.603

A To the nearest hundredth:

Tens	Ones o	Tenths	Hundredths	Thousandths

So, 14.603 rounded to the nearest hundredth is \_\_\_\_\_\_.

B To the nearest whole number:

Tens	Ones o	Tenths	Hundredths	Thousandths

Circle and underline the digits as you did above to help you round to the nearest hundredth.

Circle and underline the digits as you did above to help you round to the nearest whole number.

So, 14.603 rounded to the nearest whole number is \_\_\_\_\_.

rite the place value of t umber to the place of th		•		
<b>1.</b> 0.6 <u>7</u> 3	<b>V</b> 2. 4	4. <u>2</u> 82	3.	1 <u>2</u> .917
ame the place value to v	which each num	ber was rounded.		
<b>4.</b> 0.982 to 0.98	5. 3	3.695 to 4	<b>Ø</b> 6.	7.486 to 7.5
On Your Own			— •	
Vrite the place value of t umber to the place of th		•		
<b>7.</b> 0. <u>5</u> 92	<b>8.</b> (	<u>6</u> .518	9.	0.8 <u>0</u> 9
<b>0.</b> 3. <u>3</u> 34	11.	12. <u>0</u> 74	12.	4.494
			12.	4.4 <u>9</u> 4
Tame the place value to v	which each num			4.4 <u>9</u> 4 12.583 to 13
<ul> <li>0. 3.<u>3</u>34</li> <li>3. 3.234</li> <li>3. 0.328 to 0.33</li> <li>3. 0.328 to 0.33</li> </ul>	which each num	ber was rounded.		
Tame the place value to v <b>3.</b> 0.328 to 0.33	which each num 14. 2 e named.	ber was rounded.	15.	
Tame the place value to v 3. 0.328 to 0.33	which each num 14. 2 e named.	<b>ber was rounded.</b> 2.607 to 2.61 hundredths	15.	12.583 to 13

# Problem Solving • Applications 🖁



- **20. GODEEPER** The speeds of two insects when rounded to the nearest whole number are the same. Which two insects are they?
- **21.** What is the speed of the housefly rounded to the nearest hundredth?

Insect Speeds (meters per second)		
Insect	Speed	
Dragonfly	6.974	
Horsefly	3.934	
Bumblebee	2.861	
Honeybee	2.548	
Housefly	1.967	

22. **THINASMARTER** What's the Error? Mark said that the speed of a dragonfly rounded to the nearest tenth was 6.9 meters per second. Is he correct? If not, what is his error?



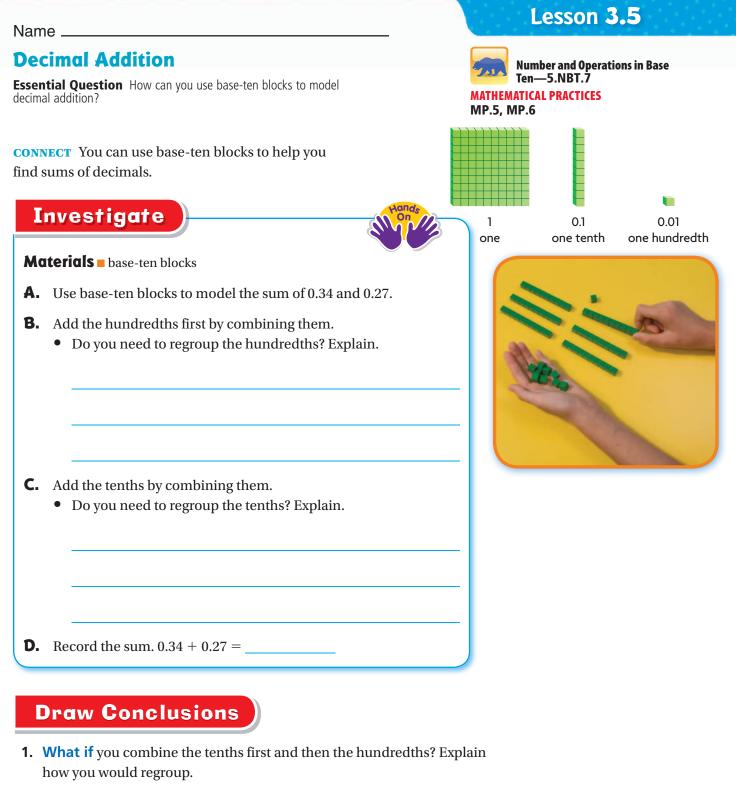


**23.** (MATHEMATICAL O PRACTICE O A rounded number for the speed of an insect is 5.67 meters per second. What are the fastest and slowest speeds to the thousandths that could round to 5.67 meters per second? Explain.

**24. The price of a certain box of cereal at the grocery store is** \$0.258 per ounce. For numbers 24a–24c, select True or False for each statement.

24a.	Rounded to the nearest whole number,	🔾 True	○ False
	the price is \$1 per ounce.		
24b.	Rounded to the nearest tenth, the price is \$0.3 per ounce.	○ True	○ False
24c.	Rounded to the nearest hundredth,	○ True	○ False

the price is \$0.26 per ounce.



**2.** MATHEMATICAL O PRACTICE O If you add two decimals that are each greater than 0.5, will the sum be less than or greater than 1.0? Explain.

Chapter 3 125

# Make Connections

You can use a quick picture to add decimals greater than 1.

## STEP 1

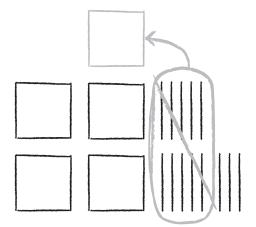
Model the sum of 2.5 and 2.8 with a quick picture.

## STEP 2

Add the tenths.

• Are there more than 9 tenths? \_\_\_\_\_\_ If there are more than 9 tenths, regroup.

Add the ones.



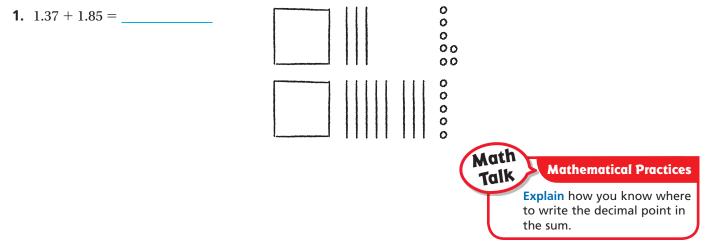
## STEP 3

Draw a quick picture of your answer. Then record.

2.5 + 2.8 =

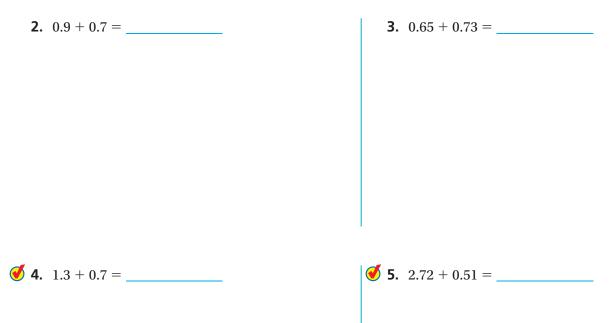


Complete the quick picture to find the sum.



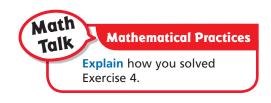
Name _			

Add. Draw a quick picture.



# **Problem Solving • Applications**

6. THINASMARTER Carissa bought 2.35 pounds of chicken and 2.7 pounds of turkey for lunches this week. She used a quick picture to find the amount of lunch meat. Does Carissa's work make sense? Explain.



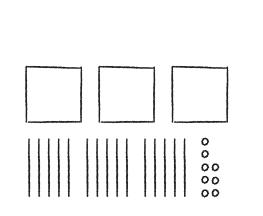


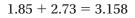
**7.** Robyn and Jim used quick pictures to model 1.85 + 2.73.

**Robyn's Work** 

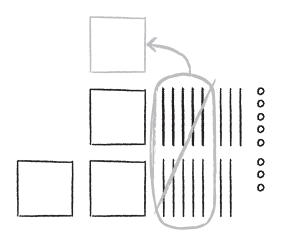


**Jim's Work** 





Does Robyn's work make sense? Explain your reasoning.

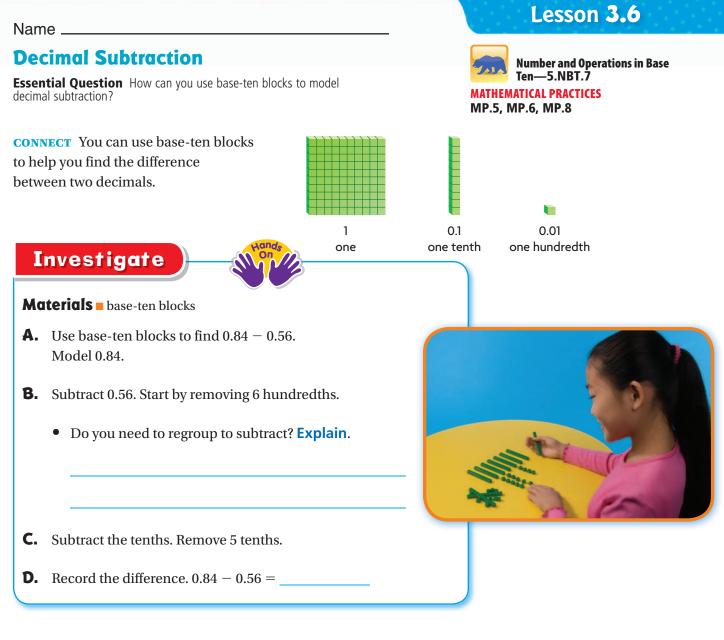


1.85 + 2.73 = 4.58

Does Jim's work make sense? Explain your reasoning.

8. Make Arguments Explain how you would help Robyn understand that regrouping is important when adding decimals.

**9. GODEEPER** Write a decimal addition problem that requires regrouping the hundredths. Explain how you know you will need to regroup.



# **Draw Conclusions**

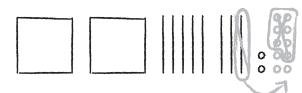
- **1. What if** you remove the tenths first and then the hundredths? Explain how you would regroup.
- 2. Ceneralize If two decimals are both less than 1.0, what do you know about the difference between them? Explain.

# Make Connections

You can use quick pictures to subtract decimals that need to be regrouped.

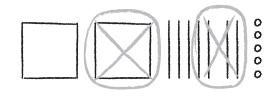
## STEP 1

- Use a quick picture to model 2.82 1.47.
- Subtract the hundredths.
- Are there enough hundredths to remove? \_\_\_\_\_\_\_ If there are not enough hundredths, regroup.



## STEP 2

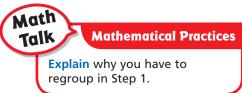
- Subtract the tenths.
- Subtract the ones.



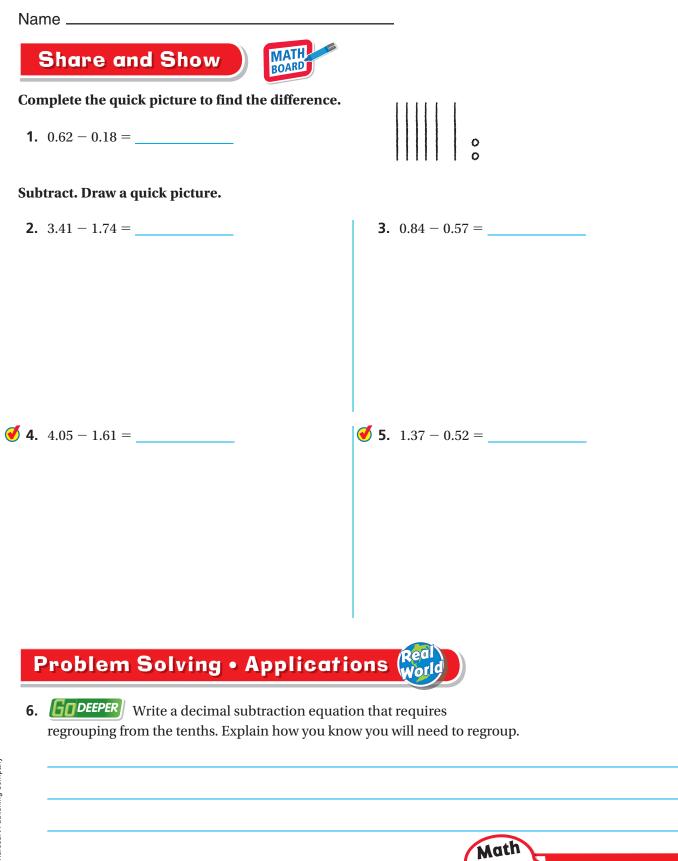
## STEP 3

Draw a quick picture of your answer. Then record the answer.









0.81 – 0.46.

**Explain** how you can use a quick picture to find

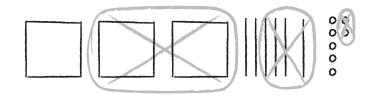
Talk

**Mathematical Practices** 

## THINKISMARTER Pose a Problem

**7.** Antonio left his MathBoard on his desk during lunch. The quick picture below shows the problem he was working on when he left.





Write a word problem that can be solved using the quick picture above.

Pose a problem.	Solve your problem.

• MATHEMATICAL **O** Use Reasoning Describe how you can change the problem by changing the quick picture.

**8. THINASMARTER** The price of a box of markers at a retail store is \$4.65. The price of a box of markers at the school bookstore is \$3.90. How much more do the markers cost at the retail store? Explain how you can use a quick picture to solve the problem.

C Houghton Mifflin Harcourt Publishing Company

	<b>**</b>	Mid-Chap	ter Check	ooint	
Concept	s <mark>and Ski</mark>	lls			
<b>Explain</b> how y	ou can use base-	ten blocks to find	1.54 + 2.37. (5.NBT.7	)	
omplete the sent	ence. (5.NBT.1)				
<b>2.</b> 0.04 is $\frac{1}{10}$ of			<b>3.</b> 0.06 is 10 t	imes as muo	ch as
rite the value of	the underlined (	digit. (5.NBT.3a)	1		
<b>1.</b> 6.5 <u>4</u>	<b>5.</b> 0. <u>8</u>	-	<b>6.</b> 8.70 <u>2</u>		<b>7.</b> <u>9</u> .173
			_		
ompare. Write <	c, >, or =. (5.NBT.3)	b)			
<b>3.</b> 6.52 6.520		9. 3.589	3.598	<b>10.</b> 8.4	83 8.463
—		lined digit. Roun			
-		ined digit. (5.NBT.4)		<b>13.</b> 4.7	20
<b>1.</b> 0. <u>7</u> 24		<b>12.</b> <u>2</u> .576		<b>13.</b> 4.7	<u>5</u> 5
				_  _	
raw a quick pict	are to find the su	ım or difference.	(5.NBT.7)		
<b>1.</b> 2.46 + 0.78 =			<b>15.</b> 3.27 – 1.84	1 =	

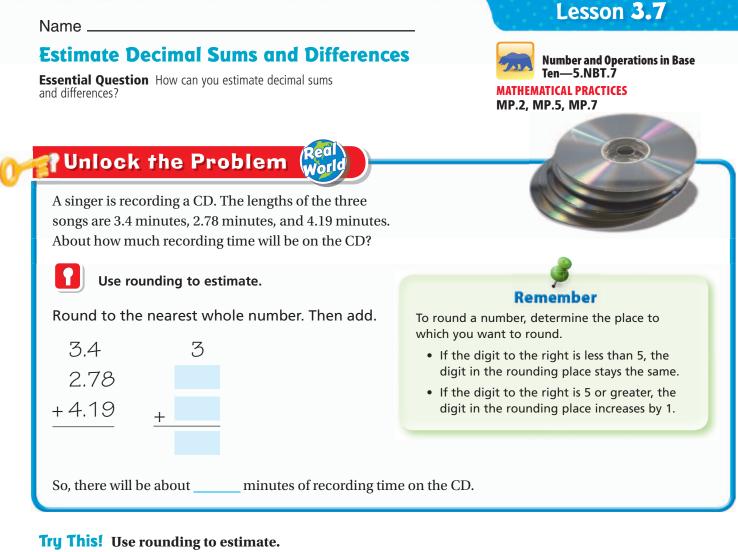
**16.** Marco read that a honeybee can fly up to 2.548 meters per second. He rounded the number to 2.55. To which place value did Marco round the speed of a honeybee? (5.NBT.4)

**17.** What is the relationship between 0.04 and 0.004? (5.NBT.1)

**18.** Jodi drew a quick picture to model the answer for 3.14 - 1.75. Draw what her picture might look like. (5.NBT.7)

**19.** The average annual rainfall in California is 0.564 of a meter per year. What is the value of the digit 4 in that number? (5.NBT.3a)

**20.** Jan ran 1.256 miles on Monday, 1.265 miles on Wednesday, and 1.268 miles on Friday. What were her distances from greatest to least? (5.NBT.3b)

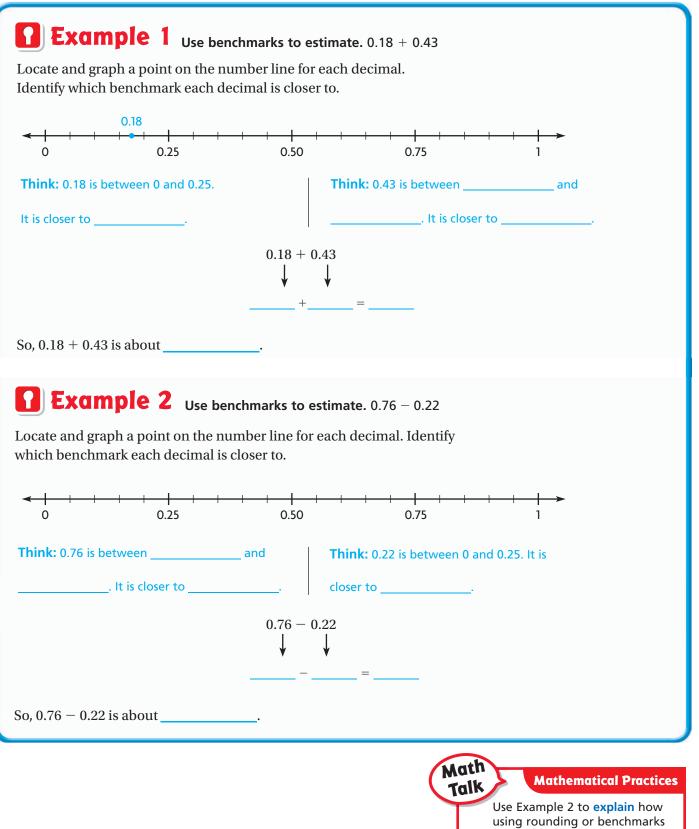


Round to the nearest whole dollar. Then subtract.	<ul> <li>Round to the nearest ten dollars. Then subtract.</li> </ul>
\$27.95	\$27.95
-\$11.72 _	_\$11.72 _
To the nearest dollar, \$27.95 – \$11.72 is about	To the nearest ten dollars, \$27.95 – \$11.72 is about

(MATHEMATICAL O) Use Appropriate Tools Do you want an overestimate or an underestimate when you estimate the total cost of items you want to buy? Explain.

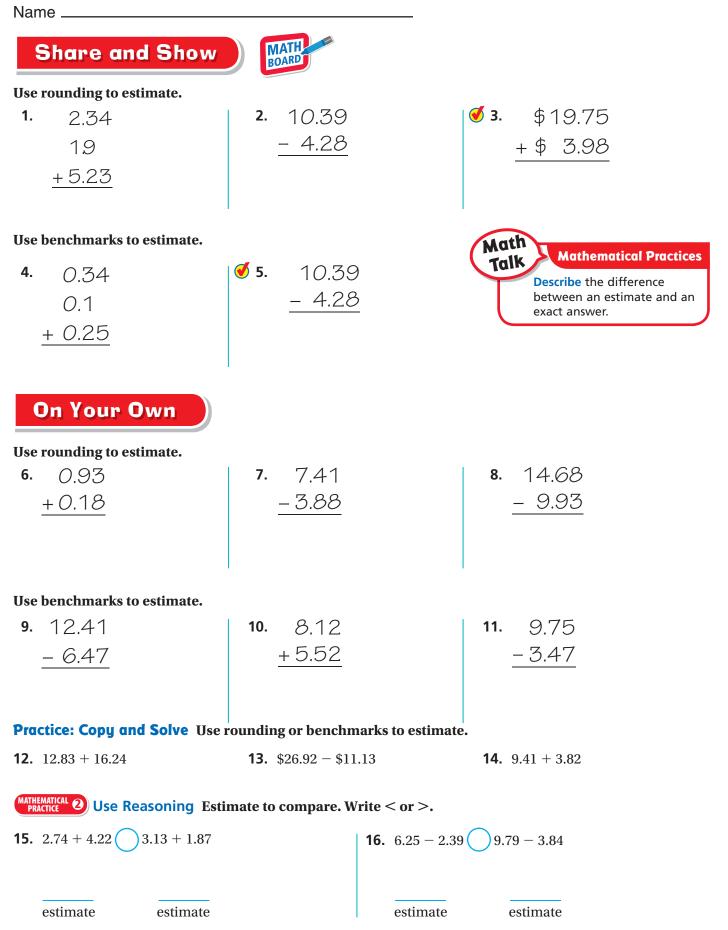
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 OC Squared Studios/Getty Images

**Use Benchmarks** Benchmarks are familiar numbers used as points of reference. You can use the benchmarks 0, 0.25, 0.50, 0.75, and 1 to estimate decimal sums and differences.



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to estimate a decimal difference can give you different answers.



## Problem Solving • Applications 🎇

#### Use the table to solve 17-18. Show your work.

**17.** For the week of April 4, 1964, the Beatles had the top four songs. About how long would it take to listen to these four songs?

	Top Songs	0-1
Number	Song Title	Song Length (in minutes)
1	"Can't Buy Me Love"	2.30
2	"She Loves You"	2.50
3	"I Want to Hold Your Hand"	2.75
4	"Please Please Me"	2.00

- **18. What's the Error?** Isabelle says she can listen to the first three songs in the table in 6 minutes.
- **19. THINASMARTER** Tracy ran a lap around the school track in 74.2 seconds. Malcolm ran a lap in 65.92 seconds. Estimate the difference in the times in which the students completed the lap.

## Connect to Science

### Nutrition

Your body needs protein to build and repair cells. You should get a new supply of protein each day. The average 10-year-old needs 35 grams of protein daily. You can find protein in foods like meat, vegetables, and dairy products.

### Use estimation to solve.

**20.** Gina had a scrambled egg and a cup of low-fat milk for breakfast. She had an oat bran muffin for a morning snack. About how many more grams of protein did Gina have for breakfast than for a snack?

Grams of	<b>Protein</b>	per Serving
		•

Type of Food	Protein (in grams)
1 scrambled egg	6.75
1 cup shredded wheat cereal	5.56
1 oat bran muffin	3.99
1 cup low-fat milk	8.22

21. **21.** Pablo had a cup of shredded wheat cereal, a cup of low-fat milk, and one other item for breakfast. He had about 21 grams of protein. What was the third item Pablo had for breakfast?

#### Name \_\_\_\_\_

### **Add Decimals**

Essential Question How can place value help you add decimals?

Henry recorded the amount of rain that fell during 2 hours.

**P**Unlock the Problem

### Lesson 3.8



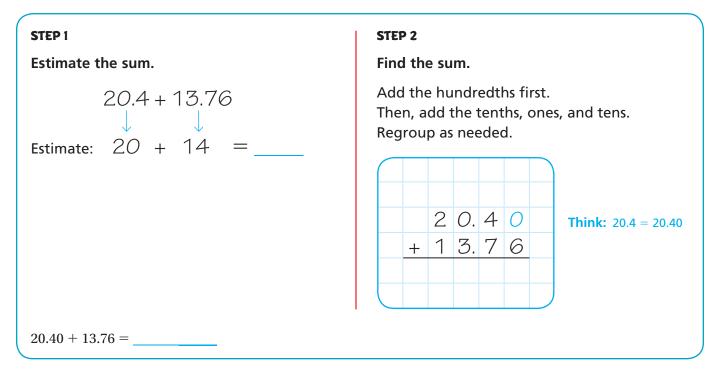
**Number and Operations in Base** Ten—5.NBT.Ż **MATHEMATICAL PRACTICES** MP.4, MP.5

In the first hour, Henry measured 2.35 centimeters of rain. In the second hour, he measured 1.82 centimeters of rain. Henry estimated that about 4 centimeters of rain fell in 2 hours. What is the total amount of rain that fell? How can you use this estimate to decide if your answer is reasonable?
Add. 2.35 + 1.82
Add the hundredths first.
5 hundredths + 2 hundredths = hundredths.
• Then add the tenths and ones. Regroup as needed. $2.35$
$3 \text{ tenths} + 8 \text{ tenths} = \_\_\_ \text{tenths. Regroup.} + 1.82$
2 ones + 1 one + 1 regrouped one = ones.
Record the sum for each place value.
Draw a quick picture to check your work.
Math Talk Explain how you know when you need to regroup in a decima addition problem.
So, centimeters of rain fell.
Since is close to the estimate, 4, the answer is reasonable.

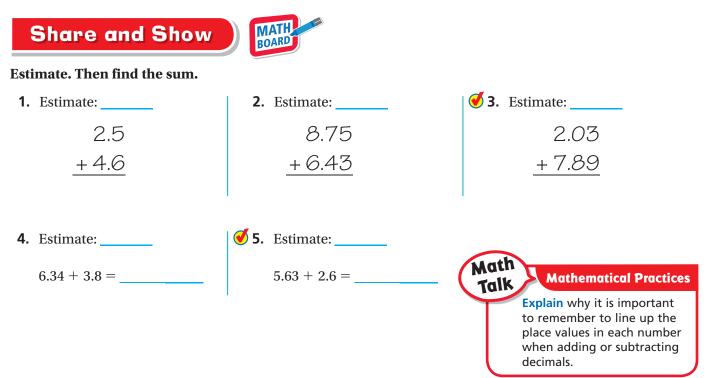
Real

**Equivalent Decimals** When adding decimals, you can use equivalent decimals to help keep the numbers aligned in each place. Add zeros to the right of the last digit as needed, so that the addends have the same number of decimal places.





• **MATHEMATICAL O** Evaluate Reasonableness Is your answer reasonable? Explain.



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## On Your Own

### PRACTICE 2 Connect Symbols and Words Find the sum.

- **6.** seven and twenty-five hundredths added to nine and four tenths
- **7.** twelve and eight hundredths added to four and thirty-five hundredths

**8.** nineteen and seven tenths added to four and ninety-two hundredths

**9.** one and eighty-two hundredths added to fifteen and eight tenths

### **Practice: Copy and Solve** Find the sum.

<b>10.</b> 7.99 + 8.34	<b>11.</b> 15.76 + 8.2	<b>12.</b> 9.6 + 5.49
<b>13.</b> 33.5 + 16.4	<b>14.</b> 9.84 + 21.52	<b>15.</b> 3.89 + 4.6
<b>16.</b> 42.19 + 8.8	<b>17.</b> 16.74 + 5.34	<b>18.</b> 27.58 + 83.9

**19. Think SMARTER** Tania measured the growth of her plant each week. The first week, the plant's height measured 2.65 decimeters. During the second week, Tania's plant grew 0.7 decimeter. How tall was Tania's plant at the end of the second week? Describe the steps you took to solve the problem.



**20. GODEEPER** Maggie had \$35.13. Then her mom gave her \$7.50 for watching her younger brother. She was paid \$10.35 for her old roller skates. How much money does Maggie have now?

1	Unloc	k the	Probl	em (Real World		
21.	August. O 8.33 centi 4.65 centi	<mark>)ne year,</mark> imeters b imeters tl	during the n y August 15 hrough the e	fall of 16.99 centi nonth of August, th. Then it rained end of the month neters for the mon	it rained l another . What	
a.	What do y	you need	to find?			
b.	What info	ormation	are you give	en?		
C.		•	addition to fi n that fell?	ind the total num	ber of	
d.	Show hov	v you sol	ved the prob	olem.	e. Complet	te the sentence. It rained centimeters for the month.
					P	ersonal Math Trainer
C	ater he cau ombined w	veight of	her fish that both fish? U	aught a fish that v weighed 1.92 po se the digits on tl more than once	ounds. What wa	as the
		0	1			
		2	3			
		4	5	+		
		6	7			
		8	9	L		

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#### Name \_\_\_

### **Subtract Decimals**

Essential Question How can place value help you subtract decimals?

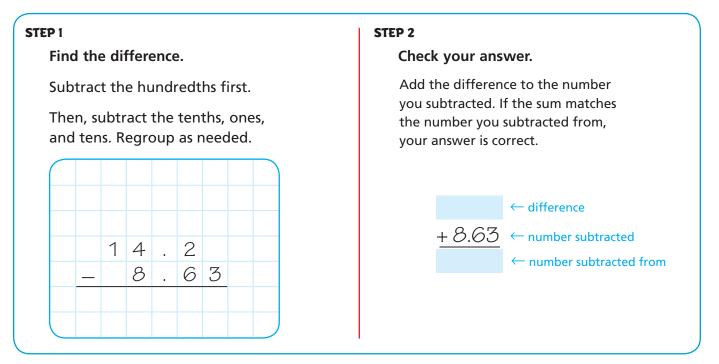
## Lesson 3.9



Hannah has 3.36 kilograms of apples and 2.28 kilograms of oranges. Hannah estimates she has about 1 more kilogram of apples than oranges.	• What operation will you use to solve the problem?
How many more kilograms of apples than oranges does Hannah have? How can you use this estimate to decide if your answer is reasonable?	<ul> <li>Circle Hannah's estimate to check that your answer is reasonable.</li> </ul>
Subtract. 3.36 – 2.28	
<ul> <li>Subtract the hundredths first. If there are not enough hundredths, regroup 1 tenth as 10 hundredths.</li> </ul>	
hundredths – 8 hundredths = 8 hundredths	
• Then subtract the tenths and ones. Regroup as needed.	3.36
tenths $-2$ tenths $= 0$ tenths	- 2.28
ones $-2$ ones $= 1$ one	
• Record the difference for each place value.	
Draw a quick picture to check your work.	
So, Hannah has more kilograms of apples than o Since is close to 1, the answer is reasonable.	ranges.

### Try This! Use addition to check.

Since subtraction and addition are inverse operations, you can check subtraction by adding.



• MATHEMATICAL **1** Evaluate Is your answer correct? Explain.

## **Share and Show**

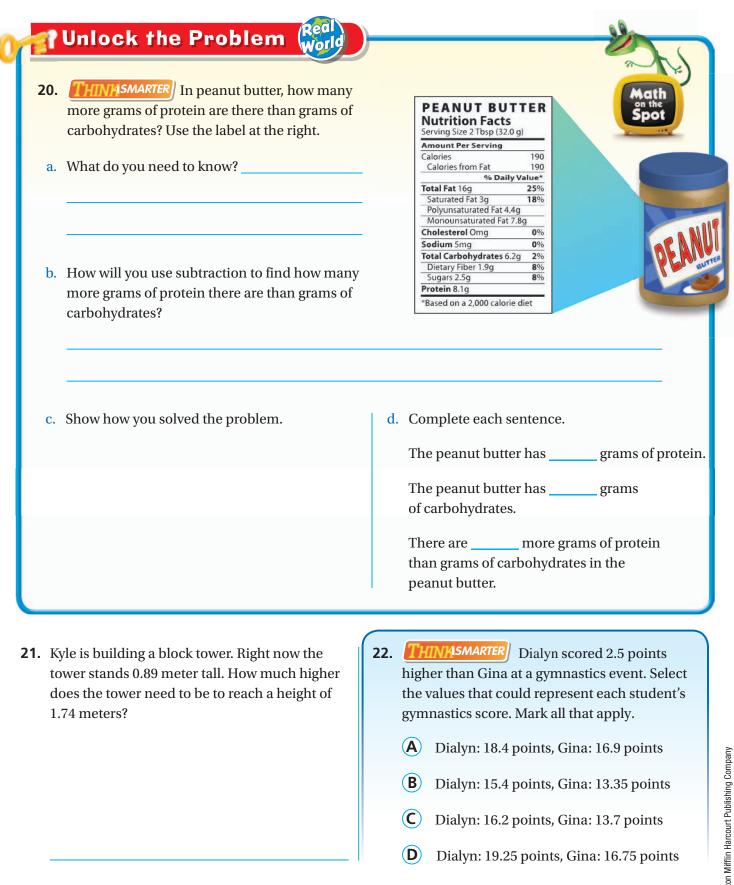


### Estimate. Then find the difference.

1. Estimate:	<b>2.</b> Estimate:	<b>I Stimate:</b>
5.83	4.45	4.03
-2.18	-1.86	-2.25
Find the difference. Check your an	iswer.	
<b>4.</b> 0.70	<b>5.</b> 13.2	<b>€</b> 6. 15.8
<u> </u>	- 8.04	- 9.67

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On Your Own			
Connect Symbo	ols and Words Find the	e difference.	
. three and seventy-two hu from five and eighty-one h			six hundredths subtracted from eight y-two hundredths
THEMATICAL <b>O</b> Use Reasoning	Algebra Write the un	known number	for <i>n</i> .
<b>b.</b> $5.28 - 3.4 = n$	<b>10.</b> <i>n</i> - 6.47 =	4.32	<b>11.</b> 11.57 - <i>n</i> = 7.51
<i>n</i> =	<i>n</i> =		<i>n</i> =
actice: Copy and Solve . 8.42 - 5.14	Find the difference. <b>13.</b> 16.46 – 13.	97	<b>14.</b> 34.27 – 17.51
5. 15.83 – 11.45	<b>16.</b> 12.74 - 10.		<b>17.</b> 48.21 – 13.65
B. <b>GODEEPER</b> Beth finish the race in 0.8 minute less 1.02 minutes less than An race in minutes?		ed the race in	WRITE Math • Show Your Work• •
<ol> <li>Fatima planted sunflower sunflower grew 2.65 meters sunflower was 0.34 meters was the height, in meters</li> </ol>	ers tall. The height of the e less than the tallest sun	shortest flower. What	



#### Name \_\_\_\_\_

### **Patterns with Decimals**

Essential Question How can you use addition or subtraction to describe a pattern or create a sequence with decimals?

## ALGEBRA Lesson 3.10



Number and Operations in Base Ten—5.NBT.7 **MATHEMATICAL PRACTICES** 

MP.3, MP.7



## Unlock the Problem

A state park rents canoes for guests to use at the lake. It costs \$5.00 to rent a canoe for 1 hour, \$6.75 for 2 hours, \$8.50 for 3 hours, and \$10.25 for 4 hours. If this pattern continues, how much should it cost Jason to rent a canoe for 7 hours?

A **sequence** is an ordered list of numbers. A **term** is each number in a sequence. You can find the pattern in a sequence by comparing one term with the next term.

### **STEP 1**

Write the terms you know in a sequence. Then look for a pattern by finding the difference from one term in the sequence to the next.



### **STEP 2**

Write a rule that describes the pattern in the sequence.

Rule:

### STEP 3

Extend the sequence to solve the problem.

\$5.00, \$6.75, \$8.50, \$10.25, \_\_\_\_\_, \_\_\_\_, \_\_\_\_,

So, it should cost to rent a canoe for 7 hours.

MATHEMATICAL O Look for a Pattern What observation can you make about the pattern in the sequence that will help you write a rule?

<b>Example</b> Write a rule for the pattern in the sequence.		
29.6, 28	.3, 27, 25.7,,, 20.5, 19.2	
STEP 1	Look at the first few terms in the sequence.	
	<b>Think:</b> Is the sequence increasing or decreasing from one term to the next?	
STEP 2	Write a rule that describes the pattern in the sequence.	
What o	peration can be used to describe a sequence that increases?	
What o	peration can be used to describe a sequence that decreases?	
Rule:		
STEP 3	Use your rule to find the unknown terms. Then complete the sequence above.	

• Explain how you know whether your rule for a sequence

would involve addition or subtraction.

### **Try This!**

Write a rule for the sequence. Then find the unknown term.

65.9, 65.3, \_\_\_\_\_, 64.1, 63.5, 62.9

Rule:

**B** Write the first four terms of the sequence.

Rule: start at 0.35, add 0.15

,\_\_\_\_

,\_\_\_

,\_

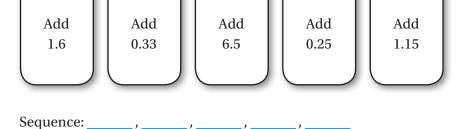
Nar	me		
	Share and Show		
Wri	te a rule for the sequence.		
1.	0.5, 1.8, 3.1, 4.4, Think: Is the sequence increasing or decreasing?	<b>Ø</b> 2.	23.2, 22.1, 21, 19.9,
	Rule:		Rule:
Wri	te a rule for the sequence. Then find the unknow	wn term	l.
3.	0.3, 1.5,, 3.9, 5.1	<b>∛</b> 4.	19.5, 18.8, 18.1, 17.4,
	Rule:		Rule:
			Math Talk Mathematical Practices
			What operation, other than addition, suggests an increase
	Dn Your Own		from one term to the next?
Wri	te the first four terms of the sequence.		
	<b>Rule:</b> start at 10.64, subtract 1.45	6.	<b>Rule:</b> start at 0.87, add 2.15
	,,,		
	//	1	/ / /
7.	Rule: start at 19.3, add 1.8	8.	Rule: start at 29.7, subtract 0.4
9.	Marta put \$4.87 in her coin bank. E added 1 quarter, 1 nickel, and 3 pennies. How mu was in her coin bank after 6 days? Describe the pa used to solve.	ıch mon	ey
10.	<b>MATHEMATICAL O</b> Identify Relationships Look at the Do the numbers show a pattern? Explain how you		DW.
	11.23, 10.75, 10.3, 9.82, 9.37, 8.89		

1

## Problem Solving • Applications World

### THINASMARTER Pose a Problem

**11.** Bren has a deck of cards. As shown below, each card is labeled with a rule describing a pattern in a sequence. Select a card and decide on a starting number. Use the rule to write the first five terms in your sequence.



Write a problem that relates to your sequence and requires the sequence be extended to solve.

### Pose a Problem

2.	<b>THINKISMARTER</b> Colleen and Tom are playing a pattern game. Tom wrote the following sequence	mber	
	33.5, 34.6, 35.7, , 37.9		



Solve your problem.

## **Problem Solving • Add and Subtract Money**

**Essential Question** How can the strategy *make a table* help you organize and keep track of your bank account balance?

## **PROBLEM SOLVING** Lesson 3.11



**Number and Operations in Base** Ten—5.NBT.7 MATHEMATICAL PRACTICES

MP.1, MP.4

**Solve the Problem** 



\$442.37

\$63.92

# **PUNIOCK the Problem**

At the end of May, Mrs. Freeman had a bank account balance of \$442.37. Since then, she has written a check for \$63.92 and made a deposit of \$350.00. Mrs. Freeman says she has \$729.45 in her bank account. Make a table to determine if Mrs. Freeman is correct.

## **Read the Problem**

What do I need to find?

I need to find

### What information do I need to use

I need to use the

### How will I use the information?

I need to make a table and use the information to\_

Mrs. Freeman's Checkbook					
\$44					
—\$6					

+

Mrs. Freeman's correct balance is

MATHEMATICAL **D** Evaluate Reasonableness How can you tell if your answer 1.

is re	asonable?	

# Try Another Problem

Nick is buying juice for himself and 5 friends. Each bottle of juice costs \$1.25. How much do 6 bottles of juice cost? Make a table to find the cost of 6 bottles of juice.

Use the graphic below to solve the problem.



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, the total cost of 6 bottles of juice
	is

2. What if Ginny says that 12 bottles of juice cost \$25.00? Is Ginny's

statement reasonable? Explain.

3. If Nick had \$10, how many bottles of juice could he buy?

 Mathematical Practices

 Explain how you could use another strategy to solve this problem.

## Share and Show



1. Sara wants to buy a bottle of apple juice from a vending machine. She needs exactly \$2.30. She has the following bills and coins:





Make and complete a table to find all the ways Sara could pay for the juice.

**First,** draw a table with a column for each type of bill or coin.

**Next,** fill in your table with each row showing a different way Sara can make exactly \$2.30.

- ✓ 2. What if Sara decides to buy a bottle of water that costs \$1.85? What are all the different ways she can make exactly \$1.85 with the bills and coins she has? Which coin must Sara use?
- At the end of August, Mr. Diaz had a balance of \$441.62. Since then, he has written two checks for \$157.34 and \$19.74 and made a deposit of \$575.00. Mr. Diaz says his balance is \$739.54. Find Mr. Diaz's correct balance.

### **On Your Own**

### Use the following information to solve 4-6.

At Open Skate Night, admission is \$3.75 with a membership card and \$5.00 without a membership card. Skate rentals are \$3.00.

- **4. GODEEPER** Aidan paid the admission for himself and two friends at Open Skate Night. Aidan had a membership card, but his friends did not. Aidan paid with a \$20 bill. How much change should Aidan receive?
- **5. THINHSMARTER** The Moores paid \$6 more for skate rentals than the Cotters did. Together, the two families paid \$30 for skate rentals. How many pairs of skates did the Moores rent?



6. **MATHEMATICAL** O Analyze Jennie and 5 of her friends are going to Open Skate Night. Jennie does not have a membership card. Only some of her friends have membership cards. What is the total amount that Jennie and her friends might pay for admission?

**WRITE** Math • Show Your Work

**7. THIN SMARTER** Marisol bought 5 movie tickets for a show. Each ticket cost \$6.25. Complete the table to show the price of 2, 3, 4, and 5 tickets.

Number of Tickets	Price
1	\$6.25
2	
3	
4	
5	

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### Name \_\_\_\_\_

## Choose a Method

**Essential Question** Which method could you choose to find decimal sums and differences?

world

## Lesson 3.12



MATHEMATICAL PRACTICES

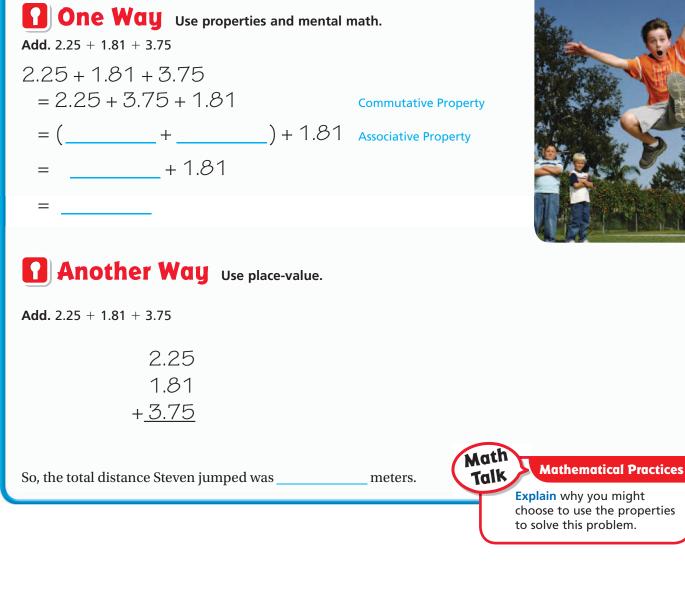
MP.1, MP.2, MP.5, MP.7

## **Mulock the Problem**

At a track meet, Steven entered the long jump. His jumps were 2.25 meters, 1.81 meters, and 3.75 meters. What was the total distance Steven jumped?

To find decimal sums, you can use properties and mental math or you can use paper and pencil.

- Underline the sentence that tells you what you are trying to find.
- Circle the numbers you need to use.
- What operation will you use?



### **Try This!**

In 1924, William DeHart Hubbard won a gold medal with a long jump of 7.44 meters. In 2000, Roman Schurenko won the bronze medal with a jump of 8.31 meters. How much longer was Schurenko's jump than Hubbard's?

A Use place-value.	<b>B</b> Use a calculator.
8.31         -7.44         1	

So, Schurenko's jump was \_\_\_\_\_\_ meter longer than Hubbard's.

MATHEMATICAL **1** Identify Relationships Explain why you cannot use the Commutative Property or the Associative Property to find the difference between two decimals.

Share and Show	MATH BOARD	
Find the sum or difference.		
<b>1</b> . 4.19 + 0.58	<b>2.</b> 9.99 – 4.1	<b>∛ 3</b> . 5.7 + 2.25 + 1.3
<b>4.</b> 28.6 – 9.84	<b>5.</b> \$15.79+\$32.81	<b>ĕ 6</b> . 38.44 – 25.86

## On Your Own

Find the sum or difference.

<b>7.</b> \$18.39	<b>8</b> . 8.22 – 4.39	<b>9.</b> 93.6 – 79.84	<b>10.</b> 1.82
+\$ 7.56			2.28
•			+ 2.18

<b>Practice:</b>	Сору	and	Solve	Find the sum	or difference.
------------------	------	-----	-------	--------------	----------------

<b>11.</b> 6.3 + 2.98 + 7.7	<b>12.</b> 27.96 - 16.2	<b>13.</b> 12.63 + 15.04	<b>14.</b> 9.24 - 2.68
<b>15.</b> \$18 - \$3.55	<b>16.</b> 9.73 – 2.52	<b>17.</b> \$54.78 + \$43.62	<b>18.</b> 7.25 + 0.25 + 1.5

MATHEMATICAL **2** Use Reasoning **Algebra** Find the missing number.

<b>19.</b> <i>n</i> −9.02 = 3.85	<b>20.</b> <i>n</i> + 31.53 = 62.4	<b>21.</b> 9.2 + <i>n</i> + 8.4 = 20.8
n =	n =	n =

**Problem Solving • Applications** 

- **22. DEEPER** Jake needs 7.58 meters of wood to complete a school project. He buys a 2.25-meter plank of wood and a 3.12-meter plank of wood. How many more meters of wood does Jake need to buy?
- © Houghton Mifflin Harcourt Publishing Company
- **23. ITHIN ASMARTER** Lori needs a length of twine 8.5 meters long to mark a row in her garden. Andrew needs a length of twine 7.25 meters long for his row. They have one length of twine that measures 16.27 meters. After they each take the lengths they need, how much twine will be left?



MATHEMATICAL PRACTICES

#### Use the table to solve 24-26.

- **24.** How much farther did the gold medal winner jump than the silver medal winner?
- **25.** MATHEMATICAL **(**) The fourth-place competitor's jump measured 8.19 meters. If his jump had been 0.10 meter greater, what medal would he have received? **Explain** how you solved the problem.

2008 Men's Olympic Long Jump Results		
Medal	Distance (in meters)	
Gold	8.34	
Silver	8.24	
Bronze	8.20	

**26.** In the 2004 Olympics, the gold medalist for the men's long jump had a jump of 8.59 meters. How much farther did the 2004 gold medalist jump compared to the 2008 gold medalist?

**27. THINASMARTER** Alexander and Holly are solving the following word problem.

At the supermarket Carla buys 2.25 pounds of hamburger. She also buys 3.85 pounds of chicken. How many pounds of hamburger and chicken did Carla buy?

Alexander set up his problem as 2.25 + 3.85. Holly set up her problem as 3.85 + 2.25. Who is correct? Explain your answer and solve the problem.



1. Chaz kept a record of how many gallons of gas he purchased each day last week.

Day	Gas (in gallons)
Monday	4.5
Tuesday	3.9
Wednesday	4.258
Thursday	3.75
Friday	4.256

Order the days from least amount of gas Chaz purchased to greatest amount of gas Chaz purchased.

Least		Greatest	

2. For numbers 2a–2c, select True or False for each statement.

2a.	16.437 rounded to the nearest whole number is 16.	⊖ True	○ False
2b.	16.437 rounded to the nearest tenth is 16.4.	⊖ True	○ False
2c.	16.437 rounded to the nearest hundredth is 16.43.	○ True	○ False

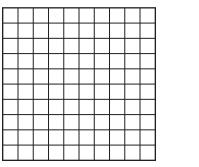
**3.** Students are selling muffins at a school bake sale. One muffin costs \$0.25, 2 muffins cost \$0.37, 3 muffins cost \$0.49, and 4 muffins cost \$0.61. If this pattern continues, how much will 7 muffins cost? Explain how you found your answer.



**4.** What is the value of the underlined digit? Mark all that apply.

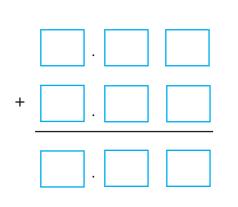
0.<u>6</u>79

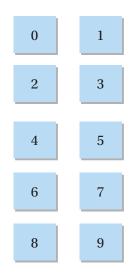
- $\bigcirc$  0.6  $\bigcirc$  six hundredths
- $\bigcirc 0.06$   $\bigcirc 6 \times \frac{1}{10}$
- six tenths
- **5.** Rowanda jogged 2.14 kilometers farther than Terrance. Select the values that could represent how far each student jogged. Mark all that apply.
  - O Rowanda: 6.5 km, Terrance: 4.36 km
  - O Rowanda: 4.8 km, Terrance: 2.76 km
  - Rowanda: 3.51 km, Terrance: 5.65 km
  - O Rowanda: 7.24 km, Terrance: 5.1 km
- 6. Shade the model to show the decimal 0.542.





7. Benjamin rode his bicycle 3.6 miles on Saturday and 4.85 miles on Sunday. How many miles did he ride Saturday and Sunday combined? Use the digits on the tiles to solve the problem. Digits may be used more than once or not at all.





Name \_

**8.** The school is 3.65 miles from Tonya's house and 1.28 miles from Jamal's house. How much farther from school is Tonya's house than Jamal's house? Explain how you can use a quick picture to solve the problem.

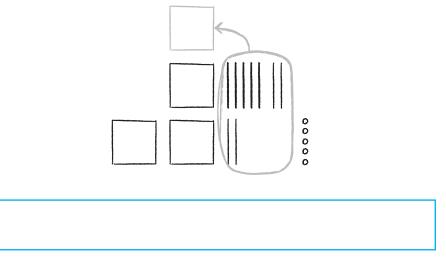
**9.** A vet measured the mass of two birds. The mass of the robin was 76.64 grams. The mass of the blue jay was 81.54 grams. Estimate the difference in the masses of the birds.

grams

**10.** Rick bought 5 yogurt bars at a snack shop. Each yogurt bar cost \$1.75. Complete the table to show the price of 2, 3, 4, and 5 yogurt bars.

Number of Yogurt Bars	Price
1	\$1.75
2	
3	
4	
5	

**11.** Clayton Road is 2.25 miles long. Wood Pike Road is 1.8 miles long. Kisha used a quick picture to find the combined length of Clayton Road and Wood Pike Road. Does Kisha's work make sense? Explain why or why not.



**12.** Bob and Ling are playing a number pattern game. Bob wrote the following sequence.

28.9, 26.8, 24.7, \_\_\_\_\_, 20.5

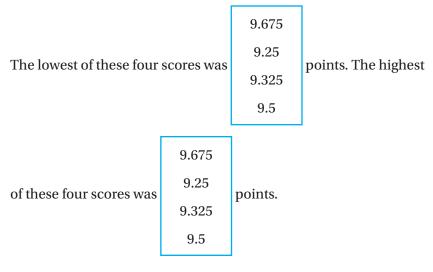
What is the unknown term in the sequence?



**13.** Rafael bought 2.15 pounds of potato salad and 4.2 pounds of macaroni salad to bring to a picnic. For numbers 13a–13c, select Yes or No to indicate whether each statement is true.

13a.	Rounded to the nearest whole number, Rafael bought 2 pounds of potato salad.	O Yes	O No
13b.	Rounded to the nearest whole number, Rafael bought 4 pounds of macaroni salad.	⊖ Yes	O No
13c.	Rounded to the nearest tenth, Rafael bought 2.1 pounds of potato salad.	O Yes	O No

**14.** The four highest scores on the floor exercise at a gymnastics meet were 9.675, 9.25, 9.325, and 9.5 points. Choose the numbers that make the statement true.



**15.** Michelle records the value of one euro in U.S. dollars each day for her social studies project. The table shows the data she has recorded so far.

Day	Value of 1 Euro (in U.S. dollars)
Monday	1.448
Tuesday	1.443
Wednesday	1.452
Thursday	1.458

On which two days was the value of 1 euro the same when rounded to the nearest hundredth of a dollar?

**16.** Miguel has \$20. He spends \$7.25 on a movie ticket, \$3.95 for snacks, and \$1.75 for bus fare each way. How much money does Miguel have left?

\$

**17.** Yolanda's sunflower plant was 64.34 centimeters tall in July. During August, the plant grew 18.2 centimeters.

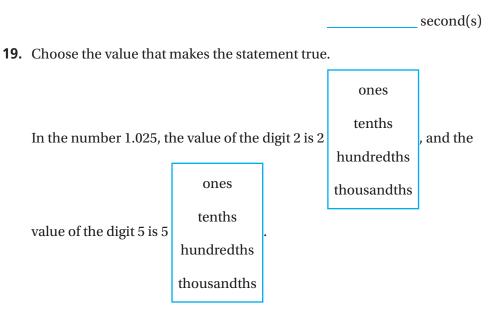
### Part A

Estimate the height of Yolanda's plant at the end of August by rounding each value to the nearest whole number. Will your estimate be less than or greater than the actual height? Explain your reasoning.

### Part B

What was the exact height of the plant at the end of August? Was the estimate less than or greater than the exact value?

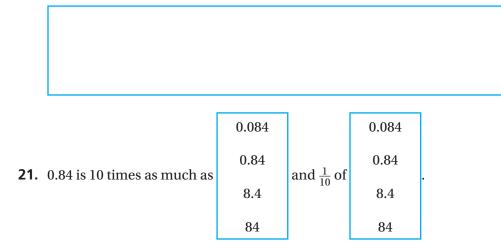
**18.** Oscar ran the 100-yard dash in 12.41 seconds. Jesiah ran the 100-yard dash in 11.85 seconds. How many seconds faster was Jesiah's time than Oscar's time?

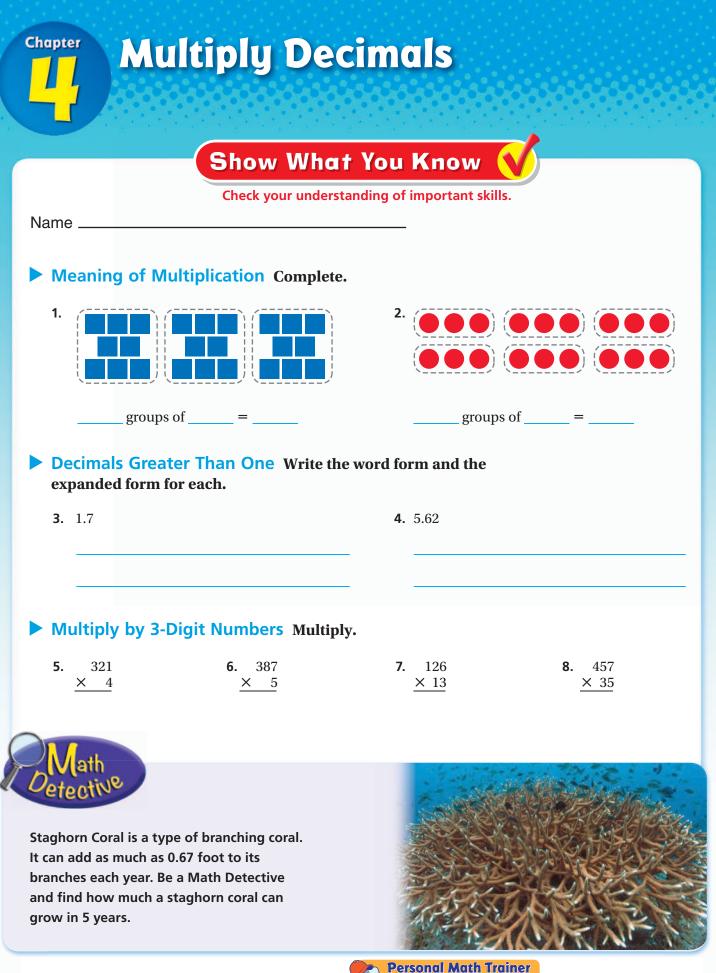


**20.** Troy and Lazetta are solving the following word problem.

Rosalie's cat weights 9.8 pounds. Her dog weighs 25.4 pounds. What is the weight of both animals combined.

Troy sets up his problem as 9.8 + 25.4. Lazetta sets up her problem as 25.4 + 9.8. Who is correct? Explain your answer and solve the problem.





**Online Assessment** 

and Intervention

Chapter 4 165

## **Vocabulary Builder**

#### Visualize It •••• **Review Words** Complete the flow map using the words with a $\checkmark$ . decimal Multiply the Multiply the Multiply the expanded form 6.35 2 × ✓hundredths multiplication **√**ones The Check for pattern Estimate. reasonableness. place value is 12.70. ✓product ✓tenths thousandths Understand Vocabulary .....

### Read the description. What term do you think it describes?

1. It is the process used to find the total number of items in a

given number of groups. \_\_\_\_\_

2. It is a way to write a number that shows the value of

each digit. \_\_\_\_

- 3. It is one of one hundred equal parts.
- **4.** This is the result when you multiply two numbers.
- 5. It is the value of a digit in a number based on the location

of the digit. \_\_\_\_\_



### Name \_\_

### **Multiplication Patterns with Decimals**

**Essential Question** How can patterns help you place the decimal point in a product?



## PUnlock the Problem 🖁

Cindy is combining equal-sized rectangles from different fabric patterns to make a postage-stamp quilt. Each rectangle has an area of 0.75 of a square inch. If she uses 1,000 rectangles to make the quilt, what will be the area of the quilt?



Use the pattern to find the product.

$$1 \times 0.75 = 0.75$$
  
 $10 \times 0.75 = 7.5$   
 $100 \times 0.75 = 75.$   
 $1,000 \times 0.75 = 750.$ 

The quilt will have an area of \_\_\_\_\_\_ square inches.

 As you multiply by increasing powers of 10, how does the position of the decimal point change in the product?

Place value patterns can be used to find the product of a number and the decimals 0.1 and 0.01.

## 🛿 Example 1

Jorge is making a scale model of the Willis Tower in Chicago for a theater set. The height of the tower is 1,353 feet. If the model is  $\frac{1}{100}$  of the actual size of the building, how tall is the model?

> $1 \times 1,353 = 1,353$   $0.1 \times 1,353 = 135.3$  $0.01 \times 1,353 = 4$   $\leftarrow \frac{1}{100} \text{ of } 1,353$

- What fraction of the actual size of the building is the model?
- Write the fraction as a decimal.

- Jorge's model of the Willis Tower is \_\_\_\_\_\_ feet tall.
- 2. As you multiply by decreasing powers of 10, how does the position of the decimal point change in the product?

## ALGEBRA Lesson 4.1



Number and Operations in Base Ten—5.NBT.2 Also 5.NBT.7

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



## Example 2

Three friends are selling items at an arts and crafts fair. Josey makes \$45.75 selling jewelry. Mark makes 100 times as much as Josey makes by selling his custom furniture. Carlos makes a tenth of the money Mark makes by selling paintings. How much money does each friend make?

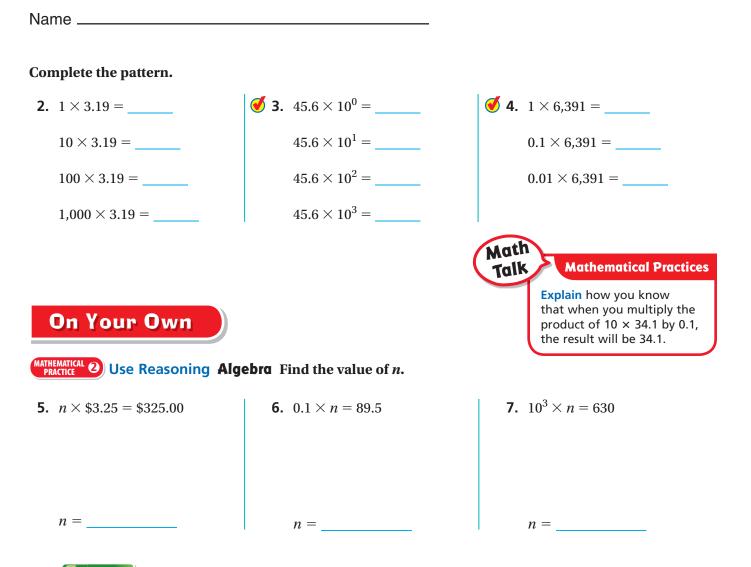


### Josey: \$45.75

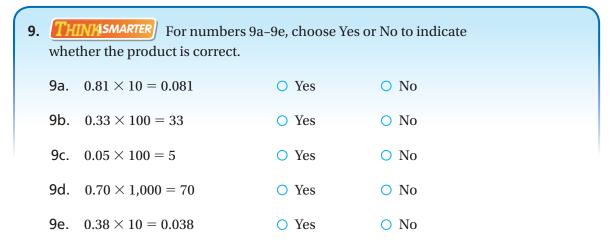
Mark:	× \$45.75	Carlos: ×
Think:	1 × \$45.75 =	Think: 1 × =
	10 × \$45.75 =	×=
	100 × \$45.75 =	
So, Josey makes \$45.75, Mark makes,		
and Carlos makes		

### **Try This!** Complete the pattern.

A $10^0 \times 4.78 =$ $10^1 \times 4.78 =$ $10^2 \times 4.78 =$	$38 \times 1 = \38 \times 0.1 = \28 \times 0.01 = \$
$10^{3} \times 4.78 =$	38 × 0.01 =
Share and Show Complete the pattern.	BOARD
<b>1</b> . $10^0 \times 17.04 = 17.04$	Think: The decimal point moves one place to
	the second second second second second
$10^1 \times 17.04 = 170.4$	the for each increasing power of 10.
$10^1 \times 17.04 = 170.4$ $10^2 \times 17.04 = 1,704$	



**8. GODEEPER** A glacier in Alaska moves about 29.9 meters a day. About how much farther will it move in 1,000 days than it will move in 100 days?



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### Problem Solving • Applications 🖁

### THINKISMARTER) What's the Error?

10. Kirsten is making lanyards for a convention. She needs to make 1,000 lanyards and knows that 1 lanyard uses 1.75 feet of cord. How much cord will Kirsten need?

Kirsten's work is shown below.

 $1 \times 1.75 = 1.75$ 

 $10 \times 1.75 = 10.75$ 

 $100 \times 1.75 = 100.75$ 

 $1,000 \times 1.75 = 1,000.75$ 



Solve the problem using the correct pattern.


Find and describe Kirsten's error.

So, Kirsten needs \_\_\_\_\_\_ feet of cord to make 1,000 lanyards.

• **MATHEMATICAL O Compare Strategies** Describe how Kirsten could solve the problem without writing out the pattern.

#### Name \_\_\_\_\_

### **Multiply Decimals and Whole Numbers**

**Essential Question** How can you use a model to multiply a whole number and a decimal?

### Investigate

**Materials** decimal models color pencils

Giant tortoises move very slowly. They can travel a distance of about 0.17 mile in 1 hour. How far could a giant tortoise move if it travels at this same speed for 4 hours?

**A.** Complete the statement to describe the problem.

I need to find how many total miles are in \_\_\_\_\_ groups

### of\_\_\_\_\_.

- Write an expression to represent the problem. \_\_\_\_\_\_
- **B.** Use the decimal model to find the answer.
  - What does each small square in the decimal model represent?

	$\vdash$	_				_	_	
$\vdash$	⊢	-	-		-	-	-	
F	$\vdash$	-		$\vdash$			-	
	⊢							

- **C.** Shade a group of \_\_\_\_\_\_ squares to represent the distance a giant tortoise can move in 1 hour.
- **D.** Use a different color to shade each additional
  - group of \_\_\_\_\_ squares until you
  - have \_\_\_\_\_ groups of \_\_\_\_\_ squares.
- **E.** Record the total number of squares shaded. \_\_\_\_\_\_ squares

So, the giant tortoise can move \_\_\_\_\_ mile in 4 hours.





**Explain** how the model helps you determine if your answer is reasonable.

#### Number and Operations in Base Ten—5.NBT.7

Lesson 4.2

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

### **Draw Conclusions**

- 1. Explain why you used only one decimal model to show the product.
- **2.** Explain how the product of 4 groups of 0.17 is similar to the product of 4 groups of 17. How is it different?
- **3.** MATHEMATICAL **()** Compare the product of 0.17 and 4 with each of the factors. Which number has the greatest value? Explain how this is different than multiplying two whole numbers.

### **Make Connections**

You can draw a quick picture to solve decimal multiplication problems.

#### Find the product. $3 \times 0.46$

**STEP 1** Draw 3 groups of 4 tenths and 6 hundredths. Remember that a square is equal to 1.

**STEP 2** Combine the hundredths and rename.

There are \_\_\_\_\_ hundredths. I will rename

hundredths as \_\_\_\_\_\_.

Cross out the hundredths you renamed.

**STEP 3** Combine the tenths and rename.

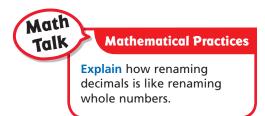
There are \_\_\_\_\_ tenths. I will rename

\_\_\_\_\_ tenths as \_\_\_\_\_\_.

Cross out the tenths you renamed.

**STEP 4** Record the value shown by your completed quick picture.

So,  $3 \times 0.46 =$  \_\_\_\_\_.

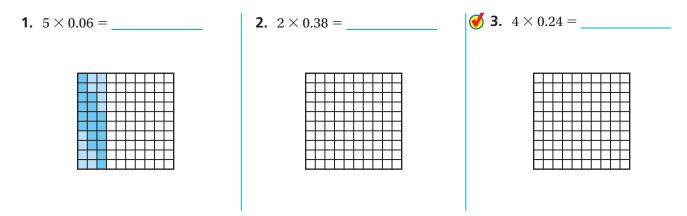




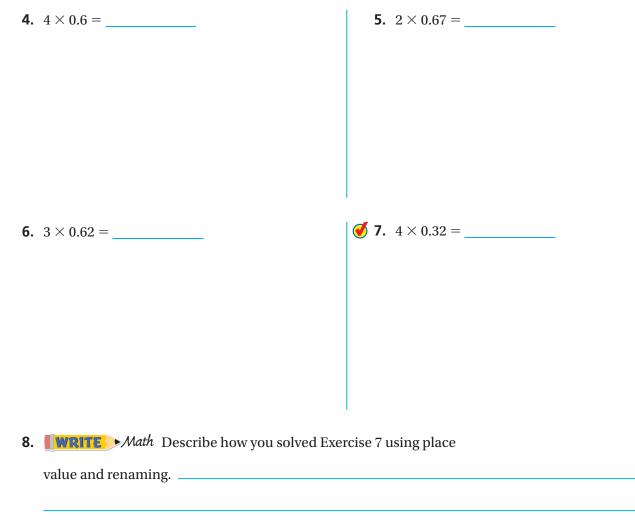




Use the decimal model to find the product.



#### Find the product. Draw a quick picture.



## **Problem Solving • Applications (**

#### Use the table for 9-11.

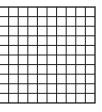
9. MATHEMATICAL 2 Reason Quantitatively Each day a bobcat drinks about 3 times as much water as a Canada goose drinks. How much water can a bobcat drink in one day?

- **10. THINASMARTER** River otters drink about 5 times as much water as a bald eagle drinks in a day. How much water can a river otter drink in 3 days?
- **11. GODEEPER** An animal shelter provides a bowl with 1.25 liters of water for 3 cats. About how much water will be left after the cats drink their average daily amount of water?

**12. THIMASMARTER** Yossi is shading the model to show  $0.14 \times 3$ .

Describe what Yossi should shade to show the product. Then shade in the correct amount of boxes that will show the product of  $0.14 \times 3$ .

groups of \_\_\_\_\_ small squares or \_\_\_\_\_ small squares



FOR MORE PRACTICE:
Standards Practice Book
Stanuarus Fractice DOOK



MATHEMATICAL PRACTICES

Animal	Average Amount (liters per day)
Canada Goose	0.24
Cat	0.15
Mink	0.10
Opossum	0.30
Bald Eagle	0.16



#### Name \_

### Multiplication with Decimals and Whole Numbers

**Essential Question** How can you use properties and place value to multiply a decimal and a whole number?

ME

## Unlock the Problem (Real World

In 2010, the United States Mint released a newly designed Lincoln penny. A Lincoln penny has a mass of 2.5 grams. If there are 5 Lincoln pennies on a tray, what is the total mass of the pennies?



Multiply.  $5 \times 2.5$ 

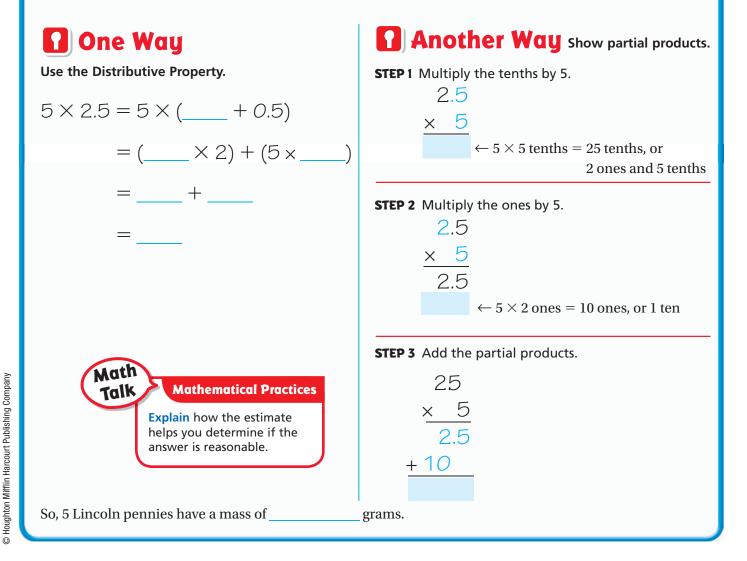
Estimate the product. Round to the nearest whole number.

5×\_\_\_\_=

- How much mass does one penny have?
- How many pennies are on the tray?

MP.5, MP.7

• Use grouping language to describe what you are asked to find.





Ten—5.NBT.7 Also 5.NBT.2

MATHEMATICAL PRACTICES

Number and Operations in Base

## **Example** Use place value patterns.

Having a thickness of 1.35 millimeters, the dime is the thinnest coin produced by the United States Mint. If you stacked 8 dimes, what would be the total thickness of the stack?

**Multiply.** 8 × 1.35

STEP 1	STEP 2	STEP 3		
Write the decimal factor as a	Multiply as with whole	Place the decimal point.		
whole number. <b>Think:</b> 1.35 × 100 = 135	numbers.	<b>Think:</b> 0.01 of 135 is 1.35. Find 0.01 of 1,080 and record the product.		
$1.35 \xrightarrow{\times 100} 135 \xrightarrow{\times 0.01} 1.35$				
$\frac{\times 8}{?} \xrightarrow{\times 100} \frac{\times 8}{1,080} \xrightarrow{\times 0.01} \frac{\times 8}{100}$				
A stack of 15 dimes would have a thickness of millimeters.				

(MATHEMATICAL  $\bigcirc$  **Explain** how you know the product of  $8 \times 1.35$  is greater than 8.

**2.** What if you multiplied 0.35 by 8? Would the product be less than or greater than 8? Explain.

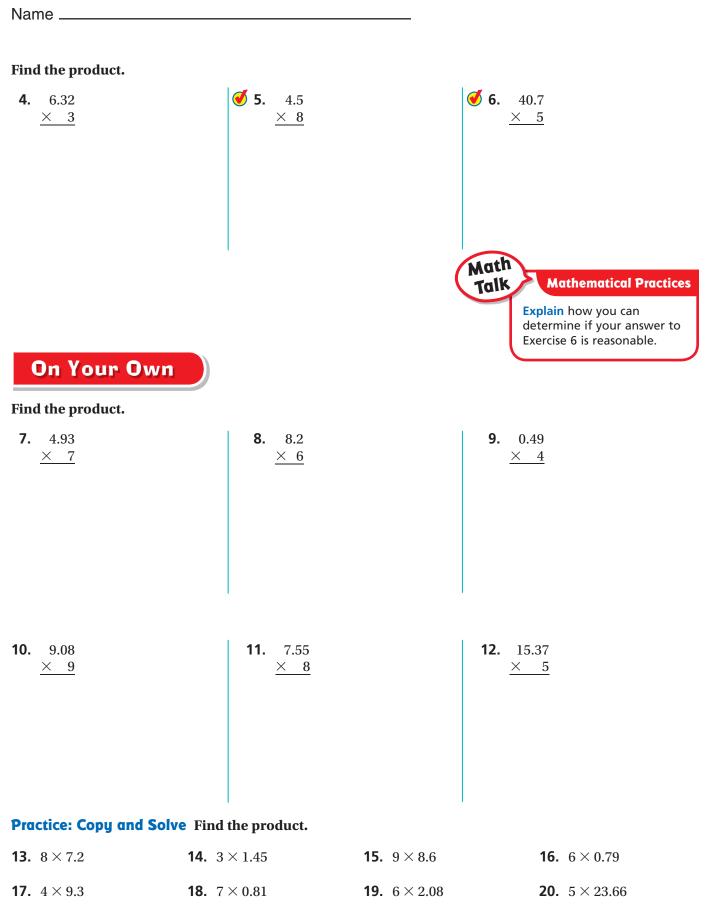
Share and Show



### Place the decimal point in the product.

<b>1.</b> 6.81 $\frac{\times 7}{4767}$	<b>Think:</b> The place value of the decimal factor is hundredths.	<b>2.</b> 3.7 $\times \frac{2}{74}$	<b>3.</b> 19.34 $\times$ 5 9670

1.



#### MATHEMATICAL PRACTICES

### Problem Solving • Applications 🎇

#### Use the table for 21-22.

- **21. GODEEPER** Sari has a bag containing 6 half dollars and 3 dollar coins. What is the total mass of the coins in Sari's bag?
- **22. THINASMARTER** Chance has \$2 in quarters. Blake has \$5 in dollar coins. Whose coins have the greatest mass? Explain.



Cain Mass (in grame)	24/5)
Coin Mass (in grams)	1
Nickel 5.00	200
Dime 2.27	
Quarter 5.67	)
Half Dollar 11.34	9
Dollar 8.1	

WRITE Math • Show Your Work •

**23.** Mathematical **3** Make Arguments Julie multiplies 6.27 by 7 and claims the product is 438.9. Explain without multiplying how you know Julie's answer is not correct. Find the correct answer.

#### Personal Math Trainer

24. **THE ASMARTER** Rachel and Abby are trying to solve a science homework question. They need to find how much a rock that weighs 6 pounds on Earth would weigh on the moon. They know they can multiply weight on Earth by about 0.16 to find weight on the moon. Select the partial products Rachel and Abby would need to add to find the product of 6 and 0.16. Mark all that apply.



FOR MORE PRACTICE:

**Standards Practice Book** 

#### Name \_\_\_

### **Multiply Using Expanded Form**

**Essential Question** How can you use expanded form and place value to multiply a decimal and a whole number?

### Lesson 4.4



Number and Operations in Base Ten—5.NBT.7 Also 5.NBT.2

MATHEMATICAL PRACTICES MP.3, MP.4

### **P**Unlock the Problem Real

The length of a day is the amount of time it takes a planet to make a complete rotation on its axis. On Jupiter, there are 9.8 Earth hours in a day. How many Earth hours are there in 46 days on Jupiter?

You can use a model and partial products to solve the problem.



A day on Jupiter is called a Jovian day.

Multiply. 46 × 9.8

THINK MODEL RECORD **STEP**1 Rewrite the factors in expanded form, and label the model. 9.8 ×46 46 = \_\_\_\_\_ + \_\_\_\_ 9 0.8 9.8 = \_\_\_\_\_ + \_\_\_\_  $-40 \times 9$ 40  $-40 \times 0.8$ **STEP 2**  $-6 \times 9$ Multiply to find the area of each 6  $-6 \times 0.8$ section. The area of each section represents a partial product. **STEP 3** Add the partial products. So, there are Earth hours in 46 days on Jupiter.

**1. What if** you wanted to find the number of Earth hours in 125 days on Jupiter? How would your model change?

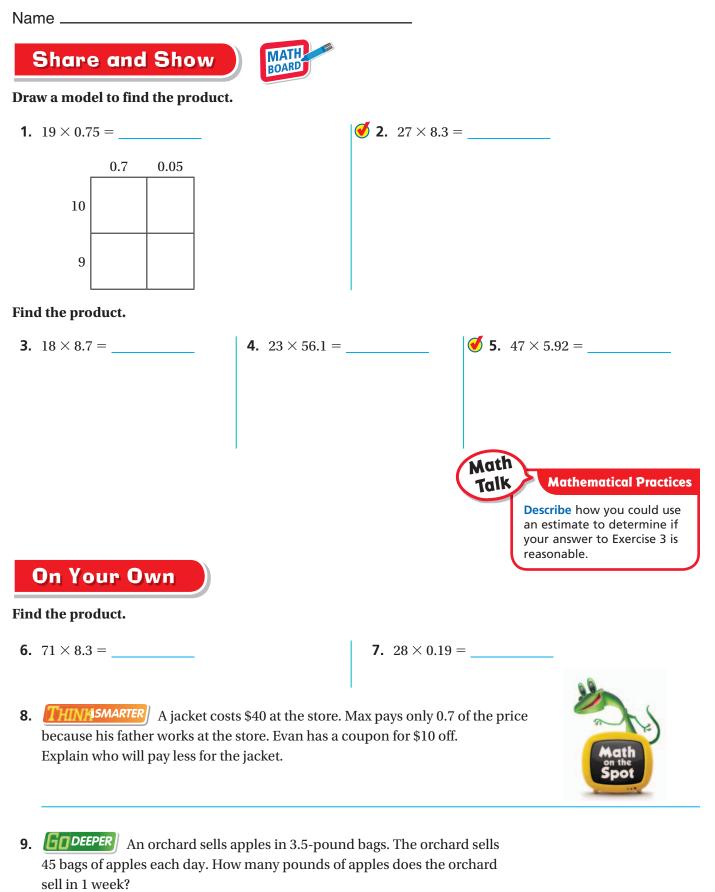


Another Way Use place value patterns.			
A day on the planet Mercury lasts about 58 many Earth days are there in 14 days on M			
Multiply. 14 $ imes$ 58.6			
STEP 1			
Write the decimal factor as a	▲ It takes Mercury 88 Earth days		
whole number.	to complete an orbit of the Sun.		
STEP 2			
Multiply as with whole numbers.	$58.6 \xrightarrow{\times 10} 586 \xrightarrow{\times 0.1} 58.6$		
STEP 3	<u>× 14</u> 2,344 × 14		
Place the decimal point.	? + 5,860		
The decimal product is of the whole number product.	×10 > 8,204 ×0.1		
So, there are Earth days in 1	14 days on Mercury.		

2. **Compare Strategies** What if you rewrite the problem as  $(10 + 4) \times 58.6$  and used the Distributive Property to solve? Explain how this is similar to your model using place value.

### **Try This!** Find the product.

A Use a model.	<b>B</b> Use place value patterns.
52 × 0.35 =	16 × 9.18 =



<ul> <li>Unlock the Problem</li> <li>Make Sense of Problem facts on the planet Earth, Kate learned is about 23.93 hours long. How many h on Earth?</li> <li>What are you being asked to find?</li> </ul>	ns While researching I that a true Earth day
<b>b.</b> What information do you need to know	w to solve the problem?
<b>c.</b> Write an expression to represent the p	roblem to be solved.
d. Show the steps you used to solve the problem.	<ul> <li>e. Complete the sentences.</li> <li>On Earth, there are about</li> <li>hours in a day, days in 1 week,</li> </ul>
	and days in 2 weeks.
	Since × =
	, there are about hours in 2 weeks on Earth.
<b>1. THINMSMARTER</b> Write each number in has the same value. A number may be us	
7.68 76.8 768	
$40 \times 16 -$	

 $48 \times 16 = \_\_\_$   $48 \times 1.6 = \_\_\_$   $4.8 \times 16 = \_\_\_$   $0.48 \times 16 = \_\_$   $48 \times 0.16 = \_\_$ 

FOR MORE PRACTICE:

**Standards Practice Book** 

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### **Problem Solving • Multiply Money**

**Essential Question** How can the strategy *draw a diagram* help you solve a decimal multiplication problem?

### **PROBLEM SOLVING** Lesson 4.5



Number and Operations in Base Ten—5.NBT.7 MATHEMATICAL PRACTICES

MP.1, MP.4, MP.6

## **PUnlock the Problem**

A group of friends go to a local fair. Jayson spends \$3.75. Myra spends 3 times as much as Jayson. Teresa spends \$5.25 more than Myra. How much does Teresa spend?

Use the graphic organizer below to help you solve the problem.



### **Read the Problem**

### What do I need to find?

I need to find

### **Solve the Problem**

The amount of money Myra and Teresa spend depends on the amount Jayson spends. Draw a diagram to compare the amounts without calculating. Then, use the diagram to find the amount each person spends.

What information do I need to use?	Jayson \$3.75
I need to use the amount spent by	Myra
to find the amount spent by and at the fair.	Teresa \$5.25
How will I use the information?	Jayson: \$3.75
I can draw a diagram to show	Муга: 3 × =
	<b>Teresa:</b> + \$5.25 =

So, Teresa spent \_\_\_\_\_\_ at the fair.

Try Another Problem

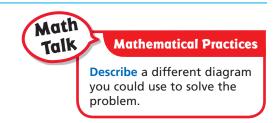
Julie's savings account has a balance of \$57.85 in January. By March, her balance is 4 times as much as her January balance. Between March and November, Julie deposits a total of \$78.45. If she does not withdraw any money from her account, what should Julie's balance be in November?



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, Julie's savings account balance will be
X	in November.

• **MATHEMATICAL 1** Evaluate Reasonableness How does the diagram help you determine

if your answer is reasonable?



### Share and Show



 Manuel collects \$45.18 for a fundraiser. Gerome collects \$18.07 more than Manuel. Cindy collects 2 times as much as Gerome. How much money does Cindy collect for the fundraiser?

**First,** draw a diagram to show the amount Manuel collects.

**Then,** draw a diagram to show the amount Gerome collects.

**Next,** draw a diagram to show the amount Cindy collects.

Finally, find the amount each person collects.

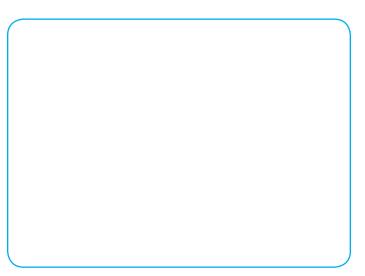
Cindy collects \_\_\_\_\_\_ for the fundraiser.

✓ 2. What if Gerome collects \$9.23 more than Manuel? If Cindy still collects 2 times as much as Gerome, how much money would Cindy collect?

 ✓ 3. Jenn buys a pair of jeans for \$24.99. Her friend Karen spends \$3.50 more for the same pair of jeans. Vicki paid the same price as Karen for the jeans but bought 2 pairs. How much did Vicki spend?

**4.** The fifth-grade students in Miguel's school formed 3 teams to raise money for the Penny Harvest fundraiser. Team A raised \$65.45. Team B raised 3 times as much as Team A. Team C raised \$20.15 more than Team B. How much money did Team C raise?

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### •••• WRITE Math • Show Your Work ••

### **On Your Own**

Use the sign for 5–7.

- 5. Nathan receives a coupon in the mail for \$10 off of a purchase of \$100 or more. If he buys 3 pairs of board shorts, 2 towels, and a pair of sunglasses, will he spend enough to use the coupon? How much will his purchase cost?
- 6. MATHEMATICAL O Make Sense of Problems Ana spends \$33.90 on 3 different items. If she did not buy board shorts, which three items did Ana buy?
- 7. GODEEPER Austin shops at Surfer Joe's Surf Shop before going to the beach. He buys 2 T-shirts, a pair of board shorts, and a towel. If he gives the cashier \$60, how much change will Austin get back?
- 8. It costs \$5.15 to rent a kayak for 1 hour at a local state park. The price per hour stays the same for up to 5 hours of rental. After 5 hours, the cost decreases to \$3.75 per hour. How much would it cost to rent a kayak for 6 hours?



**9. THINKSMARTER** At a video game store it costs \$10.45 to buy one movie. It costs 3 times as much to buy one video game. Choose the answer to complete the sentence.

\$20.90It would cost Jon\$31.35\$41.80

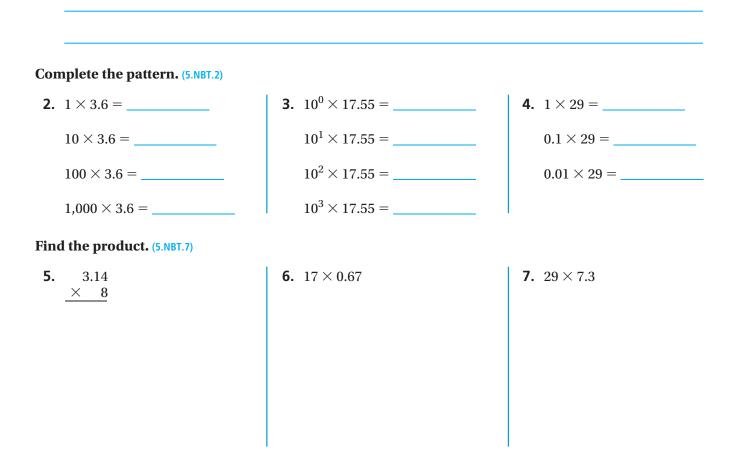


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### Concepts and Skills

**1. Explain** how you can use a quick picture to find  $3 \times 2.7$ . (5.NBT.7)



#### Draw a diagram to solve. (5.NBT.7)

**8.** Julie spends \$5.62 at the store. Micah spends 5 times as much as Julie. Jeremy spends \$6.72 more than Micah. How much money does each person spend?

Julie: \$5.62

Micah:

Jeremy: \_\_\_\_\_

**9.** Sarah is cutting ribbons for a pep rally. The length of each ribbon needs to be 3.68 inches. If she needs 1,000 ribbons, what is the length of ribbon Sarah needs? (5.NBT.2)

**10.** Adam is carrying books to the classroom for his teacher. Each books weighs 3.85 pounds. If he carries 4 books, how many pounds is Adam carrying? (5.NBT.7)

**11.** A car travels 54.9 miles in an hour. If the car continues at the same speed for 12 hours, how many miles will it travel? (5.NBT.7)

**12.** Charlie saves \$21.45 each month for 6 months. In the seventh month, he only saves \$10.60. How much money will Charlie have saved after 7 months? (5.NBT.7)

#### Name \_

### **Decimal Multiplication**

Essential Question How can you use a model to multiply decimals?

### Investigate

#### **Materials** color pencils

The distance from Charlene's house to her school is 0.8 mile. Charlene rides her bike 0.7 of the distance and walks the rest of the way. How far does Charlene ride her bike to school?

You can use a decimal square to multiply decimals.

#### Multiply. $0.7 \times 0.8$

- **A.** Draw a square with 10 equal columns.
  - What decimal value does each column represent?\_\_\_\_\_
- **B.** Using a color pencil, shade columns on the grid to represent the distance to Charlene's school.
  - The distance to the school is 0.8 mile.

How many columns did you shade?

- **C.** Divide the square into 10 equal rows.
  - What decimal value does each row represent? \_\_\_\_\_\_
- **D.** Using a different color, shade rows that overlap the shaded columns to represent the distance to school that Charlene rides her bike.
  - What part of the distance to school does Charlene ride
    - her bike?\_\_\_\_\_
  - How many rows of the shaded columns did you shade?
- **E.** Count the number of squares that you shaded twice.

There are \_\_\_\_\_\_ squares. Each square represents \_\_\_\_\_.

Record the value of the squares as the product. 0.7 imes 0.8 = \_\_\_\_\_

So, Charlene rides her bike for \_\_\_\_\_ mile.

### Lesson 4.6



Number and Operations in Base Ten—5.NBT.7

MATHEMATICAL PRACTICES MP.1, MP.5, MP.6



I       I <tdi< td="">       I       I</tdi<>						
Image: Sector						



### **Draw Conclusions**

**1.** Explain how dividing the decimal square into 10 equal columns and rows shows that tenths multiplied by tenths is equal to hundredths.

2. MATHEMATICAL 3 Draw Conclusions Why is the part of the model representing the product less than either factor?

### **Make Connections**

You can use decimal squares to multiply decimals greater than 1.

Multiply.  $0.3\times1.4$ 

#### **STEP** 1

Shade columns to represent 1.4.

How many tenths are in 1.4?

#### STEP 2

Shade rows that overlap the shaded columns to represent 0.3.

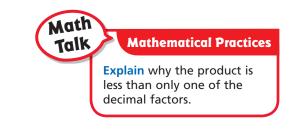
How many rows of the shaded

columns did you shade?

#### STEP 3

Count the number of squares that you shaded twice. Record the product at the right.

					_					
					]					
					]					
					]					
					]					
					-					



Share and Show



### Multiply. Use the decimal model.

**1.**  $0.8 \times 0.4 =$  \_\_\_\_\_

**4.**  $0.3 \times 0.4 =$  \_\_\_\_\_

_	_				$\square$
-	-	H		-	-
-	-	H			Н
-					

**5.**  $0.9 \times 0.6 =$  \_\_\_\_\_

 $\checkmark$  **2.** 0.1 × 0.7 =

Ц					
Ш					
Ц					

### $\checkmark$ 3. 0.4 × 1.6 =

_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	
	_										_								

### **6.** $0.5 \times 1.2 =$ \_\_\_\_\_

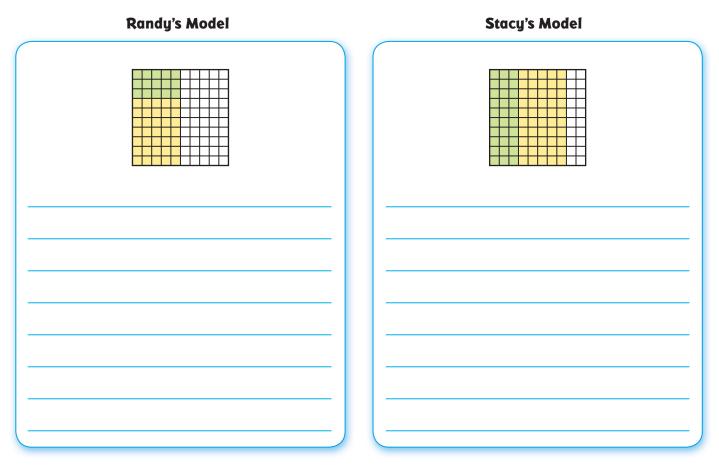
### Problem Solving • Applications (Real

- 7. **GODEEPER** Rachel buys 1.5 pounds of grapes. She eats 0.3 of that amount on Tuesday and 0.2 of that amount on Wednesday. How many pounds of grapes are left?
- 8. **HIMASMARTER** A large bottle contains 1.2 liters of olive oil. A medium-sized bottle has 0.6 times the amount of olive oil as the large bottle. How much more olive oil does the large bottle contain than the medium-sized bottle?



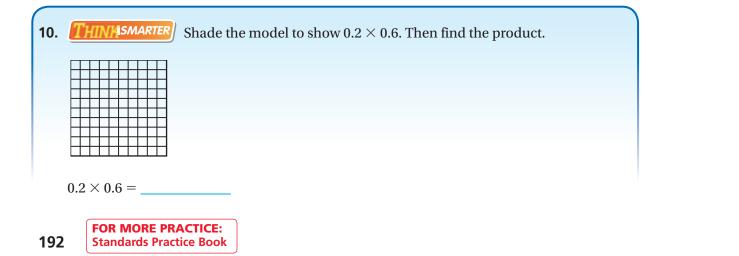
•••• WRITE Math • Show Your Work ••••

9. MATHEMATICAL ③ Compare Representations Randy and Stacy used models to find 0.3 of 0.5. Both Randy's and Stacy's models are shown below. Whose model makes sense? Whose model is nonsense? Explain your reasoning below each model. Then record the correct answer.



#### 0.3 imes 0.5 =

• For the answer that is nonsense, describe the error the student made.



#### Name \_\_\_\_\_

### **Multiply Decimals**

**Essential Question** What strategies can you use to place a decimal point in a product?

**CONNECT** You can use what you have learned about patterns and place value to place the decimal point in the product when you multiply two decimals.

$$1 \times 0.1 = 0.1$$

 $0.1\times0.1=0.01$ 

 $0.01 \times 0.1 = 0.001$ 

# TUnlock the Problem 🚱

A male leopard seal is measured and has a length of 2.8 meters. A male elephant seal is about 1.5 times as long. What length is the male elephant seal?

**Multiply.** 1.5 × 2.8

```
One Way Use place value.
```

#### STEP 1

Multiply as with whole numbers.

#### STEP 2

Place the decimal point.

Think: Tenths are being multiplied by tenths. Use the pattern  $0.1 \times 0.1$ .

Place the decimal point so the value of the

decimal is \_\_\_\_\_

So, the length of a male elephant seal is about \_\_\_\_\_ meters.

**CALL MATHEMATICAL Analyze** What if you multiplied 2.8 by 1.74? What would be the place value of the product? Explain your answer.

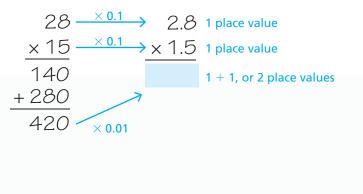
### Lesson 4.7



## Remember

When a number is multiplied by a decimal, the decimal point moves one place to the left in the product for each decreasing place value being multiplied.



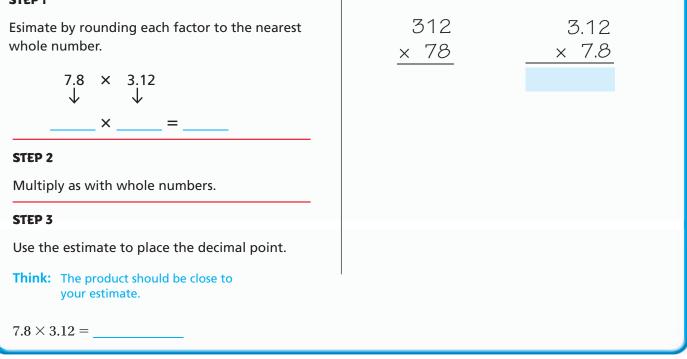


## Another Way Use estimation.

You can use an estimate to place the decimal point in a product.

Multiply. 7.8 imes 3.12

#### STEP 1



Share and Show



### Place the decimal point in the product.

1. 2. 6.8 3.62 **Think:** A hundredth is being multiplied by a tenth. Use the pattern 0.01 imes 0.1. imes 1.2 $\times$  1.4 Estimate:  $1 \times 7 =$ 5068816 Find the product. **4**. 3. **5**. 0.9 2.39 84.5 imes 0.8  $\times$  5.5  $\times$  2.7 Math Talk **Mathematical Practices** Explain how you might know the place value of the product for Exercise 5 before you solve.

Name \_\_\_\_

### On Your Own

Find the product.

6. 7.9	<b>7.</b> 9.2		8. 3.45
<u>× 3.4</u>	<u>× 5.6</u>		<u>× 9.7</u>
9. 45.3	<b>10.</b> 6.98		11. 7.02
<u>× 0.8</u>	<u>× 2.5</u>		<u>× 3.4</u>
Practice: Copy and S	<b>Solve</b> Find the product.		
<b>12.</b> 3.4 × 5.2	<b>13.</b> 0.9 × 2.46	<b>14.</b> 9.1 × 5.7	<b>15.</b> 4.8 × 6.01

- **16.**  $7.6 \times 18.7$  **17.**  $1.5 \times 9.34$  **18.**  $0.77 \times 14.9$  **19.**  $3.3 \times 58.14$
- **20.** Charlie has an adult Netherlands dwarf rabbit that weighs 1.2 kilograms. Cliff's adult Angora rabbit weighs 2.9 times as much as Charlie's rabbit. How much does Cliff's rabbit weigh?

### Problem Solving • Applications

- 21. GODEEPER John has pet rabbits in an enclosure that has an area of 30.72 square feet. The enclosure Taylor is planning to build for his rabbits will be 2.2 times as large as John's. How many more square feet will Taylor's enclosure have than John's enclosure?
- THINK SMARTER A zoo is 22. planning a new building for the penguin exhibit. First, they made a model that was 1.3 meters tall. Then, they made a more detailed model that was 1.5 times as tall as the first model. The building

will be 2.5 times as tall as the height of the detailed model. What will be the height of the building?

**23.** Make Arguments Leslie and Paul both solve the multiplication problem  $5.5 \times 4.6$ . Leslie says the answer is 25.30. Paul says the answer is 25.3. Whose answer is correct? Explain your reasoning.

### 24.

**THINKISMARTER** For 24a–24d select True or False to indicate if the statement is correct.

- **24a**. The product of 1.3 and 2.1 is 2.73. ○ True ○ False **24b**. The product of 2.6 and 0.2 is 52. ○ True ○ False
- O False O True **24c**. The product of 0.08 and 0.3 is 2.4.
- **24d**. The product of 0.88 and 1.3 is 1.144. O True ○ False





#### Name \_

### **Zeros in the Product**

Essential Question How do you know you have the correct number of decimal places in your product?

### Lesson 4.8



**Number and Operations in Base** Ten—5.NBT.7 Also 5.NBT.2

MATHEMATICAL PRACTICES MP.2, MP.7, MP.8

## **TUNIOCK** the Problem

**CONNECT** When decimals are multiplied, the product may not have enough digits to place the decimal point. In these cases, you may need to write additional zeros as place holders.

Students are racing typical garden snails and measuring the distance the snails travel in 1 minute. Chris's snail travels a distance of 0.2 foot. Jamie's snail travels 0.4 times as far as Chris's snail. How far does Jamie's snail travel?



Multiply.  $0.4 \times 0.2$ 

#### **STEP 1**

Multiply as with whole numbers.

#### STEP 2

Determine the position of the decimal point in the product.

Since tenths are being multiplied by tenths,

the product will show

#### **STEP 3**

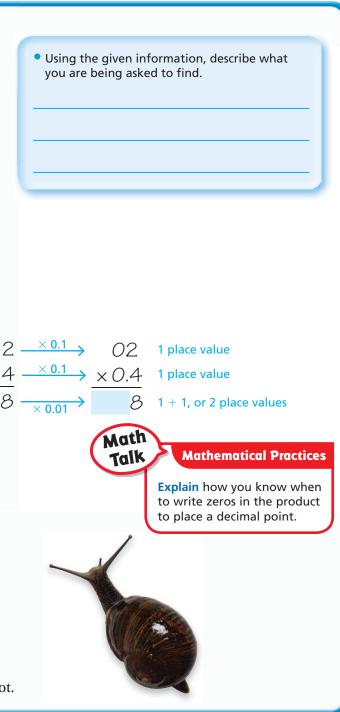
Place the decimal point.

Are there enough digits in the product

to place the decimal point?

Write zeros, as needed, to the left of the whole number product to place the decimal point.

So, Jamie's snail travels a distance of foot.

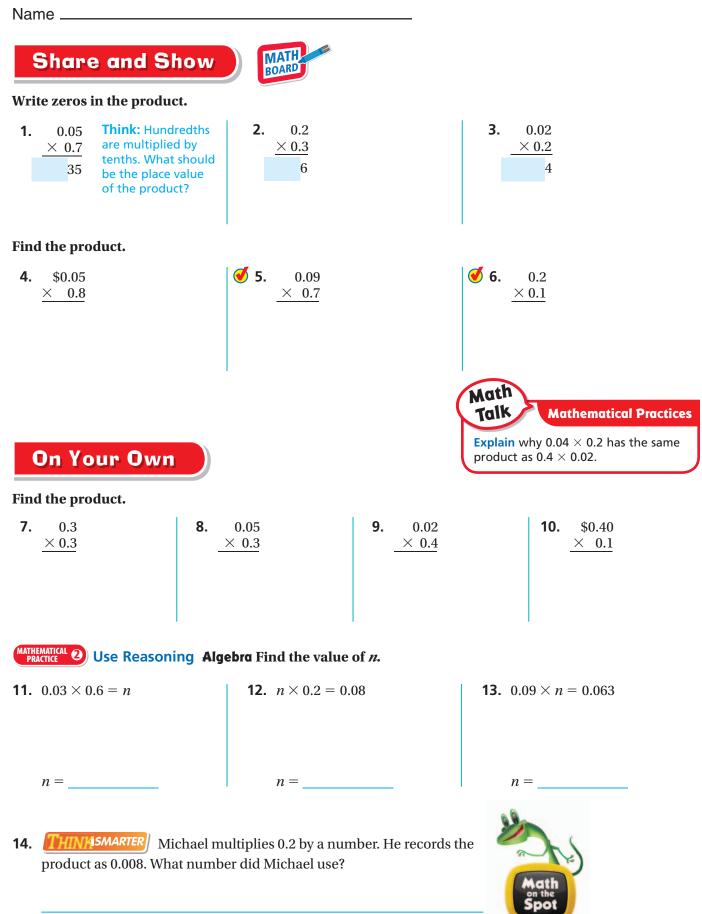


<b>Example</b> Multiply money.	
Multiply. 0.2 × \$0.30	
<b>STEP1</b> Multiply as with whole numbers.	
Think: The factors are 30 hundredths and 2 tenths.	
What are the whole numbers you will multiply?	
<b>STEP 2</b> Determine the position of the decimal	\$0.30 × 0.2
point in the product.	
Since hundredths are being multiplied by tenths, the product will show	
<b>STEP 3</b> Place the decimal point. Write zeros to the left of the whole number product as needed.	
Since the problem involves dollars and cents, what place value should you use to show cents?	
So, 0.2 $ imes$ \$0.30 is	

### **Try This!** Find the product.

0.2 × 0.05 =	What steps did you take to find the product?
Math	
Talk Mathematical Practices	
<b>Explain</b> why the answer to the Try This! can have a digit with a place value of hundredths or thousandths and still be correct.	

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15.	Unlock the Problem CODEEPER On an average day, a garden snail can travel about 0.05 mile. The snail travels 0.2 times as far as the average distance on Day 1. It travels 0.6 times as far as the average distance on Day 2. How far does it travel in two days?
b.	What are you being asked to find? What information will you use to solve the problem? Which operations can you use to solve the problem?
	Show how you will solve the problem.  e. Complete the sentence. A garden snail travelsmile in 2 days.

**16.** In a science experiment, Tania uses 0.8 ounce of water to create a reaction. She wants the next reaction to be 0.1 times the size of the previous reaction. How much water should she use?

#### Personal Math Trainer

**17. THINMSMARTER** The library is 0.5 mile from Celine's house. The dog park is 0.3 times as far from Celine's house as the library. How far is the dog park from Celine's house? Write an equation and solve.

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1. Omar is making a scale model of the Statue of Liberty for a report on New York City. The Statue of Liberty is 305 feet tall measuring from the ground to the tip of the torch. If the model is  $\frac{1}{100}$  the actual size of the Statue of Liberty, how tall is the model?

feet

**2.** For numbers 2a–2d, choose Yes or No to indicate whether the product is correct.

2a.	$0.62 \times 10 = 62$	○ Yes	O No
2b.	$0.53 \times 10 = 5.3$	○ Yes	O No
2c.	0.09  imes 100 = 9	○ Yes	○ No
2d.	$0.60 \times 1,000 = 60$	○ Yes	O No

- 3. Nicole is making 1,000 bows for people who donate to the library book sale. She needs a piece of ribbon that is 0.75 meter long for each bow. How many meters of ribbon does Nicole need to make the bows? Explain how to find the answer.
- **4.** Fatima is shading this model to show  $0.08 \times 3$ . Shade the correct amount of boxes that will show the product.

Fatima should shade		groups of	small squares or	
small squares.			•	



**5.** Tenley is making a square frame for her painting. She is using 4 pieces of wood that are each 2.75 feet long. How much wood will Tenley use to make the frame?

feet

**6.** Which problems will have two decimal places in the product? Mark all that apply.

A	5 imes 0.89	B	7.4 imes10	C	$5.31 imes10^{0}$
D	6.1  imes 3	E	3.2  imes 4.3		

7. Ken and Leah are trying to solve a science homework question. They need to find out how much a rock that weighs 4 pounds on Earth would weigh on Venus. They know they can multiply the number of pounds the rock weighs on Earth by 0.91 to find its weight on Venus. Select the partial products Ken and Leah would need to add to find the product of 4 and 0.91. Mark all that apply.



**8.** Sophia exchanged 1,000 U.S. dollars for the South African currency, which is called the rand. The exchange rate was 7.15 rand to \$1.

#### Part A

How many South African rand did Sophia get? Explain how you know.

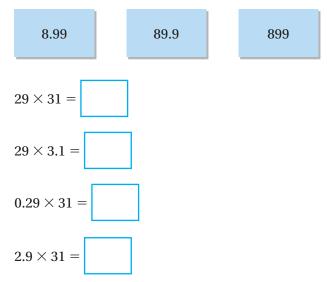
#### Part B

Sophia spent 6,274 rand on her trip. She exchanged the rand she had left for U.S. dollars. The exchange rate was 1 rand to \$0.14. How many U.S. dollars did Sophia get? Support your answer using specific information from the problem. Name \_

**9.** Trevor is reading a book for a book report. Last week, he read 35 pages of the book. This week, he read 2.5 times as many pages as he read last week. How many pages of the book has Trevor read this week? Show your work.

**10.** Jonah drives his car to and from work. The total length of the trip to and from work is 19.2 miles. In August, Jonah worked 21 days. How many miles in all did Jonah drive to and from work that month? Show your work.

**11.** Write each number in a box next to the expression that has the same value. A number may be used more than once.



**12.** Melinda, Zachary, and Heather went to the mall to shop for school supplies. Melinda spent \$14.25 on her supplies. Zachary spent \$2.30 more than Melinda spent. Heather spent 2 times as much money as Zachary spent. How much did Heather spend on school supplies?

\$.

**13.** The cost of admission to the Baytown Zoo is \$10.50 for each senior citizen, \$15.75 for each adult, and \$8.25 for each child.

### Part A

A family of 2 adults and 1 child plan to spend the day at the Baytown Zoo. How much does admission for the family cost? Explain how you found your answer.

#### Part B

Describe another way you could solve the problem.

#### Part C

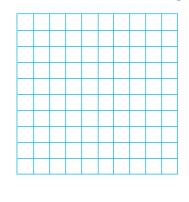
What if 2 more tickets for admission are purchased? If the two additional tickets cost \$16.50, determine what type of tickets the family purchases. Explain how you can determine the answer without calculating.

**14.** At a tailor shop, it costs \$6.79 to shorten a pair of pants and 4 times as much to mend a dress. Choose the answer that correctly completes the statement.

	\$19.47	
It would cost Lisa	\$27.16	to shorten one pair of pants and mend one dress.
	\$33.95	

#### Name \_

**15.** Shade the model to show  $0.3 \times 0.5$ . Then find the product.



 $0.3 \times 0.5 =$ 

**16.** Mr. Evans is paid \$9.20 per hour for the first 40 hours he works in a week. He is paid 1.5 times that rate for each hour after that.

Last week, Mr. Evans worked 42.25 hours. He says he earned \$388.70 last week. Do you agree? Support your answer.

17. Explain how an estimate helps you to place the decimal point when multiplying  $3.9 \times 5.3$ .

**18.** On Saturday, Ahmed walks his dog 0.7 mile. On the same day, Latisha walks her dog 0.4 times as far as Ahmed walks his dog. How far does Latisha walk her dog on Saturday?

\_\_\_\_\_mile(s)

**19.** For 19a–19d select True or False for each statement.

19a.	The product of 1.5 and 2.8 is 4.2.	○ True	○ False
19b.	The product of 7.3 and 0.6 is 43.8.	○ True	○ False
19c.	The product of 0.09 and 0.7 is 6.3.	○ True	○ False
19d.	The product of 0.79 and 1.5 is 1.185.	○ True	○ False

**20.** A builder buys 24.5 acres of land to develop a new community of homes and parks.

#### Part A

The builder plans to use 0.25 of the land for a park. How many acres will he use for the park?

acres

#### Part B

He buys a second property that has 0.62 times as many acres as the first property. How many acres of land are in the second property? Show your work.

**21.** Joaquin lives 0.3 miles from Keith. Layla lives 0.4 as far from Keith as Joaquin. How far does Layla live from Keith? Write an equation to solve.

\_\_\_\_\_ miles

**22.** Brianna is getting materials for a chemistry experiment. Her teacher gives her a container that has 0.15 liter of a liquid in it. Brianna needs to use 0.4 of this liquid for the experiment. How much liquid will Brianna use?

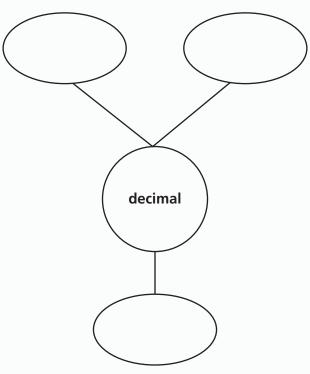
liter

Chapter <b>Divide</b>	Decimals	
S	how What You H	Know
Ch Name	eck your understanding of im	portant skills.
Division Facts Find the c	juotient.	
<b>1.</b> $6)\overline{24} = $ <b>2.</b> 7	$\overline{)56} = $ <b>3.</b> 18 ÷ 9	$\theta = $ <b>4.</b> $35 \div 5 = $
Estimate with 1-Digit D	vivisors Estimate the quot	tient.
<b>5.</b> 6)253	<b>6.</b> 4)1,165	<b>7.</b> 7)1,504
<b>Division</b> Divide.		
<b>8.</b> 34)785	<b>9.</b> 27)1,581	<b>10.</b> 41)4,592
Math	C	lue
Detective	My age is 10	
Instead of telling Carmen her age, Sora gave her this clue. Be a Math Detective and find Sora's age.	one-tenth of one-tenth of	f one-tenth of f 3,000.

## **Vocabulary Builder**

### Visualize It ••••••••••••

Complete the bubble map using review words.



Review Words
compatible numbers
decimal
decimal point
dividend
divisor
equivalent fractions
estimate
exponent
hundredth
quotient
remainder
tenth

### Understand Vocabulary .....

### Complete the sentences using the review words.

- **1.** A \_\_\_\_\_\_ is a symbol used to separate the ones place from the tenths place in decimal numbers.
- 2. Numbers that are easy to compute with mentally are called
- **3.** A \_\_\_\_\_\_ is one of ten equal parts.
- 4. A number with one or more digits to the right of the decimal

point is called a \_\_\_\_\_.

- **5.** The \_\_\_\_\_\_ is the number that is to be divided in a division problem.
- 6. A \_\_\_\_\_\_ is one of one hundred equal parts.
- **7.** You can \_\_\_\_\_\_ to find a number that is close to the exact amount.



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#### Name \_\_\_\_

### **Division Patterns with Decimals**

**Essential Question** How can patterns help you place the decimal point in a quotient?



## **P**Unlock the Problem 😽

The Healthy Wheat Bakery uses 560 pounds of flour to make 1,000 loaves of bread. Each loaf contains the same amount of flour. How many pounds of flour does the bakery use in each loaf of bread?

You can use powers of ten to help you find quotients. Dividing by a power of 10 is the same as multiplying by 0.1, 0.01, or 0.001.

**One Way** Use place-value patterns.

Divide. 560 ÷ 1,000

Look for a pattern in these products and quotients.

$560 \times 1 = 560$	$560 \div 1 = 560$
560 × 0.1 = 56.0 ►	560 ÷ 10 = 56.0 ►
560 × 0.01 = 5.60 ₩	560 ÷ 100 = 5.60
560 × 0.001 = 0.560	560 ÷ 1,000 = 0.560

So, \_\_\_\_\_ pound of flour is used in each loaf of bread.

**1.** As you divide by increasing powers of 10, how does the position of the decimal point change in the quotients?

## Another Way Use exponents.

**Divide.**  $560 \div 10^3$ 

Look for a pattern.  $560 \div 10^0 = 560$ 

- $560 \div 10^{1} = 56.0$   $560 \div 10^{2} = 5.60$  $560 \div 10^{3} =$
- **2.** Each divisor, or power of 10, is 10 times the divisor before it. How do the quotients compare?

## ALGEBRA Lesson **5.1**

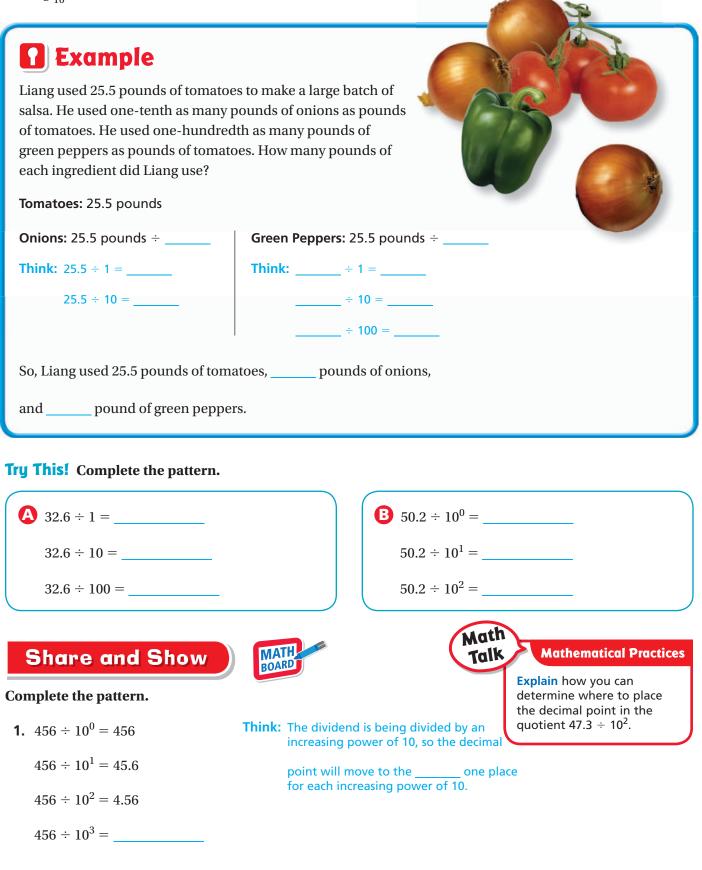


Number and Operations in Base Ten—5.NBT.2

MATHEMATICAL PRACTICES MP.5, MP.6, MP.7

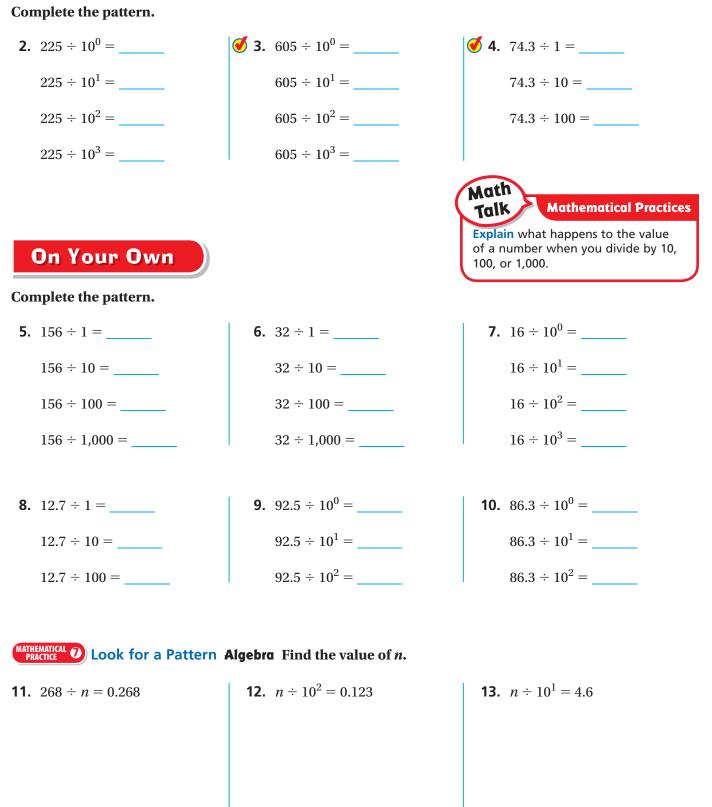
- Underline the sentence that tells you what you are trying to find.
- Circle the numbers you need to use.

**Remember** The zero power of 10 equals 1.  $10^0 = 1$ The first power of 10 equals 10.  $10^1 = 10$  **CONNECT** Dividing by 10 is the same as multiplying by 0.1 or finding  $\frac{1}{10}$  of a number.



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n =

n =

n =

## Problem Solving • Applications 🎇

### Use the table to solve 14-16.

- **14. GODEEPER** About how much more cornmeal than flour does each muffin contain?
- **15. THINASMARTER** If each muffin contains the same amount of sugar, how many kilograms of sugar, to the nearest thousandth, are in each corn muffin?



- **16.** MATHEMATICAL **(D)** Use Patterns The bakery decides to make only 100 corn muffins on Tuesday. How many kilograms of sugar will be needed?
- **17. WRITE** Math Explain how you know that the quotient  $47.3 \div 10^1$  is equal to the product  $47.3 \times 0.1$ .

**18.** THINASMARTER Use the numbers on the tiles to write the value of each expression.  $62.4 \div 10^0 =$ \_\_\_\_\_\_\_ . 0 2  $62.4 \div 10^1 =$ \_\_\_\_\_\_\_ 4 6

### Dry Ingredients for 1,000 Corn Muffins

Ingredient	Number of Kilograms
Cornmeal	150
Flour	110
Sugar	66.7
Baking powder	10
Salt	4.17

#### Name \_\_\_

### **Divide Decimals by Whole Numbers**

**Essential Question** How can you use a model to divide a decimal by a whole number?

### Investigate

**Materials** decimal models color pencils

Angela has enough wood to make a picture frame with a perimeter of 2.4 meters. She wants the frame to be a square. What will be the length of each side of the frame?

- **A.** Shade decimal models to show 2.4.
- **B.** You need to share your model among \_\_\_\_\_\_ equal groups.
- **C.** Since 2 wholes cannot be shared among 4 groups without regrouping, cut your model apart to show the tenths.

There are \_\_\_\_\_ tenths in 2.4.

Share the tenths equally among the 4 groups.

There are \_\_\_\_\_ ones and \_\_\_\_\_ tenths in each group.

Write a decimal for the amount in each group.

**D.** Use your model to complete the number sentence.

 $2.4 \div 4 =$ \_\_\_\_\_

So, the length of each side of the frame will be \_\_\_\_\_ meter.

### **Draw Conclusions**

- **1.** MATHEMATICAL **(D)** Use a Concrete Model Explain why you needed to cut apart the model in Step C.
- **2.** Explain how your model would be different if the perimeter were 4.8 meters.

### Lesson 5.2

Number and Operations in Base Ten—5.NBT.7

MATHEMATICAL PRACTICES MP.3, MP.5



# **Make Connections**

You can also use base-ten blocks to model division of a decimal by a whole number.

**Materials** base-ten blocks

Kyle has a roll of ribbon 3.21 yards long. He cuts the ribbon into 3 equal lengths. How long is each piece of ribbon?

**Divide.** 3.21 ÷ 3

### STEP 1

Use base-ten blocks to show 3.21.

Remember that a flat represents one, a long represents one tenth, and a small cube represents one hundredth.

There are \_\_\_\_\_ one(s), \_\_\_\_\_ tenth(s), and

hundredth(s).

STEP 2 Share the ones.

Share the ones equally among 3 groups.

There is one(s) shared in each group and one(s) left over.

### STEP 3 Share the tenths.

Two tenths cannot be shared among 3 groups without regrouping. Regroup the tenths by replacing them with hundredths.

There are \_\_\_\_\_ tenth(s) shared in each group and

tenth(s) left over.

There are now hundredth(s).

**STEP 4** Share the hundredths.

Share the 21 hundredths equally among the 3 groups.

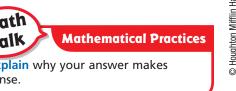
There are hundredth(s) shared in each group

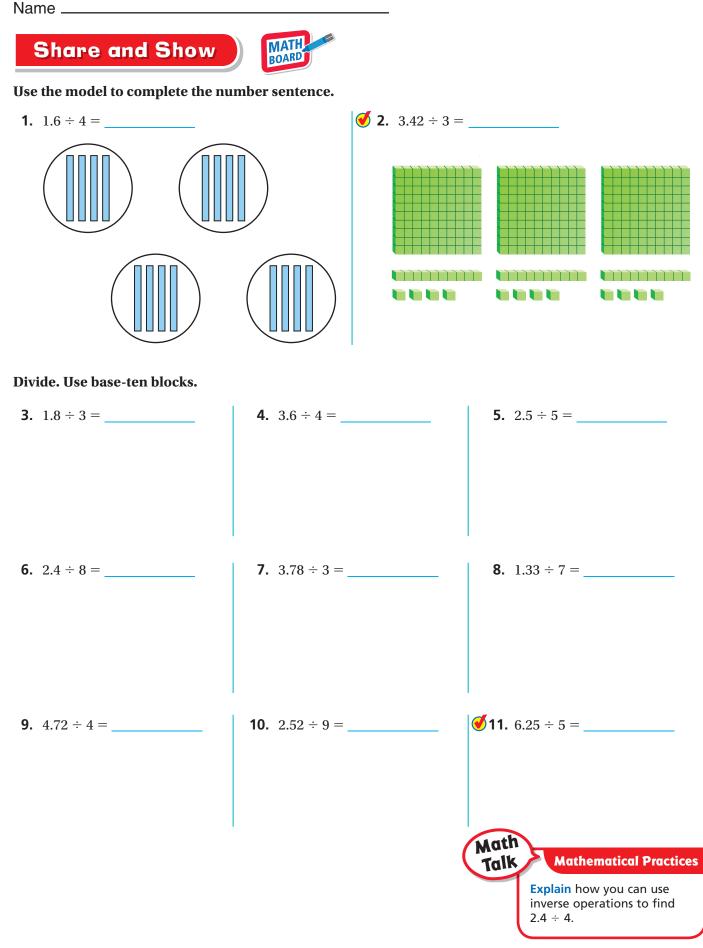
and \_\_\_\_\_ hundredth(s) left over.

So, each piece of ribbon is \_\_\_\_\_ yards long.









## Problem Solving • Applications

12. THINKISMARTER What's the Error? Aida is making banners from a roll of paper that is 4.05 meters long. She will cut the paper into 3 equal lengths. She uses base-ten blocks to model how long each piece will be. Describe Aida's error.

- **13. GODEEPER** Sam can ride his bike 4.5 kilometers in 9 minutes, and Amanda can ride her bike 3.6 kilometers in 6 minutes. Which rider might go farther in 1 minute?
- **14. (MATHEMATICAL 2)** Use Reasoning Explain how you can use inverse operations to find  $1.8 \div 3$ .

**15. THIMASMARTER** Draw a model to show  $4.8 \div 4$  and solve.

 $4.8 \div 4 =$ 

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#### Name \_

### **Estimate Quotients**

Essential Question How can you estimate decimal quotients?

### Lesson 5.3

Number and Operations in Base Ten—5.NBT.7

MATHEMATICAL PRACTICES MP.1, MP.2

## 🚮 Unlock the Problem 保

Carmen likes to ski. The ski resort where she goes to ski got 3.2 feet of snow during a 5-day period. The *average* daily snowfall for a given number of days is the quotient of the total amount of snow and the number of days. Estimate the average daily snowfall.

You can estimate decimal quotients by using compatible numbers. When choosing compatible numbers, you can look at the whole-number part of a decimal dividend or rename the decimal dividend as tenths or hundredths.





Carly and her friend Marco each find an estimate. Since the divisor is greater than the dividend, they both first rename 3.2 as tenths.

3.2 is tenths.

#### **CARLY'S ESTIMATE**

30 tenths is close to 32 tenths and divides easily by 5. Use a basic fact to find 30 tenths  $\div$  5.

30 tenths ÷ 5 is \_\_\_\_\_ tenths or \_\_\_\_\_.

So, the average daily snowfall is about

foot.

#### **MARCO'S ESTIMATE**

35 tenths is close to 32 tenths and divides easily by 5. Use a basic fact to find 35 tenths  $\div$  5.

35 tenths  $\div$  5 is \_\_\_\_\_ tenths or \_\_\_\_\_.

So, the average daily snowfall is about

\_\_\_\_\_foot.

**1.** MATHEMATICAL **1** Interpret a Result Whose estimate do you think is closer to the exact quotient?

Explain your reasoning.

**2.** Explain how you would rename the dividend in  $29.7 \div 40$  to choose compatible numbers and estimate the quotient.

### **Estimate with 2-Digit Divisors**

When you estimate quotients with compatible numbers, the number you use for the dividend can be greater than the dividend or less than the dividend.

# **Ω** Example

A group of 31 students is going to visit the museum. The total cost for the tickets is \$144.15. About how much money will each student need to pay for a ticket?

Estimate. \$144.15 ÷ 31

Ose a whole number greater than the dividend.

Use 30 for the divisor. Then find a number close to and greater than \$144.15 that divides easily by 30.

 $144.15 \div 31$   $\downarrow$   $\downarrow$  $150 \div 30 =$ 

So, each student will pay about \$\_\_\_\_\_ for a ticket.

#### **B** Use a whole number less than the dividend.

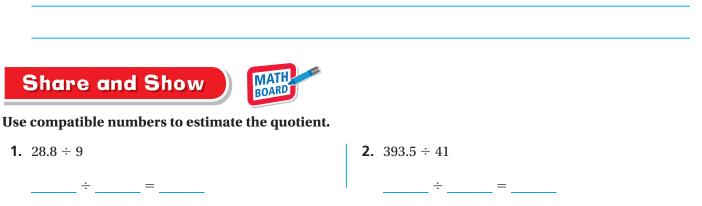
Use 30 for the divisor. Then find a number close to and less than \$144.15 that divides easily by 30.

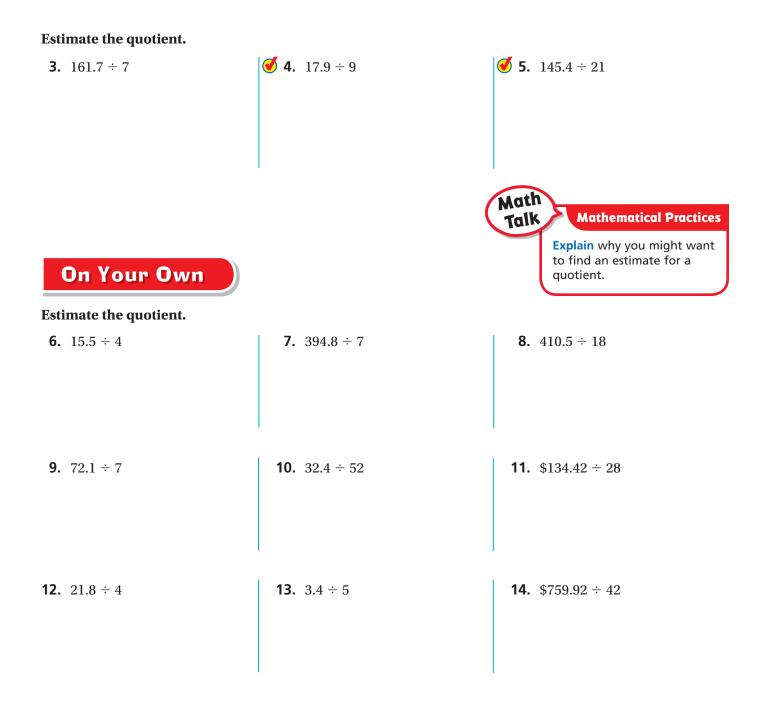
 $\begin{array}{cccc}
\$144.15 \div 31 \\
\downarrow & \downarrow \\
\$120 \div 30 = \$ \\
\end{array}$ 

So, each student will pay about \$ \_\_\_\_\_ for a ticket.

**3.** MATHEMATICAL **2** Use Reasoning Which estimate do you think will be a better

estimate of the cost of a ticket? Explain your reasoning.





**15.** Mathematical PRACTICE Shayne has a total of \$135.22 to spend on souvenirs at the zoo. He wants to buy 9 of the same souvenir for his friends. Choose a method of estimation to find about how much Shayne can spend on each souvenir. Explain how you used the method to reach your estimation.

## Problem Solving • Applications

### Use the table to solve 16–17.

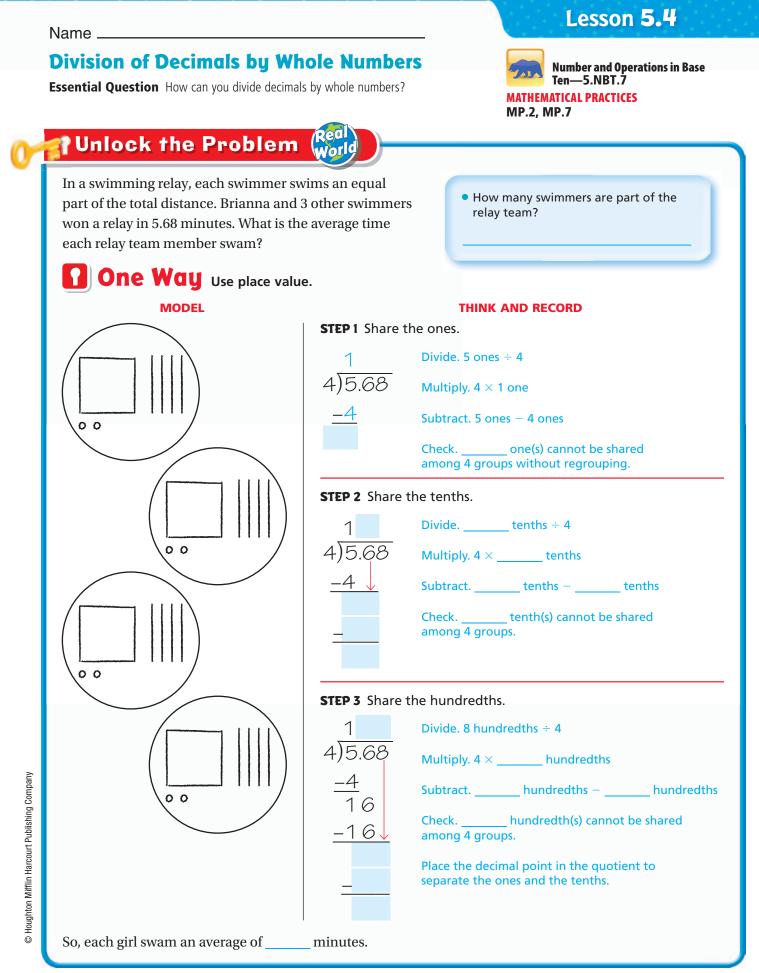
- **16. DEEPER** How does the estimate of the average daily snowfall for Wyoming's greatest 7-day snowfall compare to the estimate of the average daily snowfall for South Dakota's greatest 7-day snowfall?
- **17.** The greatest monthly snowfall total in Alaska is 297.9 inches. This happened in February, 1953. Compare the daily average snowfall for February, 1953, with the average daily snowfall for Alaska's greatest 7-day snowfall. Use estimation.

Greatest 7-Day SnowfallStateAmount of Snow (in inches)Alaska186.9Wyoming84.5South Dakota112.7

WRITE Math • Show Your Work •

**18. WRITE** *Math* **What's the Error?** During a 3-hour storm, it snowed 2.5 inches. Jacob said that it snowed an average of about 8 inches per hour.

**19.** Juliette will cut a piece of string that is 45.1 feet long into 7 smaller pieces. Each of the 7 pieces will be the same length. Write a division sentence using compatible numbers to estimate the quotient.



Another Way Use an estimate.	
Divide as you would with whole numbers.	
<b>Divide.</b> \$40.89 ÷ 47	
• Estimate the quotient. 4,000 hundredths $\div$ 50 = 80 hundredths, or \$0.80	47)40.89
• Divide the tenths.	
<ul> <li>Divide the hundredths. When the remainder is zero and there are no more digits in the dividend, the division is complete.</li> </ul>	
<ul> <li>Use your estimate to place the decimal point. Place a zero to show there are no ones.</li> </ul>	
So, \$40.89 ÷ 47 is	

• MATHEMATICAL (6) Explain how you used the estimate to place the decimal point in the quotient.

### **Try This!** Divide. Use multiplication to check your work.

23)79.35	Check.
	<u>× 23</u>
	+
<b>Share and Show</b> Write the quotient with the decimal p	MATH BOARD

**1.**  $4.92 \div 2 = 246$ 

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Nar	me			
Div	ide.			
3.	8)\$8.24	<b>⋖ 4.</b> 3)2.52		<b>5.</b> 27)97.2
	On Your Own	I		Math Talk Mathematical Practices Explain how you can check that the decimal point is placed correctly in the quotient.
Pra	ctice: Copy and Solve Divid	е.		
6.	3)\$7.71	<b>7.</b> 14)79.8		<b>8.</b> 33)25.41
9.	7)15.61	<b>10.</b> 14)137.2		<b>11.</b> 34)523.6
MATH PR	EMATICAL 2 Use Reasoning Alge	<b>bra</b> Write the unkn	own number for	each .
12.	$\div 5 = 1.21$	<b>13.</b> 46.8 ÷ 39 =		<b>14.</b> 34.1 ÷ ■ = 22
	=	=		=
15.	Mei runs 80.85 miles in 3 weeks. If she runs 5 days each week, what is the average distance she runs each day?	Math on the Spot		Rob buys 6 tickets to the basketball ays \$8.50 for parking. His total cost is at is the cost of each ticket?

7. MATHEMATICAL O Make Sense of Problems The star width of 8 lanes in swimming pools used for com 21.92 meters. The standard width of 9 lanes is 21. How much wider is each lane when there are 8 la when there are 9 lanes?	petitions is .96 meters.
a. What are you asked to find?	
<b>b.</b> What operations will you use to solve the probler	m?
<b>c.</b> Show the steps you used to solve the problem.	<b>d.</b> Complete the sentences.
c. Show the steps you used to solve the problem.	
c. Show the steps you used to solve the problem.	Each lane is meters wide when there are 8 lanes.
c. Show the steps you used to solve the problem.	Each lane is meters wide when there are 8 lanes. Each lane is meters wide when there
c. Show the steps you used to solve the problem.	Each lane is meters wide when there are 8 lanes. Each lane is meters wide when there are 9 lanes.

- **18. THINMSMARTER** Simon cut a pipe that was 5.75 feet long. Then he cut the pipe into 5 equal pieces. What is the length of each piece?
- **19.** Jasmine uses 14.24 pounds of fruit for 16 servings of fruit salad. If each serving contains the same amount of fruit, how much fruit is in each serving?



## **Concepts and Skills**

- **1. Explain** how the position of the decimal point changes in a quotient as you divide by increasing powers of 10. (5.NBT.2)
- **2.** Explain how you can use base-ten blocks to find  $2.16 \div 3.$  (5.NBT.7)

### Complete the pattern. (5.NBT.2)

<b>3.</b> 223 ÷ 1 =	<b>4.</b> $61 \div 1 =$	<b>5.</b> $57.4 \div 10^0 =$
$223 \div 10 = \_$	$61 \div 10 = \_$	$57.4 \div 10^1 = \_$
$223 \div 100 = \_$	$61 \div 100 = \_$	$57.4 \div 10^2 = \_$
223 ÷ 1,000 =	61 ÷ 1,000 =	

#### Estimate the quotient. (5.NBT.7)

<b>6.</b> 31.9 ÷ 4	<b>7.</b> 6.1 ÷ 8	<b>8.</b> 492.6 ÷ 48
Divide. (5.NBT.7)		
<b>9.</b> 5)4.35	<b>10.</b> 8)9.92	<b>11.</b> 61)207.4

**12.** The Westside Bakery uses 440 pounds of flour to make 1,000 loaves of bread. Each loaf contains the same amount of flour. How many pounds of flour are used in each loaf of bread? (5.NBT.2)

**13.** Elise pays \$21.75 for 5 student tickets to the fair. What is the cost of each student ticket? (5.NBT.7)

**14.** Jason has a piece of wire that is 62.4 inches long. He cuts the wire into 3 equal pieces. Estimate the length of 1 piece of wire. (5.NBT.7)

**15.** Elizabeth uses 33.75 ounces of granola for 15 servings of trail mix. If each serving contains the same amount of granola, how much granola is in each serving? (5.NBT.7)

#### Name \_

### **Decimal Division**

Essential Question How can you use a model to divide by a decimal?

### Lesson 5.5



MP.2, MP.5, MP.6

### Investigate

**Materials** decimal models color pencils

Lisa is making reusable shopping bags. She has 3.6 yards of fabric. She needs 0.3 yard of fabric for each bag. How many shopping bags can she make from the 3.6 yards of fabric?

- **A.** Shade decimal models to show 3.6.
- **B.** Cut apart your model to show the tenths. Separate the tenths into as many groups of 3 tenths as you can.

There are groups of tenths.

- **C.** Use your model to complete the number sentence.
  - $3.6 \div 0.3 =$
- So, Lisa can make shopping bags.



### **Draw Conclusions**

- **1.** Explain why you made each group equal to the divisor.
- 2. MATHEMATICAL 2 Represent a Problem Identify the problem you would be modeling if each strip in the model represents 1.

### Remember

The divisor can tell the number of same-sized groups, or it can tell the number in each group.

- **3.** (MATHEMATICAL **6**) **Communicate** Dennis has 2.7 yards of fabric to make bags that require 0.9 yard of fabric each. Describe a decimal model you can use to find how many bags he can make.

## Make Connections

You can also use a model to divide by hundredths.

**Materials** decimal models color pencils

Julie has \$1.75 in nickels. How many stacks of \$0.25 can she make from \$1.75?

#### STEP 1

Shade decimal models to show 1.75.

There are \_\_\_\_\_ one(s) and \_\_\_\_\_ hundredth(s).

#### STEP 2

Cut apart your model to show groups of 0.25.

There are \_\_\_\_\_ groups of \_\_\_\_\_ hundredths.

#### STEP 3

Use your model to complete the number sentence.

1.75 ÷ 0.25 =\_\_\_\_

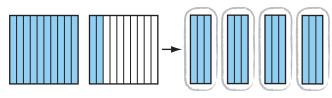
So, Julie can make \_\_\_\_\_\_ stacks of \$0.25 from \$1.75.

### **Share and Show**

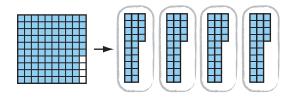
#### Use the model to complete the number sentence.

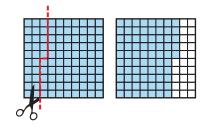
MATH BOARD

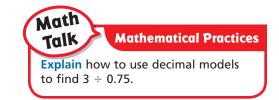
**1.**  $1.2 \div 0.3 =$ 

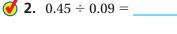


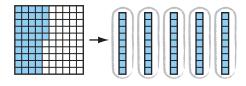
**3.**  $0.96 \div 0.24 =$ 

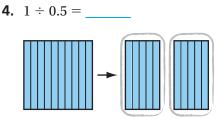












 Name

 Divide. Use decimal models.

 5. 1.24 ÷ 0.62 = \_\_\_\_

 6. 0.84 ÷ 0.14 = \_\_\_\_

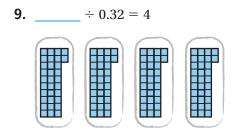
 Ø 7. 1.6 ÷ 0.4 = \_\_\_\_

 Problem Solving • Applications

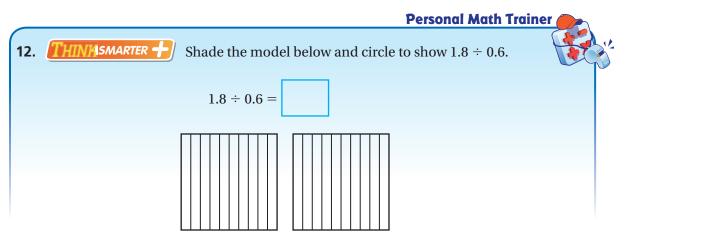
 Image: Solving • Use Appropriate Tools Use the model to find the

unknown value.

**8.**  $2.4 \div$  \_\_\_\_ = 3



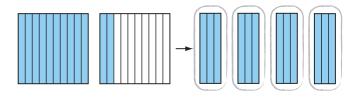
- **10. THIMASMARTER** Make a model to find  $0.6 \div 0.15$ . Describe your model.
- **11. Explain** using the model, what the equation represents in Exercise 9.



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### HINASMARTER Pose a Problem

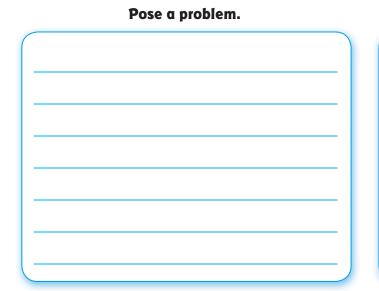
**13.** Emilio buys 1.2 kilograms of grapes. He separates the grapes into packages that contain 0.3 kilogram of grapes each. How many packages of grapes does Emilio make?



#### $1.2 \div 0.3 = 4$

Emilio made 4 packages of grapes.

Write a new problem using a different amount for the weight in each package. The amount should be a decimal with tenths. Use a total amount of 1.5 kilograms of grapes. Then use decimal models to solve your problem.



### Solve your problem. Draw a picture of the model you used to solve your problem.

**14. GODEEPER** Jose has 2.31 meters of blue ribbon to cut into 0.33-meter long pieces. Isha has 2.05 meters of red ribbon. She will cut her ribbon into pieces that are 0.41 meters long. How many more pieces of blue ribbon will there be?

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#### Name \_\_\_\_\_

### **Divide Decimals**

**Essential Question** How can you place the decimal point in the quotient?

When you multiply both the divisor and the dividend by the same power of 10, the quotient stays the same.

divisor	dividend	divisor o	dividend
$6 \div$	3 = 2	120 ÷	30 = 4
$\downarrow  imes$ 10	ightarrow 10	ightarrow 0.1	$\downarrow  imes$ 0.1
60 ÷	30 = 2	$12 \div$	3 = 4
$\downarrow  imes$ 10	$\downarrow imes$ 10	ightarrow 0.1	$\downarrow  imes$ 0.1
600 ÷	300 = 2	$1.2$ $\div$	0.3 = 4



Lesson 5.6

Also 5.NBT.2

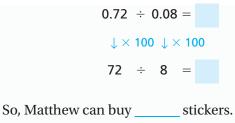
MATHEMATICAL PRACTICES MP.2, MP.6, MP.7

# 30 = 4 $1 \times 0.1$ 3 = 4 $1 \times 0.1$ 0.3 = 4

Unlock the Problem World

Matthew has \$0.72. He wants to buy stickers that cost \$0.08 each. How many stickers can he buy?

• Multiply both the dividend and the divisor by the power of 10 that makes the divisor a whole number. Then divide.



 What do you multiply hundredths by to get a whole number?

**1.** MATHEMATICAL **1** Make Connections Explain how you know that the quotient  $0.72 \div 0.08$  is equal to the quotient  $72 \div 8$ .

#### **Try This! Divide.** 0.56 ÷ 0.7

• Multiply the divisor by a power of 10 to make it a whole number. Then multiply the dividend by the same power of 10.

0.7  imes	=	



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0'	7.)5.6

Divide.

•

### 🛯 Example Sherri hikes on the Pacific Coast trail. She plans to hike 3.72 miles. If she hikes at an average speed of 1.2 miles per hour, how long will she hike? **Divide.** 3.72 ÷ 1.2 Estimate. STEP 1 **STEP 2 STEP 3** Multiply the divisor by a power Write the decimal point in the Divide. of 10 to make it a whole number. quotient above the decimal Then, multiply the dividend by point in the new dividend. the same power of 10. 12)37.2 12)37.2 1.2 × \_\_\_\_\_ = \_\_\_\_\_ 3.72 × \_\_\_\_\_ = \_\_\_\_ So, Sherri will hike \_\_\_\_\_ hours.

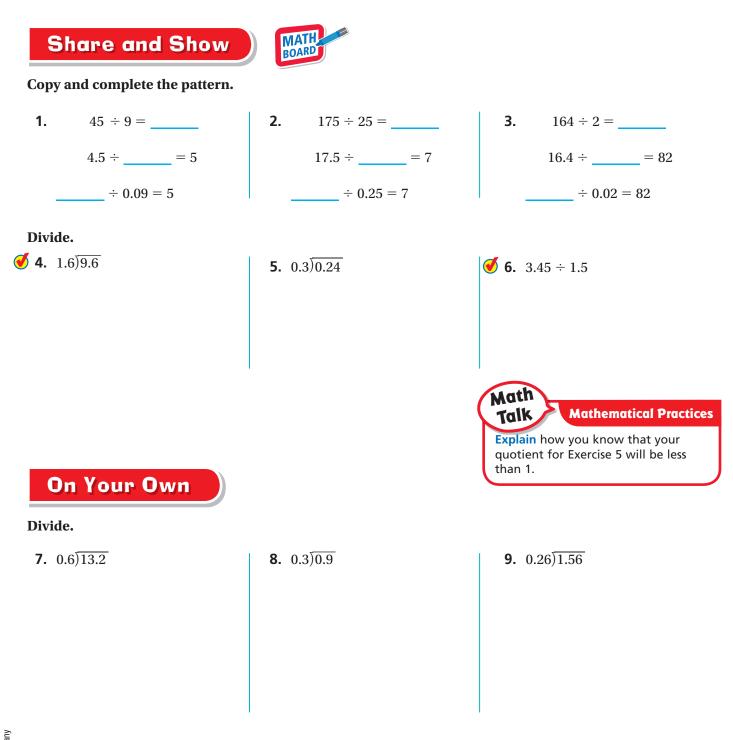
- **2.** MATHEMATICAL **3** Generalize Describe what happens to the decimal point in the divisor and in the dividend when you multiply by 10.
- **3.** Explain how you could have used the estimate to place the decimal point.

### Try This!

Divide. Check you	ır answer.	0.14	
0.14)1.96	Multiply the divisor and the dividend by	× +	

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**10. MATHEMATICAL 1** Samuel has \$0.96. He wants to buy erasers that cost \$0.06 each. Describe how Samuel can find the number of erasers he can buy.

Chapter 5 • Lesson 6 233

## Problem Solving • Applications 🎇

#### Use the table to solve 11-15.

- **11.** Connie paid \$1.08 for pencils. How many pencils did she buy?
- **12.** Albert has \$2.16. How many more pencils can he buy than markers?
- **13. How many erasers can Ayita buy for the same amount that she would pay for two notepads?**
- **14. THINASMARTER** Ramon paid \$3.25 for notepads and \$1.44 for markers. What is the total number of items he bought?



**15.** Keisha has \$2.00. She wants to buy 4 notepads. Does she have enough money? Explain your reasoning.

**16.** *WRITE Math* What's the Error? Katie divided 4.25 by 0.25 and got a quotient of 0.17.

**17. THINKSMARTER** Tara has a large box of dog treats that weighs 8.4 pounds. She uses the large box of dog treats to make smaller bags, each containing 0.6 pound of treats. How many smaller bags of dog treats can Tara make?

School Store
Price
\$0.05
\$0.36
\$0.65
\$0.12

Math • Show Your Work

VRITE

#### Name \_\_\_\_\_

### Write Zeros in the Dividend

Essential Question When do you write a zero in the dividend to find a quotient?

**CONNECT** When decimals are divided, the dividend may not have enough digits for you to complete the division. In these cases, you can write zeros to the right of the last digit.

Unlock the Problem

The equivalent fractions show that writing zeros to the right of a decimal does not change the value.

 $90.8 = 90 \frac{8 \times 10}{10 \times 10} = 90 \frac{80}{100} = 90.80$ 

During a fund-raising event, Adrian rode his bicycle 45.8 miles in 4 hours. Find his speed in miles per hour by dividing the distance by the time.

#### **Divide.** 45.8 ÷ 4

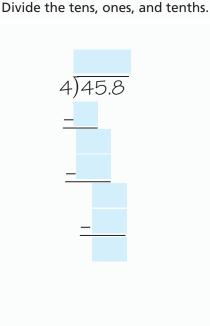
Estimate. 44 ÷ 4 =

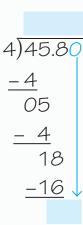
**STEP 2** 

#### **STEP 1**

Write the decimal point in the quotient above the decimal point in the dividend.

4)45.8





So, Adrian's speed was \_\_\_\_\_ miles per hour.

Explain how you would model this problem using base-ten blocks.

**Mathematical Practices** 

## Lesson 5.7



**Number and Operations in Base** Ten—5.NBT.7 Also 5.NF.3

MATHEMATICAL PRACTICES **MP.1, MP.6** 

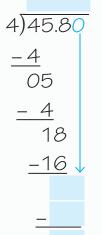


#### **STEP 3**

Math

Talk

Write a zero in the dividend and continue dividing.



**CONNECT** When you divide whole numbers, you can show the amount that is left over by writing a remainder or a fraction. By writing zeros in the dividend, you can also show that amount as a decimal.

#### **Example** Write zeros in the dividend. 24. 15)372.0 Divide. 372 ÷ 15 -<u>30</u> Divide until you have an amount less than the divisor left over. • 72 Insert a decimal point and a zero at the end of the dividend. -60 Place a decimal point in the quotient above the decimal point in • the dividend. Continue dividing. • So, 372 ÷ 15 = \_\_\_\_\_.

• MATHEMATICAL <sup>(1)</sup> Sarah has 78 ounces of rice. She puts an equal amount of rice ineach of 12 bags. What amount of rice does she put in each bag? **Explain** how you would write the answer using a decimal.

# **Try This!** Divide. Write a zero at the end of the dividend as needed.

<b>Divide.</b> 1.23 ÷ 0.06		<b>Divide.</b> 10 ÷ 0.8	
006.)123.	20. 6)123.0 <u>-12</u> 03 <u>- 0</u> 30 -	08,)100,	8.)100.

Name				
Share and Show				
Write the quotient w	ith the decimal point placed	correctly.		
<b>1.</b> 5 ÷ 0.8 = 625	<b>2.</b> $26.1 \div 6 = 435$	<b>3.</b> 0.42 ÷ 0.35 = 12	<b>4.</b> 80 ÷ 50 = 16	
Divide.				
<b>5.</b> 4)32.6	<b>6.</b> 1.2)9	<b>∛ 7.</b> 15)42	<b>∛ 8.</b> 0.14)0.91	
On Your O Practice: Copy and		Exp zero	Mathematical Practices Mathematical Practices Main why you would write a o in the dividend when dividing timals.	
		11 0 54 2 42	<b>12</b> 20\00	
<b>9.</b> 1.6)20	<b>10.</b> 15)4.8	<b>11.</b> 0.54)2.43	<b>12.</b> 28)98	
<b>13.</b> 1.8 ÷ 12	<b>14.</b> 3.5 ÷ 2.5	<b>15.</b> 40 ÷ 16	<b>16.</b> 2.24 ÷ 0.35	

- **17.** MATHEMATICAL **2** Reason Quantitatively Lana has a ribbon that is 2.2 meters long. She cuts the ribbon into 4 equal pieces to trim the edges of her bulletin board. What is the length of each piece of ribbon?
- **18.** Hiro's family lives 896 kilometers from the beach. Each of the 5 adults drove the family van an equal distance to get to the beach. How far did each adult drive?

## **Problem Solving • Applications**

- **19.** Jerry takes trail mix on hikes. A package of dried apricots weighs 25.5 ounces. A package of sunflower seeds weighs 21 ounces. Jerry divides the apricots and seeds equally among 6 bags of trail mix. How many more ounces of apricots than seeds are in each bag?
- 20. THINASMARTER Amy has 3 pounds of raisins. She divides the raisins equally into 12 bags. How many pounds of raisins are in each bag? Tell how many zeros you had to write at the end of the dividend to solve.



- Compare Representations Find
   65 ÷ 4. Write your answer using a remainder, a fraction, and a decimal. Then tell which form of the answer you prefer. Explain your choice.
- **22. THINASMARTER** For numbers 22a–22d select Yes or No to indicate whether a zero must be written in the dividend to find the quotient.

<b>22a</b> . 5.2 ÷ 8	⊖ Yes	O No
<b>22b.</b> 3.63 ÷ 3	O Yes	O No
<b>22c.</b> 71.1 ÷ 0.9	O Yes	O No
<b>22d.</b> 2.25 ÷ 0.6	⊖ Yes	O No

## Connect to Science

#### **Rate of Speed Formula**

The formula for velocity, or rate of speed, is  $r = d \div t$ , where *r* represents rate of speed, *d* represents distance, and *t* represents time. For example, if an object travels 12 feet in 10 seconds, you can find its rate of speed by using the formula.

 $r = d \div t$ 

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 $r = 12 \div 10$ 

r = 1.2 feet per second

#### Use division and the formula for rate of speed to solve.

**23.** A car travels 168 miles in 3.2 hours. Find the car's rate of speed in miles per hour.

- Cook -
- **24.** A submarine travels 90 kilometers in 4 hours. Find the submarine's rate of speed in kilometers per hour.

#### Name \_

### **Problem Solving • Decimal Operations**

**Essential Question** How do you use the strategy *work backward* to solve multistep decimal problems?

## PROBLEM SOLVING Lesson 5.8



Number and Operations in Base Ten—5.NBT.7

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

# Vnlock the Problem Real

Carson spent \$15.99 for 2 books and 3 pens. The books cost \$4.95 each. The sales tax on the total purchase was \$1.22. Carson also used a coupon for \$0.50 off his purchase. If each pen had the same cost, how much did each pen cost?



Read	the	Prob	lem

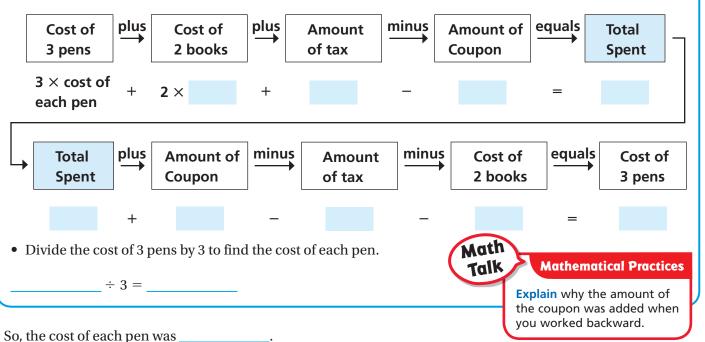
What do I need to find?

What information do I need to use?

# How will I use the information?

### **Solve the Problem**

• Make a flowchart to show the information. Then using inverse operations, work backward to solve.



# Try Another Problem

Last week, Vivian spent a total of \$20.00. She spent \$9.95 for tickets to the school fair, \$5.95 for food, and the rest for 2 rings that were on sale at the school fair. If each ring had the same cost, how much did each ring cost?



	<b>Read the Problem</b>	
What do I need to find?	What information do I need to use?	How will I use the information?
	Solve the Problem	
So, the cost of each ring was		Math Talk Mathematical Practices
		<b>Explain</b> how you can check your answer.

**Share and Show** 



1. Hector spent \$36.75 for 2 DVDs that cost the same amount. The sales tax on his purchase was \$2.15. Hector also used a coupon for \$1.00 off his purchase. How much did each DVD cost?

**First,** make a flowchart to show the information and show how you would work backward.

Then, work backward to find the cost of 2 DVDs.

Finally, find the cost of one DVD.

So, each DVD costs

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- ✓ 2. What if Hector spent \$40.15 for the DVDs, the sales tax was \$2.55, and he didn't have a coupon? How much would each DVD cost?
- Sophia spent \$7.30 for school supplies. She spent \$3.00 for a notebook and \$1.75 for a pen. She also bought 3 large erasers. If each eraser had the same cost, how much did she spend for each eraser?

••• WRITE Math • Show Your Work

WRITE Math • Show Your Work

#### **On Your Own**

- 4. The change from a gift purchase was \$3.90. Each of 6 students donated an equal amount for the gift. How much change should each student receive?
- 5. **CODEEPER** A mail truck picks up two boxes of mail from the post office. The total weight of the boxes is 32 pounds. One box is 8 pounds heavier than the other box. How much does each box weigh?
- 6. **THINASMARTER** Stacy buys 3 CDs in a set for \$29.98. She saved \$6.44 by buying the set instead of buying the individual CDs. If each CD costs the same amount, how much does each of the 3 CDs cost when purchased individually?
- Math
- 7. Cook for a Pattern A school cafeteria sold 1,280 slices of pizza the first week, 640 the second week, and 320 the third week. If this pattern continues, in what week will the cafeteria sell 40 slices? Explain how you got your answer.

#### Personal Math Trainer



including sales tax on 4 books and 3 folders. The books cost \$5.33 each and the total sales tax was \$1.73. Fill in the table with the correct cost of each item.

ltem	Cost
Cost of each book	
Cost of each folder	
Cost of sales tax	

8. THINKISMARTER - Dawn spent \$26.50,

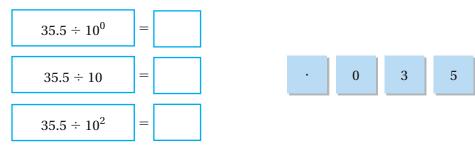
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**1.** Rita is hiking along a trail that is 13.7 miles long. So far she has hiked along one-tenth of the trail. How far has Rita hiked?

miles

**2.** Use the numbers on the tiles to write the value of each expression. You can use a tile more than once or not at all.



**3.** Tom and his brothers caught 100 fish on a weeklong fishing trip. The total weight of the fish was 235 pounds.

#### Part A

Write an expression that will find the weight of one fish. Assume that the weight of each fish is the same.

#### Part B

What is the weight of one fish?

\_\_\_\_ pounds

#### Part C

Suppose the total weight of the fish caught stayed the same but instead of 100 fish caught during the weekend, only 10 fish were caught. How would the weight of each fish change? Explain.



**4.** Draw a model to show  $5.5 \div 5$ .



- **5.** Emma, Brandy, and Damian will cut a rope that is 29.8 feet long into 3 jump ropes. Each of the 3 jump ropes will be the same length. Write a division sentence using compatible numbers to estimate the length of each rope.
- **6.** Karl drove 617.3 miles. For each gallon of gas, the car can travel 41 miles. Select a reasonable estimate of the number of gallons of gas Karl used. Mark all that apply.
  - A 1.5 gallons
  - **B** 1.6 gallons
  - C 15 gallons
  - **D** 16 gallons
  - (E) 150 gallons
- **7.** Donald bought a box of golf balls for \$9.59. There were 18 golf balls in the box. About how much did each golf ball cost?
- **8.** Luke cut down a tree that was 28.8 feet tall. Then he cut the tree into 6 equal pieces to take it away. What is the length of each piece?

feet

Name \_

**9.** Samantha is making some floral arrangements. The table shows the prices for one-half dozen of each type of flower.

Prices For $\frac{1}{2}$ Dozen Flowers		
Rose	\$5.29	
Carnation	\$3.59	
Tulip	\$4.79	

#### Part A

Samantha wants to buy 6 roses, 4 carnations, and 8 tulips. She estimates that she will spend about \$14 on these flowers. Do you agree? Explain your answer.

#### Part B

Along with the flowers, Samantha bought 4 packages of glass beads and 2 vases. The vases cost \$3.59 each and the total sales tax was \$1.34. The total amount she paid was \$28.50, including sales tax. Explain a strategy she could use to find the cost of 1 package of glass beads.

**10.** Les is sending 8 identical catalogs to one of his customers. If the package with the catalogs weighs 6.72 pounds, how much does each catalog weigh?

\_\_\_\_ pounds

#### **11.** Divide.



**12.** Isabella is buying art supplies. The table shows the prices for the different items she buys.

#### Part A

Isabella spends \$2.25 on poster boards. How many poster boards does she buy?

\_\_\_\_ poster boards

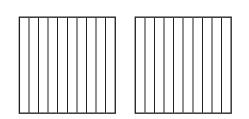
#### Part B

Isabella spends \$4.87 on paintbrushes and paint. How many of each item does she buy? Explain how you found your answer.

Art Supplies		
ltem	Price	
Glass beads	\$0.28 perounce	
Paint brush	\$0.95	
Poster board	\$0.75	
Jar of paint	\$0.99	

**13.** Shade the model and circle to show  $1.4 \div 0.7$ .

$$1.4 \div 0.7 =$$



Name \_

**14.** Tabitha bought peppers that cost \$0.79 per pound. She paid \$3.95 for the peppers. How many pounds of peppers did she buy? Show your work.

**15.** Hank has a large bag of trail mix that weighs 7.8 pounds. He uses the mix in the large bag to make bags each containing 0.6 pound of mix. How many bags containing 0.6 pound can be made?

\_\_\_\_\_ bags

**16.** Shareen walked a total of 9.52 miles in a walk-a-thon. If her average speed was 2.8 miles per hour, how long did it take Shareen to complete the walk?

hours

**17.** For numbers 17a–17c, choose Yes or No to indicate whether a zero must be written in the dividend to find the quotient.

17a.	$1.4 \div 0.05$	○ Yes	O No
17b.	$2.52 \div 0.6$	O Yes	O No
17c.	$2.61 \div 0.3$	○ Yes	O No

**18.** Lisandra made 22.8 quarts of split pea soup for her restaurant. She wants to put the same amount of soup into each of 15 containers. How much soup should Lisandra put into each container?

\_\_\_\_ quarts

**19.** Percy buys tomatoes that cost \$0.58 per pound. He pays \$2.03 for the tomatoes.

#### Part A

Percy estimates he bought 4 pounds of tomatoes. Is Percy's estimate reasonable? Explain.

#### Part B

How many pounds of tomatoes did Percy actually buy? Show your work.

- **20.** Who drove the fastest? Select the correct answer.
  - A Harlin drove 363 miles in 6 hours.
  - **B** Kevin drove 435 miles in 7 hours.
  - **C** Shanna drove 500 miles in 8 hours.
  - **D** Hector drove 215 miles in 5 hours.
- **21.** Maritza is buying a multipack of 3 pairs of socks for \$25.98. She will save \$6.39 by buying the multipack instead of buying 3 individual pairs of the same socks. If each pair of socks costs the same amount, how much does each pair of socks cost when bought individually? Show your work.

**22.** Eric spent \$22.00, including sales tax, on 2 jerseys and 3 pairs of socks. The jerseys cost \$6.75 each and the total sales tax was \$1.03. Fill in the table with the correct prices.

ltem	Cost
Cost of each jersey	
Cost of each pair of socks	
Cost of sales tax	

## Critical Area Operations with Fractions



**(CRITICAL AREA)** Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)

Board operator at a recording studio

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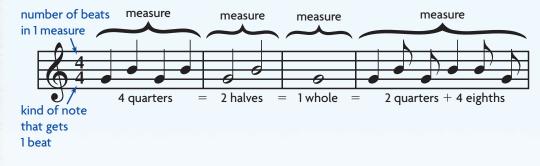
Project

.....

## **The Rhythm Track**

..........

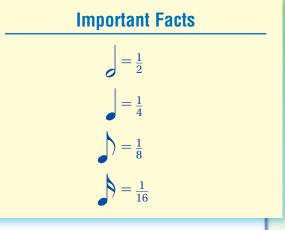
Math and music both involve numbers and patterns of change. In music, these patterns are called rhythm. We hear rhythm as a number of beats.



## **Get Started**

The time signature at the beginning of a line of music looks like a fraction. It tells the number of beats in each measure and the kind of note that fills 1 beat. When the time signature is  $\frac{4}{4}$ , each  $\frac{1}{4}$  note or quarter note, is 1 beat.

In the music below, different kinds of notes make up each measure. The measures are not marked. Check the time signature. Then draw lines to mark each measure.





	dd and Sub vith Unlike I		
_	Show What	You Knov	v 🔨
	Check your understar	nding of important	t skills.
Name			
► Part of a W	hole Write a fraction to name	e the shaded par	rt.
1.	number of shaded parts number of total parts	2.	number of shaded parts number of total parts
	fraction		fraction
Add and Su	ubtract Fractions Write the s	sum or differenc	e in simplest form.
<b>3.</b> $\frac{3}{6} + \frac{1}{6} = $	<b>4.</b> $\frac{4}{10} + \frac{1}{10} =$	<b>5.</b> $\frac{7}{8} - \frac{3}{8} =$	<b>6.</b> $\frac{9}{12} - \frac{2}{12} =$
Multiples V	Write the first six nonzero mul	tiples.	
<b>7.</b> 5	<b>8.</b> 3		<b>9.</b> 7
Detective			
There are 30 senat	tors and 60 members of the House		Y ALTON

of Representatives in the Arizona Legislature. Suppose 20 senators and 25 representatives came to a committee meeting. Be a math detective to write a fraction that compares the number of legislators that attended to the total number of legislators.

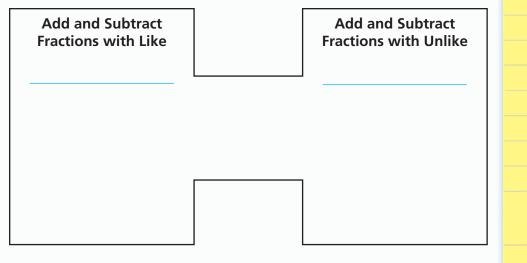




## **Vocabulary Builder**

#### Use the $\checkmark$ words to complete the H-diagram.

Visualize It • • • •



#### **Review Words**

#### benchmark ✓ common multiple ✓ denominators ✓ difference

- ✓ equivalent fractions mixed number
- ✓ numerators
- ✓ simplest form
- 🗸 sum

#### **Preview Words**

✓ common denominator

#### Understand Vocabulary ••••••

#### Draw a line to match the word with its definition.

- **1.** common multiple
- 2. benchmark
- **3.** simplest form
- 4. mixed number
- 5. common denominator
- 6. equivalent fractions

- a number that is made up of a whole number and a fraction
- a number that is a multiple of two or more numbers
- a common multiple of two or more denominators
- the form of a fraction in which the numerator and denominator have only 1 as their common factor
- a familiar number used as a point of reference
- fractions that name the same amount or part



# Investigate

Hilary is making a tote bag for her friend. She uses  $\frac{1}{2}$  yard of blue fabric and  $\frac{1}{4}$  yard of red fabric. How much fabric does Hilary use?

**Materials** fraction strips MathBoard

**Addition with Unlike Denominators** 

Essential Question How can you use models to add fractions that have

Name \_

different denominators?

- **A.** Find  $\frac{1}{2} + \frac{1}{4}$ . Place a  $\frac{1}{2}$  strip and a  $\frac{1}{4}$  strip under the 1-whole strip on your MathBoard.
- В. Find fraction strips, all with the same denominator, that are equivalent to  $\frac{1}{2}$  and  $\frac{1}{4}$  and fit exactly under the sum  $\frac{1}{2} + \frac{1}{4}$ . Record the addends, using like denominators.

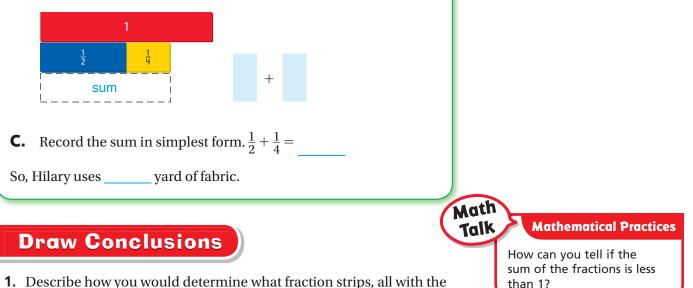
## Lesson 6.1



Number and Operations-Fractions—5.NF.1, 5.NF.2

MATHEMATICAL PRACTICES MP.5, MP.6, MP.7





1. Describe how you would determine what fraction strips, all with the same denominator, would fit exactly under  $\frac{1}{2} + \frac{1}{3}$ . What are they?

2. MATHEMATICAL O Use Concrete Models Explain the difference between finding fraction strips with the same denominator for  $\frac{1}{2} + \frac{1}{3}$  and  $\frac{1}{2} + \frac{1}{4}$ .

#### **Make Connections**



Sometimes, the sum of two fractions is greater than 1. When adding fractions with unlike denominators, you can use the 1-whole strip to help determine if a sum is greater than 1 or less than 1.

Use fraction strips to solve.  $\frac{3}{5} + \frac{1}{2}$ 

#### STEP 1

Work with another student. Place three  $\frac{1}{5}$  fraction strips under the 1-whole strip on your MathBoard. Then place a  $\frac{1}{2}$  fraction strip beside the three  $\frac{1}{5}$  strips.

#### **STEP 2**

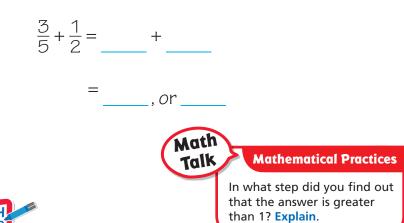
Find fraction strips, all with the same denominator, that are equivalent to  $\frac{3}{5}$  and  $\frac{1}{2}$ . Place the fraction strips under the sum. At the right, draw a picture of the model and write the equivalent fractions.



#### STEP 3

Add the fractions with like denominators. Use the 1-whole strip to rename the sum in simplest form.

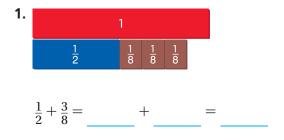
Think: How many fraction strips with the same denominator are equal to 1 whole?

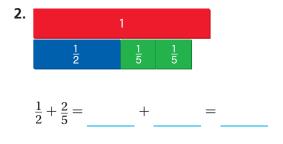


## Share and Show



#### Use fraction strips to find the sum. Write your answer in simplest form.

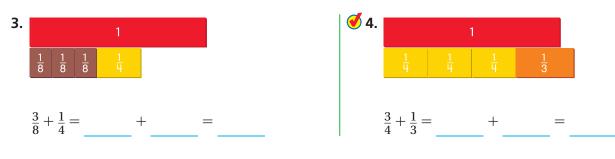




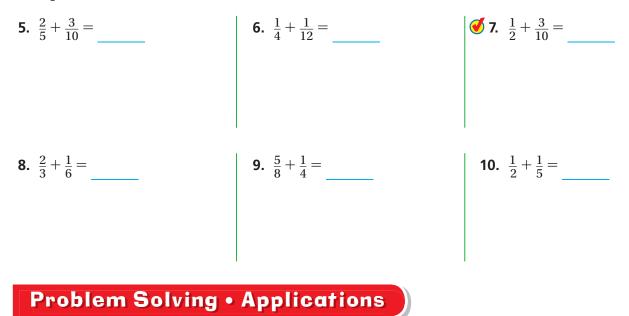
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Name \_

Use fraction strips to find the sum. Write your answer in simplest form.



## Use fraction strips to find the sum. Write your answer in simplest form.



- **11. WRITE** Math Explain how using fraction strips with like denominators makes it possible to add fractions with unlike denominators.
- **12. DEEPER** Luis is making two batches of muffins for a school picnic. One batch of muffins uses  $\frac{1}{4}$  cup of oats and  $\frac{1}{3}$  cup of flour. How much oats and flour does Luis need for two batches? Explain how you use fraction strips to solve the problem.

total amount of ingredients in her trail mix?

13.

**14. Pose a Problem** Write a new problem using different amounts for ingredients Maya used. Each amount should be a fraction with a denominator of *2*, *3*, or *4*.

**THINKSMARTER** Maya makes trail mix by combining  $\frac{1}{3}$  cup of mixed

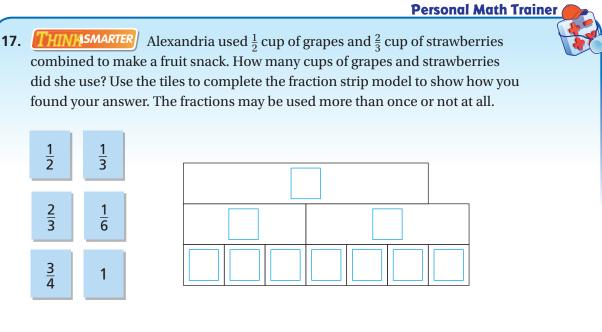
nuts,  $\frac{1}{4}$  cup of dried fruit, and  $\frac{1}{6}$  cup of chocolate morsels. What is the

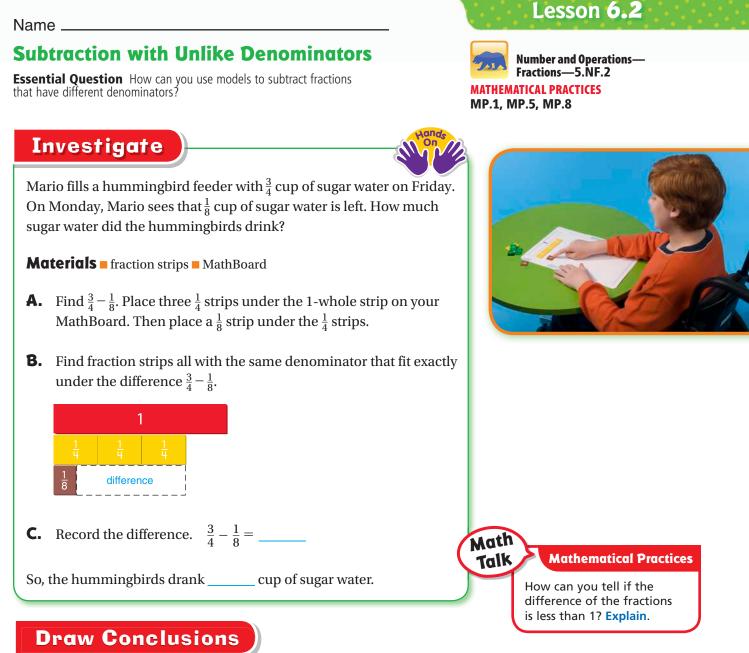
- **15. MATHEMATICAL Use Diagrams** Solve the problem you wrote. Draw a picture of the fractions strips you use to solve your problem.
- **16.** Explain why you chose the amounts you did for your problem.

cups of grapes and raisins



MATHEMATICAL PRACTICES





**1.** Describe how you determined what fraction strips, all with the same denominator, would fit exactly under the difference. What are they?

2. **MATHEMATICAL O** Use Appropriate Tools Explain whether you could have used fraction strips with any other denominator to find the difference. If so, what is the denominator?

#### **Make Connections**

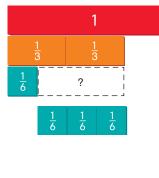


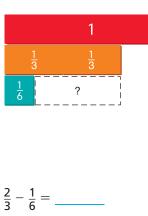
Sometimes you can use different sets of same-denominator fraction strips to find the difference. All of the answers will be correct.

**Solve.**  $\frac{2}{3} - \frac{1}{6}$ 

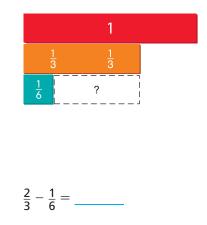
Find fraction strips, all with the same denominator, that fit exactly under the difference  $\frac{2}{3} - \frac{1}{6}$ .

B Find another set of fraction strips, all with the same denominator, that fit exactly under the difference  $\frac{2}{3} - \frac{1}{6}$ . Draw the fraction strips you used.





Find other fraction strips, all with the same denominator, that fit exactly under the difference  $\frac{2}{3} - \frac{1}{6}$ . Draw the fraction strips you used.



While each answer appears different, all of the answers

can be simplified to \_\_\_\_\_.

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

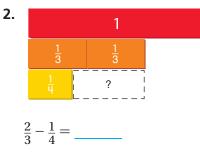
**Share and Show** 



Math Talk Mathematical Practices Which other fraction strips with the same denominator could fit exactly in the difference of  $\frac{2}{3} - \frac{1}{6}$ ?

Use fraction strips to find the difference. Write your answer in simplest form.

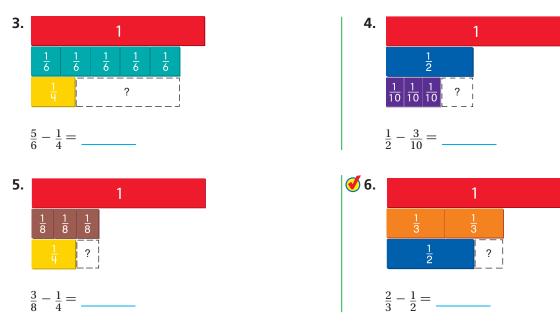
1.  $1 = \frac{1}{10} \frac{1$ 



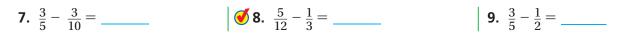
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Nar	ne.
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## Use fraction strips to find the difference. Write your answer in simplest form.



Use fraction strips to find the difference. Write your answer in simplest form.

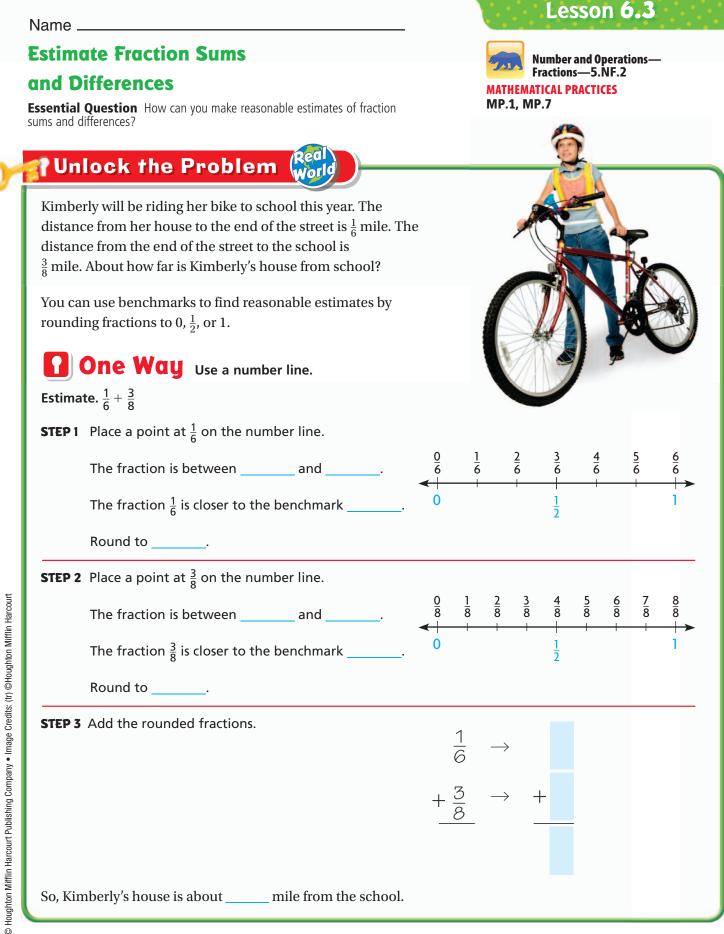


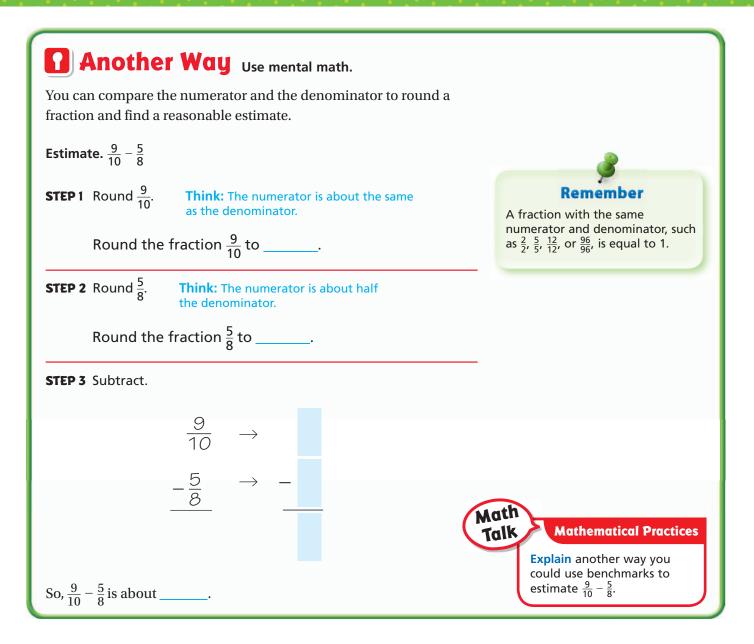
## Problem Solving • Applications

- **10.** MATHEMATICAL 3 Compare Representations Explain how your model for  $\frac{3}{5} \frac{1}{2}$  is different from your model for  $\frac{3}{5} \frac{3}{10}$ .
- **11. [FOPER]** The shaded part of the diagram shows what Tina had left from a yard of fabric. She now uses  $\frac{1}{3}$  yard of fabric for one project and  $\frac{1}{6}$  yard for a second project. How much of the original yard of fabric does Tina have left after the two projects? Write the answer in simplest form.

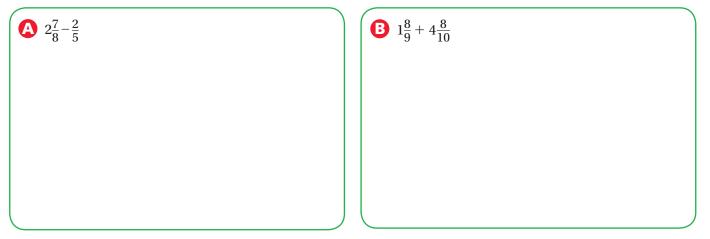


Unlock the Problem (Real World			
<b>12. THINKISMARTER</b> The picture at the right sho pizza was left over from lunch. Jason eats $\frac{1}{4}$ of for dinner. Write a fraction that represents the that is remaining after dinner.	the whole pizza e amount of pizza		Math on the Spot
<b>a.</b> What problem are you being asked to solve?			
<b>b.</b> How will you use the diagram to solve the pro	blem?		_
<b>c.</b> Jason eats $\frac{1}{4}$ of whole pizza. How many slices	does he eat?		_
d. Redraw the diagram of the pizza. Shade the sections of pizza that are remaining after Jason eats his dinner.	e. Complete the ser There is after dinner.	ntence. _ of the pizza remainin	ng
<b>13. THINKISMARTER</b> The shaded part of the diagratic from a roll of construction paper that measured to make a poster. She wants to determine how mafter making the poster. For numbers 13a–13c, s	one yard. She will use nuch paper she will hav	$\frac{3}{4}$ yard of paper ve remaining	
1 yd			
<b>13a.</b> To determine how much paper will be le making the poster, Margie must find 1 –	0	○ False	
<b>13b.</b> The fractions $\frac{3}{4}$ and $\frac{6}{8}$ are equivalent.	<b>○</b> True	○ False	
<b>13c.</b> Margie will have $\frac{1}{8}$ yard of paper remaining	ng. O True	⊖ False	

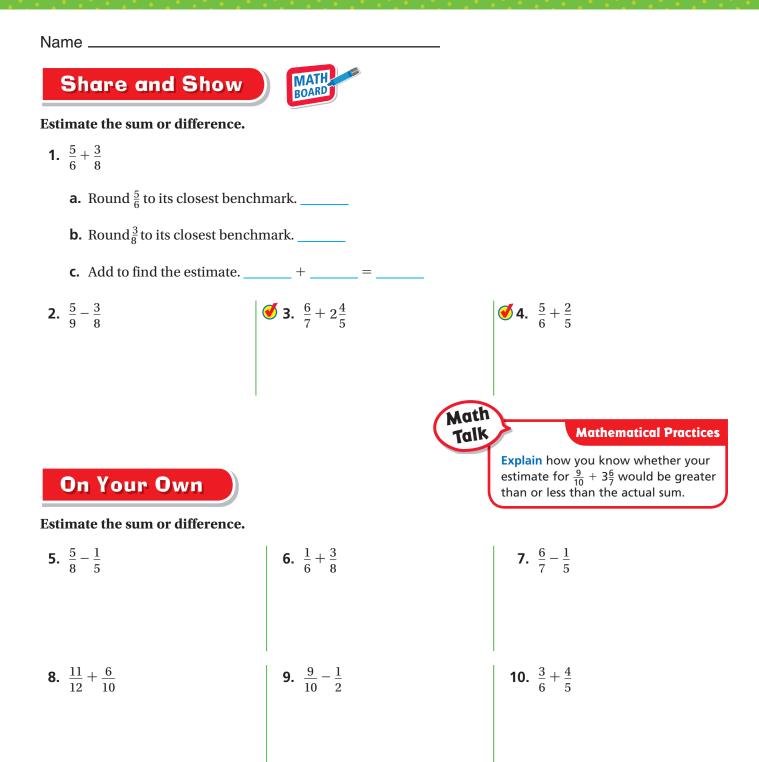




#### Try This! Estimate.



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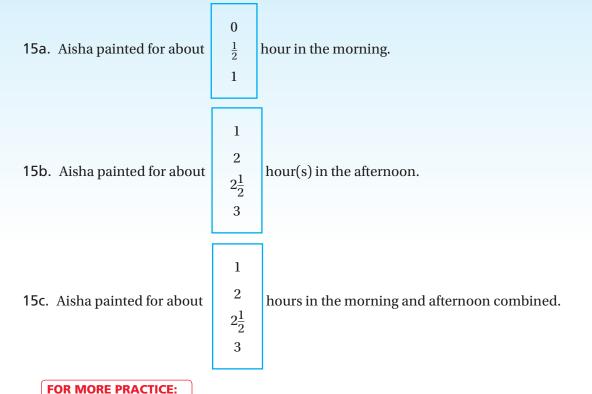
**11. DEEPER** Lisa and Valerie are picnicking in Trough Creek State Park in Pennsylvania. Lisa has brought a salad that she made with  $\frac{3}{4}$  cup of strawberries,  $\frac{7}{8}$  cup of peaches, and  $\frac{1}{6}$  cup of blueberries. They ate  $\frac{11}{12}$  cup of salad. About how many cups of fruit salad are left?

## **Problem Solving • Applications**

- **12. THINASMARTER** At Trace State Park in Mississippi, there is a 40-mile mountain bike trail. Tommy rode  $\frac{1}{2}$  of the trail on Saturday and  $\frac{1}{5}$  of the trail on Sunday. He estimates that he rode more than 22 miles over the two days. Is Tommy's estimate reasonable?
- **13.** Make Arguments Explain how you know that  $\frac{5}{8} + \frac{6}{10}$  is greater than 1.

**14. WRITE** Math Nick estimated that  $\frac{5}{8} + \frac{4}{7}$  is about 2. Explain how you know his estimate is not reasonable.

**15. THIMASMARTER** Aisha painted for  $\frac{5}{6}$  hour in the morning and  $2\frac{1}{5}$  hours in the afternoon. Estimate how long Aisha painted. For numbers 15a–15b, choose the number that makes each sentence true.





#### Name \_

#### Factors

**Essential Question** How can you write a whole number as a product of its prime factors?

Factors are numbers that are multiplied to form a product.

#### 2 and 3 are factors of 6 because 2 $\times$ 3 = 6

A prime number is a whole number greater than 1 that has exactly two factors, 1 and itself.

A composite number is a whole number greater than 1 that has more than two factors. A composite number can be written as a product of its prime factors.

## 0

## Tunlock the Problem (Red

Marcel makes mathematical patterns in his paintings with vertical stripes. For his next painting, each stripe will be the width, in inches, of one of the prime factors of the total width of the painting. He wants this painting to have a width of 20 inches. Marcel needs to determine all the prime factors of 20 so he will know the width of each stripe. What are the prime factors of 20?

#### Make a list to find the factors.

List the pairs of factors that form the product 20.

 $1 \times 20 = 20$ 

2 imes 10 = 20

 $4 \times 5 = 20$ 

So, the factors of 20 are \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_,

and \_\_\_\_\_.

Find which of the factors of 20 are prime.

Ask: Does 1 have exactly 2 factors?

Repeat for each factor. Circle the prime factors.

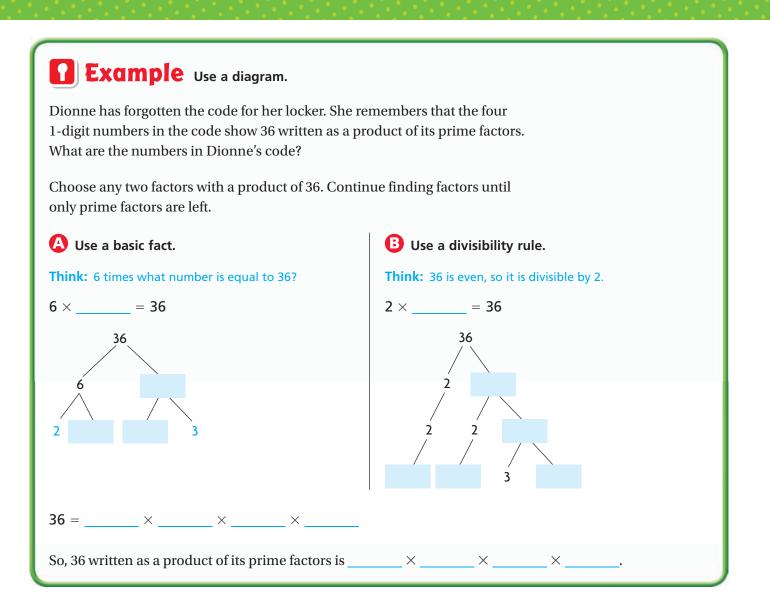
So, the prime factors of 20 are \_\_\_\_\_ and \_\_\_\_\_.

Math Talk Mathematical Practices

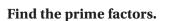
> **Explain** how to check that your list of factors includes all possible factors of a number.

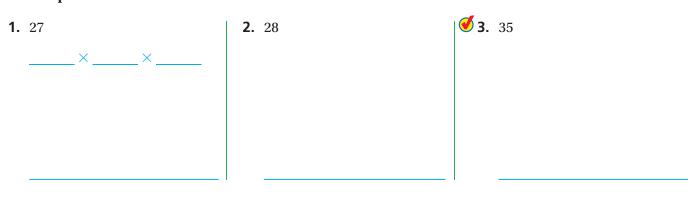
## Lesson 6.4

Operations and Algebraic Thinking—5.OA.2.1 MATHEMATICAL PRACTICES MP.1, MP.2, MP.7



## Share and Show





MATH BOARD

Name		
Write the number as a product o	f its prime factors.	
<b>4.</b> 16	<b></b> <i>s</i> .	42
On Your Own		
Write the number as a product o	f its prime factors.	
<b>6.</b> 21	<b>7.</b> 24	<b>&amp;</b> 30
<b>9. Sense or Nonsense?</b> Briann a product of its prime factors. your reasoning.		
<b>10. PRACTICE Use Reasoning</b> What is another number less		
<b>11. THIMASMARTER</b> Todd want 1 and 50 have only 2 and 5 as only 2 and 5 as prime factors.		umbers that have

## **Problem Solving • Applications**

#### Use the table for 12-14.

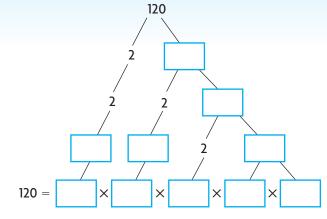
Amber weaves tapestries with colored blocks based on the prime factors of numbers. For the number 6, she makes a tapestry with 1 red block and 1 green block since 2 and 3 are the only prime factors of 6.

**12.** What colors would Amber use in a tapestry based on the prime factors of 15?

Prime Factors	Color
2	Red
3	Green
5	Blue
7	Yellow
11	Purple

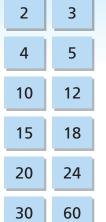
**13. GODEEPER** Amber wants to know how many blocks of each color will be needed for a tapestry based on the number 40. How many blocks of each color will she make? Explain how you found your answer.

- **14.** Mathematical **(b)** Amber wants to make a tapestry based on the prime factors of 39. **Explain** why she needs to identify a new color for this tapestry.
- **15.** THINKISMARTER + Jeremy has 120 books in his collection. Complete the diagram by using the tiles to write 120 as the product of its prime factors. You may use a number more than once or not at all.
  120



FOR MORE PRACTICE:

**Standards Practice Book** 



**Personal Math Trainer** 

#### Common Denominators and

## **Equivalent Fractions**

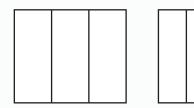
**Essential Question** How can you rewrite a pair of fractions so that they have a common denominator?

## Vullock the Problem (Real World)

Sarah planted two 1-acre gardens. One had three sections of flowers and the other had 4 sections of flowers. She plans to divide both gardens into more sections so that they have the same number of equal-sized sections. How many sections will each garden have?

You can use a **common denominator** or a common multiple of two or more denominators to write fractions that name the same part of a whole.





Divide each  $\frac{1}{3}$  into fourths and divide each  $\frac{1}{4}$  into thirds, each of the wholes will be divided into the same size parts, twelfths.

So, both gardens will have \_\_\_\_\_\_ sections.

## Another Way Use a list.

• Make a list of the first eight nonzero multiples of 3 and 4.

Multiples of 3: 3, 6, 9, \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_,

Multiples of 4: 4, 8, \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_,

- Circle the common multiples.
- Use one of the common multiples as a common denominator to write equivalent fractions for  $\frac{1}{3}$  and  $\frac{1}{4}$ .



So, both gardens can have \_\_\_\_\_, or \_\_\_\_\_ sections.

### Lesson 6.5



Number and Operations— Fractions— 5.NF.1 Also 5.OA.2.1

MATHEMATICAL PRACTICES MP.1, MP.2



#### RECORD

• Multiply the denominators to find a common denominator.

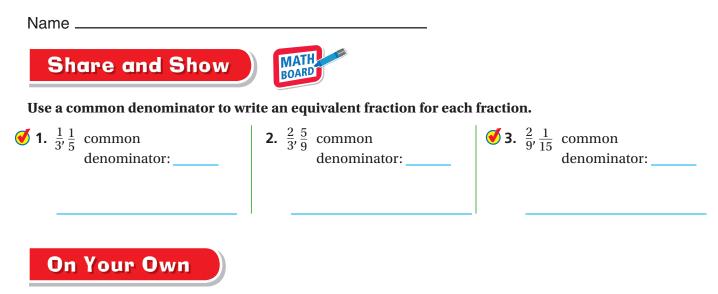
A common denominator of  $\frac{1}{3}$  and  $\frac{1}{4}$  is \_\_\_\_\_.

• Write  $\frac{1}{3}$  and  $\frac{1}{4}$  as equivalent fractions using the common denominator.

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

Mathematical Practices Explain what a common denominator of two fractions represents. **Least Common Denominator** Find the least common denominator of two or more fractions by finding the least common multiple of two or more numbers.

<b>STEP 1</b> List nonzero multiples of the denominators. Find the least common multiple.
Multiples of 4:
Multiples of 6:
So, the least common denominator of $\frac{3}{4}$ and $\frac{1}{6}$ is
<b>STEP 2</b> Using the least common denominator, write an equivalent fraction for each fraction.
Think: What number multiplied by the denominator of the fraction will result in the least common denominator?
$\frac{3}{4} = \frac{?}{12} = \frac{3 \times 3}{4 \times 3} = \frac{1}{6} = \frac{?}{12} = \frac{1 \times 1}{6 \times 1} = \frac{1}{6} = \frac{?}{12} = \frac{1}{6} = \frac{1}{$
least common denominator
$\frac{3}{4}$ can be rewritten as and $\frac{1}{6}$ can be rewritten as
<b>Another Way</b> Use prime factors. Use prime factors to find a common denominator of $\frac{5}{8}$ and $\frac{7}{20}$ . Then write an equivalent fraction for each fraction. <b>STEP 1</b> Write each denominator as a product of its prime factors.
Prime factors of 8: $2 \times 2 \times 2$ Think: Look for all prime factors that are
Prime factors of 20: $2 \times 2 \times 5$
A common denominator of $\frac{5}{8}$ and $\frac{7}{20}$ is $2 \times 2 \times 2 \times 5 = 40$ .
<b>STEP 2</b> Write an equivalent fraction for each fraction. $\frac{5}{8} = \frac{5 \times 1}{8 \times 1} = \frac{1}{40} \qquad \frac{7}{20} = \frac{7 \times 1}{20 \times 1} = \frac{1}{40}$
$\frac{5}{8}$ can be rewritten as and $\frac{7}{20}$ can be rewritten as



## **Practice: Copy and Solve** Use the least common denominator to write an equivalent fraction for each fraction.

**4.**  $\frac{5}{9}, \frac{4}{15}$  **5.**  $\frac{1}{6}, \frac{4}{21}$  **6.**  $\frac{5}{14}, \frac{8}{42}$  **7.**  $\frac{7}{12}, \frac{5}{18}$ 

#### MATHEMATICAL 2 Use Reasoning Algebra Write the unknown number for each .

- 8.  $\frac{1}{5}, \frac{1}{8}$  least common denominator: 4 = 2 4
- **11. THINASMARTER** Arnold had three pieces of different colored strings that are all the same length. Arnold cut the blue string into 2 equal-size lengths. He cut the red string into 3 equal-size lengths, and the green string into 6 equal-size lengths. He needs to cut the string so each color has the same number of equal-size lengths. What is the least number of equal-size lengths each color string could have?



**12. DEEPER** One tray of granola bars was cut into 4 equal-size pieces. A second tray was cut into 12 equal-size pieces, and a third was cut into 8 equal-size pieces. Jan wants to continue cutting until all three trays have the same number of pieces. How many pieces will there be on each tray?

three equal slices and the other into 5 equal s continue to cut the pies so each one has the s of equal-sized slices. What is the least numbe slices each pie could have?	ame number
a. What information are you given?	
<b>b.</b> What problem are you being asked to solve?	
c. When Katie cuts the pies more, can she cut ea of times and have all the slices the same size?	-
d. Use the diagram to show the steps you use to solve the problem.	<b>e.</b> Complete the sentences. The least common denominator of $\frac{1}{3}$ and $\frac{1}{5}$ is
	Katie can cut each piece of the first pie into and each piece of the second pie into That means that Katie can cut each pie into pieces that are of the whole pie.
<b>THINKISMARTER</b> Mindy bought $\frac{5}{8}$ pound of almSelect the pairs of fractions that are equivalent to Mark all that apply. <b>A</b> $\frac{5}{8}$ and $\frac{6}{8}$ <b>B</b> $\frac{10}{16}$ and $\frac{14}{16}$	

#### Name \_

## **Add and Subtract Fractions**

**Essential Question** How can you use a common denominator to add and subtract fractions with unlike denominators?

**CONNECT** You can use what you have learned about common denominators to add or subtract fractions with unlike denominators.

## PUnlock the Problem 👫

Malia bought shell beads and glass beads to weave into designs in her baskets. She bought  $\frac{1}{4}$  pound of shell beads and  $\frac{3}{8}$  pound of glass beads. How many pounds of beads did she buy?

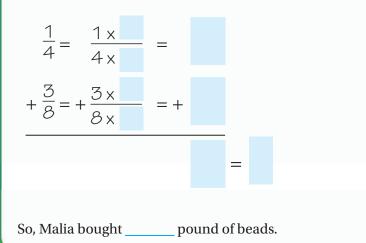
- Underline the question you need to answer.
  Draw a circle around the information
- Draw a circle around the information you will use.

## Add. $\frac{1}{4} + \frac{3}{8}$ Write your answer in simplest form. One Way

Find a common denominator by multiplying the denominators.

 $4 \times 8 =$  \_\_\_\_\_  $\leftarrow$  common denominator

Use the common denominator to write equivalent fractions with like denominators. Then add, and write your answer in simplest form.



## **Another Way**

Find the least common denominator.

The least common denominator

```
of \frac{1}{4} and \frac{3}{8} is _____.
```

 $+\frac{0}{8}$ 

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

+

**MATHEMATICAL 1 Evaluate Reasonableness** Explain how you know whether your answer is reasonable.

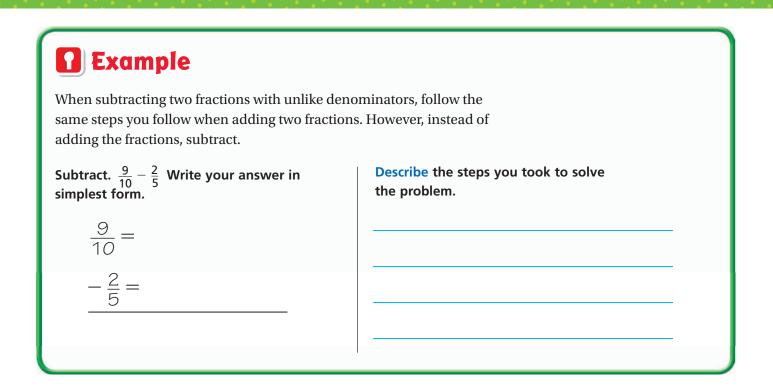
1.



Number and Operations— Fractions—5.NF.1 Also 5.NF.2

**MATHEMATICAL PRACTICES** 

MP.1, MP.2, MP.6

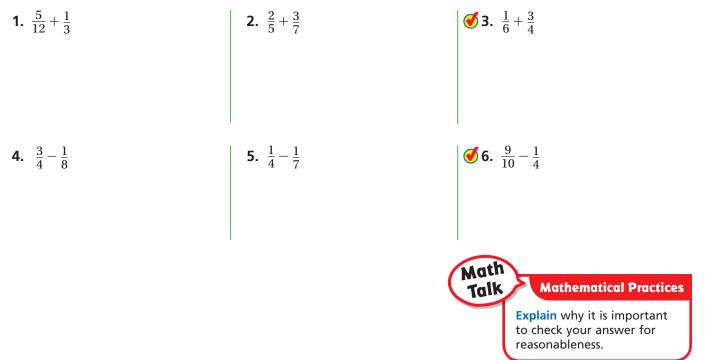


**2. Evaluate Reasonableness** Explain how you know whether your answer is reasonable.

## Share and Show



#### Find the sum or difference. Write your answer in simplest form.



## On Your Own

**Practice: Copy and Solve** Find the sum or difference. Write your answer in simplest form.



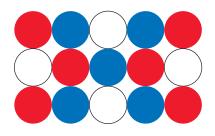
PRACTICE **O** Use Reasoning Algebra Find the unknown number.

<b>15.</b> $\frac{9}{10} - \blacksquare = \frac{1}{5}$	<b>16.</b> $\frac{5}{12} + \blacksquare = \frac{1}{2}$
	=

Problem Solving • Applications (Real World)

#### Use the picture for 17-18.

**17.** Sara is making a key chain using the bead design shown. What fraction of the beads in her design are either blue or red?



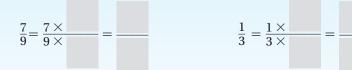
**18. THIMASMARTER** In making the key chain, Sara uses the pattern of beads 3 times. After the key chain is complete, what fraction of the beads in the key chain are either white or blue?



- **19. DEEPER** On Friday,  $\frac{1}{6}$  of band practice was spent trying on uniforms. The band spent  $\frac{1}{4}$  of practice on marching. The remaining practice time was spent playing music. What fraction of practice time was spent playing music?
- **20. WATHEMATICAL 3 Verify the Reasoning of Others** Jamie had  $\frac{4}{5}$  of a spool of twine. He then used  $\frac{1}{2}$  of a spool of twine to make friendship knots. He claims to have  $\frac{3}{10}$  of the original spool of twine left over. Explain how you know whether Jamie's claim is reasonable.

**21. THINKASMARTER** Mr. Barber used  $\frac{7}{9}$  yard of wire to put up a ceiling fan. He used  $\frac{1}{3}$  yard of wire to fix a switch.

Complete the calculations below to write equivalent fractions with a common denominator.



How much wire did Mr. Barber use to put up the ceiling fan and fix the switch combined? Explain how you found your answer.

# Mid-Chapter Checkpoint

Vocabulary

#### Choose the best term from the box.

- **1.** A \_\_\_\_\_\_ is a number that is a multiple of two or more numbers. (p. 269)
- **2.** A \_\_\_\_\_\_ is a common multiple of two or more denominators. (p. 269)

#### **Concepts and Skills**

#### Estimate the sum or difference. (5.NF.2)

# **3.** $\frac{8}{9} + \frac{4}{7}$ **4.** $3\frac{2}{5} - \frac{5}{8}$ **5.** $1\frac{5}{6} + 2\frac{2}{11}$ Use a common denominator to write an equivalent fraction for each fraction. (5.NF.1)

 6.  $\frac{1}{6'}$ ,  $\frac{1}{9}$  common denominator:
 7.  $\frac{3}{8'}$ ,  $\frac{3}{10}$  common denominator:
 8.  $\frac{1}{9'}$ ,  $\frac{5}{12}$  common denominator:

 Write the number as a product of its prime factors. (5.0A.2.1)
 9. 48
 10. 18
 11. 30

Find the sum or difference. Write your answer in simplest form. (5.NF.1)

**12.**  $\frac{11}{18} - \frac{1}{6}$  **13.**  $\frac{2}{7} + \frac{2}{5}$  **14.**  $\frac{3}{4} - \frac{3}{10}$ 

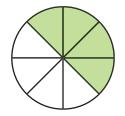
# © Houghton Mifflin Harcourt Publishing Company

equivalent fractions

common denominator

common multiple

**15.** Mrs. Vargas bakes a pie for her book club meeting. The shaded part of the diagram below shows the amount of pie left after the meeting. That evening, Mr. Vargas eats  $\frac{1}{4}$  of the whole pie. What fraction represents the amount of pie remaining? (5.NF.2)



**16.** Keisha makes a large sandwich for a family picnic. She takes  $\frac{1}{2}$  of the sandwich to the picnic. At the picnic, her family eats  $\frac{3}{8}$  of the whole sandwich. What fraction of the whole sandwich does Keisha bring back from the picnic? (5.NF.2)

**17.** Mike is mixing paint for his walls. He mixes  $\frac{1}{6}$  gallon blue paint and  $\frac{5}{8}$  gallon green paint in a large container. What fraction represents the total amount of paint Mike mixes? (5.NF.2)

#### Name \_ Add and Subtract Mixed Numbers Number and Operations— Fractions—5.NF.1 Essential Question How can you add and subtract mixed numbers with Also 5.NF.2 unlike denominators? **MATHEMATICAL PRACTICES** MP.1, MP.2, MP.6 **P**Unlock the Problem Denise mixed $1\frac{4}{5}$ ounces of blue paint with $2\frac{1}{10}$ ounces of yellow paint. How many • What operation should you use to solve the problem? ounces of paint did Denise mix? • Do the fractions have the same denominator? Add. $1\frac{4}{5} + 2\frac{1}{10}$ To find the sum of mixed numbers with unlike denominators, you can use a common denominator. STEP 1 Estimate the sum. $1\frac{4}{5} =$ **STEP 2** Find a common denominator. Use the $+2\frac{1}{10} = +$ common denominator to write equivalent fractions with like denominators. **STEP 3** Add the fractions. Then add the whole numbers. Write the answer in simplest form. Math So, Denise mixed \_\_\_\_\_ ounces of paint. **Mathematical Practices** Talk Did you use the least common denominator? Explain. **MATHEMATICAL 1 Evaluate Reasonableness** Explain how you know whether your answer is reasonable. 1.

2. What other common denominator could you have used?

Lesson 6.7

# Subtract. $4\frac{5}{6} - 2\frac{3}{4}$ You can also use a common denominator to find the difference of<br/>mixed numbers with unlike denominators.STEP 1Estimate the difference.STEP 2Find a common denominator. Use the<br/>common denominator to write equivalent<br/>fractions with like denominators.STEP 3Subtract the fractions. Subtract the whole<br/>numbers. Write the answer in simplest form.

**3. Evaluate Reasonableness** Explain how you know whether your answer is reasonable.

**Share and Show** 



**1.** Use a common denominator to write equivalent fractions with like denominators and then find the sum. Write your answer in simplest form.

$$7\frac{2}{5} =$$
  
+  $4\frac{3}{4} = +$ 

Find the sum. Write your answer in simplest form.

**2.** 
$$2\frac{3}{4} + 3\frac{3}{10}$$
 **3.**  $5\frac{3}{4} + 1\frac{1}{3}$ 

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

Name .

Find the difference. Write your answer in simplest form.

5. 
$$9\frac{5}{6} - 2\frac{1}{3}$$
  
6.  $10\frac{5}{9} - 9\frac{1}{6}$   
7.  $7\frac{2}{3} - 3\frac{1}{6}$   
Math  
Talk  
Mathematical Practices  
Explain why you need to  
write equivalent fractions  
with common denominators  
to add  $4\frac{3}{6}$  and  $1\frac{1}{8}$ .  
10.  $2\frac{1}{2} + 2\frac{1}{3}$   
11.  $12\frac{3}{4} - 6\frac{1}{6}$   
12.  $2\frac{5}{8} - 1\frac{1}{4}$   
13.  $14\frac{7}{12} - 5\frac{1}{4}$ 

**Practice: Copy and Solve** Find the sum or difference. Write your answer in simplest form.

<b>14.</b> $1\frac{5}{12} + 4\frac{1}{6}$	<b>15.</b> $8\frac{1}{2} + 6\frac{3}{5}$	<b>16.</b> $2\frac{1}{6} + 4\frac{5}{9}$	<b>17.</b> $3\frac{5}{8} + \frac{5}{12}$
<b>18.</b> $3\frac{2}{3} - 1\frac{1}{6}$	<b>19.</b> $5\frac{6}{7} - 1\frac{2}{3}$	<b>20.</b> $2\frac{7}{8} - \frac{1}{2}$	<b>21.</b> $4\frac{7}{12} - 1\frac{2}{9}$

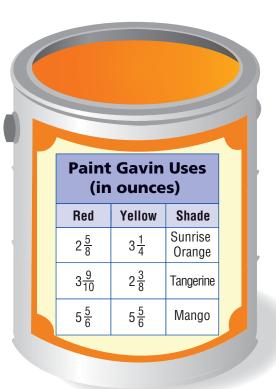
.

**22. Dakota** makes a salad dressing by combining  $6\frac{1}{3}$  fluid ounces of oil and  $2\frac{3}{8}$  fluid ounces of vinegar in a jar. She then pours  $2\frac{1}{4}$  fluid ounces of the dressing onto her salad. How much dressing remains in the jar?

# **Problem Solving • Applications**

Use the table to solve 23-24.

**23. (MATHEMATICAL 2) Reason Quantitatively** Gavin plans to mix a batch of Tangerine paint. He expects to have a total of  $5\frac{3}{10}$  ounces of paint after he mixes the amounts of red and yellow. Explain how you can tell if Gavin's expectation is reasonable.



24. **CHINASMARTER** Gavin mixes the amount of red from one shade of paint with the amount of yellow from a different shade of paint. He mixes the batch so he will have the greatest possible amount of paint. What amounts of red and yellow from which shades are used in the mixture? Explain your answer.



25.		Martin won first place in the 100-meter de econds. Samuel came in second place with a time of 15 5a–25d, select True or False for each statement.		e of
	25a.	A common denominator of the mixed numbers is 100.	⊖ True	⊖ False
	25b.	To find the difference between the runners' times, Samuel's time needs to be rewritten.	⊖ True	⊖ False
	25c.	Samuel's time written with a denominator of 100 is $15\frac{70}{100}$ .	⊖ True	○ False
	25d.	Martin beat Samuel by $\frac{21}{25}$ second.	<mark>○</mark> True	○ False

#### **Subtraction with Renaming**

**Essential Question** How can you use renaming to find the difference of two mixed numbers?

#### PUnlock the Problem 👹

To practice for a race, Kara is running  $2\frac{1}{2}$  miles. When she reaches the end of her street, she knows that she has already run  $1\frac{5}{6}$  miles. How many miles does Kara have left to run?

• Underline the sentence that tells you what you need to find.

MP.1, MP.2

• What operation should you use to solve the problem?

 $2\frac{1}{2} = 2\frac{6}{12} =$ 

 $-1\frac{5}{6} = -1\frac{10}{12} = -1\frac{10}{12}$ 

## **One Way** Rename the first mixed number.

**Subtract.**  $2\frac{1}{2} - 1\frac{5}{6}$ 

- **STEP 1** Estimate the difference.
- **STEP 2** Find a common denominator. Use the common denominator to write equivalent fractions with like denominators.
- **STEP 3** Rename  $2\frac{6}{12}$  as a mixed number with a fraction greater than 1.

**Think:**  $2\frac{6}{12} = 1 + 1 + \frac{6}{12} = 1 + \frac{12}{12} + \frac{6}{12} = 1\frac{18}{12}$ 

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

**STEP 4** Find the difference of the fractions. Then find the difference of the whole numbers. Write the answer in simplest form. Check to make sure your answer is reasonable.

So, Kara has \_\_\_\_\_ mile left to run.

MATHEMATICAL (1) Explain why it is important to write equivalent fractions before renaming.

Number and Operations—

Fractions—5.NF.1 Also 5.NF.2

MATHEMATICAL PRACTICES

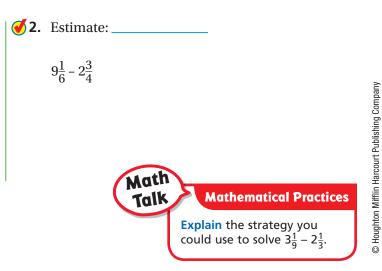
<b>Another Way</b> fractions greater than 1. Subtract. $2\frac{1}{2} - 1\frac{5}{6}$				
STEP 1	Write equivalent fractions, using a common denominator.	A common c $2\frac{1}{2} \longrightarrow$ $1\frac{5}{6} \longrightarrow$	denominator of $\frac{1}{2}$ and $\frac{5}{6}$ is 6.	
STEP 2	Rename both mixed numbers as fractions greater than 1.	$2\frac{3}{6} =$ $1\frac{5}{6} =$	Think: $\frac{6}{6} + \frac{6}{6} + \frac{3}{6}$ Think: $\frac{6}{6} + \frac{5}{6}$	
<b>STEP 3</b> $2\frac{1}{2} - 1\frac{5}{6}$	Find the difference of the fractions. Then write the answer in simplest form.	-	=	





Estimate. Then find the difference and write it in simplest form.

<b>V</b> 1.	Estimate:	
	$4\frac{1}{2} - 3\frac{4}{5}$	



Ν	ame	
---	-----	--



#### Estimate. Then find the difference and write it in simplest form.

**3.** Estimate:
 **4.** Estimate:
 **5.** Estimate:

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

#### **Practice: Copy and Solve** Find the difference and write it in simplest form.

- 6.  $11\frac{1}{9} 3\frac{2}{3}$ 7.  $6 - 3\frac{1}{2}$ 8.  $4\frac{3}{8} - 3\frac{1}{2}$ 9.  $9\frac{1}{6} - 3\frac{5}{8}$ 10.  $1\frac{1}{5} - \frac{1}{2}$ 11.  $13\frac{1}{6} - 3\frac{4}{5}$ 12.  $12\frac{2}{5} - 5\frac{3}{4}$ 13.  $7\frac{3}{8} - 2\frac{7}{9}$
- **14. GODEEPER** Three commercials are played in a row between songs on the radio. The three commercials fill exactly 3 minutes of time. If the first commercial uses  $1\frac{1}{6}$  minutes, and the second uses  $\frac{3}{5}$  minute, how long is the third commercial?

	students made videos for shows the length of each video.		
Match each pair of vide	Art in Nature		
between their times.		Video	Time (in hours)
Video 1 and Video 3 • • $1\frac{17}{22}$ hours		1	4 <u>3</u>
	• $1\frac{17}{30}$ hours	2	$4\frac{2}{5}$
Video 2 and Video 3 $ullet$	• $1\frac{9}{10}$ hours	3	2 <u>5</u> 6
Video 2 and Video 4 •	• $1\frac{11}{12}$ hours	4	2 <u>1</u>

#### Connect to Reading

#### Summarize

An amusement park in Sandusky, Ohio, offers 17 amazing roller coasters for visitors to ride. One of the roller coasters runs at 60 miles per hour and has 3,900 feet of twisting track. This coaster also has 3 trains with 8 rows per train. Riders stand in rows of 4, for a total of 32 riders per train.

The operators of the coaster recorded the number of riders on each train during a run. On the first train, the operators reported that  $7\frac{1}{4}$  rows were filled. On the second train, all 8 rows were filled, and on the third train,  $5\frac{1}{2}$  rows were filled. How many more rows were filled on the first train than on the third train?

When you *summarize*, you restate the most important information in a shortened form to more easily understand what you have read.

**13. Analyze** Identify and summarize the important information given in the problem.



#### Use the summary from item 13 to solve.

- **14.** Solve the problem above.
- **15. THINASMARTER** How many rows were empty on the first train? How many additional riders would it take to fill the empty rows? Explain your answer.



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FOR MORE PRACTICE: Standards Practice Book

#### **Patterns with Fractions**

Essential Question How can you use addition or subtraction to describe a pattern or create a sequence with fractions?

#### ALGEBRA Lesson 6.9



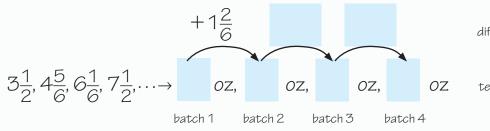
Number and Operations— Fractions—5.NF.1 MATHEMATICAL PRACTICES MP.5, MP.7, MP.8

# lunlock the Problem 🕻

Mr. Patrick wants to develop a new chili recipe for his restaurant. Each batch he makes uses a different amount of chili powder. The first batch uses  $3\frac{1}{2}$  ounces, the second batch uses  $4\frac{5}{6}$  ounces, the third uses  $6\frac{1}{6}$  ounces, and the fourth uses  $7\frac{1}{2}$  ounces. If this pattern continues, how much chili powder will he use in the sixth batch?

You can find the pattern in a sequence by comparing one term with the next term.

**STEP 1** Write the terms in the sequence as equivalent fractions with a common denominator. Then examine the sequence and compare the consecutive terms to find the rule used to make the sequence of fractions.





difference between terms

terms with common denominator

**STEP 2** Write a rule that describes the pattern in the sequence.

• Is the sequence increasing or decreasing from one term to the next? Explain.

Rule:

Extend the sequence to solve the problem. STEP 3

 $3\frac{1}{2}, 4\frac{5}{6}, 6\frac{1}{6}, 7\frac{1}{2},$ 

So, Mr. Patrick will use \_\_\_\_\_ ounces of chili powder in the sixth batch.

-	
Ð	Example Find the unknown terms in the sequence.
	$1\frac{3}{8}, 1\frac{3}{16}, \dots, 1\frac{3}{16}, \dots, 1\frac{7}{16}, \frac{7}{16}, \frac{1}{4}$
4 10	0 10 <u> </u>
STEP 1	Write the terms in the sequence as equivalent fractions with a common denominator.
	·,,,,,
STEP 2	Write a rule describing the pattern in the sequence.
• What	operation can be used to describe a sequence that increases?
• What	operation can be used to describe a sequence that decreases?
Rule:	
	Math
STEP 3	Use your rule to find the unknown terms. Then complete the sequence above.
	whether your rule for a sequence would involve addition or subtraction.
Try This	1
-	te a rule for the sequence. Then find the nown term.
1 <u>1</u> 12'	$\frac{5}{6}$ ,, $\frac{1}{3}$ , $\frac{1}{12}$
Rule	e:
B Wri	te the first four terms of the sequence.
Rule	e: start at $\frac{1}{4}$ , add $\frac{3}{8}$

Name	
Share and Show	MATH BOARD
Write a rule for the sequence.	
<b>1.</b> $\frac{1}{4'}$ $\frac{1}{2'}$ $\frac{3}{4'}$	$\checkmark$ <b>2.</b> $\frac{1}{9}, \frac{1}{3}, \frac{5}{9}, \dots$
Think: Is the sequence increasing or decr	
Rule:	Rule:
Write a rule for the sequence. Then, find	d the unknown term.
<b>3.</b> $\frac{3}{10}, \frac{2}{5}, \ldots, \frac{3}{5}, \frac{7}{10}$	<b>4.</b> $10\frac{2}{3}$ , $9\frac{11}{18}$ , $8\frac{5}{9}$ ,, $6\frac{4}{9}$ <b>Rule:</b>
Rule:	Rule:
On Your Own Write the first four terms of the sequence	ce.
<b>5.</b> Rule: start at $5\frac{3}{4}$ , subtract $\frac{5}{8}$	<b>6.</b> Rule: start at $\frac{3}{8}$ , add $\frac{3}{16}$
,,,,	
<b>7. Rule:</b> start at $2\frac{1}{3}$ , add $2\frac{1}{4}$	<b>8.</b> Rule: start at $\frac{8}{9}$ , subtract $\frac{1}{18}$
,,,,	
	cki started jogging. The first time she ran, she $\frac{3}{8}$ mile, and the third time, she ran $\frac{9}{16}$ mile. If she

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- **10. GETTER** Mr. Conners drove  $78\frac{1}{3}$  miles on Monday,  $77\frac{1}{12}$  miles on Tuesday, and  $75\frac{5}{6}$  miles on Wednesday. If he continues this pattern on Thursday and Friday, how many fewer miles will he drive on Friday than on Tuesday?

continued this pattern, when was the first time she ran more than 1 mile? Explain.

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#### **Problem Solving • Applications**

- **11.** When Bill bought a marigold plant, it was  $\frac{1}{4}$  inch tall. After the first week, it measured  $1\frac{1}{12}$  inches tall. After the second week, it was  $1\frac{11}{12}$  inches. After week 3, it was  $2\frac{3}{4}$  inches tall. Assuming the growth of the plant was constant, what was the height of the plant at the end of week 4?
- **12.** What if Bill's plant grew at the same rate but was  $1\frac{1}{2}$  inches when he bought it? How tall would the plant be after 3 weeks?

**13. THINMSMARTER** Kendra hiked each day for a week. The first day she hiked  $\frac{1}{8}$  mile, the second day she hiked  $\frac{3}{8}$  mile, and the third day she hiked  $\frac{5}{8}$  mile.

What is the rule for the distance Kendra hikes each day? Show how you can check your answer.

If the pattern continues, how many miles will Kendra hike on day 7? Explain how you found your answer.



#### **Problem Solving** •

#### Practice Addition and Subtraction

Unlock the Problem

Essential Question How can the strategy work backward help you solve a problem with fractions that involves addition and subtraction?

#### **PROBLEM SOLVING** Lesson 6.10



Number and Operations—Fractions— 5.NF.2 Also 5.NF.1 MATHEMATICAL PRACTICES

MP.1, MP.2



The Diaz family is cross-country skiing the Big Tree trails, which have a total length of 4 miles. Yesterday, they skied the  $\frac{7}{10}$ mile Oak Trail. Today, they skied the  $\frac{3}{5}$  mile Pine Trail. If they plan to ski all of the Big Tree trails, how many more miles do they have left to ski?

Real

Use the graphic organizer to help you solve the problem.

#### **Read the Problem** What do I need to find? What information do I How will I use the need to use? information? I need to find the distance I need to use the distance I can work backward by starting with the and the total distance each distance and they have already skied to find amount they have left. **Solve the Problem** Addition and subtraction are inverse operations. By working backward and using the same numbers, one operation undoes the other. • Write an equation. • Then work backward to find *m*. miles skied miles skied miles they total vesterdav todav need to ski = mdistance = mm So, the family has miles left to ski.

reactice **1**) Evaluate Reasonableness Explain how you know your answer is reasonable.

### Try Another Problem

As part of their study of Native American basket weaving, Lia's class is making wicker baskets. Lia starts with a strip of wicker 36 inches long. From the strip, she first cuts one piece but does not know its length, and then cuts a piece that is  $6\frac{1}{2}$  inches long. The piece left is  $7\frac{3}{4}$  inches long. What is the length of the first piece she cut from the strip?



	<b>Read the Problem</b>		
What do I need to find?	What information do I need to use?	How will I use the information?	
	Solve the Problem		
So, the length of the first piece cut was inches.			

What other strategy could you use to solve the problem?

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#### Share and Show



Caitlin has 4<sup>3</sup>/<sub>4</sub> pounds of clay. She uses 1<sup>1</sup>/<sub>10</sub> pounds to make a cup, and another 2 pounds to make a jar. How many pounds are left?

**First,** write an equation to model the problem.

**Unlock the Problem** 

- Plan your solution by deciding on the steps you will use.
- Check your exact answer by comparing it with your estimate.
- Check your answer for reasonableness.

**Next,** work backwards and rewrite the equation to find *x*.

Solve.

So, \_\_\_\_\_ pounds of clay remain.

- 2. **THINASMARTER** What if Caitlin had used more than 2 pounds of clay to make a jar? Would the amount remaining have been more or less than your answer to Exercise 1?
- A pet store donated 50 pounds of food for adult dogs, puppies, and cats to an animal shelter. 19<sup>3</sup>/<sub>4</sub> pounds was adult dog food and 18<sup>7</sup>/<sub>8</sub> pounds was puppy food. How many pounds of cat food did the pet store donate?
  - **4.** Thelma spent  $\frac{1}{6}$  of her weekly allowance on dog toys,  $\frac{1}{4}$  on a dog collar, and  $\frac{1}{3}$  on dog food. What fraction of her weekly allowance is left?

**RITE** Math • Show Your Work

#### **On Your Own**

- **5. DEFPER** Martin is making a model of a Native American canoe. He has  $5\frac{1}{2}$  feet of wood. He uses  $2\frac{3}{4}$  feet for the hull and  $1\frac{1}{4}$  feet for a paddle. How much wood does he have left?
- **6. INFINITION** Beth's summer vacation lasted 87 days. At the beginning of her vacation, she spent some time at soccer camp, 5 days at her grandmother's house, and 13 days visiting Glacier National Park with her parents. She then had 48 vacation days remaining. How many weeks did Beth spend at soccer camp?
- Math
- 7. **Reason Quantitatively** You can buy 2 DVDs for the same price you would pay for 3 CDs selling for \$13.20 apiece. Explain how you could find the price of 1 DVD.

8. **THINKSMARTER** Julio caught 3 fish weighing a total of  $23\frac{1}{2}$  pounds. One fish weighed  $9\frac{5}{8}$  pounds and another weighed  $6\frac{1}{4}$  pounds. How much did the third fish weigh? Use the numbers and symbols to write an equation that represents the problem. Then solve the equation. Symbols may be used more than once or not at all.

$$23\frac{1}{2}$$
  $9\frac{5}{8}$   $6\frac{1}{4}$   $x = +$ 

weight of third fish: \_\_\_\_\_ pounds



#### **Use Properties of Addition**

Essential Question How can properties help you add fractions with unlike denominators?

**CONNECT** You can use properties of addition to help you add fractions with unlike denominators.

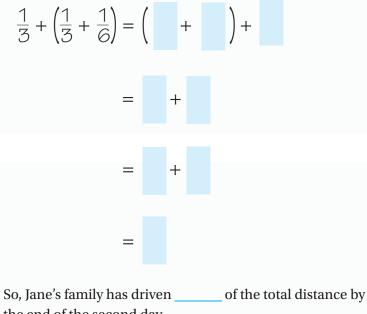
> Commutative Property:  $\frac{1}{2} + \frac{3}{5} = \frac{3}{5} + \frac{1}{2}$  $\left(\frac{2}{9}+\frac{1}{8}\right)+\frac{3}{8}=\frac{2}{9}+\left(\frac{1}{8}+\frac{3}{8}\right)$ Associative Property:

# PUnlock the Problem Gord

Jane and her family are driving to Big Lagoon State Park. On the first day, they travel  $\frac{1}{3}$  of the total distance. On the second day, they travel  $\frac{1}{3}$  of the total distance in the morning and then  $\frac{1}{6}$  of the total distance in the afternoon. How much of the total distance has Jane's family driven by the end of the second day?

#### Use the Associative Property.





the end of the second day.

#### ALGEBRA Lesson 6.11



#### Remember Parentheses () tell which operation to do first.



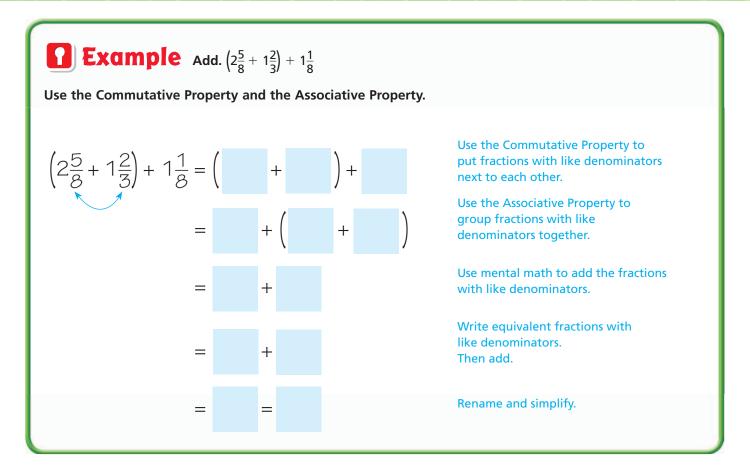
Write the number sentence to represent the problem. Use the Associative Property to group fractions with like denominators together.

Use mental math to add the fractions with like denominators.

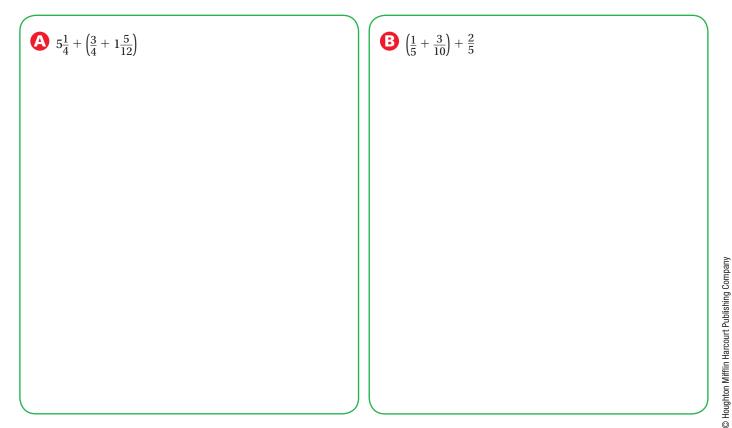
Write equivalent fractions with like denominators. Then add.



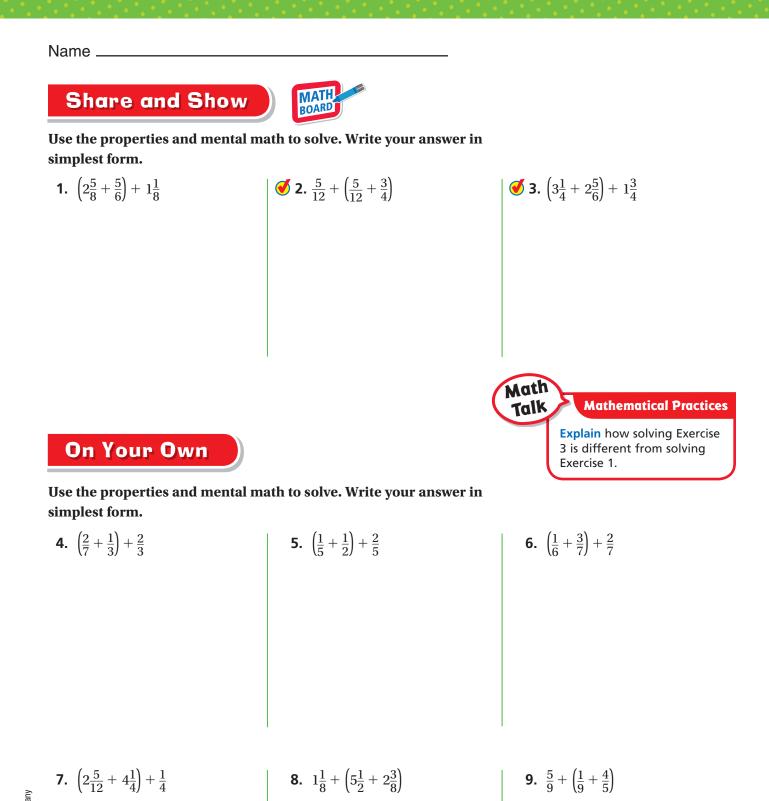
fractions differently makes it easier to find the sum.



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



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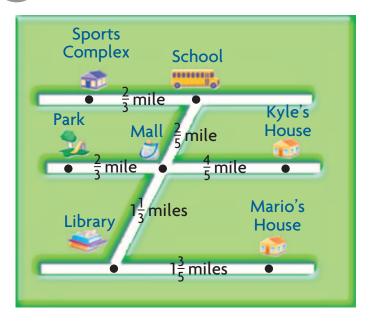


#### Problem Solving • Applications Red

Use the map to solve 10-12.

- **10. DEEPER** Julie rides her bike from the sports complex to the school. Then she rides from the school to the mall, and then on to the library. Kyle rides his bike from his house to the mall, and then to the library. Who rides farther? How many miles farther?
- **11.** Mario walks from his house to the library. That evening, Mario walks from the library to the mall, and then to Kyle's house. Describe how you can use the properties to find how far Mario walks.

Math on the Spot



**12. Write an Expression** Kyle is adding the distances between the school and the mall, the mall and the park, and the mall and his house. He writes  $\frac{2}{5} + \frac{2}{3} + \frac{4}{5}$ . Rewrite Kyle's expression using properties so the fractions are easier to add.

**13. THIN ISMARTER** For 13a–13c, tell whether each expression was rewritten using the Commutative Property or the Associative Property. Choose the correct property of addition.

13a. 
$$\frac{9}{10} + \left(\frac{3}{10} + \frac{5}{6}\right) = \left(\frac{9}{10} + \frac{3}{10}\right) + \frac{5}{6}$$

13b. 
$$\left(\frac{3}{4} + \frac{1}{5}\right) + \frac{1}{4} = \left(\frac{1}{5} + \frac{3}{4}\right) + \frac{1}{4}$$

**3c.** 
$$\left(3\frac{1}{2}+2\frac{1}{8}\right)+1\frac{5}{8}=3\frac{1}{2}+\left(2\frac{1}{8}+1\frac{5}{8}\right)$$

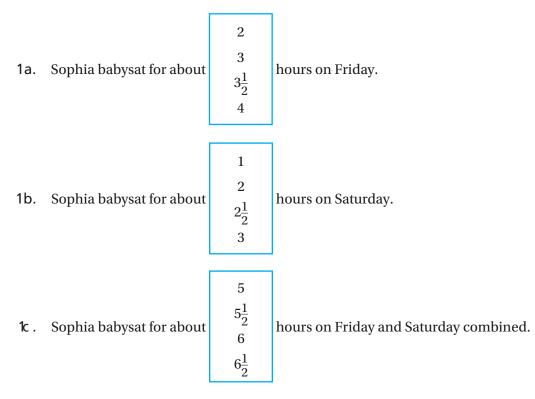
Associative Property Commutative Property Associative Property Commutative Property

Associative Property Commutative Property O Houghton Mifflin Harcourt Publishing Company

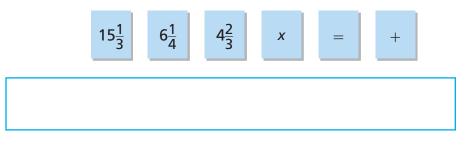
Name



**1.** Sophia babysat for  $3\frac{7}{12}$  hours on Friday. She babysat for  $2\frac{5}{6}$  hours on Saturday. For numbers 1a–1c, estimate how long Sophia babysat on Friday and Saturday combined. Choose the correct benchmarks and sum.



**2.** Rodrigo practiced playing the guitar  $15\frac{1}{3}$  hours over the past 3 weeks. He practiced for  $6\frac{1}{4}$  hours during the first week and  $4\frac{2}{3}$  hours during the second week. How much time did Rodrigo spend practicing during the third week? Use the numbers and symbols to write an equation that represents the problem. Then solve the equation. Symbols may be used more than once or not at all.

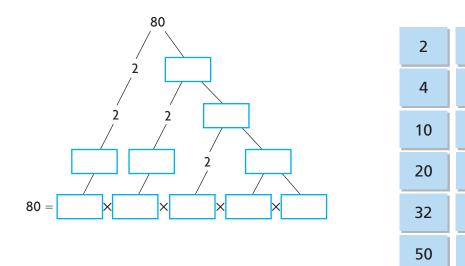


Practice time during third week: \_\_\_\_\_ hours

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- **3.** Liam bought  $5\frac{7}{8}$  pounds of steak. He used  $2\frac{1}{16}$  pounds of the steak for a cookout. For numbers 3a–3c, fill in each blank.
  - **3a**. Rounded to the closest benchmark, Liam bought about pounds of steak.
  - **3b.** Rounded to the closest benchmark, Liam used about of steak for the cookout.
  - **3c.** Liam has about pounds of steak remaining after the cookout.
- **4.** Filipe has 80 songs on his mp3 player. Complete the diagram by using the tiles to write 80 as the product of its prime factors. You may use a number more than once or not at all.



**5.** Write  $\frac{2}{5}$  and  $\frac{1}{3}$  as equivalent fractions using a common denominator.



**6.** Jill brought  $2\frac{1}{3}$  boxes of carrot muffins for a bake sale. Mike brought  $1\frac{3}{4}$  boxes of apple muffins. What is the total number of boxes of muffins Jill and Mike brought to the bake sale?

boxes of muffins

pounds

3

5

15

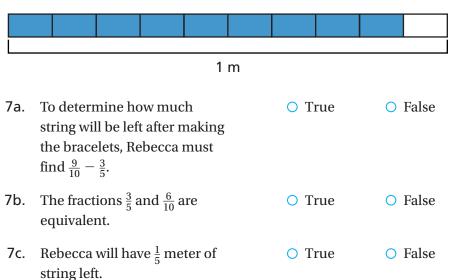
30

40

80

Name .

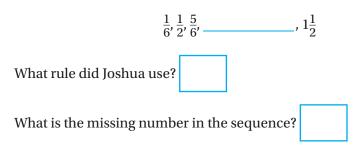
**7.** The shaded part of the diagram shows what Genie has left from a meter of string. She will use  $\frac{3}{5}$  meter of string to make bracelets. She wants to determine how much of the string she will have remaining after making the bracelets. For numbers 7a–7c, select True or False for each statement.



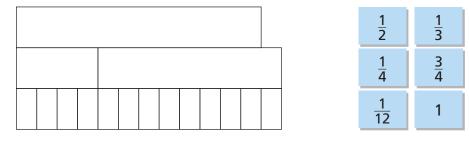
**8.** For numbers 8a–8c, tell whether each expression was rewritten using the Commutative Property or the Associative Property. Choose the correct property of addition.

8a. 
$$\frac{1}{6} + \left(\frac{7}{8} + \frac{5}{6}\right) = \frac{1}{6} + \left(\frac{5}{6} + \frac{7}{8}\right)$$
Associative Property  
Commutative Property8b.  $\left(\frac{7}{10} + \frac{1}{3}\right) + \frac{1}{10} = \left(\frac{1}{3} + \frac{7}{10}\right) + \frac{1}{10}$ Associative Property  
Commutative Property8c.  $\left(6\frac{2}{5} + \frac{4}{9}\right) + 3\frac{2}{9} = 6\frac{2}{5} + \left(\frac{4}{9} + 3\frac{2}{9}\right)$ Associative Property  
Commutative Property

9. Joshua uses a rule to write the following sequence of numbers.



**10.** Jeffrey walked  $\frac{1}{3}$  mile on Monday and jogged  $\frac{3}{4}$  mile on Tuesday. How far did he walk and jog on Monday and Tuesday combined? Use the tiles to complete the fraction strip model to show how you found your answer. The fractions may be used more than once or not at all.



\_\_\_\_ mile(s)

**11.** Mr. Cohen drives  $84\frac{2}{10}$  miles on Tuesday,  $84\frac{6}{10}$  miles on Wednesday, and 85 miles on Thursday.

#### Part A

What is the rule for the distance Mr. Cohen drives each day? Show how you can check your answer.

#### Part B

If the pattern continues, how many miles will Mr. Cohen drive on Sunday? Explain how you found your answer. Name \_

**12.** Alana bought  $\frac{3}{8}$  pound of Swiss cheese and  $\frac{1}{4}$  pound of American cheese. Which pairs of fractions are equivalent to the amount Alana bought? Mark all that apply.

A	$\frac{24}{64}$ and $\frac{8}{64}$	C	$\frac{12}{32}$ and $\frac{6}{32}$
B	$\frac{6}{16}$ and $\frac{4}{16}$	D	$\frac{15}{40}$ and $\frac{10}{40}$

**13.** Four students spent time volunteering last weekend. The table shows how much time each student spent volunteering.

Volunteering		
Student	Time (in hours)	
Amy	4 <u>5</u>	
Beth	6 <u>1</u>	
Victor	5 <u>3</u>	
Cal	5 <u>2</u> 3	

Match each pair of students with the difference between how much time they spent volunteering.

Amy and Victor o	• $\frac{3}{4}$ hour
Cal and Beth •	• $\frac{11}{12}$ hour
Beth and Victor	• $\frac{5}{6}$ hour

**14.** For numbers 14a–14d, tell which expressions require you to rename mixed numbers before you can subtract. Find each difference. Write each expression and the difference in the correct box.

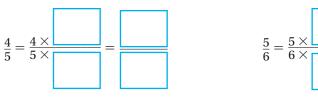
14a. $2\frac{1}{3} - 1\frac{3}{4}$	14c. $5\frac{2}{3} - 2\frac{5}{8}$
14b. $1\frac{3}{4} - \frac{7}{8}$	14d. $6\frac{1}{5} - 2\frac{1}{3}$
Requires Renaming	Does Not Require Renaming

- **15.** Mr. Clements painted his barn for  $3\frac{3}{5}$  hours in the morning. He painted the barn for  $5\frac{3}{4}$  hours in the afternoon. For numbers 15a–15c, select True or False for each statement.
  - 15a. A common denominator of the mixed numbers is 20.
    15b. The amount of time spent painting in the morning can be rewritten as 3<sup>15</sup>/<sub>20</sub> hours.
    15c. Mr. Clements spent 2<sup>3</sup>/<sub>20</sub> hours or True False longer painting in the afternoon than the morning.
- **16.** Tom exercised  $\frac{4}{5}$  hour on Monday and  $\frac{5}{6}$  hour on Tuesday.

#### Part A

Complete the calculations below to write equivalent fractions with a common denominator.

=



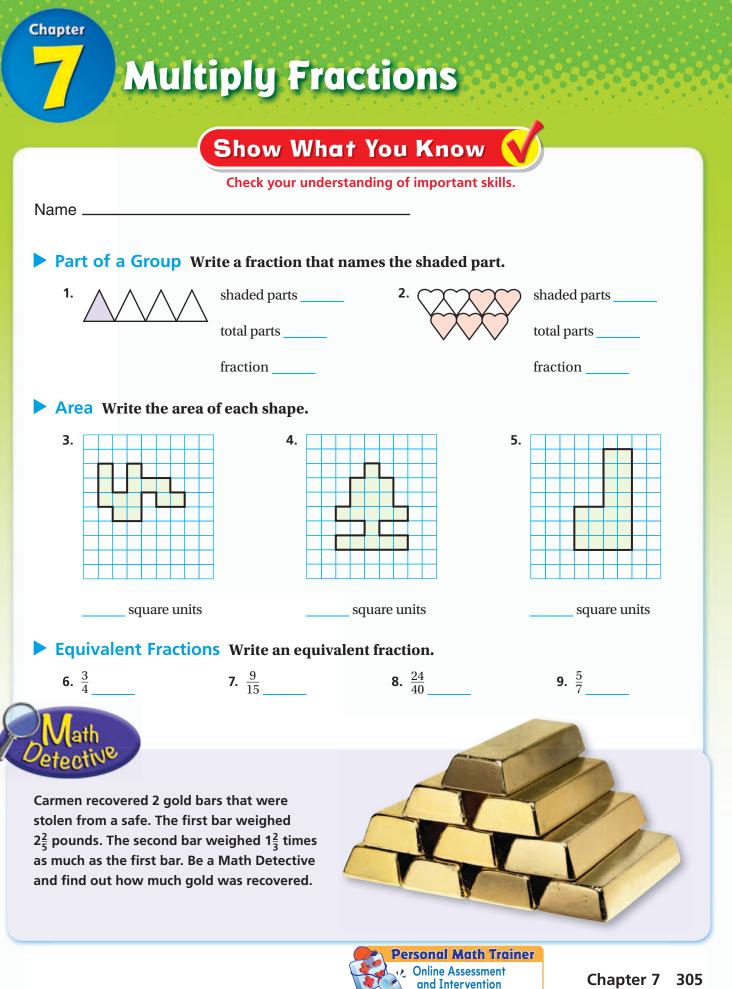
#### Part B

How much time did Tom spend exercising on Monday and Tuesday combined? Explain how you found your answer.



#### Part C

How much longer did Tom spend exercising on Tuesday than he spent on Monday? Explain how you found your answer.



Chapter 7

#### **Vocabulary Builder**

#### 

What is it? What are some examples?  $\begin{array}{c}
 & 5\\
\hline 10\\
\hline 5\\
\hline 10\\
\hline 5\\
\hline 10\\
\hline 4\frac{1}{5}, 1\frac{3}{8}, 6\frac{3}{6}\\
\hline 23' \frac{4}{6}' \frac{10}{15}\\
\end{array}$  **Review Words** 

denominator

equivalent fractions

mixed number

numerator

product

simplest form

#### Understand Vocabulary .....

Complete the sentences by using the review words.

- 1. A \_\_\_\_\_\_ is a number that is made up of a whole number and a fraction.
- **2.** A fraction is in \_\_\_\_\_\_ when the numerator and the denominator have only the number 1 as a common factor.
- **3.** The number below the bar in a fraction that tells how many equal parts are in the whole or in the group is the
- **4.** The \_\_\_\_\_\_ is the answer to a multiplication problem.
- 5. Fractions that name the same amount or part are called
- 6. The \_\_\_\_\_\_ is the number above the bar in a fraction that tells how many equal parts of the whole are being considered.



#### Name \_

#### **Find Part of a Group**

**Essential Question** How can you find a fractional part of a group?

#### Lesson 7.1

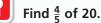


Number and Operations-Fractions—5.NF.4a

MP.5, MP.6

# Tunlock the Problem

Maya collects stamps. She has 20 stamps in her collection. Four-fifths of her stamps have been canceled. How many of the stamps in Maya's collection have been canceled?

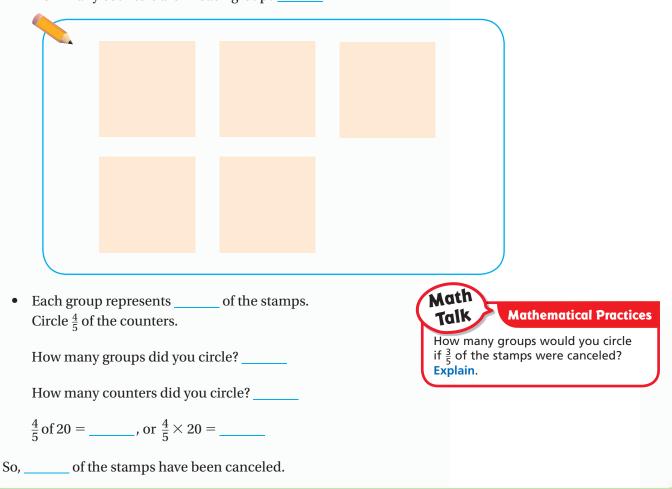


Put 20 counters on your MathBoard.

Since you want to find  $\frac{4}{5}$  of the stamps, you should arrange the 20 counters in equal groups.

Draw the counters in equal groups below. How many counters are in each group?

The post office cancels stamps to keep them from being reused.





# 🛯 Example

Max's stamp collection has stamps from different countries. He has 12 stamps from Canada. Of those twelve,  $\frac{2}{3}$  of them have pictures of Queen Elizabeth II. How many stamps have the queen on them?

Draw an array to represent the 12 stamps by drawing an X for each stamp. Since you want to find  $\frac{2}{3}$  of the stamps, your array should

show \_\_\_\_\_ rows with an equal number of Xs.

Circle \_\_\_\_\_ of the 3 rows to show  $\frac{2}{3}$  of 12. Then count the number of **X**s in the circle.

There are Xs circled.

Complete the number sentences.

 $\frac{2}{3}$  of 12 = \_\_\_\_\_, or  $\frac{2}{3} \times 12 =$  \_\_\_\_\_

So, there are \_\_\_\_\_\_ stamps with a picture of Queen Elizabeth II.

PRACTICE **O** Use Appropriate Tools On your MathBoard, use counters to find  $\frac{4}{6}$  of 12. Explain why the answer is the same as the answer when you found  $\frac{2}{3}$  of 12.

#### **Try This!** Draw an array.

Susana has 16 stamps. In her collection,  $\frac{3}{4}$  of the stamps are from the United States. How many of her stamps are from the United States and how many are not?



of Susana's stamps are from the United States, and \_\_\_\_\_\_ stamps are not. So,



#### Share and Show



**1.** Complete the model to solve.

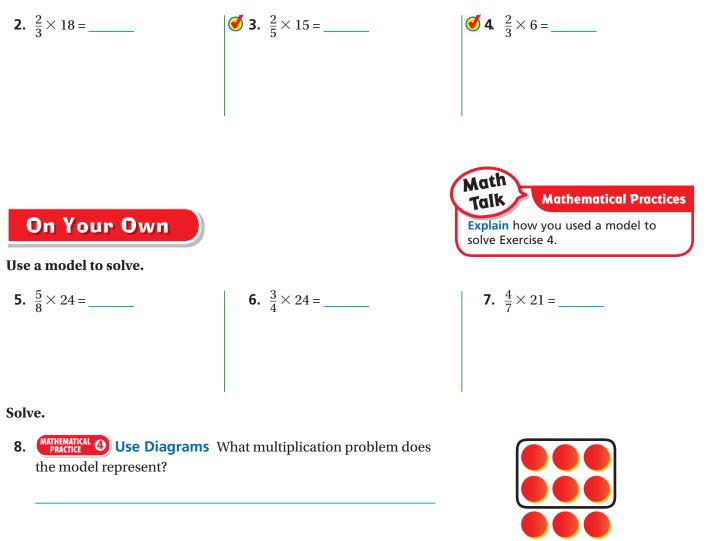
 $\frac{7}{8}$  of 16, or  $\frac{7}{8} \times 16$ 

- How many rows of counters are there?
- How many counters are in each row?
- Circle \_\_\_\_\_ rows to solve the problem.
- How many counters are circled?

$$\frac{7}{8}$$
 of 16 = \_\_\_\_\_, or  $\frac{7}{8} \times 16$  = \_\_\_\_\_

#### Use a model to solve.

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#### **Problem Solving • Applications**

Use the table for 9-10.

**9. MATHEMATICAL (d) Use Models** Four-fifths of Zack's stamps have pictures of animals. How many stamps with pictures of animals does Zack have? Use a model to solve.

Stamps Collected	
Name	Number of Stamps
Zack	30
Teri	18
Paco	24

**10. DHIMASMARTER** Zack, Teri, and Paco combined the foreign stamps from their collections for a stamp show. Out of their collections,  $\frac{3}{10}$  of Zack's stamps,  $\frac{5}{6}$  of Teri's stamps, and  $\frac{3}{8}$  of Paco's stamps were from foreign countries. How many stamps were in their display? Explain how you solved the problem.



WRITE Math • Show Your Work • • •

**11. EXAMPS** Paula has 24 stamps in her collection. Among her stamps,  $\frac{1}{3}$  have pictures of animals. Out of her stamps with pictures of animals,  $\frac{3}{4}$  of those stamps have pictures of birds. How many stamps have pictures of birds on them?

**12. THINASMARTER** Charlotte bought 16 songs for her MP3 player. Three-fourths of the songs are classical songs. How many of the songs are classical songs? Draw a model to show how you found your answer.

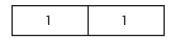
#### **Multiply Fractions and Whole Numbers**

**Essential Question** How can you use a model to show the product of a fraction and a whole number?

#### Investigate

Martin is planting a vegetable garden. Each row is 2 meters long. He wants to plant carrots along  $\frac{3}{4}$  of each row. How many meters of each row will he plant with carrots?

- $\blacksquare Multiply. \frac{3}{4} \times 2$
- **Materials** fraction strips MathBoard
- **A.** Place two 1-whole fraction strips side-by-side to represent the length of the garden.
- **B.** Find 4 fraction strips all with the same denominator that fit exactly under the two wholes.
- **C.** Draw a picture of your model.



- **D.** Circle  $\frac{3}{4}$  of 2 on the model you drew.
- **E.** Complete the number sentence.  $\frac{3}{4} \times 2 =$

So, Martin will plant carrots along \_\_\_\_\_ meters of each row.

**Draw Conclusions** 

**1. MATHEMATICAL (b) Use a Concrete Model** Explain why you placed four fraction strips with the same denominator under the two 1-whole strips.

MATHEMATICAL (6) Use a Concrete Model Explain how you would model  $\frac{3}{10}$  of 2.

2.

#### Lesson 7.2

Number and Operations-Fractions—5.NF.4a

MATHEMATICAL PRACTICES MP.5, MP.6



#### **Make Connections**



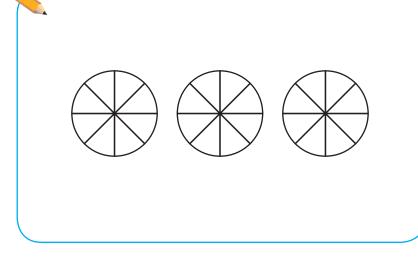
In the Investigate activity, you multiplied a whole number by a fraction. You can also use a model to multiply a fraction by a whole number.

Margo was helping clean up after a class party. There were 3 boxes remaining with pizza in them. Each box had  $\frac{3}{8}$  of a pizza left. How much pizza was left in all?

**Materials** fraction circles

- **STEP 1** Find  $3 \times \frac{3}{8}$ . Model three 1-whole fraction circles to represent the number of boxes containing pizza.
- **STEP 2** Place  $\frac{1}{8}$  fraction circle pieces on each circle to represent the amount of pizza that was left in each box.
  - Shade the fraction circles below to show your model.





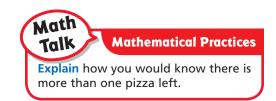
Each circle shows \_\_\_\_\_ eighths of a whole.

The 3 circles show \_\_\_\_\_\_ eighths of a whole.

**STEP 3** Complete the number sentences.

 $\frac{3}{8} + \frac{3}{8} + \frac{3}{8} =$ \_\_\_\_\_ 3 ×  $\frac{3}{8} =$ \_\_\_\_\_

So, Margo had \_\_\_\_\_\_ boxes of pizza left.

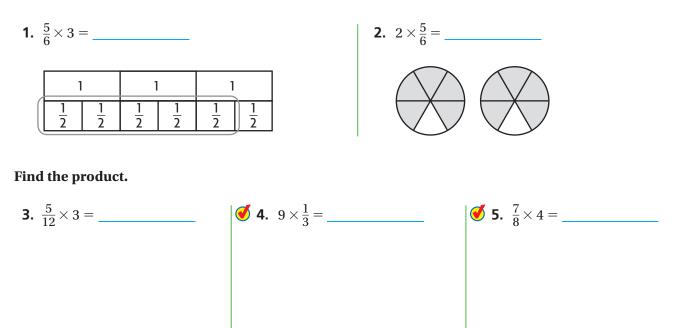


Name \_

Share and Show

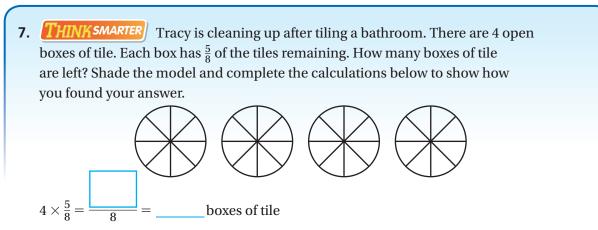


### Use the model to find the product.



# **Problem Solving • Applications**

6. **GODEEPER** Eliza brought 3 pans of homemade fruit bars to school. Her classmates ate  $\frac{7}{12}$  of each pan. Eliza gave 1 whole pan of the leftover fruit bars to the school's secretaries and took the rest home. Explain how to find how much of a pan of fruit bars Eliza took home.



8. WATHEMATICAL Use Models Tarique drew the model below for a problem. Write 2 problems that can be solved using this model. One of your problems should involve multiplying a whole number by a fraction, and the other problem should involve multiplying a fraction by a whole number.



Pose problems.

#### Solve your problems.

 jour prozremer

**9. THINKASMARTER** How could you change the model to give you an answer of  $4\frac{4}{5}$ ? Explain and write a new equation.



#### Name \_

# **Fraction and Whole Number Multiplication**

Essential Question How can you find the product of a fraction and a whole number without using a model?

# Lesson 7.3



Number and Operations— Fractions—5.NF.4a

MATHEMATICAL PRACTICES MP.2, MP.5, MP.6

### Reo **PUNIOCK the Problem**

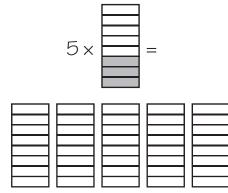
Charlene has five 1-pound bags of sand, each a different color. For an art project, she will use  $\frac{3}{8}$ pound of each bag of sand to create a colorful sand-art jar. How much sand will be in Charlene's sand-art jar?



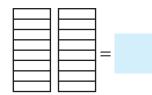
### Multiply a fraction by a whole number.

#### MODEL

• Shade the model to show 5 groups of  $\frac{3}{8}$ .



 Rearrange the shaded pieces to fill as many wholes as possible.



- How much sand is in each bag?
- Will Charlene use all of the sand in each bag? Explain.

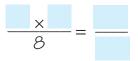
#### RECORD

 Write an expression to represent the problem.



 $5 \times \frac{3}{8}$  Think: I need to find 5 groups of 3 eighth-size pieces.

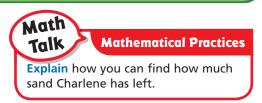
• Multiply the number of eighth-size pieces in each whole by 5. Then write the answer as the total number of eighth-size pieces.



• Write the answer as a mixed number in simplest form.



So, there are \_\_\_\_\_ pounds of sand in Charlene's sand-art jar.

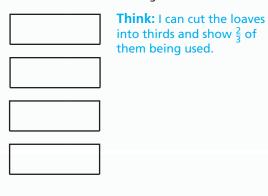


# **Example** Multiply a whole number by a fraction.

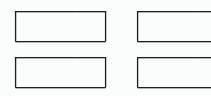
Kirsten brought in 4 loaves of sliced bread to make sandwiches for the class picnic. Her classmates used  $\frac{2}{3}$  of the bread. How many loaves of bread were used?

### MODEL

• Shade the model to show  $\frac{2}{3}$  of 4.



• Rearrange the shaded pieces to fill as many wholes as possible.

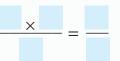


### RECORD

• Write an expression to represent the problem.



• Multiply 4 by the number of third-size pieces in each whole. Then, write the answer as the total number of thirdsize pieces.



• Write the answer as a mixed number.

_	
-	

loaves of bread were used. So,

 $\frac{1}{PRACTICE}$  Would we have the same amount of bread if we had 4 groups of  $\frac{2}{3}$  of a loaf? Explain.

### **Try This!** Find the product. Write the product in simplest form.

$4 \times \frac{7}{8}$	$\boxed{\begin{array}{c} \textcircled{5}{9} \times 12 \end{array}}$

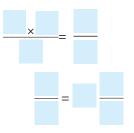


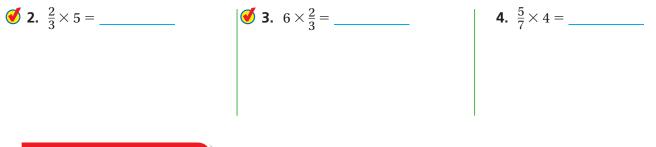
MATH

### Find the product. Write the product in simplest form.

**1.**  $3 \times \frac{2}{5} =$ 

- Multiply the numerator by the whole number. Write the product over the denominator.
- Write the answer as a mixed number in simplest form.





# On Your Own

**Practice: Copy and Solve** Find the product. Write the product in simplest form.

**5.**  $\frac{3}{5} \times 11$  **6.**  $3 \times \frac{3}{4}$  **7.**  $\frac{5}{8} \times 3$ 

MATHEMATICAL 2 Use Reasoning Algebra Find the unknown digit.

```
8. \frac{1}{2} \times 8 = 4

9. \times \frac{5}{6} = \frac{20}{6}, or 3\frac{1}{3}

10. \frac{1}{4} \times 18 = 3

= \_
```

- **11.** THIMASMARTER Patty wants to run  $\frac{5}{6}$  of a mile every day for 5 days. Keisha wants to run  $\frac{3}{4}$  of a mile every day for 6 days. Who will run the greater distance?
- **12. EXAMPLE** A baker made 5 pounds of dough. He used  $\frac{4}{9}$  of the dough to make sandwich rolls. How much of the dough is left over?

Math on the Spot

Unlock the Problem	
<b>13.</b> A caterer wants to have enough turkey to feed provide $\frac{3}{4}$ of a pound of turkey for each person he need?	
a. What do you need to find?	
<ul> <li>b. What operation will you use?</li></ul>	
<b>d.</b> Solve the problem.	e. Complete the sentences.
	The caterer wants to serve 24 people
	of a pound of turkey each.
	He will need $\times$ , or
	pounds of turkey.

**14. THINKASMARTER** Julie is using this recipe to make salad dressing. She plans to make 5 batches of the dressing. She has 4 cups of vegetable oil.

Write a multiplication expression to show how much vegetable oil is needed for 5 batches.

Does Julie have enough vegetable oil for 5 batches of the salad dressing? Explain your reasoning.



### Salad Dressing

- $1\frac{1}{2}$  teaspoons paprika
- 1 teaspoon dry mustard
- $1\frac{1}{2}$  teaspoons salt
- $\frac{1}{8}$  teaspoon onion powder
- $\frac{3}{4}$  cup vegetable oil
- $\frac{1}{4}$  cup vinegar

#### Name .

## **Multiply Fractions**

**Essential Question** How can you use an area model to show the product of two fractions?

### Investigate

Jane is making reusable grocery bags and lunch bags. She needs  $\frac{3}{4}$  yard of cloth to make a grocery bag. A lunch bag requires  $\frac{2}{3}$  of the amount of cloth a grocery bag needs. How much cloth does she need to make a lunch bag?



Find  $\frac{2}{3}$  of  $\frac{3}{4}$ . Materials - color pencils

- **A.** Fold a sheet of paper vertically into 4 equal parts. Using the vertical folds as a guide, shade  $\frac{3}{4}$  yellow.
- **B.** Fold the paper horizontally into 3 equal parts. Using the horizontal folds as a guide, shade  $\frac{2}{3}$  of the yellow sections blue.
- **C.** Count the number of sections into which the whole sheet of paper is folded.
  - How many rectangles are formed by all

the folds in the paper?

• What fraction of the whole sheet of paper

does one rectangle represent?

**D.** Count the sections that are shaded twice and record

the answer.  $\frac{2}{3} \times \frac{3}{4} =$  \_\_\_\_\_

So, Jane needs \_\_\_\_\_\_ yard of cloth to make a lunch bag.

### **Draw Conclusions**

- 1. Explain why you shaded  $\frac{2}{3}$  of the yellow sections blue rather than shading  $\frac{2}{3}$  of the whole.
- **2. MATHEMATICAL 1 Analyze** what you are finding if a model shows  $\frac{1}{2}$  of a sheet of paper shaded yellow and  $\frac{1}{3}$  of the yellow section shaded blue.

# Lesson 7.4

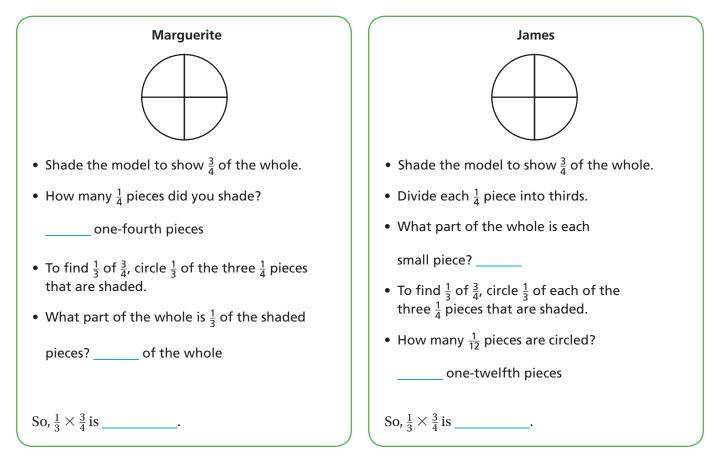
Number and Operations— Fractions—5.NF.4a, 5.NF.4b MATHEMATICAL PRACTICES MP.3, MP.5, MP.6



# **Make Connections**

You can find a part of a part in different ways. Marguerite and James both correctly solved the problem  $\frac{1}{3} \times \frac{3}{4}$  using the steps shown.





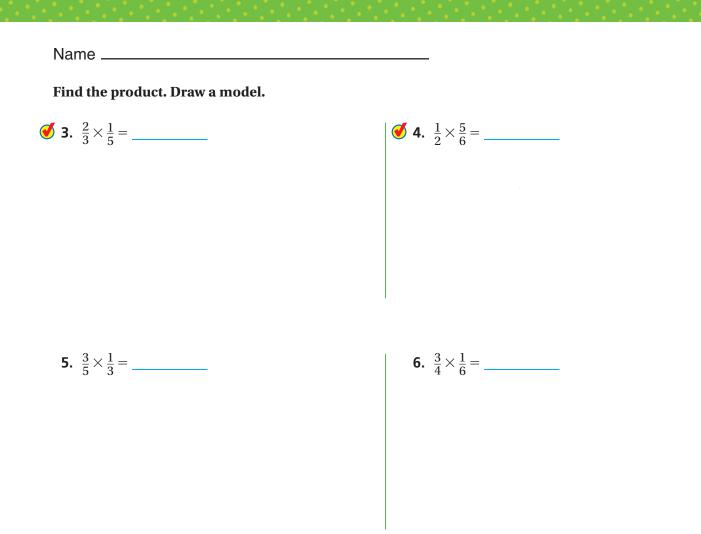
• Pose a Problem that can be solved using the equation above.

Share and Show



Use the model to find the product.





# **Problem Solving • Applications**

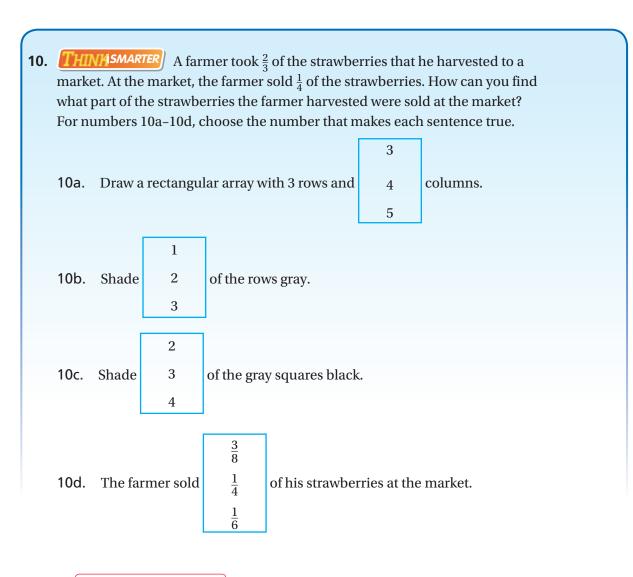
7. **Evaluate Reasonableness** Ricardo's recipe for 4 loaves of bread requires  $\frac{2}{3}$  cup of olive oil. He only wants to make 1 loaf. Ricardo makes a model to find out how much oil he needs to use. He folds a piece of paper into three parts and shades two parts. Then he folds the paper into four parts and shades  $\frac{1}{4}$  of the shaded part. Ricardo decides he needs  $\frac{1}{4}$  cup of olive oil. Is he right? Explain.

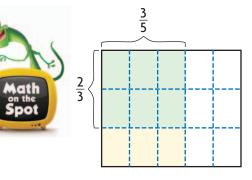
8. **GODEEPER** Three-fourths of a spinach casserole is leftover after Sam has lunch. Jackie and Alicia each take  $\frac{1}{2}$  of the leftover casserole. Jackie eats only  $\frac{2}{3}$  of her portion. What fraction of a whole casserole did Jackie eat? Draw a model.

### THINKISMARTER) What's the Error?

**9.** Cheryl and Marcus are going to make 2 batches of muffins. The smaller batch is  $\frac{2}{3}$  the size of the larger batch. The recipe for the larger batch requires  $\frac{3}{5}$  cup of water. How much water will they need to make the smaller batch?

They made a model to represent the problem. Cheryl says they need  $\frac{6}{9}$  cup of water. Marcus says they need  $\frac{2}{5}$  cup of water. Who is correct? Explain.





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Name

# **Compare Fraction Factors and Products**

**Essential Question** How does the size of the product compare to the size of one factor when multiplying fractions?

# 🚮 Unlock the Problem 👫

Multiplication can be thought of as resizing one number by another number. For example,  $2 \times 3$  will result in a product that is 2 times as great as 3.

What happens to the size of a product when a number is multiplied by a fraction rather than a whole number?

One Way Use a model.

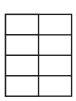
**(A)** During the week, the Delgado family ate  $\frac{3}{4}$  of a box of cereal.

- Shade the model to show  $\frac{3}{4}$  of a box of cereal.
- Write an expression for  $\frac{3}{4}$  of 1 box of cereal.  $\frac{3}{4} \times$
- Will the product be equal to, greater than, or less than 1?
- **B** The Ling family has 4 boxes of cereal. They ate  $\frac{3}{4}$  of all the cereal during the week.
  - Shade the model to show  $\frac{3}{4}$  of 4 boxes of cereal.
  - Write an expression for  $\frac{3}{4}$  of 4 boxes of cereal.  $\frac{3}{4} \times$
  - Will the product be equal to, greater than, or less than 4?

**C** The Carter family has only  $\frac{1}{2}$  of a box of cereal at the beginning of the week. They ate  $\frac{3}{4}$  of the  $\frac{1}{2}$  box of cereal.

- Shade the model to show  $\frac{3}{4}$  of  $\frac{1}{2}$  box of cereal.
- Write an expression to show  $\frac{3}{4}$  of  $\frac{1}{2}$  box of cereal.  $\frac{3}{4} \times$
- Will the product be equal to, greater than, or less than  $\frac{1}{2}$ ? than  $\frac{3}{4}$ ?

# 1?





Number and Operations— Fractions—5.NF.5a, 5.NF.5b

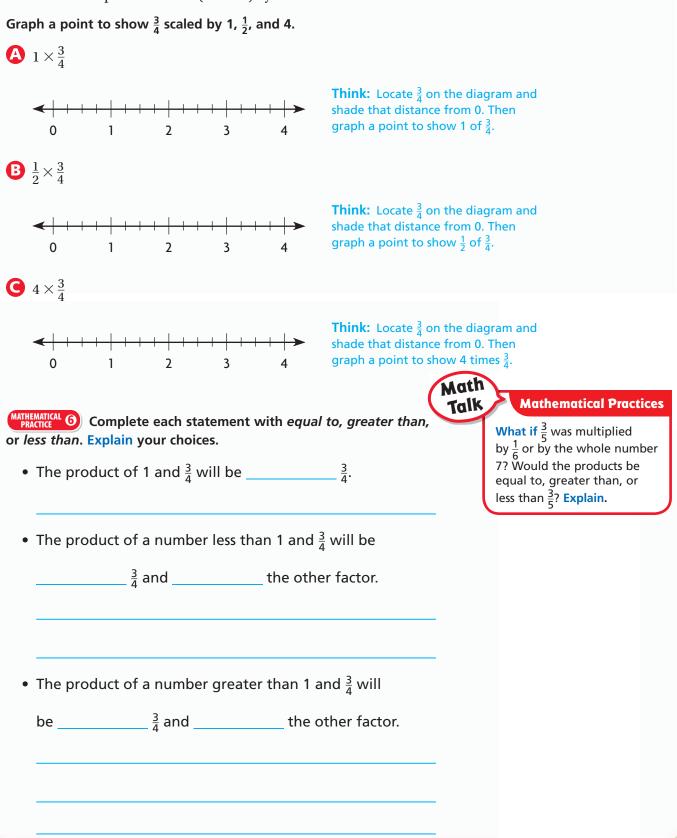
MATHEMATICAL PRACTICES

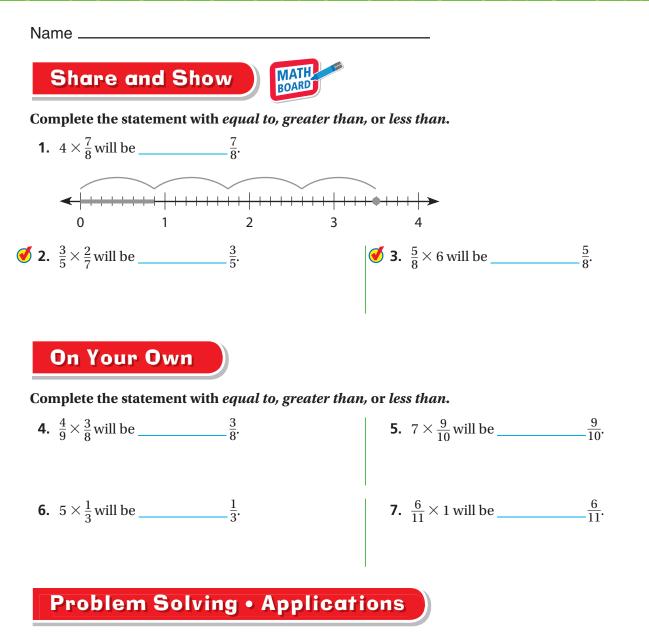
MP.3, MP.4, MP.5, MP.6

# Lesson **7.5**

# **Another Way** Use a diagram.

You can use a diagram to show the relationship between the products when a fraction is multiplied or scaled (resized) by a number.





- **8.** Peter is planning on spending  $\frac{2}{3}$  as many hours watching television this week as he did last week. Is Peter going to spend more hours or fewer hours watching television this week?
- **9. DEEPER** Mrs. Rodriguez has 18 packages of pens in stock at her store on Monday. On Tuesday, she has  $\frac{5}{6}$  the number of pens she had on Monday. On Wednesday, she has  $\frac{2}{5}$  of the number of pens she had on Tuesday. How many packages of pens does she have on Wednesday?
- **10. (MATHEMATICAL 2)** Represent a Problem Ariel goes running for  $\frac{5}{6}$  of an hour. The next day, she runs for  $\frac{3}{4}$  as much time. Does she spend more or less time running the second day? Draw a diagram or make a model to represent the problem.

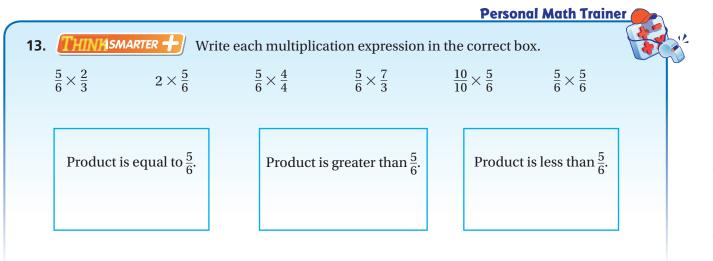
# Connect to Art

A scale model is a representation of an object with the same shape as the real object. Models can be larger or smaller than the actual object but are often smaller.

Architects often make scale models of the buildings or structures they plan to build. Models can give them an idea of how the structure will look when finished. Each measurement of the building is scaled up or down by the same factor.

Bob is building a scale model of his bike. He wants his model to be  $\frac{1}{5}$  as long as his bike.

- **11.** If Bob's bike is 60 inches long, how long will his model be?
- 12. **THIMASMARTER** If one wheel on Bob's model is 4 inches across, how many inches across is the actual wheel on his bike? Explain.









MATHEMATICAL PRACTICES

Name \_

PUnlock the Problem 🖁

Essential Question How do you multiply fractions?

**Fraction Multiplication** 

Sasha has  $\frac{3}{5}$  of a scarf left to knit. If she finishes  $\frac{1}{2}$  of that today, how much of the scarf will Sasha knit today?

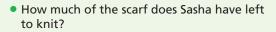
Multiply.  $\frac{1}{2} \times \frac{3}{5}$ 

# 

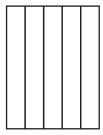
- Shade  $\frac{3}{5}$  of the model yellow.
- Draw a horizontal line across the rectangle to show 2 equal parts.
- Shade  $\frac{1}{2}$  of the yellow sections blue.
- Count the sections that are shaded twice and write a fraction for the parts of the whole that are shaded twice.

 $\frac{1}{2} \times \frac{3}{5} =$ 

• Compare the numerator and denominator of the product with the numerators and denominators of the factors. **Describe** what you notice.



• Of the fraction that is left, how much will she finish today?



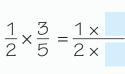


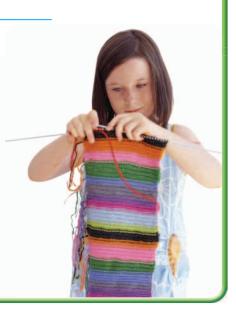
You can multiply fractions without using a model.

• Multiply the numerators.

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- Multiply the denominators.
- So, Sasha will knit \_\_\_\_\_ of the scarf today.

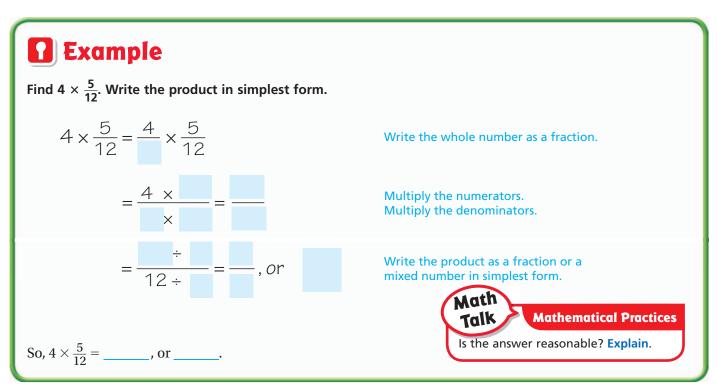




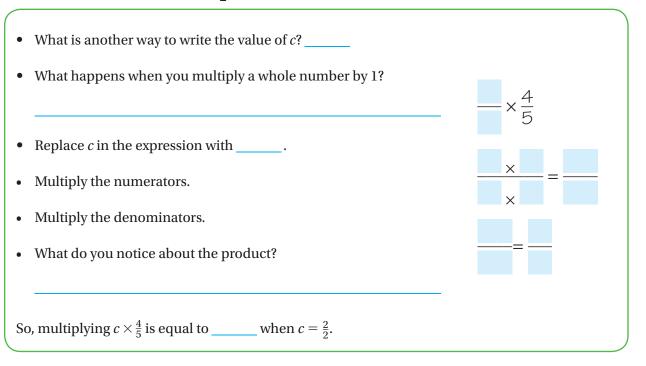


Number and Operations— Fractions—5.NF.4a, 5.NF.5b

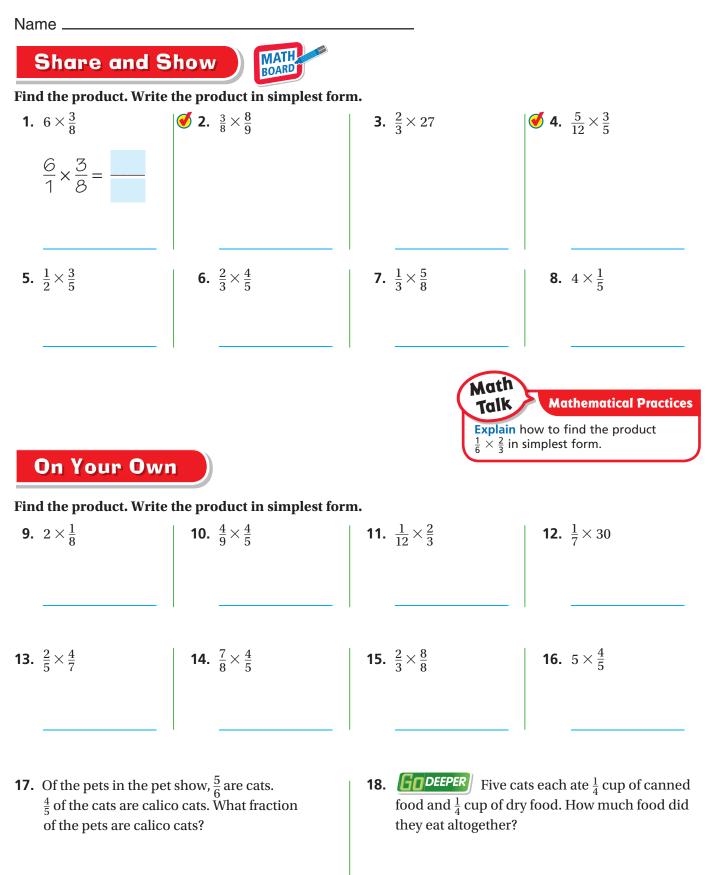
Also 5.NF.5a MATHEMATICAL PRACTICES MP.5, MP.7, MP.8 **CONNECT** Remember you can write a whole number as a fraction with a denominator of 1.



### **Try This!** Evaluate $c \times \frac{4}{5}$ for $c = \frac{2}{2}$ .



• MATHEMATICAL **(B)** Use Reasoning Will you get the same result if you multiply  $\frac{4}{5}$  by any fraction with a numerator and denominator that are the same digit? Explain.



#### MATHEMATICAL PRACTICES

# **Problem Solving • Applications**

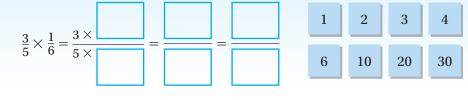
Speedskating is a popular sport in the Winter Olympics. Many young athletes in the U.S. participate in speedskating clubs and camps.

- **19.** At a camp in Green Bay, Wisconsin,  $\frac{7}{9}$  of the participants were from Wisconsin. Of that group,  $\frac{3}{5}$  were 12 years old. What fraction of the group was from Wisconsin and 12 years old?
- **20. THIMASMARTER** Maribel wants to skate  $1\frac{1}{2}$  miles on Monday. If she skates  $\frac{9}{10}$  mile Monday morning and  $\frac{2}{3}$  of that distance Monday afternoon, will she reach her goal? Explain.



**21. PRACTICE Quantitatively** On the first day of camp,  $\frac{5}{6}$  of the skaters were beginners. Of the beginners,  $\frac{1}{3}$  were girls. What fraction of the skaters were girls and beginners? Explain why your answer is reasonable.

**22. THIMASMARTER** A scientist had  $\frac{3}{5}$  liter of solution. He used  $\frac{1}{6}$  of the solution for an experiment. How much solution did the scientist use for the experiment? Use the numbers on the tiles to complete the calculations. You may use numbers more than once or not at all.







# **Concepts and Skills**

- **1. Explain** how you would model  $5 \times \frac{2}{3}$ . (5.NF.4a)
- **2.** When you multiply  $\frac{2}{3}$  by a fraction less than one, how does the product compare to the factors? **Explain**. (5.NF.5a)

Find the product. Write the product in simplest form. (5.NF.4a, 5.NF.4b)

<b>3.</b> $\frac{2}{3} \times 6$	<b>4.</b> $\frac{4}{5} \times 7$	<b>5.</b> $8 \times \frac{5}{7}$
<b>6.</b> $\frac{7}{8} \times \frac{3}{8}$	<b>7.</b> $\frac{1}{2} \times \frac{3}{4}$	<b>8.</b> $\frac{7}{8} \times \frac{4}{7}$
<b>9.</b> $2 \times \frac{3}{11}$	<b>10.</b> $\frac{5}{8} \times \frac{2}{3}$	<b>11.</b> $\frac{7}{12} \times 8$
<b>Complete the statement with </b> <i>equ</i> <b>12.</b> $3 \times \frac{2}{3}$ will be	ual to, greater than, or less than. (5.NF. 3. $13. \frac{5}{7} \times 3$ will be	5a) e57.

**14.** There is  $\frac{5}{6}$  of an apple pie left from dinner. Tomorrow, Victor plans to eat  $\frac{1}{6}$  of the pie that was left. How much of the whole pie will he eat tomorrow? (5.NF.4a)

**15.** Everett and Marie are going to make fruit bars for their family reunion. They want to make 4 times the amount the recipe makes. If the recipe calls for  $\frac{2}{3}$  cup of oil, how much oil will they need? (5.NF.5a)

**16.** Matt made the model below to help him solve his math problem. Write an expression that matches Matt's model. (5.NF.4b)

Name	Lesson 7.7
Area and Mixed Numbers Essential Question How can you use a unit tile to find the area of a rectangle with fractional side lengths?	Number and Operations— Fractions—5.NF.4b MATHEMATICAL PRACTICES MP.2, MP.4, MP.5, MP.6
<ul> <li>Investigate</li> <li>You can use square tiles with side lengths that are unit fractions to find the area of a rectangle.</li> <li>Li wants to cover the rectangular floor of her closet with tile. The floor is 2<sup>1</sup>/<sub>2</sub> feet by 3<sup>1</sup>/<sub>2</sub> feet. She wants to use the fewest tiles possible and doesn't want to cut any tiles. The tiles come in three sizes: 1 foot by 1 foot, <sup>1</sup>/<sub>2</sub> foot by <sup>1</sup>/<sub>2</sub> foot, and <sup>1</sup>/<sub>4</sub> foot by <sup>1</sup>/<sub>4</sub> foot. Choose the tile that Li should use. What is the area of the closet floor?</li> <li>A. Choose the largest tile Li can use to tile the floor of the closet and avoid gaps or overlaps.</li> </ul>	$1 \text{ ft} \qquad \frac{1}{2} \text{ ft} \qquad \frac{1}{4} \text{ ft} \\ \frac{1}{2} \text{ ft} \qquad \frac{1}{4} \text{ ft}$
<ul> <li>Which square tile should Li choose? Explain.</li> <li>B. On the grid, let each square represent the dimensions of the tile you chose. Then draw a diagram of the floor.</li> </ul>	
<ul><li>Count the squares in your diagram.</li><li>How many squares cover the diagram?</li></ul>	
<ul> <li>. What is the area of the tile you chose?</li> <li>. Since 1 square on your diagram represents an area of squares is,</li> </ul>	uare foot,
An action fact	Mathematical Practices Explain how you found the area of the tile you chose.

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# **STEP 4** Find the area of each section.

STEP 5 Add the area of each section to find the total area of the rectangle.

So, the product of  $1\frac{3}{5} \times 2\frac{3}{4}$  is \_\_\_\_\_.

**STEP 2** Draw an area model to show the original multiplication problem.

broke apart the mixed numbers in Step 1.

**STEP 3** Draw dashed lines and label each section to show how you

 $1\frac{3}{5} = \_$   $2\frac{3}{4} = \_$ 

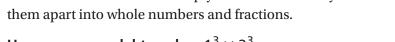
Sometimes it is easier to multiply mixed numbers if you break

Make Connections

 $\frac{1}{2}$  foot by  $\frac{1}{2}$  foot tile?

- and a fraction.
- STEP 1 Rewrite each mixed number as the sum of a whole number

- them apart into whole numbers and fractions.
- Use an area model to solve.  $1\frac{3}{5}\times 2\frac{3}{4}$



 $\frac{1}{2}$  foot **4.** How could you find the number of  $\frac{1}{4}$  foot by  $\frac{1}{4}$  foot tiles needed to cover the same closet floor?  $\frac{1}{2}$  foot

1. Using the formula for area, write a multiplication expression that could be used to find the area of the floor.

fractions greater than 1 and calculate the area. Is it the same as what you

2. **MATHEMATICAL Write an Expression** Rewrite the expression with

**3.** How many  $\frac{1}{4}$  foot by  $\frac{1}{4}$  foot tiles would Sonja need to cover one



found using the model?

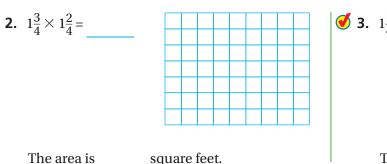
**Share and Show** 

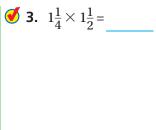


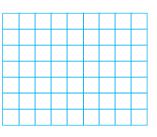
Use the grid to find the area. Let each square represent  $\frac{1}{3}$  meter by  $\frac{1}{3}$  meter.

- **1.**  $1\frac{2}{3} \times 1\frac{1}{3}$ 
  - Draw a diagram to represent the dimensions.
  - How many squares cover the diagram?\_\_\_\_\_\_
  - What is the area of each square?

# Use the grid to find the area. Let each square represent $\frac{1}{4}$ foot by $\frac{1}{4}$ foot.







The area is \_\_\_\_\_\_ square feet.

### Use an area model to solve.

- 4.  $1\frac{3}{4} \times 2\frac{1}{2}$ 5.  $1\frac{3}{8} \times 2\frac{1}{2}$ 6.  $1\frac{1}{9} \times 1\frac{2}{3}$
- C Houghton Mifflin Harcourt Publishing Company
- 7. **MATHEMATICAL 2** Use Reasoning Explain how finding the area of a rectangle with whole-number side lengths compares to finding the area of a rectangle with fractional side lengths.

# Problem Solving • Applications

### **THINKASMARTER** Pose a Problem

8. Terrance is designing a garden. He drew this diagram of his garden.Pose a problem using mixed numbers that can be solved using his diagram.

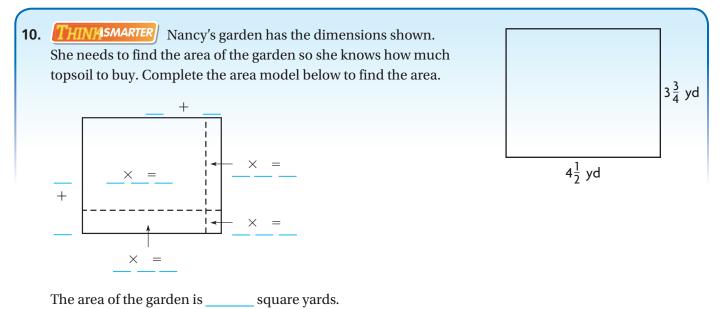


### Pose a Problem.

### Solve your problem.



**9. DEEPER** Tucker's bedroom is a rectangle that measures  $3\frac{1}{3}$  yards by  $4\frac{1}{2}$  yards. His dad buys two area rugs that each has a length of 4 yards. One rug has an area of 16 square yards. The other is 12 square yards. Which rug will fit Tucker's room? Explain.



#### Name \_

# **Compare Mixed Number Factors**

### and Products

Essential Question How does the size of the product compare to the size of one factor when multiplying fractions greater than one?

# **P**Unlock the Problem

You can make general statements about the relative size of a product when one factor is equal to 1, less than 1, or greater than 1.

# **One Way** Use a model.

Sherise has a recipe that requires  $1\frac{1}{4}$  cups of flour. She wants to know how much flour she would need if she made the recipe as written, if she made half the recipe, and if she made  $1\frac{1}{2}$  times the recipe.

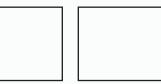
### Shade the models to show $1\frac{1}{4}$ scaled by 1, by $\frac{1}{2}$ , and by $1\frac{1}{2}$ .

 $\bigcirc 1 \times 1\frac{1}{4}$ 

Think: I can use what I know about the Identity Property.

What can you say about the product when  $1\frac{1}{4}$  is multiplied by 1?

**B**  $\frac{1}{2} \times 1\frac{1}{4}$ 



Think: The product will be half of what I started with.

What can you say about the product when  $1\frac{1}{4}$  is multiplied by a

fraction less than 1?

$$1\frac{1}{2} \times 1\frac{1}{4} = \left(1 \times 1\frac{1}{4}\right) + \left(\frac{1}{2} \times 1\frac{1}{4}\right)$$



What can you say about the product when  $1\frac{1}{4}$  is

multiplied by a number greater than 1?

+



Math

Think: The product will be what I started with and  $\frac{1}{2}$  more.

**Mathematical Practices** Talk Explain your answer to part C.

## Lesson 7.8



Number and Operations— Fractions—5.NF.5a, 5.NF.5b MATHEMATICAL PRACTICES MP.5, MP.6

**CONNECT** You can also use a diagram to show the relationship between the products when a fraction greater than one is multiplied or scaled (resized) by a number.

# 

Jake wants to train for a road race. He plans to run  $2\frac{1}{2}$  miles on the first day. On the second day, he plans to run  $\frac{3}{5}$  of the distance he runs on the first day. On the third day, he plans to run  $1\frac{2}{5}$  of the distance he runs on the first day. Which distance is greater: the distance on day 2 when he runs  $\frac{3}{5}$  of  $2\frac{1}{2}$  miles, or the distance on day 3 when he runs  $1\frac{2}{5}$  of  $2\frac{1}{2}$  miles?

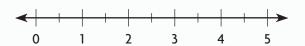
Graph a point on the diagram to show the size of the product. Then complete the statement with *equal to, greater than,* or *less than*.





• The product of 1 and  $2\frac{1}{2}$  will be \_\_\_\_\_  $2\frac{1}{2}$ .

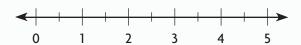
 $1 \times 2\frac{1}{2}$ 



• The product of a number less than 1 and  $2\frac{1}{2}$ 

is \_\_\_\_\_2 $\frac{1}{2}$ .

**C**  $1\frac{2}{5} \times 2\frac{1}{2} = \left(1 \times 2\frac{1}{2}\right) + \left(\frac{2}{5} \times 2\frac{1}{2}\right)$ 



• The product of a number greater than 1 and  $2\frac{1}{2}$  will

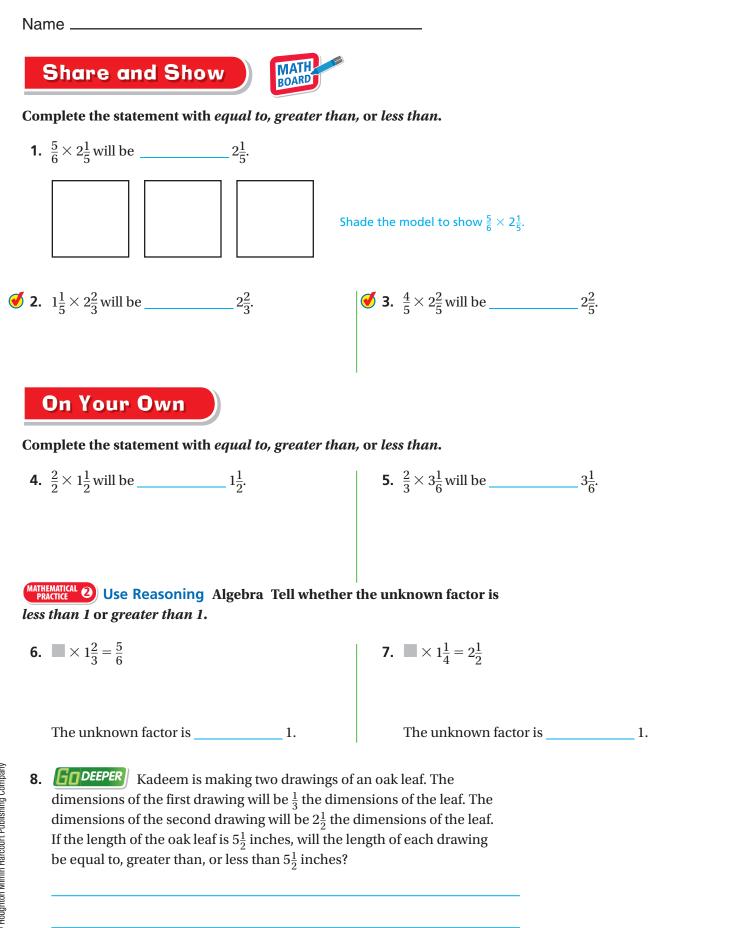


So, \_\_\_\_\_ of \_\_\_\_\_ miles is a greater distance than \_\_\_\_\_ of \_\_\_\_\_ miles.

**Think:** Locate  $2\frac{1}{2}$  on the diagram and shade that distance. Then graph a point to show 1 of  $2\frac{1}{2}$ .

**Think:** Locate  $2\frac{1}{2}$  on the diagram and shade that distance. Then graph a point to show  $\frac{3}{5}$  of  $2\frac{1}{2}$ .

**Think:** Locate  $2\frac{1}{2}$  on the diagram and shade that distance. Then graph a point to show 1 of  $2\frac{1}{2}$ and  $\frac{2}{5}$  more of  $2\frac{1}{2}$ .



O Houghton Mifflin Harcourt Publishing Company

he rode  $1\frac{1}{3}$  times as far as he rode on Friday. On Sunday he rode  $\frac{5}{6}$  times as

far as	he rode on Friday. For numbe	rs 11a-11d, selec	t True or False for each statement.
11a.	Stuart rode more miles on Sa rode on Friday.	turday than he	
	10 u0 011 1 1 uu j	○ True	○ False
11b.	Stuart rode more miles on Fr he rode on Saturday and Sun		
		○ True	○ False

### 11c. Stuart rode fewer miles on Sunday than he rode on Friday.

 $\bigcirc$  True  $\bigcirc$  False

11d. Stuart rode more miles on Sunday than he rode on Saturday.

○ True ○ False

# Problem Solving • Applications (World)

9. MATHEMATICAL 9 Verify the Reasoning of Others Penny wants to make a model of a beetle that is larger than life-size. Penny says she is going to use a scaling factor of  $\frac{7}{12}$ . Does this make sense? Explain.

**10. IDENTIFY** Shannon, Mary, and John earn a weekly allowance. Shannon earns an amount that is  $\frac{2}{3}$  of what John earns. Mary earns an amount that is  $1\frac{2}{3}$  of what John earns. John earns \$20 a week. Who earns the greatest allowance? Who earns the least? Math

# **Multiply Mixed Numbers**

Essential Question How do you multiply mixed numbers?

# Vullock the Problem (Real World



One-third of a  $1\frac{1}{4}$  acre park has been reserved as a dog park. Find the number of acres that are used as a dog park.

Multiply.  $\frac{1}{3} \times 1\frac{1}{4}$ 



**STEP 1** Shade the model to represent the whole park.

Think: The whole park is \_\_\_\_\_ acres.

**STEP 2** Shade the model again to represent the part of the park that is a dog park.

Think: The dog park is \_\_\_\_\_ of the park.

Draw horizontal lines across each rectangle to show \_\_\_\_\_

- How many parts does each rectangle show?
- What fraction of each rectangle is shaded twice?



• What fraction represents all the parts which are shaded twice?

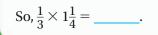


So, \_\_\_\_\_ acre has been set aside.

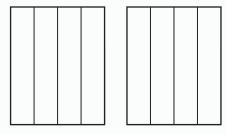
# **Another Way** Rename the mixed number as a fraction.

**STEP 1** Write the mixed number as a fraction greater than 1.

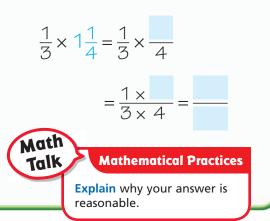
**STEP 2** Multiply the fractions.



# • Is the area of the dog park less than or greater than the area of the $1\frac{1}{4}$ acre park?





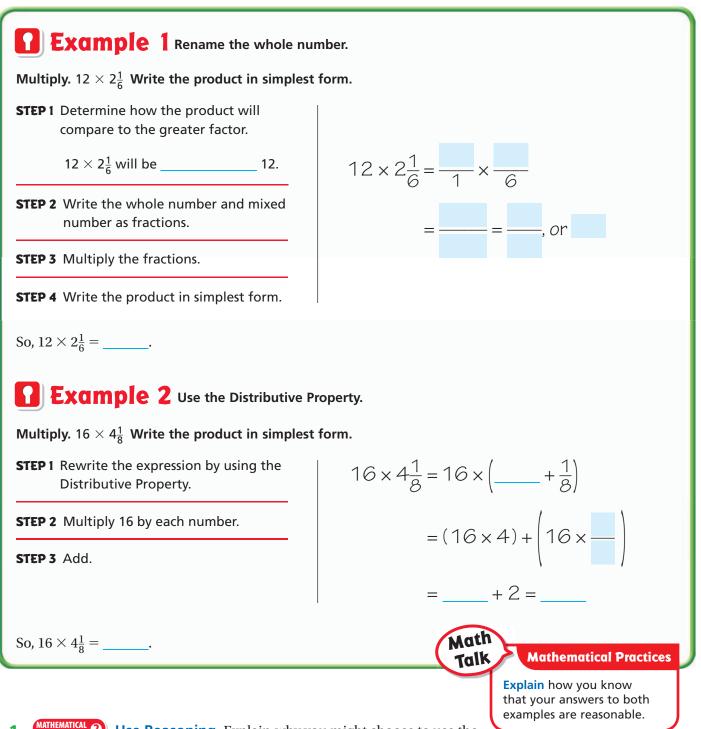


# Chapter 7 341

# Lesson 7.9



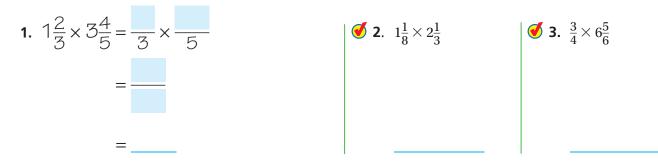
MP.1, MP.2, MP.4



- **1.** MATHEMATICAL **2** Use Reasoning Explain why you might choose to use the Distributive Property to solve Example 2.
- **2.** When you multiply two factors greater than 1, is the product less than, between, or greater than the two factors? Explain.



Find the product. Write the product in simplest form.



MATH BOARD

### Use the Distributive Property to find the product.

4.  $16 \times 2\frac{1}{2}$ 

5.	$1\frac{4}{5} \times$	15
----	-----------------------	----

# On Your Own

Find the product. Write the product in simplest form.



**10. THINASMARTER** The table shows how many hours some students worked on their math project.

April worked  $1\frac{1}{2}$  times longer on her math project than Carl. Debbie worked  $1\frac{1}{4}$  times longer than Sonia. Richard worked  $1\frac{3}{8}$  times longer than Tony. Match each student's name to the number of hours he or she worked on the math project.



Math Project		
Name	Hours Worked	
Carl	5 <u>1</u>	
Sonia	6 <u>1</u>	
Tony	5 <u>2</u> 3	

# Connect to Health

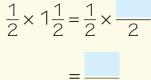
### **CHANGING RECIPES**

You can make a lot of recipes more healthful by reducing the amounts of fat, sugar, and salt.

Kelly has a muffin recipe that calls for  $1\frac{1}{2}$  cups of sugar. She wants to use  $\frac{1}{2}$  that amount of sugar. How much sugar will she use?

Multiply  $1\frac{1}{2}$  by  $\frac{1}{2}$  to find what part of the original amount of sugar to use.

Write the mixed number as a fraction greater than 1.



SUGAR

Multiply.

So, Kelly will use \_\_\_\_\_ cup of sugar.

**11.** PRACTICE O **Describe a Method** Tony's recipe for soup calls for  $1\frac{1}{4}$  teaspoons of salt. He wants to use  $\frac{1}{2}$  that amount. How much salt will he use? Describe how you found your answer.

- **12. DEEPER** Jeffrey's recipe for oatmeal muffins calls for  $2\frac{1}{4}$  cups of oatmeal and makes one dozen muffins. If he makes  $1\frac{1}{2}$  dozen muffins for a club meeting and 2 dozen muffins for a family reunion, how much oatmeal will he use?
- **13. IDENTIFY** Cara's muffin recipe calls for  $1\frac{1}{2}$  cups of flour for the muffins and  $\frac{1}{4}$  cup of flour for the topping. If she makes  $\frac{1}{2}$  of the original recipe, how much flour will she use?



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# **Problem Solving • Find Unknown Lengths**

Essential Question How can you use the strategy guess, check, and revise to solve problems with fractions?

# **PROBLEM SOLVING** Lesson 7.10



Number and Operations— Fractions—5.NF.4b, 5.NF.6 MATHEMATICAL PRACTICES MP.1, MP.4, MP.6

# Unlock the Problem

Sara wants to design a rectangular garden with a section for flowers that attract butterflies. She wants the area of this section to be  $\frac{3}{4}$  square yard. If she wants the width to be  $\frac{1}{3}$  the length, what will the dimensions of the butterfly section be?



What information do I

### What do I need to find?

I need to find \_\_\_\_\_

The part of the garden for

need to use?

butterflies has an area of

\_\_\_\_ square yard and the

width is the length.

### How will I use the information?

I will the sides of the

butterfly area. Then I will

my guess and \_\_\_\_\_ it if it is

not correct.

## Solve the Problem

I can try different lengths and calculate the widths by finding  $\frac{1}{3}$  the length. For each length and width, I find the area and then compare. If the product is less than or greater than  $\frac{3}{4}$  square yard, I need to revise the length.

Guess		Check	Revise
Length (in yards)	Width (in yards) $(\frac{1}{3}$ of the length)	Area of Butterfly Garden (in square yards)	
$\frac{3}{4}$	$\frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$	$\frac{3}{4} \times \frac{1}{4} = \frac{3}{16}$ too low	Try a longer length.
$2\frac{1}{4}$ , or $\frac{9}{4}$			

So, the dimensions of Sara's butterfly garden will be \_\_\_\_\_ yard by \_\_\_\_\_ yards.

Try Another Problem

Marcus is building a rectangular box for his kitten to sleep in. He wants the area of the bottom of the box to be 360 square inches and the length of one side to be  $1\frac{3}{5}$  the length of the other side. What should the dimensions of the bottom of the bed be?



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						
So, the dimensions of the bottom of the kitten's bed will be by • $(MATHEMATICAL \odot)$ Apply What if the longer side was still $1\frac{3}{5}$ the length of the shorter side and the shorter side was 20 inches long? What would the area of						

the bottom of the bed be then?

#### Name \_

### **Share and Show**



1. When Pascal built a dog house, he knew he wanted the floor of the house to have an area of 24 square feet. He also wanted the width to be  $\frac{2}{3}$  the length. What are the dimensions of the dog house?

First, choose two numbers that have a product of 24.

Guess: \_\_\_\_\_ feet and \_\_\_\_\_ feet

**Then,** check those numbers. Is the greater number  $\frac{2}{3}$  of the other number?

Check:  $\frac{2}{3} \times \underline{\qquad} = \underline{\qquad}$ 



**Finally,** if the guess is not correct, revise it and check again. Continue until you find the correct answer.

So, the dimensions of the dog house are \_

- **2.** What if Pascal wanted the area of the floor to be 54 square feet and the width still to be  $\frac{2}{3}$  the length? What would the dimensions of the floor be?
- **3.** Leo wants to paint a mural that covers a wall with an area of 1,440 square feet. The height of the wall is  $\frac{2}{5}$  of its length. What is the length and the height of the wall?

# **On Your Own**

- **4. GODEFPER** Barry wants to make a drawing that is  $\frac{1}{4}$  the size of the original. If a tree in the original drawing is 14 inches tall and 5 inches wide, what will be the length and width of the tree in Barry's drawing?
- **5. ITEMARTER** A blueprint is a scale drawing of a building. The dimensions of the blueprint for Patricia's doll house are  $\frac{1}{4}$  of the measurements of the actual doll house. The floor of the doll house has an area of 864 square inches. If the width of the doll house is  $\frac{2}{3}$  the length, what are the dimensions of the floor on the blueprint of the doll house?



WRITE Math 
 Show Your Work 
 · · · ·

6. **WATHEMATICAL (b)** Verify the Reasoning of Others Beth wants the floor of her tree house to be 48 square feet. She wants the length to be  $\frac{3}{4}$  the width. Using the strategy guess, check, and revise, Beth guesses the dimensions will be 4 feet by 12 feet. Is Beth's guess the correct dimensions? Explain.

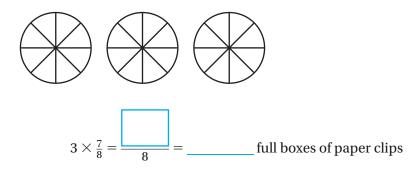
- 7. **THINMASMARTER** Sally has a photograph that has an area of 35 square inches. She creates two enlargements of the photograph. The enlargements have areas of 140 square inches and 560 square inches. In each photograph, the length is  $1\frac{2}{5}$  times the width. Select which of the following could be the dimensions of the original photograph or one of the enlargements. Mark all that apply.
  - A 5 inches by 7 inches
  - **B** 20 inches by 28 inches
  - C 7 inches by 20 inches
  - **D** 21 inches by 15 inches
  - **E** 10 inches by 14 inches

**FOR MORE PRACTICE:** Standards Practice Book

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1. Mrs. Williams is organizing her office supplies. There are 3 open boxes of paper clips in her desk drawer. Each box has  $\frac{7}{8}$  of the paper clips remaining. How many boxes of paper clips are left? Shade the model and complete the calculations below to show how you found your answer.



**2.** Diana worked on her science project for  $5\frac{1}{3}$  hours. Gabe worked on his science project  $1\frac{1}{4}$  times as long as Diana. Paula worked on her science project  $\frac{3}{4}$  times as long as Diana. For numbers 2a-2d, select True or False for each statement.

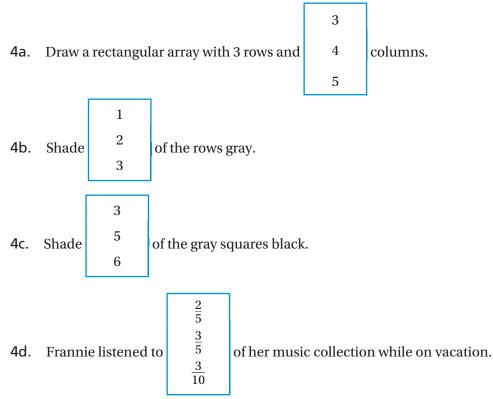
2a.	Diana worked longer on her science project than Gabe worked on his		
	science project.	O True	○ False
2b.	Paula worked less on her science project than Diana worked on her		
	science project.	O True	○ False
2c.	Gabe worked longer on his science project than Paula worked on her		
	science project.	O True	○ False
2d.	Gabe worked longer on his science project than Diana and		
	Paula combined.	○ True	○ False

**3.** Louis wants to carpet the rectangular floor of his basement. The basement has an area of 864 square feet. The width of the basement is  $\frac{2}{3}$  its length. What is the length of Louis's basement?

feet



**4.** Frannie put  $\frac{2}{3}$  of her music collection on an mp3 player. While on vacation, she listened to  $\frac{3}{5}$  of the music on the player. How much of Frannie's music collection did she listen to while on vacation? For numbers 4a-4d, choose the correct values to describe how to solve the problem.



**5.** Logan bought 15 balloons. Four-fifths of the balloons are purple. How many of the balloons are purple? Draw a model to show how you found your answer.



- **6.** Kayla walks  $3\frac{2}{5}$  miles each day. Which of the following statements correctly describe how far she walks? Mark all that apply.
  - **A** Kayla walks  $14\frac{2}{5}$  miles in 4 days.
  - **B** Kayla walks  $23\frac{4}{5}$  miles in 7 days.
  - C Kayla walks 34 miles in 10 days.
  - **D** Kayla walks  $102\frac{2}{5}$  miles in 31 days.

7. Write each multiplication expression in the correct box.

$\frac{4}{5} \times 1\frac{1}{8}$	$\frac{1}{3} \times \frac{4}{5}$	$3  imes rac{4}{5}$	$\frac{4}{5} \times \frac{4}{5}$	$\frac{8}{8}$	$\times \frac{4}{5}$	$\frac{4}{5} \times \frac{2}{2}$
Product i to $\frac{4}{5}$ .	s equal	Produ greate	ect is $er than \frac{4}{5}$ .		Prod than	luct is less $\frac{4}{5}$ .

- 8. A postcard has an area of 24 square inches. Two enlargements of the postcard have areas of 54 square inches and 96 square inches. In each postcard, the length is  $1\frac{1}{2}$  times the width. Which of the following could be the dimensions of the postcard or one of the enlargements? Mark all that apply.
  - A 6 inches by 9 inches D 6 inches by 12 inches
  - **B** 10 inches by 15 inches **E** 4 inches by 6 inches
  - C 8 inches by 12 inches
- **9.** In a fifth grade class,  $\frac{4}{5}$  of the girls have brown hair. Of the brown-haired girls,  $\frac{3}{4}$  of them have long hair. Of the girls with long brown hair,  $\frac{1}{3}$  of them have green eyes.

#### Part A

What fraction of the girls in the class have long brown hair?

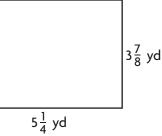
\_\_\_\_ of the girls

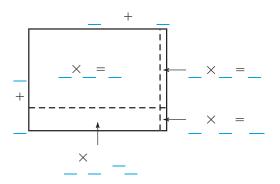
#### Part B

What fraction of the girls in the class have long brown hair and green eyes? Explain how you found your answer.

\_\_\_\_\_ of the girls

**10.** Caleb's family room has the dimensions shown. He needs to find the area of the room so that he knows how much carpet to buy. Complete the area model below to find the area of the family room.





area of the room = \_\_\_\_\_\_square yards

**11.** Doreen lives  $\frac{3}{4}$  mile from the library. Sheila lives  $\frac{1}{3}$  as far away from the library as Doreen. For numbers 11a–11c, choose Yes or No to answer each question.

11a.	Does Doreen live farther from the library than Sheila?	○ Yes	O No
11b.	Does Sheila live $\frac{1}{4}$ mile from the library?	○ Yes	O No
11c.	Does Sheila live twice as far from the library than Doreen?	○ Yes	O No

- **12.** Taniqua took a test that had 20 multiple-choice questions and 10 True/False questions. She got  $\frac{9}{10}$  of the multiple-choice questions correct, and she got  $\frac{4}{5}$  of the True/False questions correct.
  - 12a. How many multiple-choice questions did Taniqua get correct?

\_\_\_\_\_ multiple-choice questions

12b. How many True/False questions did Taniqua get correct?

True/False questions

Name

**13.** The table shows how many hours some of the part-time employees at the toy store worked last week.

Name	Hours Worked
Conrad	$6\frac{2}{3}$
Giovanni	9 <u>1</u>
Sally	$10\frac{3}{4}$

This week, Conrad will work  $1\frac{3}{4}$  times longer than last week. Giovanni will work  $1\frac{1}{3}$  times longer than last week. Sally will work  $\frac{2}{3}$  the number of hours she worked last week. Match each employee's name to the number of hours he or she will work this week.

Employee	Hours This Week
Conrad •	• $7\frac{1}{6}$
Giovanni •	• $12\frac{2}{3}$
Sally •	• $11\frac{2}{3}$

**14.** Peggy is making a quilt using panels that are  $\frac{1}{2}$  foot by  $\frac{1}{2}$  foot. The quilt is  $5\frac{1}{2}$  feet long and 4 feet wide.

#### Part A

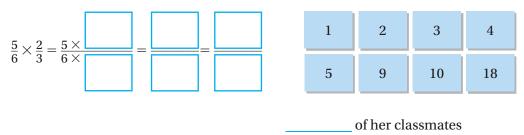
Let each square of the grid below represent  $\frac{1}{2}$  foot by  $\frac{1}{2}$  foot. Draw a rectangle on the grid to represent the quilt.

#### Part B

What is the area of the quilt? Explain how you found your answer.

square feet

**15.** Ruby conducted a survey and found that  $\frac{5}{6}$  of her classmates have a pet and  $\frac{2}{3}$  of those pets are dogs. What fraction of her classmates has dogs? Write a number from the number tiles in each box to complete the calculations shown below. You may use numbers more than once or not at all.



**16.** Robbie is using the recipe below to make chicken noodle soup. He plans to make 6 batches of the soup. He has  $\frac{2}{3}$  teaspoon of black pepper.

#### **Chicken Noodle Soup**

- 4 cups chicken broth
- 1 medium carrot, sliced
- 1 stalk celery, sliced
- $\frac{1}{2}$  cup uncooked egg noodles  $\frac{1}{8}$  teaspoon ground black pepper
- 1 cup shredded cooked chicken

#### Part A

Write an expression that Robbie can use to determine how much black pepper is needed for 6 batches.

#### Part B

Draw a model to show how Robbie can find the product from Part A.

#### Part C

Does Robbie have enough black pepper for 6 batches of the soup? Explain your reasoning.

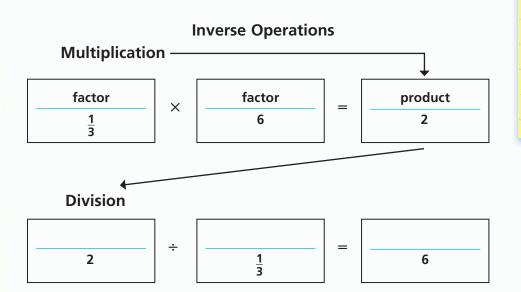
Chapter Divide Fractio	ns
Show What Y	ou Know
Check your understandi	ng of important skills.
Name	
Part of a Group Write a fraction that name	s the shaded part.
1. total counters	<b>2</b> . total groups $\Delta_{\Lambda}$
shaded counters	
fraction	fraction
Relate Multiplication and Division Use in fact families to solve.	nverse operations and
<b>3.</b> Since $6 \times 4 = 24$ ,	<b>4.</b> Since $\times$ 8 = 56,
then $\div 4 = 6.$	then $\div$ 7 = 8.
<b>5.</b> Since $9 \times 3 = $ ,	<b>6.</b> Since $\div 4 = 10$ ,
then $\div 3 = 9$ .	then $4 \times 10 =$
<b>Equivalent Fractions</b> Write an equivalent	fraction.
<b>7.</b> $\frac{16}{20}$ <b>8.</b> $\frac{3}{8}$	<b>9.</b> $\frac{5}{12}$ <b>10.</b> $\frac{25}{45}$
Detective	
Emily spent $\frac{1}{2}$ of her money at the grocery store.	
Then, she spent $rac{1}{2}$ of what was left at the bakery. Next, at the music store, she spent $rac{1}{2}$ of what was left	Parties and the second
on a CD that was on sale. She spent the remaining	
\$6.00 on lunch at the diner. Be a Math Detective and find how much money Emily started with.	A A A A A A A A A A A A A A A A A A A
and now much money ching started with.	



# **Vocabulary Builder**

### Visualize It •••••••

Complete the flow map using the review words.



Review Words	
dividend	
divisor	
equation	
fraction	
quotient	

# Understand Vocabulary ••••••••••

### Complete the sentences using the review words.

- **1.** The number that divides the dividend is the
- 2. An algebraic or numerical sentence that shows that two

quantities are equal is an \_\_\_\_\_.

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

is called a \_\_\_\_\_.

- **4.** The \_\_\_\_\_\_ is the number that is to be divided in a division problem.
- **5.** The \_\_\_\_\_\_ is the number, not including the remainder, that results from dividing.





. . . . . . . . . . . .

### Lesson 8.1

#### Name \_

### **Divide Fractions and Whole Numbers**

**Essential Question** How do you divide a whole number by a fraction and divide a fraction by a whole number?

# Investigate



Number and Operations— Fractions—5.NF.7a, 5.NF.7b Also 5.NF.7C

MATHEMATICAL PRACTICES MP.3, MP.5



- **A.** Mia walks a 2-mile fitness trail. She stops to exercise every  $\frac{1}{5}$  mile. How many times does Mia stop to exercise?
  - Draw a number line from 0 to 2. Divide the number line into fifths. Label each fifth on your number line.



• Skip count by fifths from 0 to 2 to find  $2 \div \frac{1}{5}$ .

There are \_\_\_\_\_ one-fifths in 2 wholes.

You can use the relationship between multiplication and division to explain and check your solution.

- Record and check the quotient.
  - $2 \div \frac{1}{5} = \underline{\qquad}$  because  $\underline{\qquad} \times \frac{1}{5} = 2$ .

So, Mia stops to exercise \_\_\_\_\_ times.

- **B.** Roger has 2 yards of string. He cuts the string into pieces that are  $\frac{1}{3}$  yard long. How many pieces of string does Roger have?
  - Model 2 using 2 whole fraction strips.
  - Then place enough  $\frac{1}{3}$  strips to fit exactly under the

2 wholes. There are \_\_\_\_\_ one-third-size pieces in 2 wholes.

• Record and check the quotient.

 $2 \div \frac{1}{3} = \underline{\qquad}$  because  $\underline{\qquad} \times \frac{1}{3} = 2$ .

So, Roger has \_\_\_\_\_ pieces of string.



# **Draw Conclusions**

- 1. When you divide a whole number by a fraction, how does the quotient compare to the dividend? Explain.
- **2. MATHEMATICAL (Second)** Apply Explain how knowing the number of fifths in 1 could help you find the number of fifths in 2.
- **3.** Describe how you would find  $4 \div \frac{1}{5}$ .

### **Make Connections**



You can use fraction strips to divide a fraction by a whole number.

Calia shares half of a package of clay equally among herself and each of 2 friends. What fraction of the whole package of clay will each friend get?

- **STEP 1** Place a  $\frac{1}{2}$  strip under a 1-whole strip to show the  $\frac{1}{2}$  package of clay.
- **STEP 2** Find 3 fraction strips, all with the same denominator, that fit exactly under the  $\frac{1}{2}$  strip.

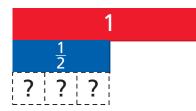
Each piece is \_\_\_\_\_ of the whole.

**STEP 3** Record and check the quotient.

 $\frac{1}{2} \div 3 =$ \_\_\_\_\_ because \_\_\_\_\_  $\times 3 = \frac{1}{2}$ .

So, each friend will get \_\_\_\_\_ of the whole package of clay.

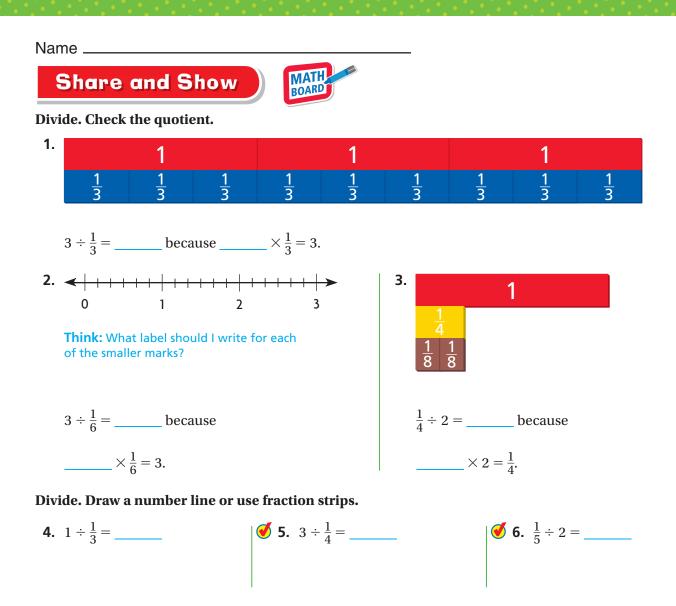




**Think:** How much of the whole is each piece when  $\frac{1}{2}$  is divided into 3 equal pieces?

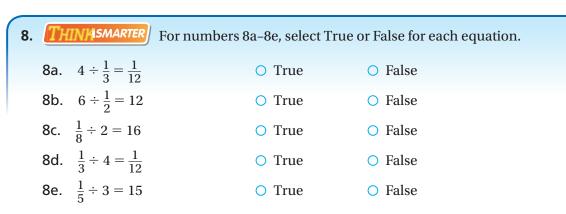


When you divide a fraction by a whole number, how does the quotient compare to the dividend? Explain.



### **Problem Solving • Applications**

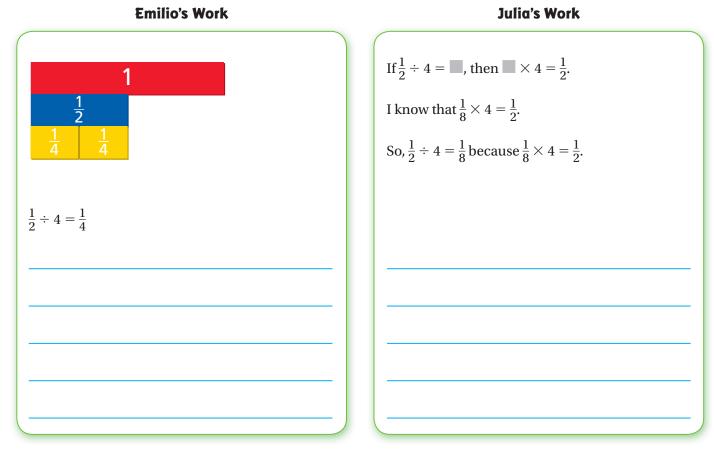
7. **EXAMPLE** Luke has  $\frac{1}{3}$  of a package of dried apricots. He divides the dried apricots equally into 3 small bags. Luke gives one of the bags to a friend and keeps the other two bags for himself. What fraction of the original package of dried apricots did Luke keep for himself?



### THINMSMARTER Sense or Nonsense?

**9.** Emilio and Julia used different ways to find  $\frac{1}{2} \div 4$ . Emilio used a model to find the quotient. Julia used a related multiplication equation to find the quotient. Whose answer makes sense? Whose answer is nonsense? Explain your reasoning.





- For the answer that is nonsense, describe how to find the correct answer.
- **10. MATHEMATICAL 9** Use a Concrete Model If you were going to find  $\frac{1}{2} \div 5$ , explain how you would find the quotient using fraction strips.

# **Problem Solving • Use Multiplication**

**Essential Question** How can the strategy *draw a diagram* help you solve fraction division problems by writing a multiplication sentence?

# **PROBLEM SOLVING** Lesson 8.2



Number and Operations— Fractions—5.NF.7b

MATHEMATICAL PRACTICES MP.1, MP.4, MP.5, MP.6

Unlock the Problem

Erica makes 6 submarine sandwiches and cuts each sandwich into thirds. How many  $\frac{1}{3}$ -size sandwich pieces does she have?



# **Read the Problem**

#### What do I need to find?

I need to find \_\_\_\_\_

#### What information do I need to use?

I need to use the size of each of

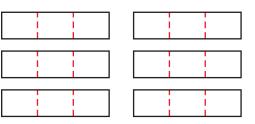
sandwich and the number of she cuts.

#### How will I use the information?

I can to organize the information from the problem. Then I can use the organized information to find

### **Solve the Problem**

Since Erica cuts 6 submarine sandwiches, my diagram needs to show 6 rectangles to represent the sandwiches. I can divide each of the 6 rectangles into thirds.



To find the total number of thirds in the 6 rectangles, I can multiply the number of thirds in each rectangle by the number of rectangles.



Math

So, Erica has one-third-size sandwich pieces.

**Mathematical Practices** Talk Explain how you can use multiplication to check your answer.

# **1** Try Another Problem

Roberto is cutting 3 blueberry pies into halves to give to his neighbors. How many neighbors will get  $\frac{1}{2}$  of a pie?



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, \_\_\_\_\_ neighbors will get  $\frac{1}{2}$  of a pie.

• **Explain** how the diagram you drew for the division problem helps you write a multiplication sentence.

# Share and Show



1. A chef has 5 blocks of butter. Each block weighs 1 pound. She cuts each block into fourths. How many  $\frac{1}{4}$ -pound pieces of butter does the chef have?

First, draw rectangles to represent the blocks of butter.

Then, divide each rectangle into fourths.

**Finally,** multiply the number of fourths in each block by the number of blocks.

So, the chef has \_\_\_\_\_ one-fourth-pound pieces of butter.

- **2.** What if the chef had 3 blocks of butter and cut the blocks into thirds? How many  $\frac{1}{3}$ -pound pieces of butter would the chef have?
- **3.** Holly cuts 3 ribbons into eighths for a craft project. How many  $\frac{1}{8}$ -size pieces of ribbon does she have?
  - **4.** Jason has 2 pizzas that he cuts into fourths. How many  $\frac{1}{4}$  -size pizza slices does he have?
  - **5.** Thomas makes 5 sandwiches that he cuts into thirds. How many  $\frac{1}{3}$ -size sandwich pieces does he have?

Show Your Work

### **On Your Own**

**6. INHIMASMARTER** Julie wants to make a drawing that is  $\frac{1}{4}$  the size of the original drawing. Sahil makes a drawing that is  $\frac{1}{3}$  the size of the original. A tree in the original drawing is 12 inches tall. What will be the difference between the height of the tree in Julie's and Sahil's drawings?



- **7.** Three friends go to a book fair. Allen spends \$2.60. Maria spends 4 times as much as Allen. Akio spends \$3.45 less than Maria. How much does Akio spend?
- 8. **EXAMPLE** Brianna has a sheet of paper that is 6 feet long. She cuts the length of paper into sixths and then cuts the length of each of these  $\frac{1}{6}$  pieces into thirds. How many pieces does she have? How many inches long is each piece?
- **9.** MATHEMATICAL **3** Use Repeated Reasoning Look back at Problem 8. Write a similar problem by changing the length of the paper and the size of the pieces.

	Personal Math Trainer
10.	<b>THINMSMARTER</b> + Adrian made 3 granola bars. He cut each bar
	into fourths. How many $\frac{1}{4}$ -size pieces of granola bar does Adrian have?
	Draw lines in the model to find the answer.
	Adrian has one-quarter-size pieces of granola bar.



### **Connect Fractions to Division**

Essential Question How does a fraction represent division?

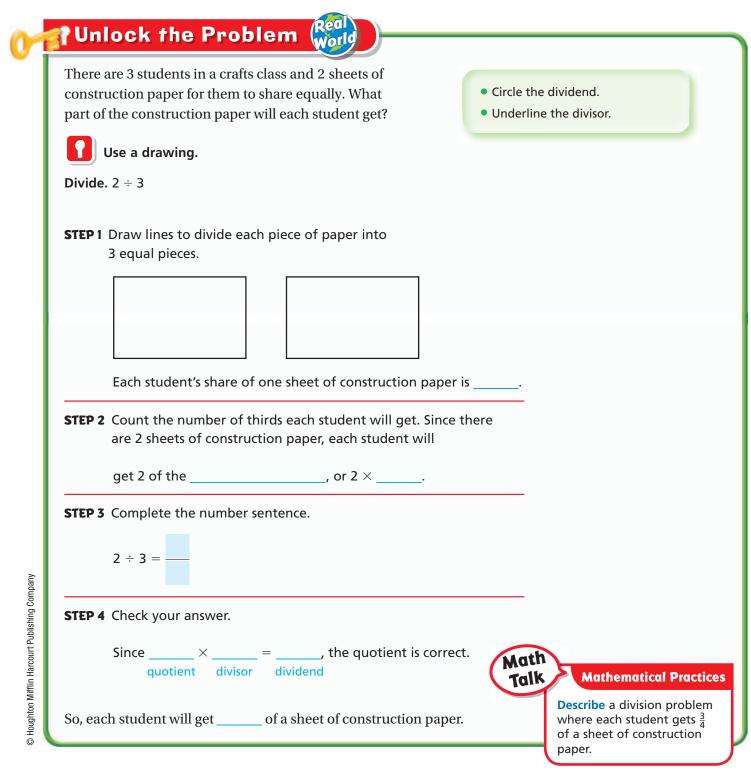
**CONNECT** A fraction can be written as a division problem.

$$\frac{3}{4} = 3 \div 4$$
  $\frac{12}{2} = 12 \div 2$ 



Number and Operations— Fractions—5.NF.3

MATHEMATICAL PRACTICES MP.2, MP.5, MP.6, MP.7



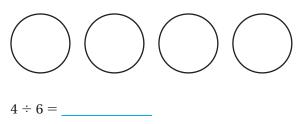
<b>Example</b>	
Four friends share 6 sheets of poster board equally. How many sheets of poster board does each friend get?	
Divide. 6 ÷ 4	
<b>STEP 1</b> Draw lines to divide each of the 6 sheets into fourths.	
Each friend's share of 1 sheet is	
<b>STEP 2</b> Count the number of fourths each friend gets. Since there are 6 sheets of poster board, each friend will	
get of the fourths, or	
<b>STEP 3</b> Complete the number sentence. Write the fraction as a mixed number in simplest form.	
6 ÷ 4 =, or	
STEP 4 Check your answer.	
Since $\times$ 4 =, the quotient is correct.	
So, each friend will get sheets of poster board.	Math Talk Describe a different way the sheets
Try This!	of poster board could have been divided into 4 equal shares.
Ms. Ruiz has a piece of string that is 125 inches long. For a scient experiment, she divides the string equally among 8 groups of stu How much string will each group get?	
You can represent this problem as a division equation or a fracti	ion.
• Divide. Write the remainder as a fraction. 125 $\div$ 8 =	
• Write $\frac{125}{8}$ as a mixed number in simplest form. $\frac{125}{8} =$	
So, each group will get inches of string.	
• <b>Evaluate</b> Explain why 125 ÷ 8 gives the same re	esult as $\frac{125}{8}$ .



#### Draw lines on the model to complete the number sentence.

MATH BOARD

**1.** Six friends share 4 small pizzas equally.

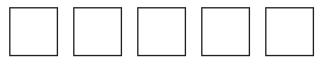


Each friend's share is \_\_\_\_\_ of a pizza.

#### Complete the number sentence to solve.

- **3.** Twelve friends share 3 melons equally. What fraction of a melon does each friend get?
  - 3 ÷ 12 = \_\_\_\_\_
  - Each friend's share is \_\_\_\_\_ of a melon.

#### 2. Four brothers share 5 packs of stickers equally.





Each brother's share is \_\_\_\_\_ packs of stickers.

✓4. Three students share 8 blocks of clay equally. How much clay does each student get?



Each student's share is \_\_\_\_\_ blocks of clay.



**6.** Eight girls share 5 fruit bars equally. What fraction of a fruit bar does each girl get?

 $5 \div 8 =$ \_\_\_\_\_

Each girl's share is \_\_\_\_\_ of a fruit bar.



# On Your Own

#### Complete the number sentence to solve.

- **5.** Four students share 7 feet of ribbon equally. How many feet of ribbon does each student get?
  - $7 \div 4 =$

Each student's share is \_\_\_\_\_\_ feet of ribbon.

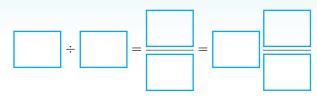
**7. THINKSMARTER** Eight students share 12 mini oatmeal muffins equally and 6 students share 15 mini apple muffins equally. Carmine is in both groups of students. What is the total number of mini muffins Carmine gets?

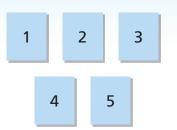
# Problem Solving • Applications 🖁

- **8.** Shawna has 3 adults and 2 children coming over. She is going to serve 2 small apple pies. If she plans to give each person, including herself, an equal amount of pie, how much pie will each person get?
- **9. GODEEPER** Addison brought 9 pounds of oranges and 7 pounds of cherries to make fruit salad for a fund raiser. She wants to package an equal amount of fruit salad into each of 12 containers. How much fruit salad should Addison put in each container?
- **10. MATHEMATICAL 2 Use Reasoning** Nine friends order 4 large pizzas. Four of the friends share 2 pizzas equally and the other 5 friends share 2 pizzas equally. In which group does each member get a greater amount of pizza? Explain your reasoning.



**11. THINASMARTER** Jason has 5 zucchinis he grew in his garden. He wants to share them equally among 3 of his neighbors. How many zucchinis will each neighbor get? Use the numbers to complete the number sentence. You may use a number more than once or not at all.



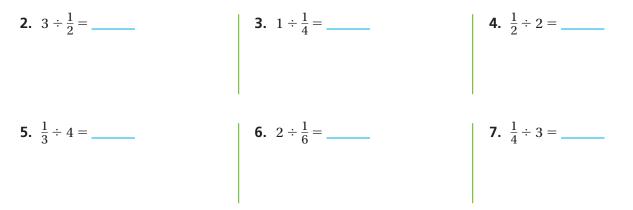




# **Concepts and Skills**

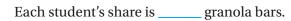
- **1.** Explain how you can tell, without computing, whether the quotient
  - $\frac{1}{2}$  ÷ 6 is greater than 1 or less than 1. (5.NF.7a, 5.NF.7b)

#### Divide. Draw a number line or use fraction strips. (5.NF.7a, 5.NF.7b)



#### Complete the number sentence to solve. (5.NF.3)

- 8. Two students share 3 granola bars equally. How many granola bars does each student get?
  - 3 ÷ 2 = \_\_\_\_\_



- **10.** Nine boys share 4 pizzas equally. What fraction of a pizza does each boy get?
  - 4 ÷ 9 = \_\_\_\_\_

Each boy's share is \_\_\_\_\_ of a pizza.

**9.** Five girls share 4 sandwiches equally. What fraction of a sandwich does each girl get?

 $4 \div 5 =$ \_\_\_\_\_



**11.** Four friends share 10 fruit bars equally. How many fruit bars does each friend get?

10 ÷ 4 = \_\_\_\_\_

Each friend's share is \_\_\_\_\_ fruit bars.

**12.** Mateo has 8 liters of punch for a party. Each glass holds  $\frac{1}{5}$  liter of punch. How many glasses can Mateo fill with punch? (5.NF.7b)

<b>└</b>	 <b>└</b>	-	-	-

**13.** Four friends share 3 sheets of construction paper equally. What fraction of a sheet of paper does each friend get? (5.NF.3)

<b></b>		

**14.** Caleb and 2 friends are sharing  $\frac{1}{2}$  quart of milk equally. What fraction of a quart of milk does each of the 3 friends get? (5.NF.7a)

**15.** Makayla has 3 yards of ribbon to use for a craft project. She cuts the ribbon into pieces that are  $\frac{1}{4}$  yard long. How many pieces of ribbon does Makayla have? (5.NF.7b)

#### Name .

### **Fraction and Whole-Number Division**

**Essential Question** How can you divide fractions by solving a related multiplication sentence?

# Vullock the Problem Real

Three friends share a  $\frac{1}{4}$ -pound package of beads equally. What fraction of a pound of beads does each friend get?



• Let the rectangle represent 1 pound of beads. Divide the rectangle into fourths and then divide each fourth into three equal parts.

The rectangle is now divided into \_\_\_\_\_ equal parts.

• When you divide one fourth into 3 equal parts, you are finding one of three equal parts or  $\frac{1}{3}$  of  $\frac{1}{4}$ . Shade  $\frac{1}{3}$  of  $\frac{1}{4}$ .

The shaded part is \_\_\_\_\_ of the whole rectangle.

• Complete the number sentence.

So, each friend gets \_\_\_\_\_ of a pound of beads.

# 🛿 Example

Brad has 9 pounds of ground turkey to make turkey burgers for a picnic. How many  $\frac{1}{3}$ -pound turkey burgers can he make?

**Divide.**  $9 \div \frac{1}{3}$ 

- Draw 9 rectangles to represent each pound of ground turkey. Divide each rectangle into thirds.
- When you divide the \_\_\_\_\_ rectangles into thirds, you are finding the number of thirds in 9 rectangles or

finding 9 groups of \_\_\_\_\_. There are \_\_\_\_\_ thirds.

• Complete the number sentence.

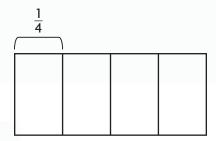
So, Brad can make \_\_\_\_\_ one-third-pound turkey burgers.

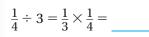
# Lesson 8.4



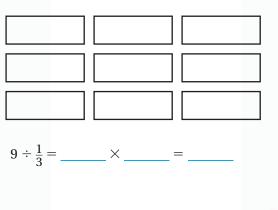
Number and Operations— Fractions—5.NF.7c Also 5.NF.7a, 5.NF.7b

MATHEMATICAL PRACTICES MP.3, MP.5

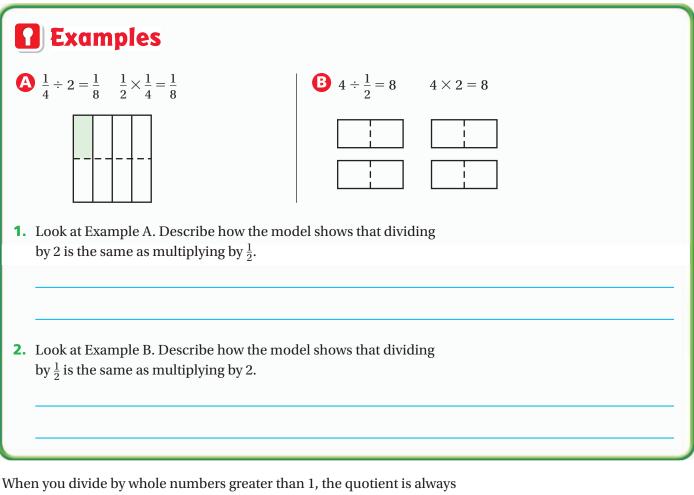




• Will the number of turkey burgers be less than or greater than 9?



**CONNECT** You have learned how to use a model and write a multiplication sentence to solve a division problem.



 $\frac{1}{2}$ 

When you divide by whole numbers greater than 1, the quotient is always less than the dividend. For example, the quotient for  $6 \div 2$  is less than 6 and the quotient for  $2 \div 3$  is less than 2. Learn below how the quotient compares to the dividend when you divide fractions and whole numbers.

### Try This!

For the two expressions below, which will have a quotient that is greater than its dividend? Explain.

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

So, when I divide a fraction by a whole number greater than 1, the quotient

is \_\_\_\_\_\_ the dividend. When I divide a whole number by a

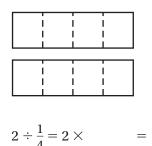
fraction less than 1, the quotient is \_\_\_\_\_\_ the dividend.

Name .

# Share and Show



**1.** Use the model to complete the number sentence.



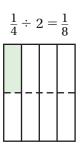
### 



# On Your Own

Write a related multiplication sentence to solve.

8. MATHEMATICAL O Describe Relationships Describe how the model shows that dividing by 2 is the same as finding  $\frac{1}{2}$  of  $\frac{1}{4}$ .



**9. CODEFFER** Mrs. Lia has 12 pounds of modeling clay. She divides the clay into  $\frac{1}{2}$ -pound blocks. If Mrs. Lia sets aside 6 of the blocks and gives the rest to the students in her art class, how many  $\frac{1}{2}$ -pound blocks of clay does Mrs. Lia give to her class?

<ul> <li><b>Unlock the Problem</b></li> <li><b>What do you need to find?</b></li> </ul>	Math en the Spot
<ul><li>b. What operations will you use to solve the pro</li></ul>	oblem?
c. Show the steps you used to solve the problem.	<ul> <li>d. Complete the sentences.</li> <li>A three-toed sloth would travel 10 feet in</li> <li>seconds.</li> <li>A giant tortoise would travel 10 feet in</li> <li>seconds.</li> <li>Since =, it would take a three-toed sloth</li> <li>seconds longer to travel 10 feet.</li> </ul>
. <b>THIMASMARTER</b> Jamie has a striped fabric is 4 yards long. She cuts the striped fabric into	<b>Personal Math Trainer</b> ric that is 5 yards long and a solid fabric that equal pieces that are $\frac{1}{2}$ yard long and the

is 4 yards long. She cuts the striped fabric into equal pieces that are  $\frac{1}{4}$  yard long and the solid fabric into equal pieces that are  $\frac{1}{3}$  yard long. How many more pieces of striped fabric does she have than pieces of solid fabric? Explain how you solved the problem.

#### Name \_

### **Interpret Division with Fractions**

Vnlock the Problem

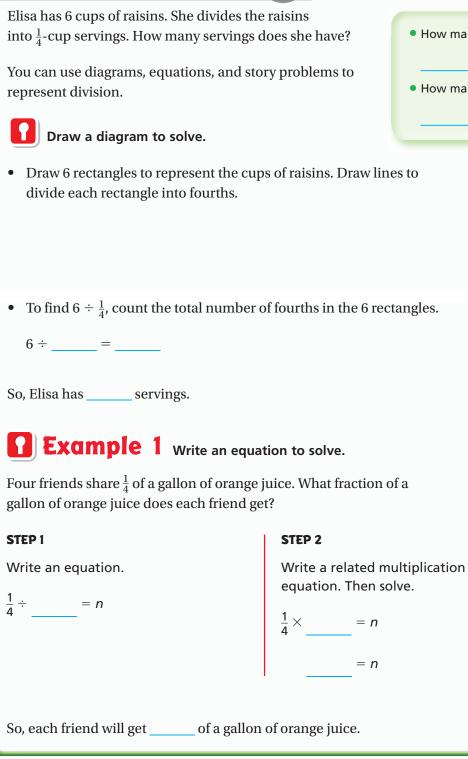
**Essential Question** How can you use diagrams, equations, and story problems to represent division?

# Lesson 8.5



Number and Operations— Fractions—5.NF.7a, 5.NF.7b Also 5.NF.7c

MATHEMATICAL PRACTICES MP.2, MP.5



• How many  $\frac{1}{4}$ -cups are in 1 cup?

• How many cups does Elisa have?

 $\frac{1}{4}$ 

**Example 2** Write a story problem. Then draw a diagram to solve.  $4 \div \frac{1}{3}$ STEP 1 Choose the item you want to divide. Think: Your problem should be about how many groups of  $\frac{1}{3}$  are in 4 wholes. Possible items: 4 sandwiches, 4 feet of ribbon, 4 apples **STEP 2** Write a story problem to represent  $4 \div \frac{1}{3}$  using the item you chose. Describe how it is divided into thirds. Then ask how many thirds there are. **STEP 3** Draw a diagram to solve.  $4 \div \frac{1}{3} =$ **Example 3** Write a story problem. Then draw a diagram to solve. O Houghton Mifflin Harcourt Publishing Company • Image Credits: (t) @Kraig Scarbinsky/Getty Images  $\frac{1}{2} \div 5$ STEP 1 Choose the item you want to divide. **Think:** Your problem should describe  $\frac{1}{2}$  of an item that can be divided into 5 equal parts. Possible items:  $\frac{1}{2}$  of a pizza,  $\frac{1}{2}$  of a yard of rope,  $\frac{1}{2}$  of a gallon of milk **STEP 2** Write a story problem to represent  $\frac{1}{2} \div 5$  using the item you chose. Describe how it is divided into 5 equal parts. Then ask about the size of each part. STEP 3 Draw a diagram to solve. Math Talk **Mathematical Practices**  $\frac{1}{2} \div 5 =$ Explain how you decided what type of diagram to

draw for your problem.

# **Share and Show**



**1.** Complete the story problem to represent  $3 \div \frac{1}{4}$ .

Carmen has a roll of paper that is \_\_\_\_\_ feet long. She cuts

the paper into pieces that are each \_\_\_\_\_\_ foot long. How many pieces of paper does Carmen have?

**2.** Draw a diagram to represent the problem. Then solve.

April has 6 fruit bars. She cuts the bars into halves. How many  $\frac{1}{2}$ -size bar pieces does she have?

**3.** Write an equation to represent the problem. Then solve.

Two friends share  $\frac{1}{4}$  of a large peach pie. What fraction of the whole pie does each friend get?

# On Your Own

represent  $2 \div \frac{1}{8}$ . Then solve.

**4. THINKASMARTER** Write an equation to represent the problem. Then solve.

Benito has  $\frac{1}{3}$  kilogram of grapes. He divides the grapes equally into 3 bags. What fraction of a kilogram of grapes is in each bag?

**MATHEMATICAL 2 Represent a Problem** Write a story problem to



**5. Draw** a diagram to represent the problem. Then solve.

Sonya has 5 sandwiches. She cuts each sandwich into fourths and gives away 6 pieces. How many  $\frac{1}{4}$ -size sandwich pieces does she have now?

6.

# Problem Solving • Applications 🎇

### THINKISMARTER Pose a Problem

**7.** Amy wrote the following problem to represent  $4 \div \frac{1}{6}$ .

Jacob has a board that is 4 feet long. He cuts the board into pieces that are each  $\frac{1}{6}$  foot long. How many pieces does Jacob have now?

Then Amy drew this diagram to solve her problem.

_							_	_
1.1			1.1	Г Г –		11	1	1.1
1.1	1 1 1			Г Г –	L L		1	1.1

So, Jacob has 24 pieces.

Write a new problem using a different item to be divided and different fractional pieces. Then draw a diagram to solve your problem.

#### Pose a problem.



### Draw a diagram to solve your problem.

8. **(THIMASMARTER)** Melvin has  $\frac{1}{4}$  gallon of fruit punch. He shares the punch equally with each of 2 friends and himself. Which equation represents the fraction of a gallon of punch that each of the 3 friends will get? Mark all that apply.

 $\begin{array}{c} \widehat{\mathbf{A}} & \frac{1}{4} \div \frac{1}{3} = n \\ \widehat{\mathbf{C}} & 3 \div \frac{1}{4} = n \\ \widehat{\mathbf{B}} & \frac{1}{4} \times \frac{1}{3} = n \\ \end{array} \begin{array}{c} \widehat{\mathbf{D}} & 3 \div 4 = n \\ \widehat{\mathbf{D}} & 3 \div 4 = n \\ \end{array} \begin{array}{c} \widehat{\mathbf{F}} & 3 \times \frac{1}{4} = n \\ \widehat{\mathbf{F}} & 3 \times \frac{1}{4} = n \end{array}$ 

**FOR MORE PRACTICE:** Standards Practice Book

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**1.** A builder has an 8-acre plot divided into  $\frac{1}{4}$ -acre home sites. How many  $\frac{1}{4}$ -acre home sites are there?

There are

home sites.

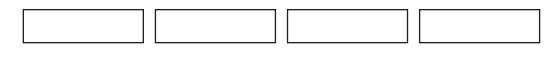
**2.** For numbers 2a–2e, select True or False for each equation.

2a. $3 \div \frac{1}{4} = \frac{1}{12}$	O True	○ False
2b. $7 \div \frac{1}{2} = 14$	O True	○ False
2c. $\frac{1}{5} \div 4 = 20$	O True	○ False
2d. $\frac{1}{2} \div 5 = \frac{1}{10}$	O True	○ False
<b>2e.</b> $\frac{1}{7} \div 3 = 21$	O True	○ False

**3.** Twelve pounds of beans are distributed equally into 8 bags to give out at the food bank. How many pounds of beans are in each bag?

pounds

**4.** Gabriel made 4 small meatloaves. He cut each meatloaf into fourths. How many  $\frac{1}{4}$ -size pieces of meatloaf does Gabriel have? Draw lines in the model to find the answer.



Gabriel has

 $\frac{1}{4}\text{-size}$  pieces of meatloaf.

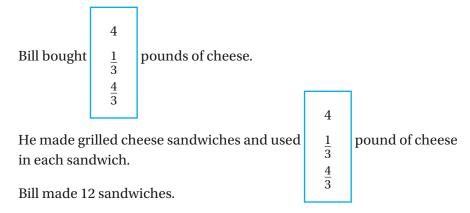
**5.** Five friends share 3 bags of trail mix equally. What fraction of a bag of trail mix does each friend get?



**6.** Landon and Colin bought  $\frac{1}{2}$  pound of strawberries. They are sharing the

strawberries equally. Each person will receive pound of strawberries.

**7.** Choose the numbers to create a story problem that represents  $4 \div \frac{1}{3}$ .



**8.** A giant tortoise can walk about  $\frac{1}{10}$  meter per second on land. A cooter turtle can walk about  $\frac{1}{2}$  meter per second on land.

#### Part A

How long would it take a giant tortoise to travel 5 meters? Show your work.

#### Part B

How much longer would it take a giant tortoise than a cooter turtle to travel 10 meters on land? Explain how you found your answer.

#### Name .

**9.** Camilla has a  $\frac{1}{2}$  pound of raisins that she will divide evenly into 5 bags. Shade the diagram to show the fractional part of a pound that will be in each bag.

	1	
	- 4 -	

**10.** Mrs. Green wrote the following problem on the whiteboard:

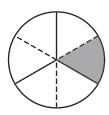
Lisa and Frank shared  $\frac{1}{3}$  pound of cherries equally. What fractional part of a pound did each person receive?

#### Part A

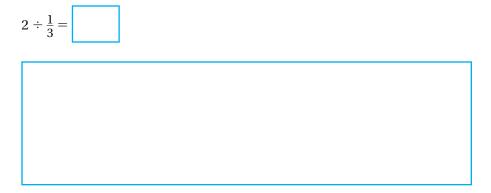
Molly wrote the following equation to solve the problem:  $2 \div \frac{1}{3} = n$ . Do you agree with Molly's equation? Support your answer with information from the problem.

#### Part B

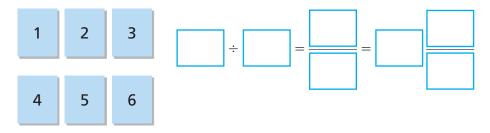
Noah drew this diagram to solve the problem. Can Noah use his diagram to find the fractional part of a pound of cherries that each person received? Support your answer with information from the problem.



**11.** Divide. Draw a number line to show your work.



**12.** Zoe has 5 cucumbers she grew in her garden. She wants to share them equally among 4 of her neighbors. How many cucumbers will each neighbor receive? Use the numbers on the tiles to complete the number sentence. You may use a number more than once or not at all.



**13.** Dora buys one package each of 1-pound, 2-pound, and 4-pound packages of ground beef to make hamburgers.

How many  $\frac{1}{4}$ -pound hamburgers can she make? Show your work using words, pictures, or numbers.

**14.** Adam has  $\frac{1}{2}$  quart of milk. If he pours the same amount of milk into

3 glasses, each glass will contain quart of milk.

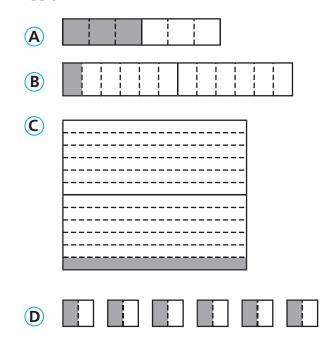
**15.** Nine friends share 3 pumpkin pies equally. What fraction of a pumpkin pie does each friend get?

Each friend will get of a pumpkin pie.

Name .

**16.** Jesse is making a pitcher of fruit smoothies that contains 3 cups of orange juice. His measuring cup only holds  $\frac{1}{4}$  cup. How many times will Jesse need to fill the measuring cup to get the 3 cups of orange juice?

- **17.** Kayleigh has  $\frac{1}{4}$ -cup of oil. She pours the same amount into each of 2 oil lamps. Which equation represents the fraction of a cup of oil that is in each oil lamp? Mark all that apply.
  - **A**  $\frac{1}{2} \div \frac{1}{4} = n$  **B**  $\frac{1}{4} \times \frac{1}{2} = n$  **C**  $2 \div \frac{1}{4} = n$  **D**  $4 \div 2 = n$ **E**  $\frac{1}{4} \div 2 = n$
  - $\bigcirc \mathbf{F} \quad 2 \times \frac{1}{4} = n$
- **18.** Brendan made a loaf of bread. He gave equal portions of  $\frac{1}{2}$  of the loaf of bread to 6 friends. Which diagram could Brendon use to find the fraction of the loaf of bread that each friend received? Mark all that apply.



**19.** Your teacher gives you the problem  $6 \div \frac{1}{5}$ .

#### Part A

Draw a diagram to represent  $6 \div \frac{1}{5}$ .

#### Part B

Write a story problem to represent  $6 \div \frac{1}{5}$ .

#### Part C

Use a related multiplication expression to solve your story problem. Show your work.

**20.** Seven friends picked 7 quarts of blueberries. Three of the friends will share 4 quarts of blueberries equally and the other 4 friends will share 3 quarts of the blueberries equally. In which group does each friend get a greater amount of blueberries? Explain your reasoning.

# Critical Area Geometry and Measurement

**(CRITICAL AREA)** Developing understanding of volume

A lunar rover is a surface exploration vehicle used on the moon. ►

Project

## **Space Architecture**

NASA's Lunar Architecture Team develops ideas for rovers and space habitats. A space habitat is made up of modules linked by airlocks. Airlocks are double doors that allow people to move between the modules without losing atmosphere.

## **Get Started**

:

Work with a partner to design a space habitat made up of 3 modules. The Important Facts name some modules that you can choose for your design. Cut out, fold, and tape the patterns for each of the modules that you have selected, and for the measuring cube.

Use a formula to find the volume of the measuring cube in cubic centimeters. Estimate the volume of each module by filling it with rice, then pouring the rice into the measuring cube. Let every cubic centimeter in the measuring cube represent 32 cubic feet. Determine what the volume of your space habitat would be in cubic feet.

Connect the modules to complete your space habitat.

### **Important Facts**

### **Modules of a Space Habitat**

- sleeping room
- kitchen
- exercise room
- bathroom
- life-support room (for air and water supplies)

• work room

airlock



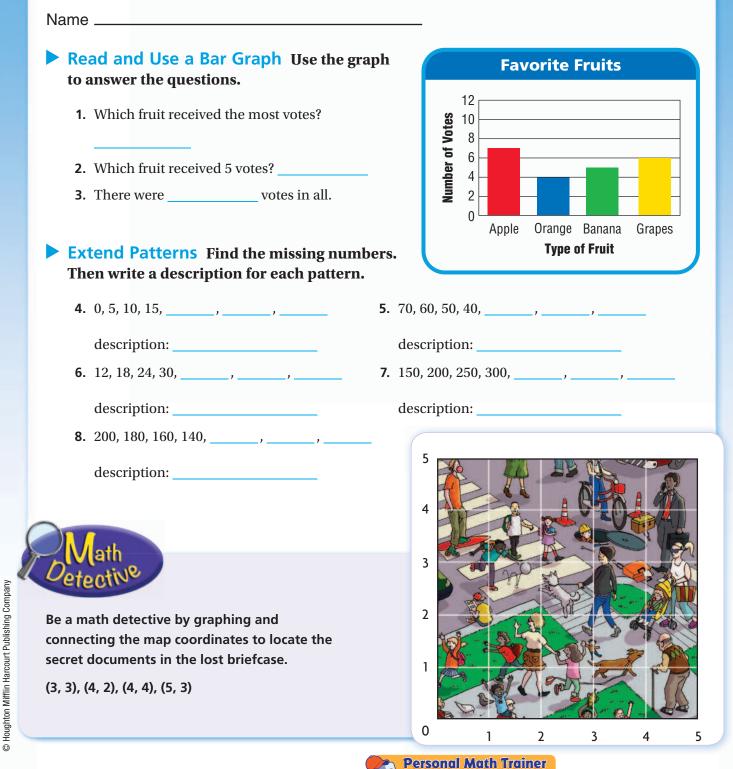
386 Chapters 9–11

Completed by



## Show What You Know 🔇

### Check your understanding of important skills.



Online Assessment

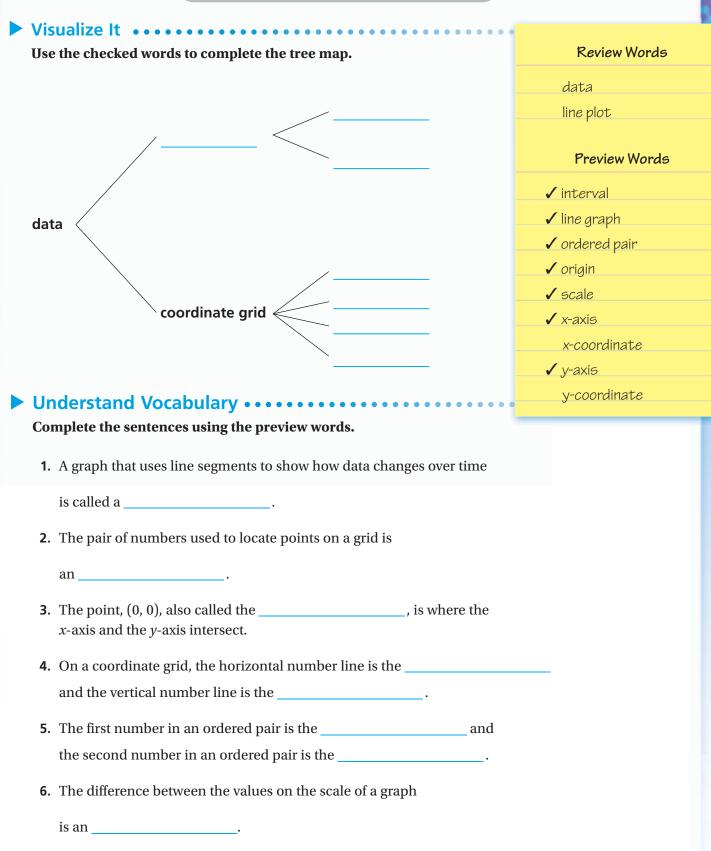
and Intervention

Chapter 9

387

Chapter

## **Vocabulary Builder**





### Name \_\_

### **Line Plots**

**Essential Question** How can a line plot help you find an average with data given in fractions?

### Lesson 9.1

Measurement and Data—5.MD.2 Also 5.OA.1 MATHEMATICAL PRACTICES

MP.2, MP.4, MP.7

PUnlock the Problem 🌘

Students have measured different amounts of water into beakers for an experiment. The amount of water in each beaker is listed below.

 $\frac{1}{4} \operatorname{cup}, \ \frac{1}{4} \operatorname{cup}, \ \frac{1}{2} \operatorname{cup}, \ \frac{3}{4} \operatorname{cup}, \ \frac{1}{4} \operatorname{cup}, \ \frac{3}{4} \operatorname{$ 

If the total amount of water stayed the same, what would be the average amount of water in a beaker?

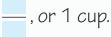
**STEP 1** Count the number of cups for each amount. Draw an X for the number of times each amount is recorded to complete the line plot.

 $\frac{1}{4}$ : \_\_\_\_\_  $\frac{1}{2}$ : \_\_\_\_\_  $\frac{3}{4}$ : \_\_\_\_\_

**STEP 3** Find the total amount of water in all of the beakers that contain  $\frac{1}{2}$  cup of water.

There are \_\_\_\_\_ beakers with  $\frac{1}{2}$  cup of

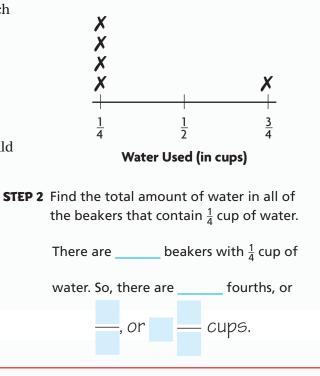
water. So, there are \_\_\_\_\_ halves, or



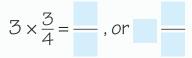
**STEP 5** Add to find the total amount of water in all of the beakers.

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

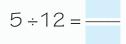
So, the average amount of water in a beaker is cup.



**STEP 4** Find the total amount of water in all of the beakers that contain  $\frac{3}{4}$  cup of water.

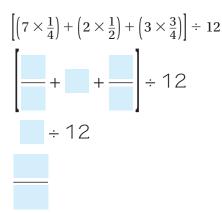


**STEP 6** Divide the sum you found in Step 5 by the number of beakers to find the average.



### Try This!

You can use the order of operations to find the average. Solve the problem as a series of expressions that use parentheses and brackets to separate them. Perform operations from inside the parentheses to the outer brackets.

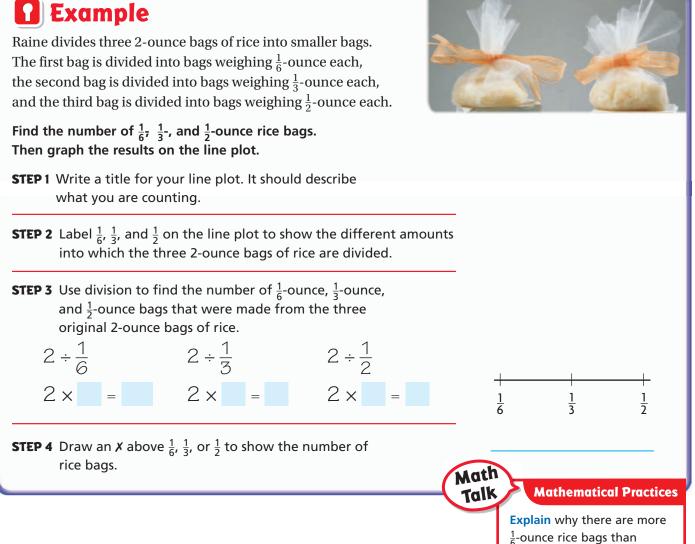


Perform the operations inside the parentheses.

Next, perform the operations in the brackets.

Divide.

Write the expression as a fraction.



 $\frac{1}{2}$ -ounce rice bags.

## Share and Show



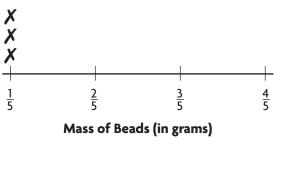
### Use the data to complete the line plot. Then answer the questions.

Liliana needs to buy beads for a necklace. The beads are sold by mass. She sketches a design to determine what beads are needed, and then writes down their sizes. The sizes are shown below.

- $\frac{2}{5}g, \ \frac{2}{5}g, \ \frac{4}{5}g, \ \frac{2}{5}g, \ \frac{1}{5}g, \ \frac{1}{5}g, \ \frac{1}{5}g, \ \frac{3}{5}g, \ \frac{4}{5}g, \ \frac{1}{5}g, \ \frac{3}{5}g, \ \frac{4}{5}g, \ \frac{1}{5}g, \ \frac{2}{5}g, \ \frac{3}{5}g, \ \frac{3}{5}g, \ \frac{2}{5}g, \ \frac{3}{5}g, \ \frac{2}{5}g, \ \frac{3}{5}g, \ \frac{2}{5}g, \ \frac{3}{5}g, \ \frac{3}{5}g, \ \frac{2}{5}g, \ \frac{3}{5}g, \ \frac{3}$
- 1. What is the combined mass of the beads with a mass of  $\frac{1}{5}$  gram?

```
Think: There are _____ Xs above \frac{1}{5} on the line plot, so the combined mass of the beads
```

- is \_\_\_\_\_ fifths, or \_\_\_\_\_ gram.
- **2.** What is the combined mass of all the beads with a mass of  $\frac{2}{5}$  gram?
- **3.** What is the combined mass of all the beads on the necklace?



**4.** What is the average mass of the beads on the necklace?

### **On Your Own**

### Use the data to complete the line plot. Then answer the questions.

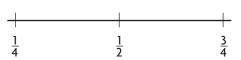
A breakfast chef used different amounts of milk when making pancakes, depending on the number of pancakes ordered. The results are shown below.

 $\frac{1}{2}c, \ \frac{1}{4}c, \ \frac{1}{2}c, \ \frac{3}{4}c, \ \frac{1}{2}c, \ \frac{3}{4}c, \ \frac{1}{2}c, \ \frac{3}{4}c, \ \frac{1}{2}c, \ \frac{1}{2}c, \ \frac{1}{2}c, \ \frac{1}{2}c$ 

5. How much milk combined is used in

 $\frac{1}{2}$ -cup amounts?

7. **EXAMPLE** How many more orders of pancakes used  $\frac{1}{2}$  cup of milk than  $\frac{1}{4}$  cup and  $\frac{3}{4}$  cup of milk combined?



### Milk in Pancake Orders (in cups)

**6. THINKISMARTER** What is the average amount of milk used for an order of pancakes?



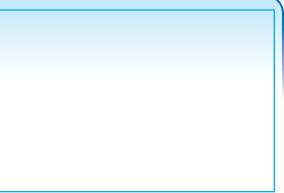
### 8. MATHEMATICAL 2 Use Reasoning

Describe an amount you could add to the data that would make the average increase.

9. MATHEMATICAL ① Make Sense of Problems For 10 straight of Samantha measured the amount of food that her cat Dew ate, recording the results, which are shown below. Graph results on the line plot. What is the average amount of cat food that Dewey ate daily? $\frac{1}{2}c, \frac{3}{8}c, \frac{5}{8}c, \frac{1}{2}c, \frac{5}{8}c, \frac{1}{4}c, \frac{3}{4}c, \frac{1}{4}c, \frac{1}{2}c, \frac{5}{8}c$	the
a. What do you need to know?	
<b>b.</b> How can you use a line plot to organize the information?	
<b>c.</b> What steps could you use to find the average amount of fo	ood that Dewey ate daily?
<ul> <li>d. Fill in the blanks for the totals of each amount</li> </ul>	ood that Dewey ate daily? nd the total amount of cat food eaten over days.
<ul> <li>d. Fill in the blanks for the totals of each amount measured.</li> <li>e. Find the second second</li></ul>	nd the total amount of cat food eaten over

**10. THINKSMARTER** Maya measured the heights of the seedlings she is growing. The heights were  $\frac{3}{4}$  in.,  $\frac{7}{8}$  in.,  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in.,  $\frac{5}{8}$  in.,  $\frac{3}{4}$  in.,  $\frac{7}{8}$  in.,  $\frac{1}{2}$  in., and  $\frac{3}{4}$  in. Organize the information in a line plot.

What is the average height of the seedlings? \_\_\_\_\_ inch



C Houghton Mifflin Harcourt Publishing Company

### Name \_

### **Ordered Pairs**

**Essential Question** How can you identify and plot points on a coordinate grid?

**CONNECT** Locating a point on a coordinate grid is similar to describing directions using North-South and West-East. The horizontal number line on the grid is the *x*-axis. The vertical number line on the grid is the *y*-axis.

Each point on the coordinate grid can be described by an **ordered pair** of numbers. The *x***-coordinate** is the first number in the ordered pair. It is the horizontal location, or the distance the point is from 0 in the direction of the *x*-axis. The *y***-coordinate** is the second number in the ordered pair. It is the vertical location, or the distance the point is from 0 in the direction of the *y*-axis.

 $x\text{-coordinate} \stackrel{(x, y)}{\frown} y\text{-coordinate}$ 

### Lesson 9.2

Geometry—5.G.1 MATHEMATICAL PRACTICES MP.4, MP.5



The *x*-axis and the *y*-axis intersect at the point (0, 0), called the **origin**.

## Unlock the Problem Red



Write the ordered pairs for the locations of the arena and the aquarium.

Locate the point for which you want to write an ordered pair.

Look below at the *x*-axis to identify the point's horizontal distance from 0, which is its *x*-coordinate.

Look to the left at the *y*-axis to identify the point's vertical distance from 0, which is its *y*-coordinate.

So, the ordered pair for the arena is (3, 2) and the ordered pair for the aquarium

is (\_\_\_\_\_, \_\_\_\_).

- pany
- Describe the path you would take to get from the origin to the aquarium, using horizontal, then vertical movements.

10 9 8 7 V-axis 6 5 aquarium 4 3 arena 2 1 2 3 4 5 678910 0 1 x-axis



Use the *x*- and *y*-coordinates to describe the distance of the point (3, 2) from the *x*- and *y*-axes.

## **Example** 1 Use the graph.

A point on a coordinate grid can be labeled with an ordered pair, a letter, or both.

### A Plot the point (5, 7) and label it J.

From the origin, move right 5 units and then up 7 units.

Plot and label the point.

B Plot the point (8, 0) and label it *S*.

From the origin, move right \_\_\_\_\_ units and

then up units.

Plot and label the point.

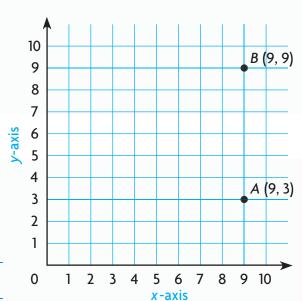
## **Example 2** Find the distance between two points.

You can find the distance between two points when the points are along the same horizontal or vertical line.

- Draw a line segment to connect point A and point B.
- Count vertical units between the two points.

There are units between points A and B.

**1.** Points *A* and *B* form a vertical line segment and have the same *x*-coordinates. How can you use subtraction to find the distance between the points?



J(5,7)

6 7

x-axis

8

9 10

10 9

8

7

5

4 3

2 1

0

1

23

4 5

/-axis 6

**2.** Graph the points (3, 2) and (5, 2). Explain how you can use subtraction to find the horizontal distance between these two points.





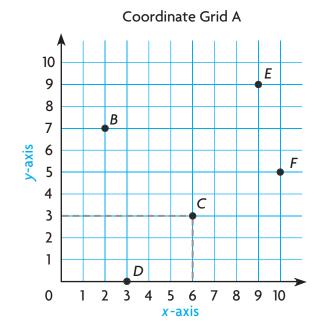
Use Coordinate Grid A to write an ordered pair for the given point.



### Plot and label the points on Coordinate Grid A.

5.	<i>M</i> (0, 9)	6.	<i>H</i> (8, 6)
7.	<i>K</i> (10, 4)	8.	T(4, 5)

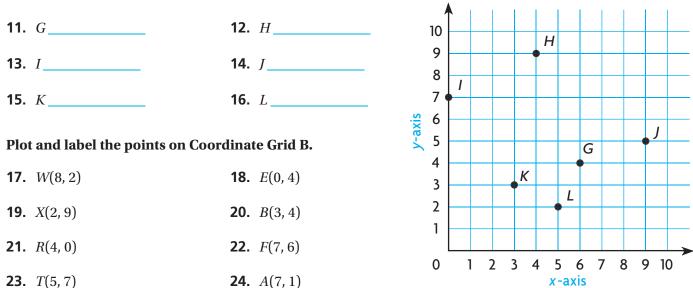
**9.** W(5, 10) **10.** R(1, 3)



Coordinate Grid B

### On Your Own

Use Coordinate Grid B to write an ordered pair for the given point.



**25. [WRITE** Math Explain how to find the distance between point F and point A.

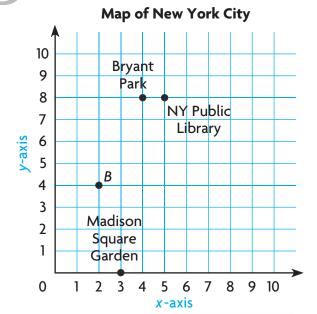
**Standards Practice Book** 

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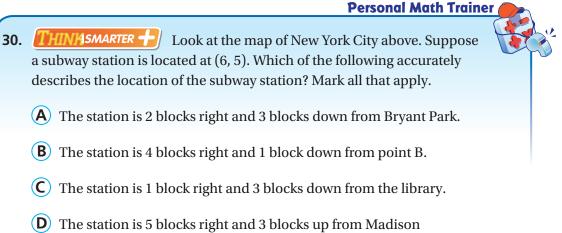
## **Problem Solving • Applications**

Nathan and his friends are planning a trip to New York City. Use the map for 26–30. Each unit represents 1 city block.

- **26.** What ordered pair gives the location of Bryant Park?
- **27. WATHEMATICAL O Use Graphs** The Empire State Building is located 5 blocks right and 1 block up from (0, 0). Write the ordered pair for this location. Plot and label a point for the Empire State Building.



- **28. What's the Error?** Nathan says that Madison Square Garden is located at (0, 3) on the map. Is his ordered pair correct? Explain.
- **29. DEEPER** Paulo walks from point *B* to Bryant Park. Raul walks from point *B* to Madison Square Garden. If they only walk along the grid lines, who walks farther? Explain.



D The station is 5 blocks right and 3 blocks up from Madison Square Garden.



### Name \_\_\_\_

### **Graph Data**

**Essential Question** How can you use a coordinate grid to display data collected in an experiment?

### Investigate

Materials paper cup water Fahrenheit thermometer ice cubes stopwatch

When data is collected, it can be organized in a table.

- **A.** Fill the paper cup more than halfway with room-temperature water.
- **B.** Place the Fahrenheit thermometer in the water and find its beginning temperature before adding any ice. Record this temperature in the table at 0 seconds.
- **C.** Place three cubes of ice in the water and start the stopwatch. Find the temperature every 10 seconds for 60 seconds. Record the temperatures in the table.

Lesson <b>9.</b>	3
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Geometry— 5.G.2 MATHEMATICAL PRACTICES MP.4, MP.5, MP.8

Water Temperature								
Time (in seconds)	Temperature (in °F)							
0								
10								
20								
30								
40								
50								
60								



### **Draw Conclusions**

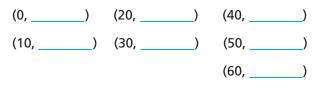
- **1.** Explain why you would record the beginning temperature at 0 seconds.
- **2.** Describe what happens to the temperature of the water in 60 seconds, during the experiment.
- 3. MATHEMATICAL B Draw Conclusions Analyze your observations of the temperature of the water during the 60 seconds, and explain what you think would happen to the temperature if the experiment continued for 60 seconds longer.

### **Make Connections**



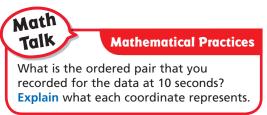
You can use a coordinate grid to graph and analyze the data you collected in the experiment.

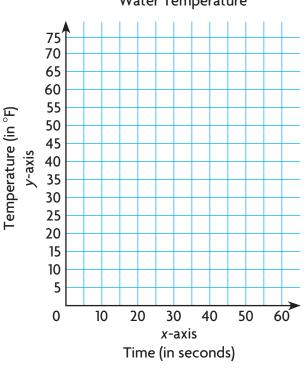
**STEP1** Write the related pairs of data as ordered pairs.



**STEP 2** Construct a coordinate grid and write a title for it. Label each axis.







### Water Temperature

### Name .

### **Share and Show**

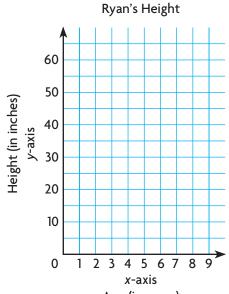


### For items 1-3, graph the data on the coordinate grid.

**1.** Write the ordered pairs for each point.

Ryan's Height									
Age (in years)	1	2	3	4	5				
Height (in inches)	30	35	38	41	44				

2. What does the ordered pair (3, 38) tell you about Ryan's age and height?



Age (in years)

### $\checkmark$ **3.** Why would the point (6, 42) be nonsense?

## **Problem Solving • Applications**

**THINKASMARTER** The table shows the depth of the Dakota River at 4. **Dakota River** different times during a rainstorm. Time (hours) 1 2 4 5 3 Graph the ordered pairs from the tiles on the coordinate grid. 7 8 10 Depth (feet) 12 15 (1, 7) **River Depth** у 16 (2, 8)14 Depth (feet) 12 10 8 6 (3, 10) 4 2 (4, 12) х 0 2 34 5 6 7 8 1 Time (hours) (5, 15)

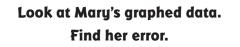
🛲 MATHEMATICAL PRACTICES

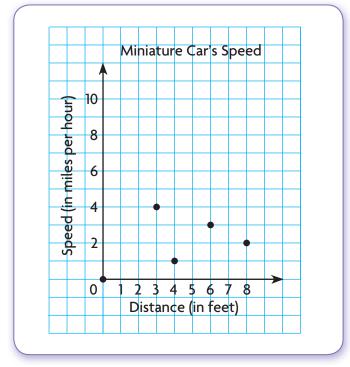
### HINH SMARTER What's the Error?

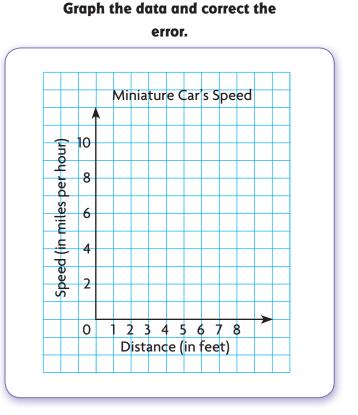
5. Mary places a miniature car onto a track with launchers. The speed of the car is recorded every foot. Some of the data is shown in the table. Mary graphs the data on the coordinate grid below.

Miniatu	Miniature Car's Speed						
Distance (in feet)	Speed (in miles per hour)						
0	0						
1	4						
2	8						
3	6						
4	3						









Mathematical 6 Verify the Reasoning of Others Describe the error Mary made. 6.

**G** DEEPER 7. At what distance do you think the car will stop? Explain and write the ordered pair.

400

### Name \_\_\_\_

### **Line Graphs**

**Essential Question** How can you use a line graph to display and analyze real-world data?

### Lesson 9.4

Geometry-5.G.2 MATHEMATICAL PRACTICES MP.4, MP.5, MP.7



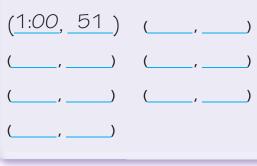
A **line graph** is a graph that uses line segments to show how data changes over time. The series of numbers placed at fixed distances that label the graph are the graph's scale. The intervals, or difference between the values on the scale, should be equal.



Graph the data. Use the graph to determine the times between which the greatest temperature change occurred.

Recorded Temperatures												
Тіте (а.м.) 1:00 2:00 3:00 4:00 5:00 6:00 7:00												
Temperature (in °F)         51         49         47         44         45         44         46												

• Write related number pairs of data as ordered pairs.

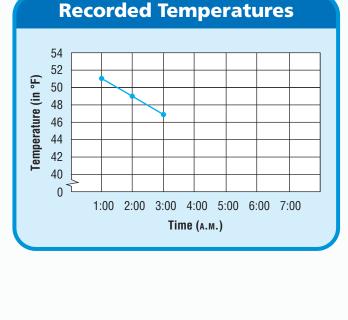


STEP 1 For the vertical axis, choose a scale and an interval that are appropriate for the data. You can show a break in the scale between 0 and 40, since there are no temperatures between 0°F and 44°F.

**STEP 2** For the horizontal axis, write the times of day. Write a title for the graph and name each axis. Then graph the ordered pairs. Complete the graph by connecting the points with line segments.

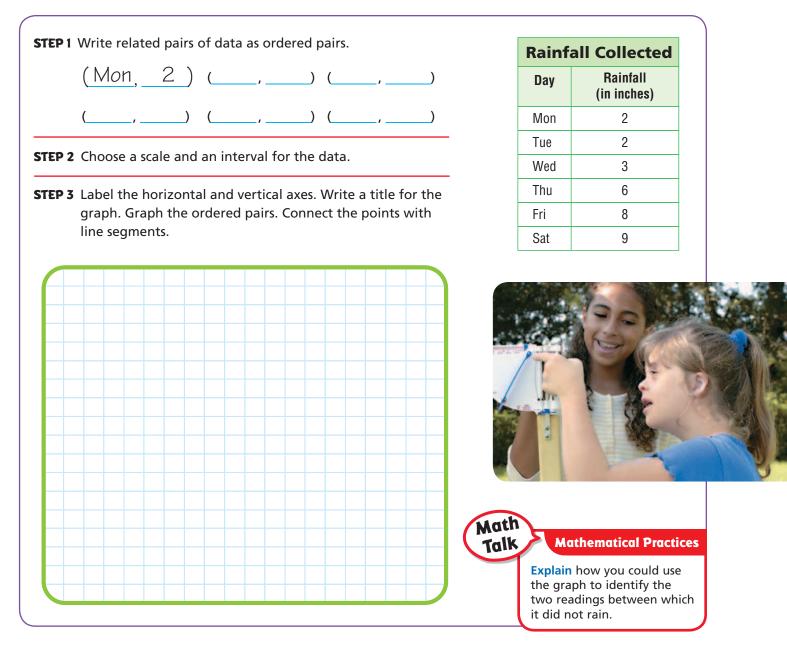
Look at each line segment in the graph. Find the line segment that shows the greatest change in temperature between two consecutive points.

The greatest temperature change occurred between and



Chapter 9 401

**Try This!** Jill used a rain gauge to collect data on the total rainfall during 6 days at her home in Miami. She read the amount of rain collected in the rain gauge each day and did not pour it out. Her data is shown in the table. Make a line graph to display Jill's data.



### Use the graph to answer the questions.

- 1. On which day was the total rainfall recorded the greatest?
- **2.** On which day did Jill record the greatest increase in rainfall collected from the previous day?

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### **Share and Show**



### Use the table at the right for 1–3.

- 1. What scale and intervals would be appropriate to make a graph of the data?
- **2.** Write the related pairs as ordered pairs.
- $\mathbf{\mathbf{\vec{\forall}3.}}$  Make a line graph of the data.
- Use the graph to determine between which two months the least change in average temperature occurs.

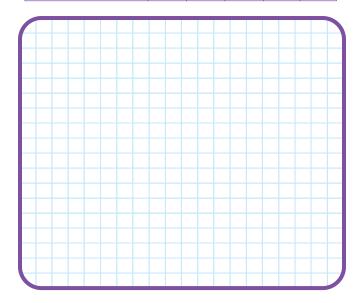
## On Your Own

### Use the table at the right for 5–7.

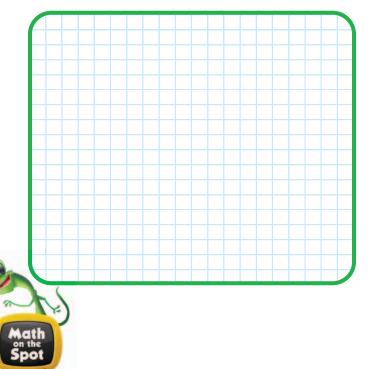
- **5.** Write the related number pairs for the plant height as ordered pairs.
- **6.** What scale and intervals would be appropriate to make a graph of the data?
- **7.** Make a line graph of the data.
- **8.** Use the graph to find the difference in height between Month 1 and Month 2.
- 9. **THINMSMARTER** Use the graph to estimate the height at  $1\frac{1}{2}$  months.

### Average Monthly Temperature in Tupelo, Mississippi

Month	Jan	Feb	Mar	Apr	May
Temperature (in °F)	40	44	54	62	70



Plant Height									
Month 1 2 3 4									
Height (in inches)	20	25	29	32					



## Connect to Science

Evaporation changes water on Earth's surface into water vapor. Water vapor condenses in the atmosphere and returns to the surface as precipitation. This process is called the water cycle. The ocean is an important part of this cycle. It influences the average temperature and precipitation of a place.

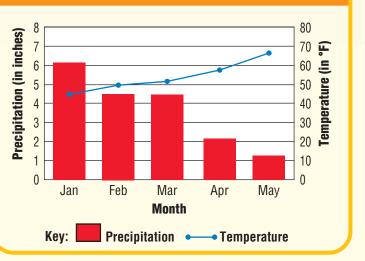
The overlay graph below uses two vertical scales to show monthly average precipitation and temperatures for Redding, California.

### Use the graph for 10–12.

**10. MATHEMATICAL O Use Graphs** Explain how the overlay graph helps you relate precipitation and temperature for each month.

**11. GODEEPER** Describe how the average temperature changes in the first 5 months of the year. Describe the relationship between the average temperature and the amount of precipitation.

### **Redding, California**



**12. THINASMARTER** The line graph shows the amount of snowfall over several days.

For numbers 12a-12c, select True or False for each statement.

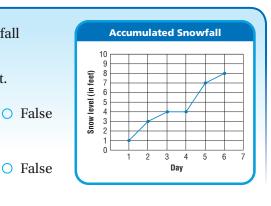
O True

O True

 $\bigcirc$  True

O False

- **12a.** There was no change in the amount of snow from Day 2 to Day 3.
- **12b.** The greatest increase in the amount of snow between consecutive days occurred from Day 4 to Day 5.
- **12c.** From Day 1 to Day 6, the amount of snow increased from 1 foot to 8 feet.



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Name .

## 🧖 🍼 Mid-Chapter Checkpoint

Vocabulary

### Choose the best term from the box.

- **1.** The \_\_\_\_\_\_ is the horizontal number line on the coordinate grid. (p. 393)
- **2.** A \_\_\_\_\_\_ is a graph that uses line segments to show how data changes over time. (p. 401)

### Concepts and Skills

### Use the line plot at the right for 3–5. (5.MD.2)

- **3.** How many kittens weigh at least  $\frac{3}{8}$  of a pound?
- 4. What is the combined weight of all the kittens?
- 5. What is the average weight of the kittens in the shelter?

Use the coordinate grid at the right for 6–13. (5.G.1)

Write an ordered pair for the given point.

**6.** A\_\_\_\_\_

**7.** *B*\_\_\_\_\_

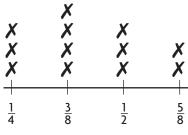
**8.** *C*\_\_\_\_\_

**9.** D

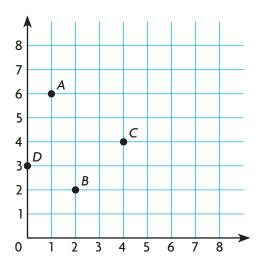
### Plot and label the point on the coordinate grid.

- **10.** *E*(6, 2) **11.** *F*(5, 0)
- **12.** *G*(3, 4) **13.** *H*(3, 1)

Vocabulary
line graph
line plot
x-axis
y-axis



Weights of Kittens in the Animal Shelter (lb)



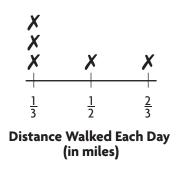
**14.** Jane drew a point that was 1 unit to the right of the *y*-axis and 7 units above the *x*-axis. What is the ordered pair for this location? (5.G.1)

**15.** The graph below shows the amount of snowfall in a 6-hour period.



Between which hours did the least amount of snow fall? (5.G.2)

**16.** Joy recorded the distances she walked each day for five days. How far did she walk in 5 days? (5.MD.2)



### Name \_\_\_\_\_

### Numerical Patterns

**Essential Question** How can you identify a relationship between two numerical patterns?

Lesson 9.5

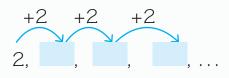
Operations and Algebraic Thinking—5.OA.3 MATHEMATICAL PRACTICES MP.7, MP.8



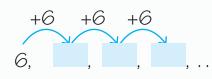
## PUnlock the Problem 🔐

On the first week of school, Joel purchases 2 movies and 6 songs from his favorite media website. If he purchases the same number of movies and songs each week, how does the number of songs purchased compare to the number of movies purchased from one week to the next?

- **STEP 1** Use the two rules given in the problem to generate the first 4 terms in the sequence for the number of movies and the sequence for number of songs.
  - The sequence for the number of movies each week is:



• The sequence for the number of songs each week is:



**STEP 2** Write number pairs that relate the number of movies to the number of songs.

Week 1: \_\_\_\_2, 6

Week 2:\_\_\_\_\_

Week 3:

Week 4:

**STEP 3** For each number pair, compare the number of movies to the number of songs. Write a rule to describe this relationship.

Think: For each related number pair, the second number is \_\_\_\_\_\_ times as great as the first number.

Rule: \_\_\_\_\_\_

So, from one week to the next, the number of songs Joel purchased

is \_\_\_\_\_ times as many as the number of movies purchased.

- How many movies does Joel purchase each week?
- How many songs does Joel purchase each week?



## 🛿 Example

When Alice completes each level in her favorite video game, she wins 3 extra lives and 6 gold coins. What rule can you write to relate the number of gold coins to the number of extra lives she has won at any level? How many extra lives will Alice have won after she completes 8 levels?

	Level	0	1	2	3	4		8					
Add	Extra Lives	0	3	6	9	12			Multiply by or				
Add	Gold Coins	0	6	12	18	24		48	divide by				
<b>STEP 1</b> To the left of the table, complete the rule for how you could find the number of extra lives won from one level to the next.													
Ċ	$\leftarrow \text{ difference between consecutive terms}$ $0,  3,  6,  9,  12$												
From one level	l to the next	, Alice	e wins		mo	ore ex	tra liv	es.					
	STEP 2 To the left of the table, complete the rule for how you could find the number of gold coins won from one level to the next. Image: Complete the rule for how you could find the number of gold coins won from one level to the next.												
Ċ	0, 6,	12	2	18		24							
From one level							ld coi	ns.					
to the Level 1	STEP 3 Write number pairs that relate the number of gold coins to the number of extra lives won at each level.         Level 1: 6, 3       Level 2:												
Level 3:       Level 4:         STEP 4 Complete the rule to the right of the table that describes how the number pairs are related. Use your rule to find the number of extra lives at level 8.         Think: For each level, the number of extra lives is as great as the number of gold coins.													
Rule:_ So, after 8 leve						a lives			<b>Explain</b> how your rule would change if you were relating extra lives to gold coins instead of gold coins to extra lives.				

Name \_





Use the given rules to complete each sequence. Then, complete the rule that describes how nickels are related to dimes.

1.

	Number of coins	1	2	3	4	5	
Add 5.	Nickels (¢)	5	10	15	20		Multiply by
Add 10.	Dimes (¢)	10	20	30	40		

Complete the rule that describes how one sequence is related to the other. Use the rule to find the unknown term.

Day	1	2	3	4	 8
Number of Books	3	6	9	12	 24
Amount Spent (\$)	12	24	36	48	

Jivide the weight of the bag by \_\_\_\_\_\_to find the number of marbles.

Bags	1	2	3	4	 12
Number of Marbles	10	20	30	40	
Weight of Bag (grams)	30	60	90	120	 360

### **On Your Own**

## Complete the rule that describes how one sequence is related to the other. Use the rule to find the unknown term.

**4.** Multiply the number of eggs by \_\_\_\_\_ to find the number of muffins.

Batches	1	2	3	4	 9
Number of Eggs	2	4	6	8	 18
Muffins	12	24	36	48	

5. Divide the number of meters by \_\_\_\_\_\_ to find the number of laps.

Runners	1	2	3	4
Number of Laps	4	8	12	
Number of Meters	1,600	3,200	4,800	6,400

6. Mathematical 6 Make Connections Suppose the number of eggs used in Exercise 4 is changed to 3 eggs for each batch of 12 muffins, and 48 eggs are used. How many batches and how many muffins will be made?

### Problem Solving • Applications

7. Emily has a road map with a key that shows an inch on the map equals 5 miles of actual distance. She will drive on two roads to get to the beach. One road is 7 inches long on the map. The other road is 5 inches long. What is the actual distance Emily will drive to the beach? Write the rule you used to find the actual distance.

Show Your Work

8. **MATHEMATICE** Identify Relationships To make a shade of lavender paint, Jon mixes 4 ounces of red tint and 28 ounces of blue tint into one gallon of white paint. If 20 gallons of white paint and 80 ounces of red tint are used, how much blue tint should be added? Write a rule that you can use to find the amount of blue tint needed.

**9. THINK SMARTER** In the cafeteria, tables are arranged in groups of 4, with each table seating 8 students. How many students can sit at 10 groups of tables? Write the rule you used to find the number of students.



### 10. THINKSMARTER

ARTER The table shows two sequences of numbers.

Day	1	2	3	4	5
Number of Runners	4	8	12	16	20
Number of Miles	12	24	36	48	?

For numbers 10a–10b, choose the correct values to describe how one sequence is related to the other.

**10a**. The unknown number in Day 5 is

**10b.** The rule that relates the number of miles to the number of runners is

multiply by 3 add 10 multiply by 5

410 FOR MORE PRACTICE: Standards Practice Book

### Problem Solving • Find a Rule

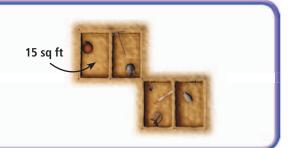
**Essential Question** How can you use the strategy *solve a simpler problem* to help you solve a problem with patterns?

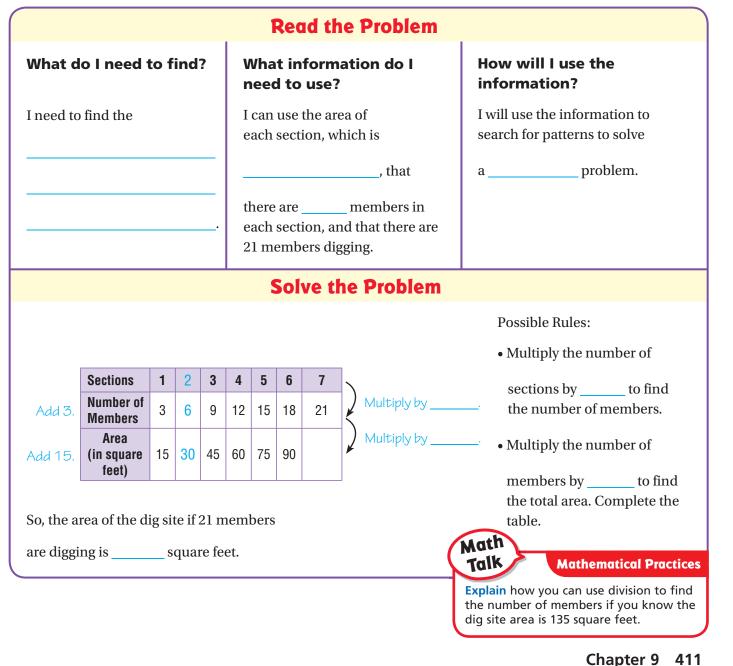
## l Unlock the Problem 🖁

On an archaeological dig, Gabriel separates his dig site into sections with areas of 15 square feet each. There are 3 archaeological members digging in every section. What is the area of the dig site if 21 members are digging at one time?

## PROBLEM SOLVING Lesson **4.6**

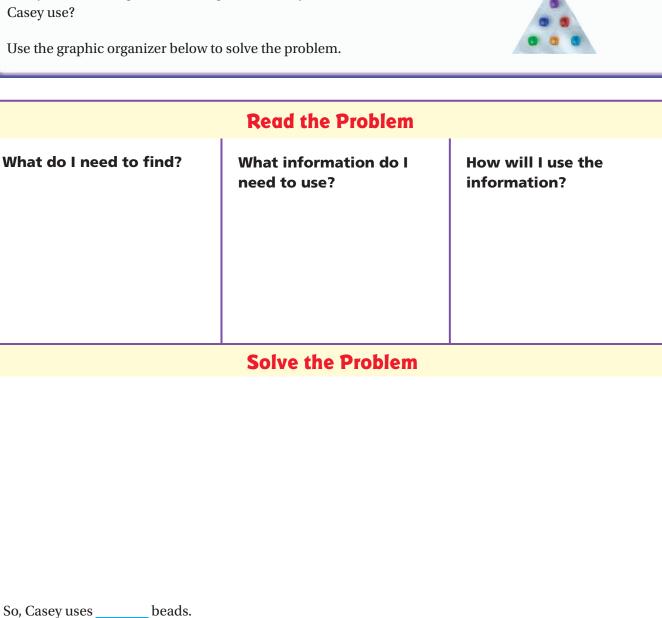
Operations and Algebraic Thinking—5.0A.3 MATHEMATICAL PRACTICES MP.1, MP.4, MP.7





Casey is making a design with triangles and beads for a costume. In his design, each pattern unit adds 3 triangles and 18 beads. Casey uses 72 triangles in his design. How many beads does Casey use?

Use the graphic organizer below to solve the problem.



• What rule could you use to find an unknown number of beads if you know the related number of triangles?

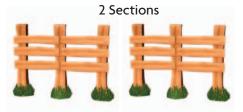
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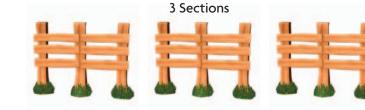
Share and Show



I. Max builds rail fences. For one style of fence, each section uses 3 vertical fence posts and 6 horizontal rails. How many rails does he need for a fence that has 27 posts?







**First,** think about what the problem is asking and what you know. As each section of fence is added, how does the number of posts and the number of rails change?

**Next,** make a table and look for a pattern. Use what you know about 1, 2, and 3 sections. Write a rule for the number of posts and rails needed for 9 sections of fence.

Number of Sections	1	2	3	 9
Number of Posts	3	6	9	 27
Number of Rails	6	12	18	

Possible rule for posts: \_

Possible rule for rails:

**Finally,** use the rule to solve the problem.

**2. THINASMARTER** What if another style of rail fencing has 6 rails between each pair of posts? How many rails are needed for 27 posts?

Number of Sections	1	2	3	 9
Number of Posts	3	6	9	 27
Number of Rails	12	24	36	



Possible rule:

## **On Your Own**

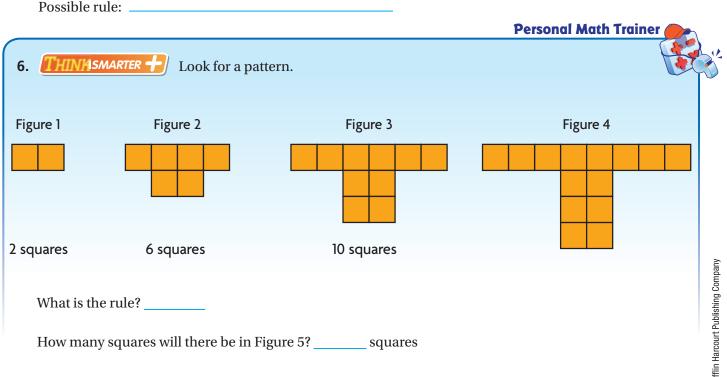
MATHEMATICAL O Look for a Pattern Jane works as a 3. limousine driver. She earns \$50 for every 2-hour shift that she works. How much does Jane earn in one week if she works 40 hours per week? Write a rule and complete the table.

Shift	1	2	3	 20
Hours Worked	2	4	6	 40
Jane's Pay (\$)	50	100	150	

Possible rule:

4. **THINASMARTER** Rosa plays games at a fair. She can buy 8 game tokens for \$1. Each game costs 2 tokens. How many games can she play with 120 tokens? Write a rule and complete the table.

**5. GODEEPER** Janelle is making snacks for her classmates. There are two cups of raisins in one batch. For every 2 cups of raisins, Janelle adds 4 cups of oats. How many cups of oats will she need if she has 10 cups of raisins? Draw a table and write a possible rule.



Cost (\$)

**Tokens** 

Games

1

8

4

2

16

8

3

24

12

4

32

16

15

120

...

...

...

### Name \_

## **Graph and Analyze Relationships**

**Essential Question** How can you write and graph ordered pairs on a coordinate grid using two numerical patterns?



MATHEMATICAL PRACTIC MP.2, MP.4, MP.7

Unlock the Problem	World
Sasha is making hot cocoa for a party. Fo	or each mu

Sasha is making hot cocoa for a party. For each mug of cocoa, he uses 3 tablespoons of cocoa mix and 6 fluid ounces of hot water. If Sasha uses an entire 18-tablespoon container of cocoa mix, how many fluid ounces of water will he use?

**STEP 1** Use the two given rules in the problem to generate the first four terms for the number of tablespoons of cocoa mix and the number of fluid ounces of water.

Cocoa Mix (tbsp)	3			18
Water (fl oz)	6			

**STEP 2** Write the number pairs as ordered pairs, relating the number of tablespoons of cocoa mix to the number of fluid ounces of water.

(3, 6)

**STEP 3** Graph and label the ordered pairs. Then write a rule to describe how the number pairs are related.

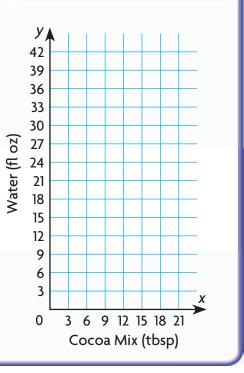
• What rule can you write that relates the amount of cocoa mix to water?

So, Sasha will use \_\_\_\_\_ fluid ounces of water if he uses the entire container of cocoa mix.

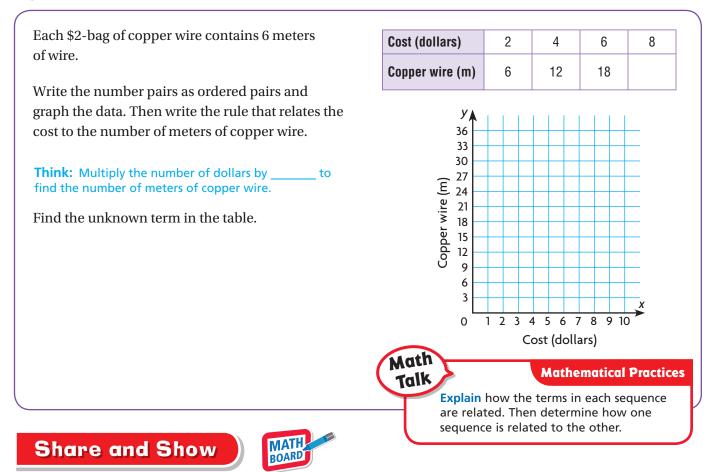
**Internation Look for Structure** Write the final number pair as an ordered pair. Then graph and label it. Starting at the origin, connect the points with straight line segments. What do the connected points form? Explain why this is formed.

 How many tablespoons of cocoa mix does Sasha add for each mug of cocoa?

 How many fluid ounces of water does Sasha add for each mug of cocoa?



### **Try This!** Find the unknown term in the table.

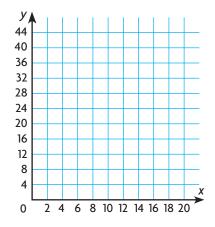


Graph and label the related number pairs as ordered pairs. Complete the rule that describes how one sequence is related to the other. Then use the rule to find the unknown term.

I. For every 2 square feet of lawn, Charlie needs 8 ounces of fertilizer.

Lawn (sq ft)	2	4	6	8	10
Weight (oz)	8	16	24	32	

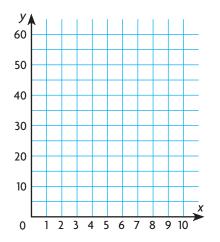
Multiply the number of square feet by \_\_\_\_\_\_ to find the ounces of fertilizer needed.



On Mary's map, every 2 inches represents 10 miles.

Map (in.)	2	4	6	8	10
Miles	10	20	30	40	

Multiply the number of inches by \_\_\_\_\_\_ to find the distance in miles.



### On Your Own

3. **GODEEPER** On Sandy's scale drawing of the school campus, 2 inches equals 4 yards. The distance between the swings and the track is 10 inches on the drawing, and the distance between the track and the basketball court is 4 inches on the drawing. How much farther is the track from the swings than from the basketball court, in actual distance?

Draw your own graph. Write a rule that describes how one sequence of terms is related to the other. Complete the table and solve.

Map (in.)	2	4	6	8	10
Distance (yds)	4	8	12	16	

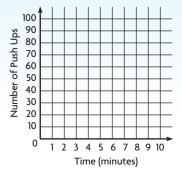
Rule:			

## **4. [] HINTASMARTER** Eric recorded the total number of push ups he did each minute for 4 minutes.

Time (minutes)	1	2	3	4
Number of Push Ups	15	30	45	60

Write the number pairs as ordered pairs.

Graph the ordered pairs on a coordinate plane.



Write a rule to describe how the number pairs are related.

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## Problem Solving • Applications 🞇

### THINKSMARTER Sense or Nonsense?

**5.** Elsa solved the following problem.

Lou and George are making chili for the Annual Firefighter's Ball. Lou uses 2 teaspoons of hot sauce for every 2 cups of

chili that he makes, and George uses 3 teaspoons of the same hot sauce for every cup of chili in his recipe. Who has the hotter chili, George or Lou?

Write the related number pairs as ordered pairs and then graph them. Use the graph to compare who has the hotter chili, George or Lou.

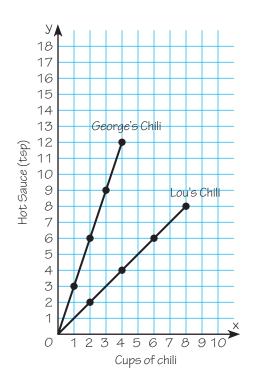
Lou's chili (cups)	2	4	6	8
Hot sauce (tsp)	2	4	6	8

George's chili (cups)	1	2	3	4
Hot sauce (tsp)	3	6	9	12

Lou's chili:	(2, 2), (4, 4), (6, 6), (8, 8)
George's chili	(1, 3), (2, 6), (3, 9), (4, 12)

Elsa said that George's chili was hotter than Lou's, because the graph showed that the amount of hot sauce in George's chili was always 3 times as great as the amount of hot sauce in Lou's chili. Does Elsa's answer make sense, or is it nonsense? Explain.



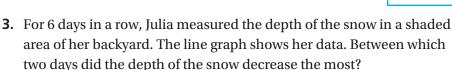


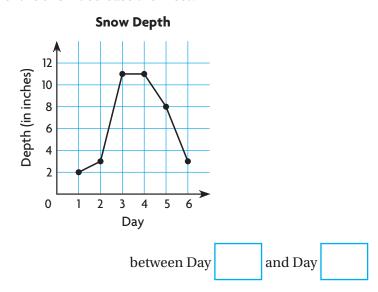
FOR MORE PRACTICE: Standards Practice Book



- The letters on the coordinate grid represent the locations of the first four holes on a golf course. Which of the following accurately describes the location of a hole? Mark all that apply.
  - A Hole *U* is 4 units left and 4 units down from hole *S*.
  - **B** Hole F is 1 unit right and 7 units down from hole U.
  - C Hole *T* is 2 units left and 4 units up from hole *S*.
  - **D** Hole *S* is 3 units left and 5 units up from hole *F*.
- **2.** A builder is buying property to build new houses. The sizes of the lots are  $\frac{1}{6}$ ,  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{2}$ ,  $\frac{1}{6}$ ,  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{6}$ ,  $\frac{1}{2}$ ,  $\frac{1}{6}$ ,  $\frac{1}{$

What is the average size of the lots?

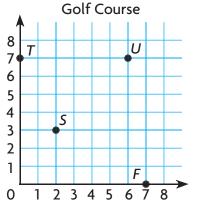




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**4.** The table shows two sequences of numbers.

Day	1	2	3	4	5
Number of T-shirts sold	5	10	15	20	25
Amount earned (\$)	20	40	60	80	?

For numbers 4a–4b, choose the correct values to describe how one sequence is related to the other.

4a. The unknown number in Day 5 is

90 100 120

**4b.** The rule that describes how the number of T-shirts sold relates to the amount earned is

add 15	
multiply by 5	
multiply by 4	

5. Jawan made a table to figure out how much he earns at his job.

Job Earnings							
Week	1	2	3	4		6	
Hours Worked	6	12	18	24		36	
Amount Earned (\$)	54	108	162	216		?	

### Part A

Write a rule that relates the amount Jawan earns to the number of hours worked. Explain how you can check your rule.

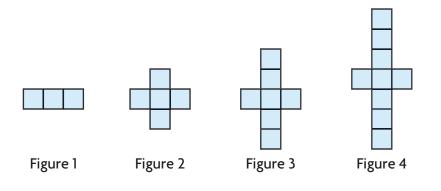
### Part B

How much does he earn from his job in Week 6?

\$\_\_\_\_\_

#### Name \_

6. Look for a pattern.



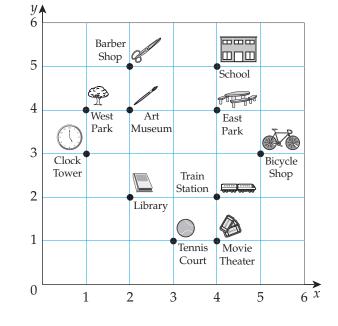
What is the rule?

How many squares will there be in Figure 5?

\_\_\_\_ squares

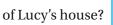
 Lindsey made a map of her town. Match each location below with the correct ordered pair that marks it on the coordinate grid. Not every ordered pair will be used.





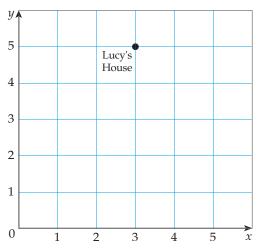
**8.** Lucy's house is located at the point shown on the coordinate grid. Ainsley's house is located 2 units right and 3 units down from Lucy's house. Plot a point on the coordinate grid to represent the location of Ainsley's house.

What ordered pair represents the location



What ordered pair represents the location

of Ainsley's house?



Chapter 9 421

**9.** Each week, Maria saves some of her allowance. The line graph shows the amount of Maria's savings for the first 5 weeks of the year.

For numbers 9a–9b, select True or False for each statement.

- **9a**. Maria's savings increased from \$30 to \$55 over the 5-week period.
- **9b.** The greatest increase in Maria's savings occurred from Week 1 to Week 2.

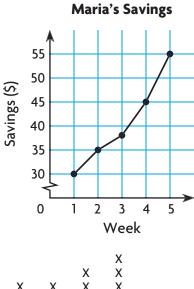
○ True

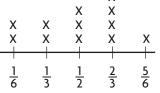
O True

O False

○ False

**10.** The line plot shows the weights of bags of beans. What is the average weight of the bags? Show your work.





Weights of Bags of Beans (in lb)

**11.** The table shows how much a puppy weighs from 1 month old to 5 months old.

թլ	uppy's V	Weight			
Age (in months)	1	2	3	4	5
Weight (in pounds)	12	18	23	31	34

What ordered pairs would you plot to show the puppy's weight on a coordinate grid? How do you think the ordered pairs would be different if the puppy's weight was measured every week instead of every month? Explain your reasoning.

Name .

**12.** Randy is training for a race. She makes a table that shows how long it takes her to run different distances.

Running Tir	me and	Distan	ce	
Distance (in miles)	1	2	3	4
Time (in minutes)	10	20	30	40

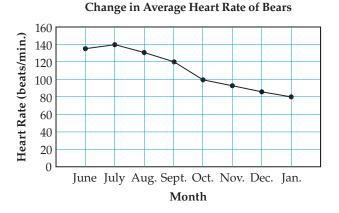
#### Part A

Write the number pairs as ordered pairs. Then write the rule to describe how the number pairs are related.

#### Part B

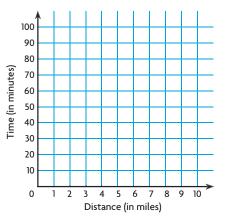
Graph the ordered pairs on the coordinate plane.

**13.** A scientist made a line graph that shows how a bear's average heart rate changes over time.



For numbers 13a–13c, select True or False for each statement.

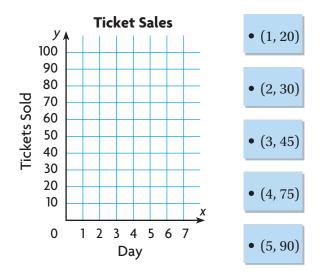
13a. The bear's heart rate is at its highest in July.
True
False
13b. The bear's average heart rate increases by 10 beats per minute from July to August.
The bear's heart rate is at its lowest in January.
True
False



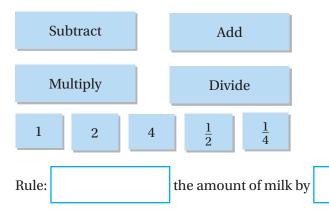
**14.** The table shows the total number of tickets sold for the school play each day for 5 days.

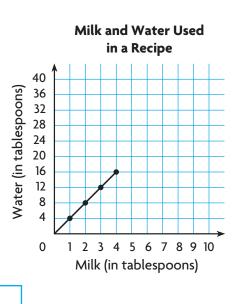
	Ticket	Sales			
Day	1	2	3	4	5
Tickets Sold	20	30	45	75	90

Graph the ordered pairs from the tiles on the coordinate grid.



15. The graph shows the relationship between the amount of milk and water used in a recipe. Determine a rule that relates the amount of milk to the amount of water by writing the correct term or value from the tiles in each blank.





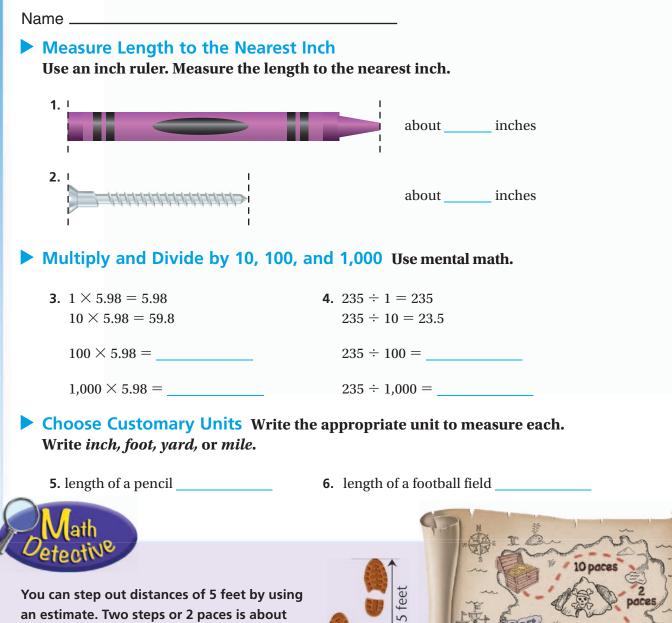
**16.** Steven is buying a new mountain bike on layaway for \$272. If he pays \$34 each week, how many weeks will it take Steven to pay for the bike? How can making a table help you solve the problem?

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**Convert Units of Measure** 

# Show What You Know

Check your understanding of important skills.



paces or

N

Personal Math Trainer

and Intervention

Chapter 10 425

an estimate. Two steps or 2 paces is about 5 feet. Be a Math Detective and act out the directions on the map to find a treasure. About how many feet from start to finish is the path to the treasure?

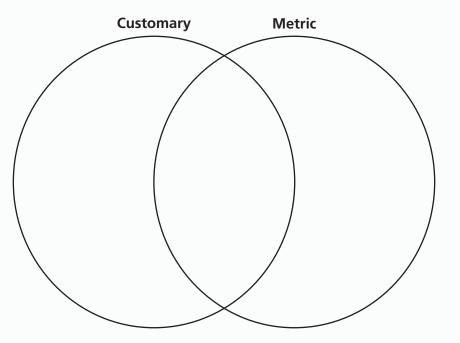
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Chapter

# **Vocabulary Builder**

### Visualize It •••••••••••••••

Sort the review and preview words into the Venn diagram.



# Understand Vocabulary •••••••

#### Complete the sentences.

**1.** A metric unit of length that is equal to one tenth of a meter

is a \_\_\_\_\_.

2. A metric unit of length that is equal to one thousandth

of a meter is a \_\_\_\_\_.

3. A metric unit of capacity that is equal to one thousandth

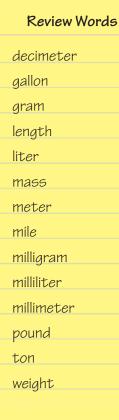
of a liter is a \_\_\_\_\_\_.

**4.** A metric unit of length that is equal to 10 meters

is a \_\_\_\_\_.

5. A metric unit of mass that is equal to one thousandth

of a gram is a \_\_\_\_\_.



#### Preview Words

capacity

dekameter



#### Name \_

## **Customary Length**

**Essential Question** How can you compare and convert customary units of length?

## Vnlock the Problem

To build a new swing, Mr. Mattson needs 9 feet of rope for each side of the swing and 6 more feet for the monkey bar. The hardware store sells rope by the yard.

• How many feet of rope does Mr. Mattson

need for the swing?

• How many feet does Mr. Mattson need for

the swing and the monkey bar combined?

Mr. Mattson needs to find how many yards of rope he needs to buy. He will need to convert 24 feet to yards. How many groups of 3 feet are in 24 feet?

# Lesson 10.1

Measurement and Data-5.MD.1 MATHEMATICAL PRACTICES MP.5, MP.7

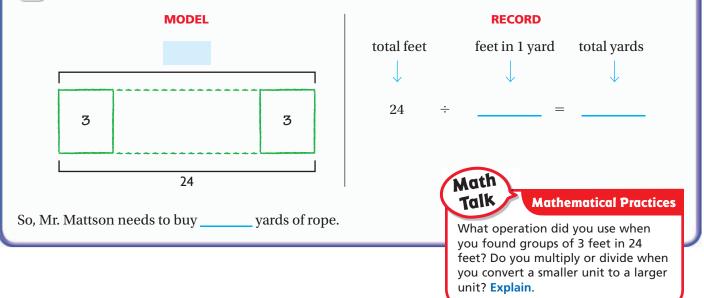


A 12-inch ruler is 1 foot.

A yardstick is 1 yard.

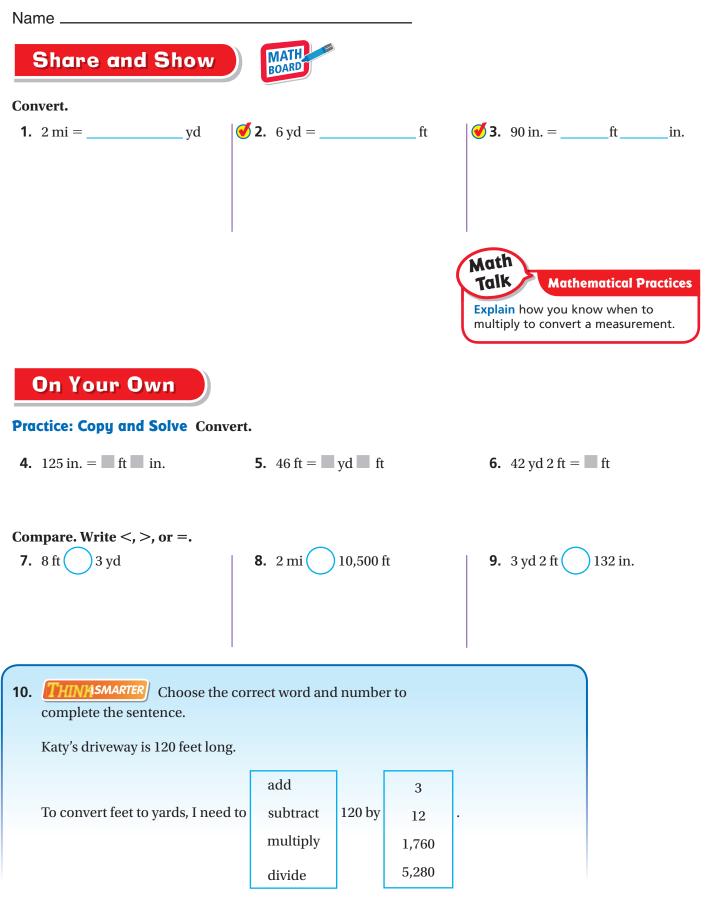
feet = 1 yard





<b>Example 1</b> Use the table to between miles and feet.	find the relation	ship	Customary Units of Length
The distance between the new high school field is 2 miles. How does this distance com		et?	1 foot (ft) = 12 inches (in.) 1 yard (yd) = 3 ft 1 mile (mi) = $5,280$ ft
When you convert larger units to smaller units, you need to multiply.			1  mile = 1,760  yd
<b>STEP 1</b> Convert 2 miles to feet.			
Think: 1 mile is equal to 5,280 feet.	total miles		total feet
number of miles by	↓ 2 × _	↓	_ =
	2  miles =		_feet
STEP 2       Compare. Write <, >, or =.         Sinceisthat			10,000 feet
			uie
new high school and the football field is	that	1 10,000 leet.	
<b>Example 2</b> Convert to mix	ed measures.		
Mixed measures use more than one unit of can convert a single unit of measurement to			
Convert 62 inches into feet and inches.			
STEP 1 Use the table.	STEP 2 Conv	ert.	
Think: 12 inches is equal to 1 foot	total in inches 1 t	ches in	t inches
I am changing from a smaller unit to		1	$\downarrow$
a larger unit, so I	62 ÷	is	r
So, 62 inches is equal to feet	inches.		

• **MATHEMATICAL (i) Explain** how to convert the mixed measures, 12 yards 2 feet, to a single unit of measurement in feet. How many feet is it?



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# Problem Solving • Applications (Real World

- **11. GODEEPER** Javon is helping his dad build a tree house. He has a piece of trim that is 13 feet long. How many pieces can Javon cut that are 1 yard long? How much of a yard will he have left over?
- **12. THINASMARTER** Patty is building a rope ladder for a tree house. She needs two 5-foot pieces of rope for the sides of the ladder. She needs 7 pieces of rope, each 18 inches long, for the steps. How many feet of rope does Patty need to make the ladder? Write your answer as a mixed number and as a mixed measure in feet and inches.

# Connect to Reading

#### **Compare and Contrast**

When you compare and contrast, you tell how two or more things are alike and different. You can compare and contrast information in a table.

Complete the table below. Use the table to answer the questions.

	Linear Units			
Yards	1	2	3	4
Feet	3	6	9	
Inches	36	72		

**13. MATHEMATICAL 1 Identify Relationships** How are the items in the table alike? How are they different?

**14. (MATHEMATICAL O)** Look for a Pattern What do you notice about the relationship between the number of larger units and the number of smaller units as the length increases? Explain.





MATHEMATICAL PRACTICES

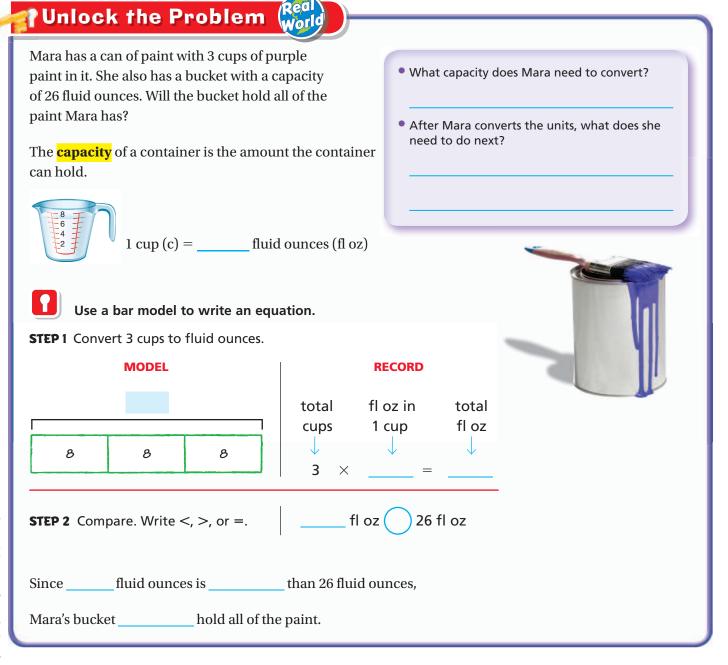
#### Name \_\_\_\_\_

## **Customary Capacity**

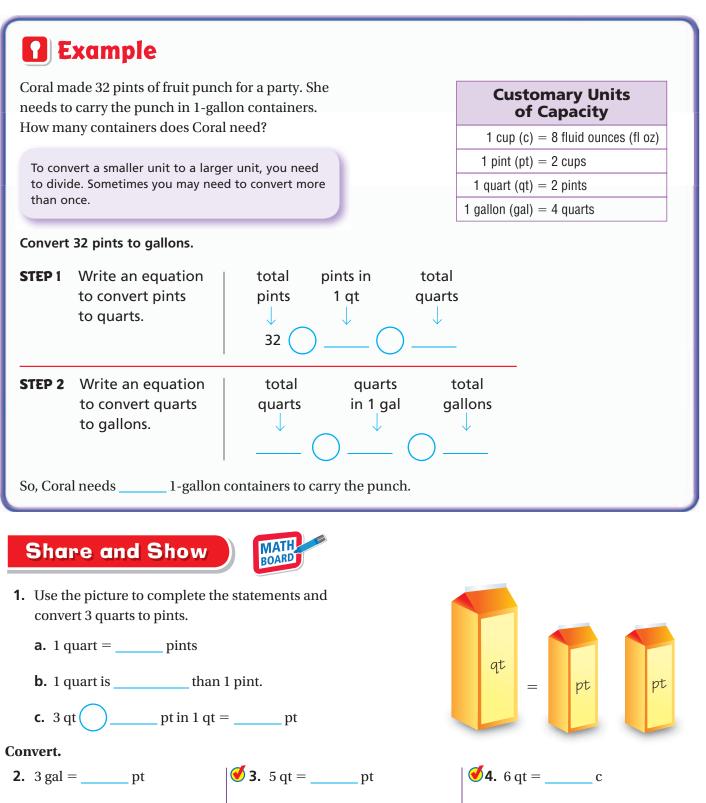
**Essential Question** How can you compare and convert customary units of capacity?

## Lesson 10.2

Measurement and Data— 5.MD.1 MATHEMATICAL PRACTICES MP.5, MP.6



• MATHEMATICAL <sup>(6)</sup> What if Mara has 7 cups of green paint and a container filled with 64 fluid ounces of yellow paint? Which color paint does Mara have more of? **Explain** your reasoning.



Math

Talk

**Mathematical Practices** 

**Explain** how converting units of capacity is similar to converting units

of length. How is it different?

Name		
On Your Own		
Convert.		
<b>5.</b> 38 c = pt	<b>6.</b> 36 qt =gal	<b>7.</b> 104 fl oz = c
Practice: Copy and Solve Conve	ert.	
<b>8.</b> $200 c = 10 qt$	<b>9.</b> $22 \text{ pt} = 10 \text{ fl oz}$	<b>10.</b> $8 \text{ gal} = 100 \text{ gal}$
<b>11.</b> $72 \text{ fl oz} = \mathbf{c}$	<b>12.</b> $2 \text{ gal} = 100 \text{ pt}$	<b>13.</b> $48 \text{ pt} = 200 \text{ gal}$
<b>Compare. Write</b> $<$ , $>$ , or $=$ . <b>14.</b> 28 c 14 pt	<b>15.</b> 25 pt 13 qt	<b>16.</b> 20 qt 80 c
<b>17.</b> 12 gal 50 qt	<b>18.</b> 320 fl oz 18 pt	<b>19.</b> 15 qt 63 c
<b>20. WRITE</b> <i>Math</i> Which of exercise the second s	xercises 14–19 could you solve menta ercise.	lly?

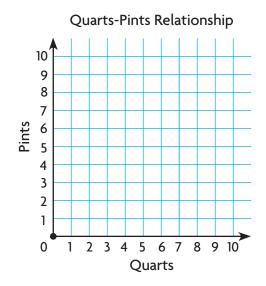
## Problem Solving • Applications (Reg

Show your work. For 21–23, use the table.

**21. WATHEMATICAL O Use Graphs** Complete the table, and make a graph showing the relationship between quarts and pints.

Quarts	0	1	2	3	4
Pints	0				

**22. Describe** any pattern you notice in the pairs of numbers you graphed. Write a rule to describe the pattern.



**23. THINASMARTER** What other pair of customary units of capacity have the same relationship as pints and quarts? Explain.



**24. THINKISMARTER** Shelby made 5 quarts of juice for a picnic. She said that she made  $1\frac{1}{4}$  cups of juice. Explain Shelby's mistake.

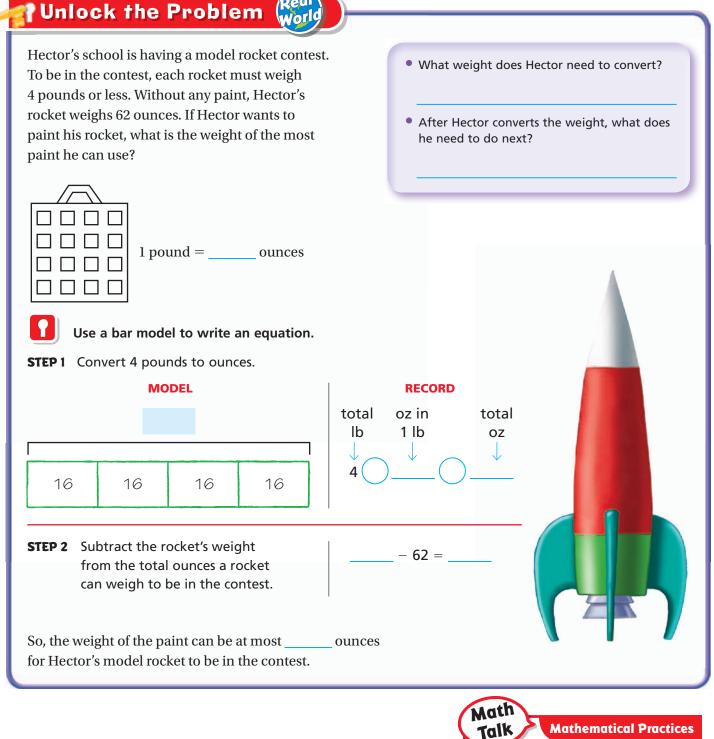
#### Name \_

## Weight

**Essential Question** How can you compare and convert customary units of weight?

# Lesson 10.3

Measurement and Data-5.MD.1 MATHEMATICAL PRACTICES MP.1, MP.6



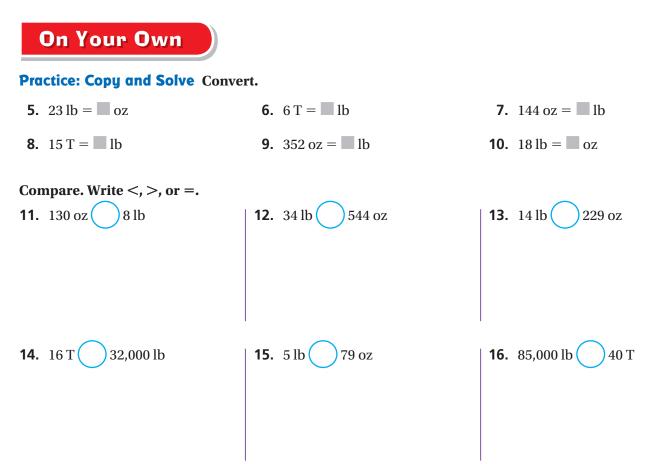
Chapter 10 435

How did you choose which operation to use to change from pounds to

ounces? Explain.

<b>Example</b>		A A
	space shuttle weigh 1,292,000 pounds ched. How many tons does each rocket	Sec.
Use mental math to convert	pounds to tons.	
<b>STEP 1</b> Decide which	Since pounds are smaller than tons,	Units of Weight
operation to use.	I need to the number	1 pound (lb) = 16 ounces (oz)
	of pounds by	1 ton (T) = 2,000 lb
<b>STEP 2</b> Break 2,000 into two factors that are easy to divide by mentally.	2,000 = × 2	
<b>STEP 3</b> Divide 1,292,000 by the first factor. Then divide the quotient by the second factor.	1,292,000 ÷ = ÷ 2 =	-
So, each rocket booster weigh	s tons when launched.	
Share and Show 1. Use the picture to complete a. 1 pound = ound c. 3 pounds = ound e. 5 pounds = ound	e each equation. ces b. 2 pounds = ounces aces d. 4 pounds = ounces	
Convert.		
<b>2.</b> 15 lb = oz	M	4. 320 oz = lb ath Mathematical Practices Explain how you can compare 11 pounds to 175 ounces mentally.

Name
------



# Problem Solving • Applications

- **17. GODEEPER** Rhada has a 5-pound bag of clay. Her craft project requires 5 ounces of clay for each batch of 6 ornaments. If she uses all of the clay, how many ornaments can Rhada make?
- **18. PRACTICE Represent a Problem** Ellis used 48 ounces of rye flour in a bread recipe. Write an expression you could use to find how many pounds of rye flour Ellis used. Explain how the expression represents the problem.

**19. IDENTIFY and SMARTER** Kevin uses 36 ounces of dried apples and 18 ounces of dried cranberries to make a fruit snack. He plans to sell the snack in  $\frac{1}{2}$ -pound containers. How may containers will he fill? Will any fruit snack be left over?

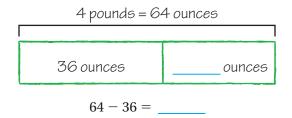


#### THINKISMARTER Pose a Problem

**20.** Kia wants to have 4 pounds of munchies for her party. She has 36 ounces of popcorn and wants the rest to be pretzel sticks. How many ounces of pretzel sticks does she need to buy?

So, Kia needs to buy \_\_\_\_\_ ounces of pretzel sticks.

Write a new problem using different amounts of snacks. Some weights should be in pounds and others in ounces. Make sure the amount of snacks given is less than the total amount of snacks needed.



### Pose a Problem

#### Draw a bar model for your problem. Then solve.

**21.**For numbers 21a-21c, select True or False for each statement.21a.1,500 lb > 1 T $\circ$  True $\circ$  False21b.32 oz < 4 lb</td> $\circ$  True $\circ$  False21c.24 oz < 1 lb 16 oz</td> $\circ$  True $\circ$  False

#### Name \_

### **Multistep Measurement Problems**

**Essential Question** How can you solve multistep problems that include measurement conversions?

world

## Lesson 10.4



# **PUNIOCK the Problem**

A leaky faucet in Jarod's house drips 2 cups of water each day. After 2 weeks of dripping, the faucet is fixed. If it dripped the same amount each day, how many quarts of water dripped from Jarod's leaky faucet in 2 weeks?



Use the steps to solve the multistep problem.

#### STEP 1

Record the information you are given.

The faucet drips	_ cups of water each day.

The faucet drips for \_\_\_\_\_ weeks.

STEP 2	
Find the total amount of water dripped in 2 weeks.	cups each day days in 2 weeks total cups $\downarrow$ $\downarrow$ $\downarrow$
Since you are given the amount of water	2 × =
dripped each day, you must convert 2 weeks into days and multiply.	The faucet drips cups in 2 weeks.
Think: There are 7 days in 1 week.	
STEP 3	
Convert from cups to quarts.	
Think: There are 2 cups in 1 pint.	cups = pints

• What if the faucet dripped for 4 weeks before it was fixed? How many quarts of water would have leaked?

A carton of large, Grade A eggs weighs about 1.5 pounds. If a carton holds a dozen eggs, how many ounces does each egg weigh? STEP 1 In ounces, find the weight of a carton of eggs.	Weight of a carton (in ounces):
in ounces, find the weight of a carton of eggs.	weight of a carton (in ounces).
Think: 1 pound = ounces	total lb oz in 1 lb total oz $\downarrow$ $\downarrow$ $\downarrow$
	1.5 × =
	The carton of eggs weighs about ounces.
STEP 2	
In ounces, find the weight of each egg in	Weight of each egg (in ounces):
a carton.	total oz eggs in 1 carton oz of 1 egg
<b>Think:</b> 1 carton (dozen eggs) = eggs	$\downarrow \qquad \downarrow \qquad \downarrow \qquad \downarrow$
	24 ÷ =
So, each egg weighs about ounces.	

Share and Show



#### Solve.

After each soccer practice, Scott runs

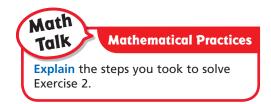
 4 sprints of 20 yards each. If he continues his
 routine, how many practices will it take for Scott
 to have sprinted a total of 2 miles combined?

Scott sprints \_\_\_\_\_ yards each practice.

Since there are \_\_\_\_\_ yards in 2 miles, he will need to continue his routine for

\_\_\_\_ practices.

 ✓ 3. Cory brings five 1-gallon jugs of juice to serve during parent night at his school. If the paper cups he is using for drinks can hold 8 fluid ounces, how many drinks can Cory serve for parent night?  A worker at a mill is loading 5-lb bags of flour into boxes to deliver to a local warehouse. Each box holds 12 bags of flour. If the warehouse orders 3 Tons of flour, how many boxes are needed to fulfill the order?



## On Your Own

#### Solve.

- **4.** A science teacher needs to collect lake water for a lab she is teaching. The lab requires each student to use 4 fluid ounces of lake water. If 68 students are participating, how many pints of lake water will the teacher need to collect?
- 5. **WATHEMATICAL ()** Use Diagrams A string of decorative lights is 28 feet long. The first light on the string is 16 inches from the plug. If the lights on the string are spaced 4 inches apart, how many lights are there on the string? Draw a picture to help you solve the problem.

- **6.** When Elena's car moves forward such that each tire makes one full rotation, the car has traveled 72 inches. How many full rotations will the tires need to make for Elena's car to travel 10 yards?
- 7. **GODEEPER** A male African elephant weighs 7 Tons. If a male African lion at the local zoo weighs  $\frac{1}{40}$  of the weight of the male African elephant, how many pounds does the lion weigh?

- **8.** An office supply company is shipping a case of wooden pencils to a store. There are 64 boxes of pencils in the case. If each box of pencils weighs 2.5 ounces, what is the weight, in pounds, of the case of wooden pencils?
- 9. **THIMASMARTER** A gallon of unleaded gasoline weighs about 6 pounds. About how many ounces does 1 quart of unleaded gasoline weigh? HINT: 1 quart  $=\frac{1}{4}$  of a gallon

<ul> <li><b>Unlock the Problem</b> (b)</li> <li><b>IIII</b> (I) (I) (I) (I) (I) (I) (I) (I) (I) (I)</li></ul>	very inces h given bunds of
<b>b.</b> What information will you use?	
<ul> <li>c. What conversion will you need to do to solve</li> <li>d. Show the steps you use to solve the</li> </ul>	the problem?  e. Complete the sentences. The small-size
problem.	dogs eat a total of ounces of dry food each day.
	The medium-size dogs eat a total of
	ounces of dry food each day. The shelter serves ounces,
	or pounds, of dry food each day.
	Personal Math Trainer
<b>1. THIMASMARTER</b> Gus is painting his house of paint per hour. Gus paints for 8 hours. How n paint did he use? Show your work.	

Name .

# 🧖 🍼 Mid-Chapter Checkpoint

Vocabulary

#### Choose the best term from the box.

- 1. The \_\_\_\_\_\_ of an object is how heavy the object is. (p. 435)
- 2. The \_\_\_\_\_\_ of a container is the amount the container can hold. (p. 431)

Vocabulary				
capacity				
length				
weight				

## Concepts and Skills

#### Convert. (5.MD.1)

<b>3.</b> 5 mi = yd	<b>4.</b> 48 qt =	gal	<b>5.</b> 9 T =	lb
<b>6.</b> $336 \text{ oz} = \ \text{lb}$	<b>7.</b> 14 ft =yd	ft	<b>8.</b> 11 pt =	fl oz
<b>6.</b> 336 oz =lb				
Compare. Write <, >, or =. (5.MD.1)				
<b>9.</b> 96 fl oz 13 c	<b>10.</b> 25 lb 384 oz		<b>11.</b> 8 yd 288 in.	
<b>Solve.</b> (5.MD.1)				
<b>12.</b> A standard coffee mug has a ca Annie needs to fill 26 mugs with of coffee does she need?		arts		

**13.** The length of a classroom is 34 feet. What is this measurement in yards and feet? (5.MD.1)

**14.** Charlie's puppy, Max, weighs 8 pounds. How many ounces does Max weigh? (5.MD.1)

**15.** Milton purchases a 5-gallon aquarium for his bedroom. To fill the aquarium with water, he uses a container with a capacity of 1 quart. How many times will Milton fill and empty the container before the aquarium is full? (5.MD.1)

**16.** Sarah uses a recipe to make 2 gallons of her favorite mixed-berry juice. The containers she plans to use to store the juice have a capacity of 1 pint. How many containers will Sarah need? (5.MD.1)

**17.** The average length of a female white-beaked dolphin is about 111 inches. What is this length in feet and inches? (5.MD.1)

#### Name \_\_\_\_\_

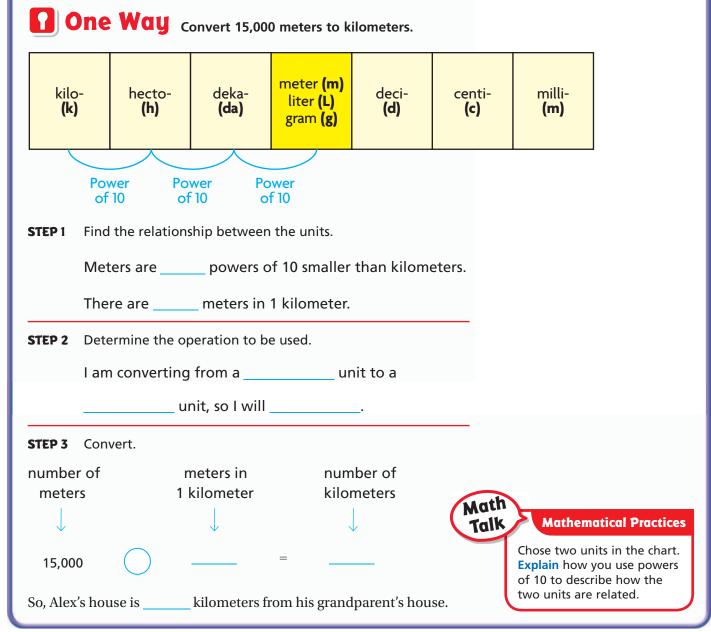
### Metric Measures

Essential Question How can you compare and convert metric units?

# Vnlock the Problem (Real

Using a map, Alex estimates the distance between his house and his grandparent's house to be about 15,000 meters. About how many kilometers away from his grandparent's house does Alex live?

The metric system is based on place value. Each unit is related to the next largest or next smallest unit by a power of 10.



 Underline the sentence that tells you what you are trying to find.

• Circle the measurement you need to convert.

Lesson 10.5

Measurement and Data— 5.MD.1 MATHEMATICAL PRACTICES

MP.2, MP.6, MP.8

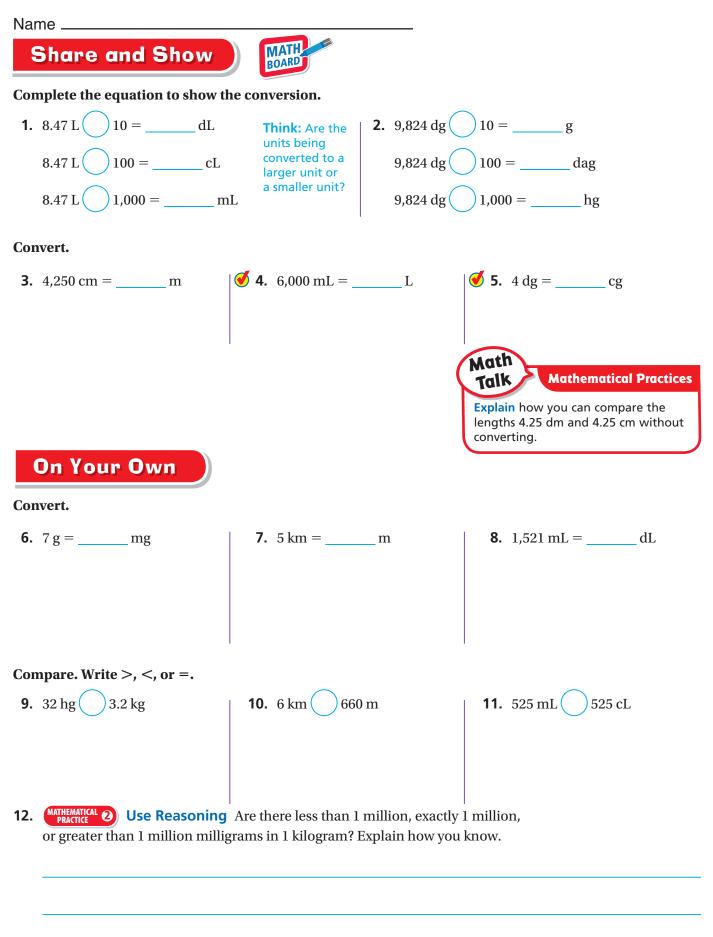
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#### Another Way Use a diagram. Jamie made a bracelet 1.8 decimeters long. How many millimeters long is Jamie's bracelet? Convert 1.8 decimeters to millimeters. 1 8 meter kilohectodekadecicentimilliliter gram **STEP 3** Record the value with **STEP1** Show 1.8 decimeters. **STEP 2** Convert. the new units. Since the unit is decimeters, Cross out the decimal and place the decimal point so that rewrite it so that millimeters 1.8 dm = \_\_\_\_\_ mm decimeters are the whole will be the whole number unit. number unit. Write zeros to the left of the decimal point as needed to complete the whole number. So, Jamie's bracelet is \_\_\_\_\_ millimeters long.

#### **Try This!** Complete the equation to show the conversion.

Convert 247 milligrams to centigrams, decigrams, and grams.	B Convert 3.9 hectoliters to dekaliters, liters, and deciliters.
Are the units being converted to a larger	Are the units being converted to a larger
unit or a smaller unit?	unit or a smaller unit?
Should you multiply or divide by powers	Should you multiply or divide by powers
of 10 to convert?	of 10 to convert?
$247 \text{ mg} 10 = \ \text{cg}$	$3.9 \text{ hL} 10 = \ \text{daL}$
247  mg 100 = dg	3.9  hL 100 =L
247  mg 1,000 = g	3.9 hL 1,000 = dL

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# Problem Solving • Applications

#### For 13–14, use the table.

- **13. GODEEPER** Kelly made one batch of raisin and pretzel snack mix. How many grams does she need to add to the snack mix to make 2 kilograms?
- **14. THINASMARTER** Kelly plans to take juice on her camping trip. Which will hold more juice, 8 cans or 2 bottles? How much more?
- **15.** Erin's water bottle holds 600 milliliters of water. Dylan's water bottle holds 1 liter of water. Whose water bottle holds more water? How much more water?
- **16.** Liz and Alana each participated in the high jump at the track meet. Liz's high jump was 1 meter. Alana's high jump was 132 centimeters. Who jumped higher? How much higher?
- **17. Monica has 426 millimeters** of fabric. How many centimeters of fabric does Monica have? Use the numbers and symbols on the tiles to write an equation to show the conversion.

426	4.26	42.6	0.426
×	÷	=	
10	100	1,000	

Food for Camping				
Item	Amount			
1 can of juice	150 mL			
1 bottle of juice	2 L			
1 batch of pancakes	200 g			
raisin & pretzel snack mix	1,425 g			



**WRITE** Math Show Your Work

448

# Problem Solving • Customary

## and Metric Conversions

**Essential Question** How can you use the strategy *make a table* to help you solve problems about customary and metric conversions?

## PROBLEM SOLVING Lesson 10.6



Measurement and Data— 5.MD.1

MATHEMATICAL PRACTICES MP.2, MP.3, MP.4, MP.7

Unlock the Problem World	_
Aaron is making fruit punch for a family reunion.	
He needs to make 120 cups of punch. If he wants	
to store the fruit punch in gallon containers, how	1

Ded

Use the graphic organizer below to help you solve the problem.

many gallon containers will Aaron need?

<b>Conversion Table</b>				
	gal	qt	pt	C
1 gal	1	4	8	16
1 qt	$\frac{1}{4}$	1	2	4
1 pt	<u>1</u> 8	<u>1</u> 2	1	2
1 c	<u>1</u> 16	$\frac{1}{4}$	<u>1</u> 2	1

Read the Problem						
What do I need to find?		What information do I need to use?			How will I use the information?	
			I need to use		I will make a table to show the relationship between the	
						number of and
		·			the number of	
Solve the Problem						
	cups ir ne table belov	-	So, each cup is	of a	a gallon.	
•	1	2	3	4	1	2 0 Multiply by
C	$\frac{1}{16}$	<u>1</u> 8	<u>3</u> 16	$\frac{1}{4}$		) Multiply by

So, Aaron needs \_\_\_\_\_ gallon containers to store the punch.

• MATHEMATICAL **2** Use Reasoning Will all of the gallon containers Aaron uses be filled

to capacity? Explain.

# Try Another Problem

Sharon is working on a project for art class. She needs to cut strips of wood that are each 1 decimeter long to complete the project. If Sharon has 7 strips of wood that are each 1 meter long, how many 1-decimeter strips can she cut?

Conversion Table					
	m	dm	cm	mm	
1 m	1	10	100	1,000	
1 dm	<u>1</u> 10	1	10	100	
1 cm	<u>1</u> 100	<u>1</u> 10	1	10	
1 mm	<u>1</u> 1,000	<u>1</u> 100	<u>1</u> 10	1	

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						

So, Sharon can cut \_\_\_\_\_\_1-decimeter lengths to complete her project.

• MATHEMATICAL **1** Look for a Pattern What relationship did the table you made show?



another strategy to solve this problem.

#### Name \_

## **Share and Show**



 Edgardo has a drink cooler that holds 10 gallons of water. He is filling the cooler with a 1-quart container. How many times will he have to fill the quart container to fill the cooler?

**First,** make a table to show the relationship between gallons and quarts. You can use a conversion table to find how many quarts are in a gallon.

gal	1	2	3	4	1
qt	4				

Then, look for a rule to help you complete your table.

number of gallons  $\times$  \_\_\_\_\_ = number of quarts

**Finally,** use the table to solve the problem.

Edgardo will need to fill the quart container \_\_\_\_\_ times.

✓ 2. *IFINASMARTER* What if Edgardo only uses 32 quarts of water to fill the cooler. How can you use your table to find how many gallons that is?

✓ 3. If Edgardo uses a 1-cup container to fill the cooler, how will that affect the number of times he has to fill a container to fill the cooler? Explain.



WRITE Math 
 Show Your Work 
 · •

0

## **On Your Own**

**4. THINK SMARTER** Maria put trim around a banner that is the shape of a triangle. Each side is 22 inches long. Maria has  $\frac{1}{2}$  foot of trim left. What was the length of the trim when she started? Write your answer in yards.



- **5.** Dan owns 9 DVDs. His brother Mark has 3 more DVDs than Dan has. Their sister, Marsha, has more DVDs than either of her brothers. Together, the three have 35 DVDs. How many DVDs does Marsha have?
- 6. **GODEEPER** Kevin is making a picture frame. He has a piece of trim that is 4 feet long. How many 14-inch-long pieces can Kevin cut from the trim? How much of a foot will he have left over?
- 7. **MATHEMATICAL 2** Reason Quantitatively Explain how you could find the number of cups in five gallons of water.

- **8.** Carla uses  $2\frac{3}{4}$  cups of whole wheat flour and  $1\frac{3}{8}$  cups of rye flour in her bread recipe. How many cups does she use in all?
- **9. <u><b>THINKSMARTER**</u> A large pot holds 12 gallons of soup. Jared has 1-pint containers of chicken broth. Complete the table to help you find the number of 1-pint containers of chicken broth Jared will need to fill the pot.

gallon	2	4	6	8	10	12
pint						

Jared will need \_\_\_\_\_\_ 1-pint containers to fill the pot.

#### Lesson 10.7 Name \_\_\_\_\_ Elapsed Time Measurement and Data-5.MD.1 **Essential Question** How can you solve elapsed time problems by MATHEMATICAL PRACTICES converting units of time? MP.6, MP.7 Unlock the Problem Real A computer company claims its laptop has a battery that lasts 4 hours. The laptop actually ran for 200 minutes before the battery ran out. Did the battery last 4 hours? 1 hour = minutes Think: The minute hand moves from one number to the next in 5 minutes. Convert 200 minutes to hours and minutes. **STEP1** Convert minutes into total min in hours and minutes. 1 hr min hr min $200 \min = hr \min$ \_\_\_\_is \_\_\_\_r \_\_\_\_ **STEP 2** Compare. Write <, >, or =. hr min () 4 hr Since \_\_\_\_\_ hours \_\_\_\_\_ minutes is \_\_\_\_\_ 4 hours, the battery last as long as the computer company claims.

### Try This! Convert to mixed measures.

Jill spent much of her summer away from home. She spent 10 days with her grandparents, 9 days with her cousins, and 22 days at camp. How many weeks and days was she away from home?

**STEP 1** Find the total number of days away.

 $10 \text{ days} + 9 \text{ days} + 22 \text{ days} = \underline{\qquad} \text{ days}$ 

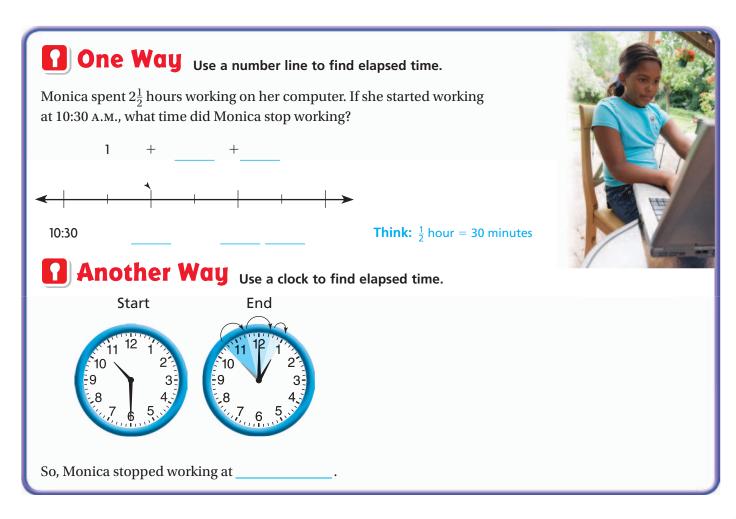
**STEP 2** Convert the days into weeks and days.

\_\_\_\_\_ ÷ 7 is \_\_\_\_\_ r \_\_\_\_

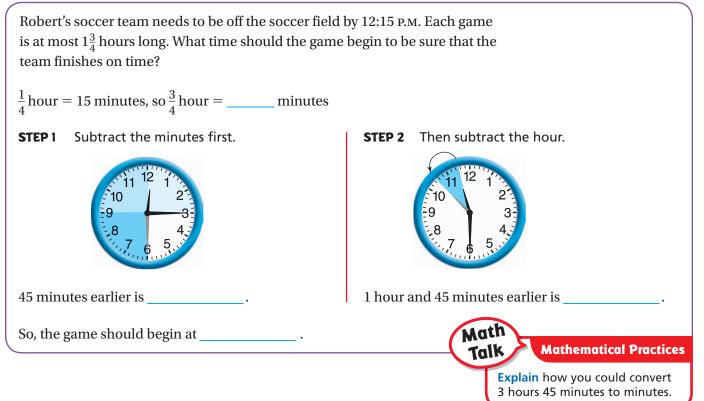
So, Jill was away from home \_\_\_\_\_ weeks and \_\_\_\_\_ days.

Units of Time
60  seconds  (s) = 1  minute (min)
60  minutes = 1  hour (hr)
24  hours = 1  day (d)
7  days = 1  week (wk)
52 weeks $=$ 1 year (yr)
12 months (mo) $=$ 1 year
$365  ext{ days} = 1  ext{ year}$

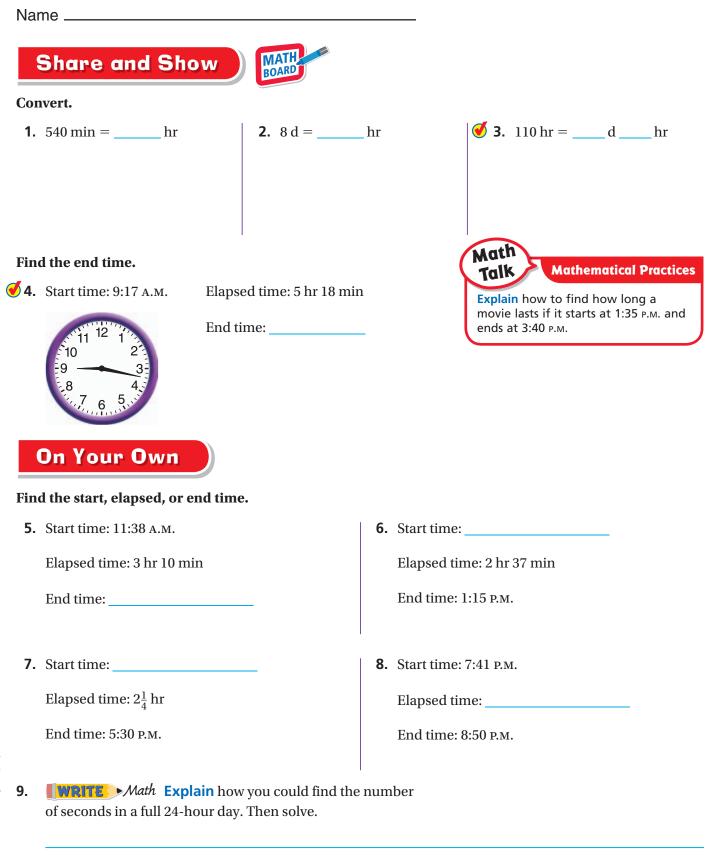
C Houghton Mifflin Harcourt Publishing Company



#### Try This! Find a start time.



Choughton Mifflin Harcourt Publishing Company • Image Credits: (tr) Cohristina Kennedy/Brand X Pictures/Getty Image

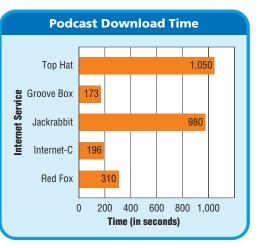


## Problem Solving • Applications 🎇

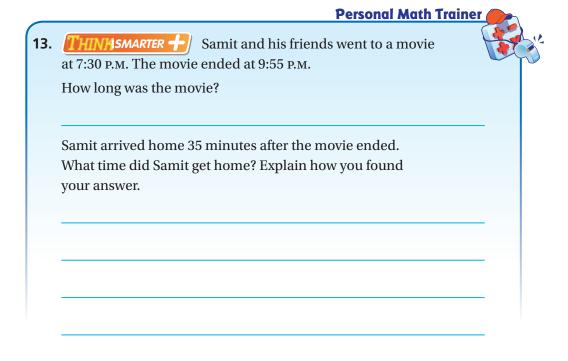
#### For 10–12, use the graph.

- **10.** MATHEMATICAL **()** Use Graphs Which Internet services downloaded the podcast in less than 4 minutes?
- **11.** Which service took the longest to download the podcast? How much longer did it take than Red Fox in minutes and seconds?





**12. GODEEPER** If both Jackrabbit and Red Fox started the podcast download at 10:05 A.M., at what time did each service complete its download? What was the difference between these times?





**1.** The library is 5 miles from the post office. How many yards is the library from the post office?

yards

**2.** Billy made 3 gallons of juice for a picnic. He said that he made  $\frac{3}{4}$  quart of juice. Explain Billy's mistake.

**3.** The Drama Club is showing a video of their recent play. The first showing begins at 2:30 P.M. The second showing is scheduled at 5:25 P.M. with a  $\frac{1}{2}$ -hour break between the showings.

#### Part A

How long is the video in hours and minutes?

hours and minutes

#### Part B

Explain how you can use a number line to find the answer.

#### Part C

The second showing started 20 minutes late. Will the second showing be over by 7:45 P.M.? Explain why your answer is reasonable.



**4.** Fred bought 4 liters of liquid laundry detergent, 3,250 milliliters of fabric softener, and 2.5 liters of bleach. For numbers 4a–4e, select True or False for each statement.

4a.	Fred bought 75 milliliters more fabric softener than bleach.	⊖ True	○ False
4b.	Fred bought 1.75 liters more laundry detergent than bleach.	○ True	○ False
4c.	Fred bought 750 milliliters more fabric softener than bleach.	○ True	○ False
4d.	Fred bought 150 milliliters more laundry detergent than bleach.	○ True	○ False
4e.	Fred bought 0.75 liters more laundry detergent than fabric softener.	○ True	○ False

**5.** A male hippopotamus can weigh up to 10,000 pounds. How many tons is 10,000 pounds?

tons

**6.** Amar and his friends went to a movie at 4:45 P.M. The movie ended at 6:20 P.M.

#### Part A

How long was the movie?

\_\_\_\_\_ hours and \_\_\_\_\_ minutes

#### Part B

Amar got home 45 minutes after the movie ended. What time did Amar get home? Explain how you found your answer.



#### Name \_\_

- **7.** Select the objects that hold the same amount of liquid as a 96-fluid-ounce jug. Mark all that apply.
  - (A) three 1-quart bottles
  - **B** two 1-quart bottles
  - **C** two 1-quart bottles and two 1-pint bottles
  - **D** one 1-quart bottle and eight 8-ounce fluid glasses
  - (E) two 8-ounce fluid glasses and two 1-pint bottles
- **8.** Lorena's backpack has a mass of 3,000 grams. What is the mass of Lorena's backpack in kilograms?

kilograms

**9.** Richard walks every day for exercise at a rate of 1 kilometer every 12 minutes.

#### Part A

At this rate, how many meters can Richard walk in 1 hour? Explain how you found your answer.

#### Part B

Suppose Richard walks 1 kilometer every 10 minutes. How many meters further can he walk in 1 hour at this new rate? Explain how you found your answer.

**10.** Beth filled 32 jars with paint. If each jar holds 1 pint of paint, how many gallons of paint did Beth use?

\_\_gallons

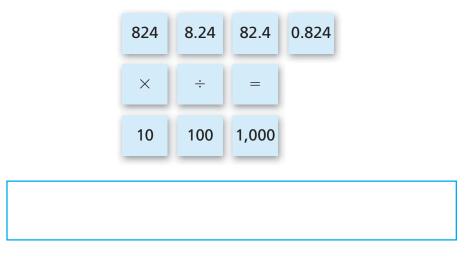
**11.** Griffins's driveway is 36 feet long. Choose the word and number to complete the sentence correctly.

To convert 20 foot to words	add		3	
	subtract 36 by		12	
To convert 36 feet to yards,	multiply	30 Dy	1,760	•
	divide		5,280	

**12.** Carlos bought 5 pounds of carrots. How many ounces of carrots did he buy?

ounces

**13.** Chandler has 824 millimeters of fabric. How many centimeters of fabric does Chandler have? Use the numbers and symbols on the tiles to write an equation to show the conversion.



Chandler has \_\_\_\_\_\_ centimeters of fabric.

**14.** Glenn needs to cut pieces of ribbon that are each 1 meter long to make ribbon key chains. If he has 3 pieces of ribbon that are each 1 dekameter long, how many 1-meter pieces of ribbon can he cut?

\_\_\_\_ pieces

Name .

**15.** A large pot holds 8 quarts of spaghetti sauce. Lisa has 1-pint containers of spaghetti sauce. Complete the table to help you find the number of 1-pint containers of spaghetti sauce Lisa will need to fill the pot.

quart	2	4	6	8
pint				

Lisa will need

1-pint containers to fill the pot.

**16.** Emily bought 48 yards of fabric to make curtains. How many inches of fabric did Emily buy?

inches

**17.** Kelly is having a party. She wants to make punch. The recipe for punch uses 3 pints of pineapple juice, 5 cups of orange juice,  $\frac{1}{4}$  gallon of lemonade, and 1 quart of apricot nectar.

#### Part A

Kelly says her recipe will make 20 cups of punch. Is Kelly correct? Explain your answer.

#### Part B

Kelly decides to pour her punch into 1-quart containers to fit into her refrigerator until the party starts. She has four 1-quart containers. Will all of her punch fit into the containers? Explain.

**18.** Sam is practicing long track speed skating at an ice skating rink. The distance around the rink is 250 yards. He has skated around the rink 6 times so far. How many more yards does he need to skate around the rink to complete 3 miles?

\_\_\_\_ yards

**19.** Maria spent 15 days traveling in South America. How many hours did she spend traveling in South America?

hours

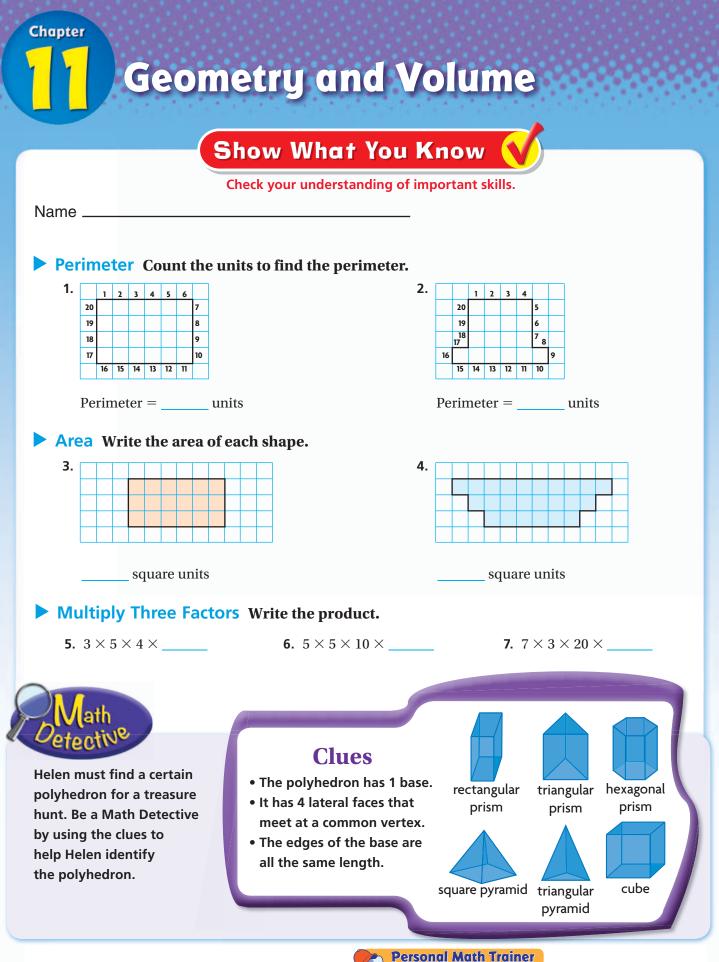
**20.** A concrete truck loaded with concrete weighs about 30 tons. About how many pounds does the loaded truck weigh?

\_\_\_\_\_ pounds

**21.** A plumber has a piece of pipe that is 2-meter long. He needs to cut it into sections that are 10 centimeters long. How many sections will he be able to cut? Show your work. Explain how you found your answer.

**22.** For numbers 22a–22d, select True or False for each statement.

22a.	2,000 lb > 1 T	O True	○ False
22b.	56  oz < 4  lb	○ True	○ False
22c.	48  oz = 3  lb	○ True	○ False
22d.	40  oz < 2  lb 4  oz	O True	○ False



Chapter 11 463

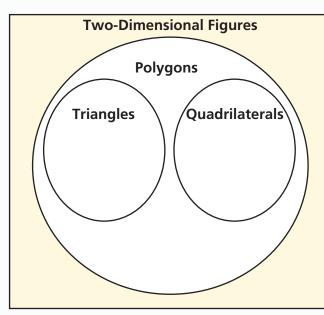
**Online Assessment** 

and Intervention

# **Vocabulary Builder**

#### 

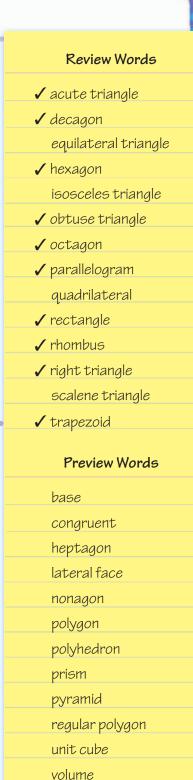
Sort the checked words into the circle map.



### Understand Vocabulary ••••••••

#### Write the preview word that answers the riddle.

- I am a solid figure with two congruent polygons that are bases, connected with lateral faces that are rectangles.
- **2.** I am a polygon in which all sides are congruent and all angles are congruent.
- **3.** I am a cube that has a length, width, and height of 1 unit.
- **4.** I am a solid figure with faces that are polygons.
- **5.** I am the measure of the amount of space a solid figure occupies.
- **6.** I am a polygon that connects with the bases of a polyhedron.





#### Name \_

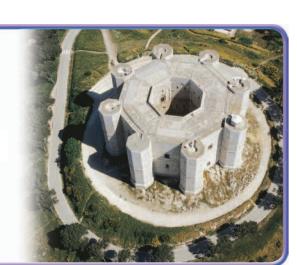
#### Polygons

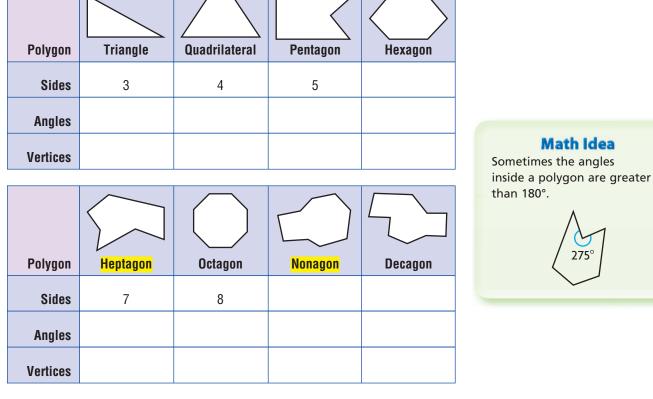
Essential Question How can you identify and classify polygons?

# Unlock the Problem

The Castel del Monte in Apulia, Italy, was built more than 750 years ago. The fortress has one central building with eight surrounding towers. Which polygon do you see repeated in the structure? How many sides, angles, and vertices does this polygon have?

A **polygon** is a closed plane figure formed by three or more line segments that meet at points called vertices. It is named by the number of sides and angles it has. To identify the repeated polygon in the fortress, complete the tables below.





So, the \_\_\_\_\_\_ is the repeated polygon in the

Castel del Monte because it has \_\_\_\_\_\_ sides, \_\_\_\_\_ angles,

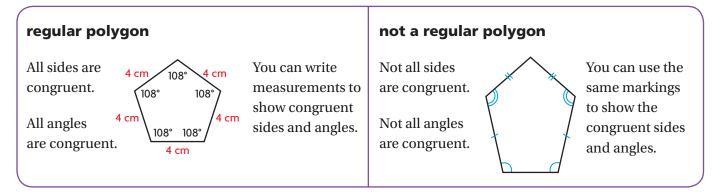
and \_\_\_\_\_ vertices.

Math Talk What pattern do you see among the

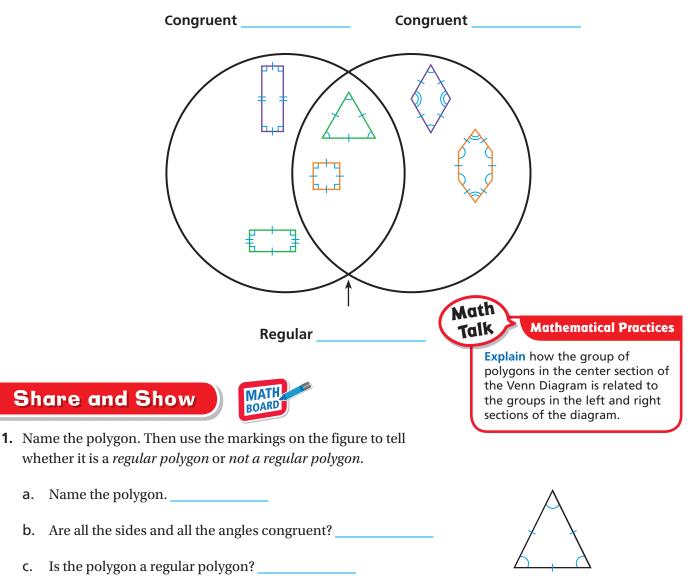
number of sides, angles, and vertices a polygon has?

# Lesson 11.1

Geometry— 5.G.3, 5.G.4 MATHEMATICAL PRACTICES MP.5, MP.7, MP.8 **Regular Polygons** When line segments have the same length or when angles have the same measure, they are **congruent**. Two polygons are congruent when they have the same size and the same shape. In a **regular polygon**, all sides are congruent and all angles are congruent.

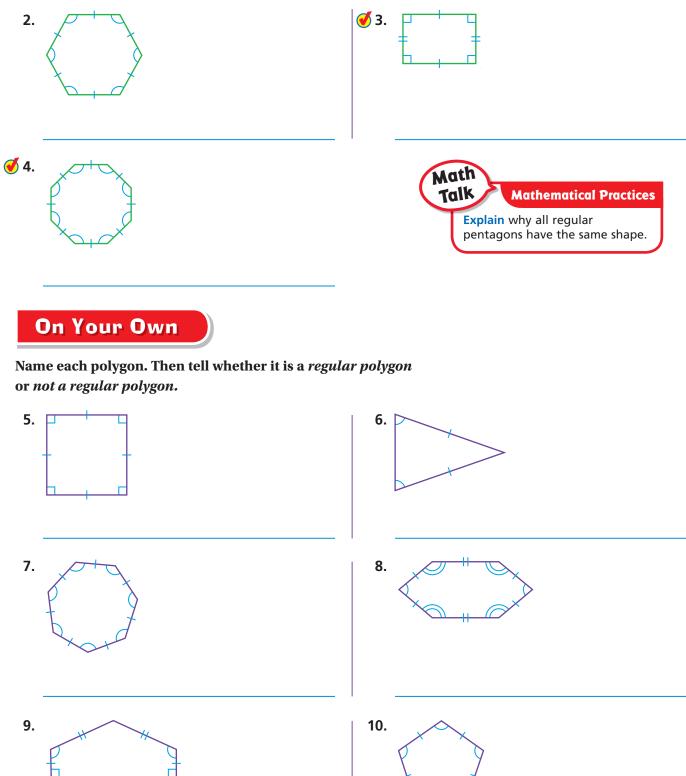


**Try This!** Label the Venn diagram to classify the polygons in each group. Then draw a polygon that belongs only to each group.



Name \_

# Name each polygon. Then tell whether it is a *regular polygon* or *not a regular polygon*.



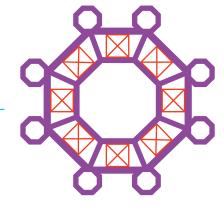
# Problem Solving • Applications

#### For 11-12, use the Castel del Monte floor plan at the right.

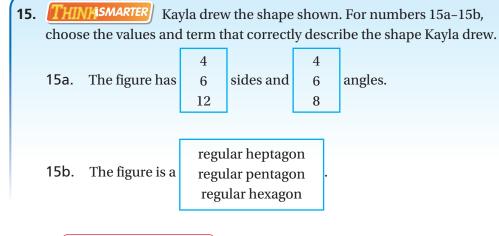
- **11. EXAMPLE 1** Which polygons in the floor plan have four equal sides and four congruent angles? How many of these polygons are there?
- **12. GODEEPER** Is there a quadrilateral in the floor plan that is not a regular polygon? Name the quadrilateral and tell how many of the quadrilaterals are in the floor plan.
- **13. (MATHEMATICAL O) Use Math Vocabulary** Sketch eight points that are vertices of a closed plane figure. Connect the points to draw the figure.

What kind of polygon did you draw?

**14. ITHINASMARTER** Look at the angles for all regular polygons. As the number of sides increases, do the measures of the angles increase or decrease? What pattern do you see?







FOR MORE PRACTICE:

**Standards Practice Book** 

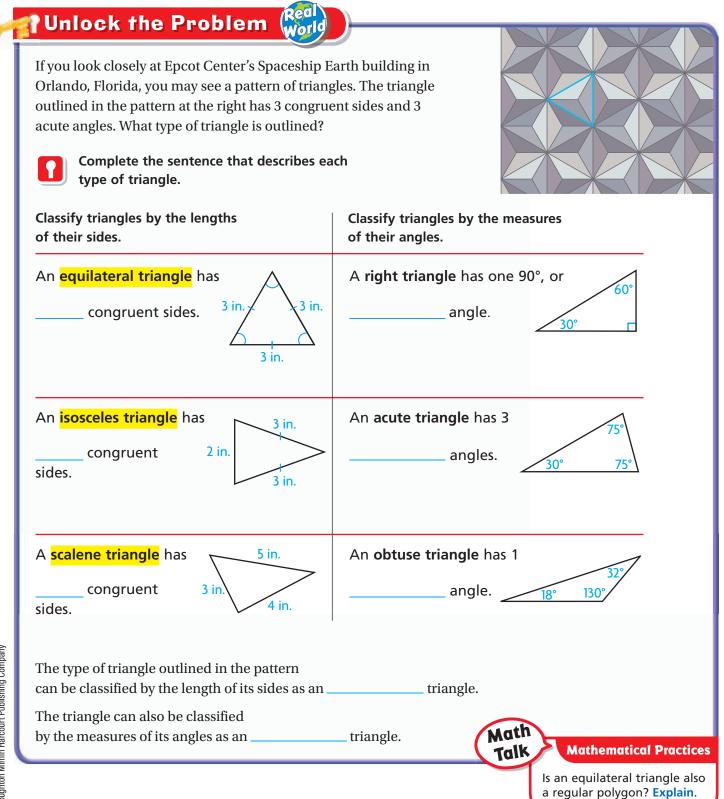
#### Name \_

#### **Triangles**

**Essential Question** How can you classify triangles?

# Lesson 11.2

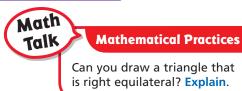
Geometry-5.G.3, 5.G.4 MATHEMATICAL PRACTICES MP.1, MP.4, MP.6, MP.7

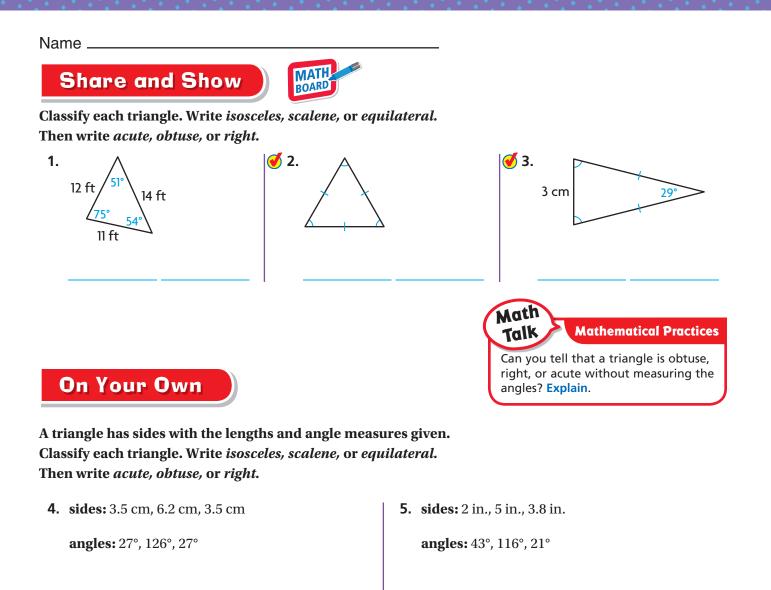


Classify	Activity triangle ABC by the lengths of its sides the measures of its angles.	• What type of triangle has 3 sides of different lengths?	
Mater	ials – centimeter ruler – protractor	<ul> <li>What is an angle called that is greater than 90° and less than 180°?</li> </ul>	
STEP 1	Measure the sides of the triangle using a centimeter ruler. Label each side with its length. Classify the triangle by the lengths of its sides.	B	
STEP 2	Measure the angles of the triangle using a protractor. Label each angle with its measure. Classify the triangle by the measures of its angles.	c	
Triangle <i>ABC</i> is a triangle.			

# **Try This!** Draw the type of triangle described by the lengths of its sides and by the measures of its angles.

	Triangle by Length of Sides					
	Scalene	Isosceles				
Triangle by Angle Measure	Think: I need to draw a triangle that is acute and scalene.					
Triangle by						





**6.** Circle the figure that does not belong. Explain.



**7. Draw** 2 equilateral triangles that are congruent and share a side. What polygon is formed? Is it a regular polygon?

# **Problem Solving • Applications**

**8.** [THIN] Shannon said that a triangle with exactly 2 congruent sides and an obtuse angle is an equilateral obtuse triangle. Describe her error.

**9. THINASMARTER** Kelly drew a triangle with exactly 2 congruent sides and 3 acute angles. Which of the following accurately describes the triangle? Mark all that apply.

- A isosceles C obtuse
- **B** acute

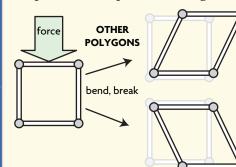
equilateral

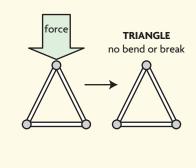
D

# Connect <mark>(to Science</mark>

#### **Forces and Balance**

What makes triangles good for the construction of buildings or bridges? The 3 fixed lengths of the sides of a triangle, when joined, can form no other shape. So, when pushed, triangles don't bend or break.





Mathematical O Identify Relationships Classify the triangles in the structures below. Write *isosceles, scalene,* or *equilateral*. Then write *acute, obtuse,* or *right*.









MATHEMATICAL PRACTICES

**Mathematical Practices** 

Explain how trapezoids and parallelograms are different.

Quadrilaterals

Name \_

Essential Question How can you classify and compare quadrilaterals?

# Tulock the Problem

A seating chart for a baseball field has many four-sided figures, or **quadrilaterals**. What types of quadrilaterals can you find in the seating chart?

There are five special types of quadrilaterals. You can classify quadrilaterals by their properties, such as parallel sides and perpendicular sides. Parallel lines are lines that are always the same distance apart. Perpendicular lines are lines that intersect to form four right angles.

Complete the sentence that describes each

type of quadrilateral.



135

133 131

> Math Talk

A general quadrilateral has 4 sides and 4 angles.		A <b>parallelogram</b> has opposite	
		that are and parallel.	
A <b>rectangle</b> is a special		A <b>rhombus</b> is a special	
parallelogram with right angles and 4 pairs of sides.		parallelogram with congruent sides.	
A <b>square</b> is a special parallelogram with		A <b>trapezoid</b> is a quadrilateral with exactly	
congruent sides		1 pair of sides.	
and right angles.			<u></u>
So, the types of quadrilaterals yo	ou can find in the sea	ting chart of the field are	



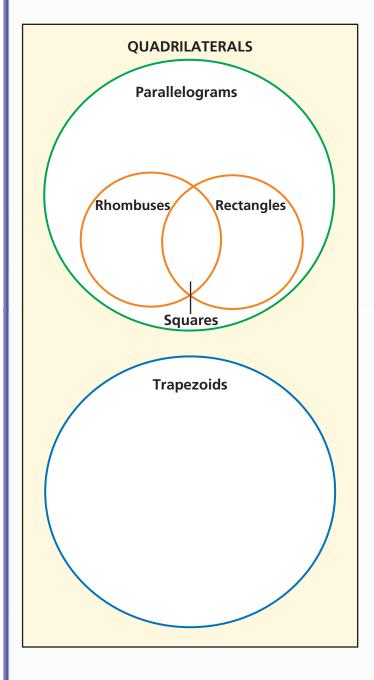
MATHEMATICAL PRACTICES MP.1, MP.7, MP.8

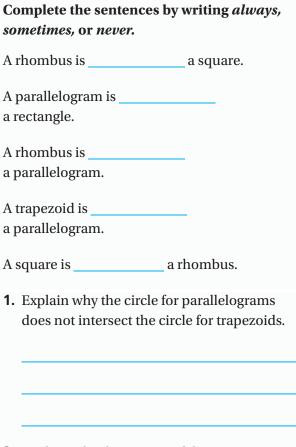
# Activity

#### **Materials** quadrilaterals scissors

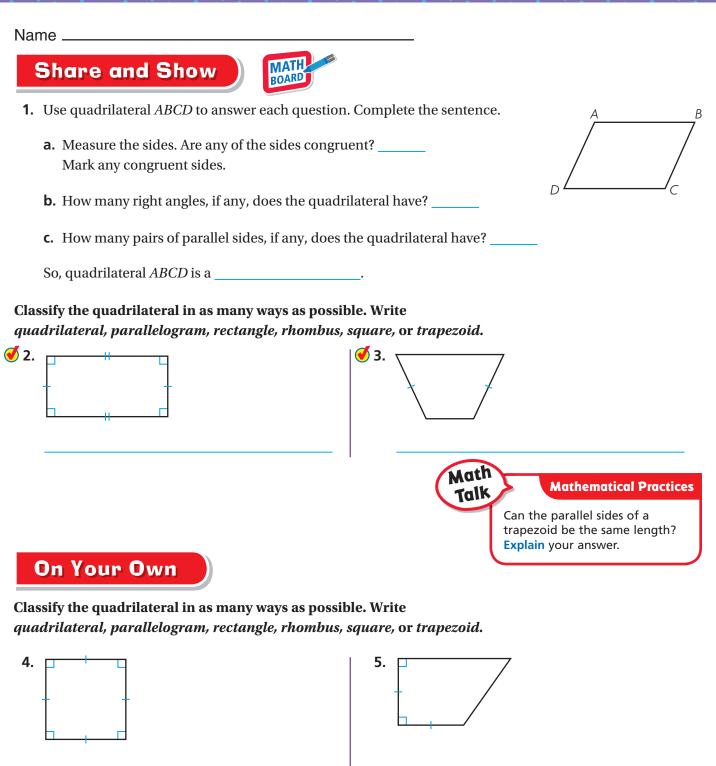
You can use a Venn diagram to sort quadrilaterals and find out how they are related.

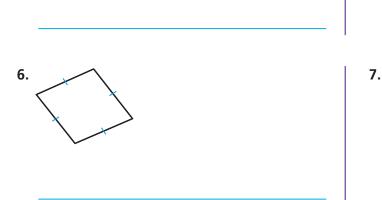
- Draw the diagram below on your MathBoard.
- Cut out the quadrilaterals and sort them into the Venn diagram.
- Record your work by drawing each figure you have placed in the Venn diagram below.





 Explain why the section of the Venn Diagram for squares intersects with both the section for rhombuses and the section for rectangles.

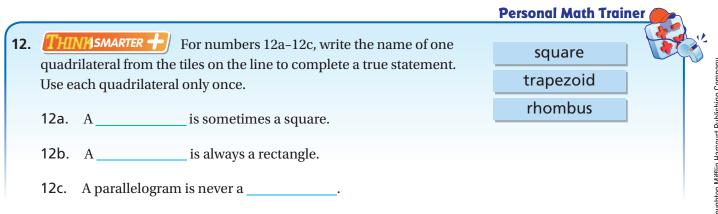




# **Problem Solving • Applications**

- 8. A quadrilateral has exactly 2 congruent sides. Which quadrilateral types could it be? Which quadrilaterals could it not be?
- **THINHSMARTER** A quadrilateral has exactly 3 congruent sides. Davis 9. claims that the figure must be a rectangle. Why is his claim incorrect? Use a diagram to explain your answer.

- **10.** Make Arguments The opposite corners of a quadrilateral are right angles. The quadrilateral is not a rhombus. What kind of quadrilateral is this figure? Explain how you know.
- **11.** *Log DEEPER* I am a figure with four sides. I can be placed in the following categories: quadrilateral, parallelogram, rectangle, rhombus, and square. Draw me. Explain why I fit into each category.







#### Name \_

# **Three-Dimensional Figures**

**Essential Question** How can you identify, describe, and classify three-dimensional figures?

## Lesson 11.4

Math Idea

A two-dimensional figure has the dimensions length and

width, which are used to find

A three-dimensional figure, or solid, has three dimensions:

length, width, and height.

These dimensions are used to find the figure's volume, or the

the figure's area.

space it occupies.

Measurement and Data– 5.MD.3

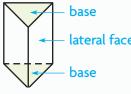
MATHEMATICAL PRACTICES MP.6, MP.7

# Unlock the Problem

A solid figure has three dimensions: length, width, and height. **Polyhedrons**, such as prisms and pyramids, are three-dimensional figures with faces that are polygons.

A **prism** is a polyhedron that has two congruent polygons as **bases**.

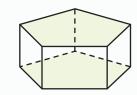
A polyhedron's **lateral faces** are polygons that connect with the bases. The lateral faces of a prism are rectangles.



baseA prism's base shape is used to namelateral facethe solid figure. The base shape ofbasethis prism is a triangle. The prism is atriangular prism.

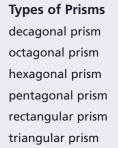
Identify the base shape of the prism. Use the terms in the box to correctly name the prism by its base shape.



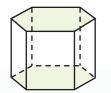


Base shape: \_\_\_\_\_ Name the solid figure.

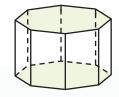
Base shape:	
Name the solid figure.	



solid figure.



Base shape: \_\_\_\_\_ Name the solid figure.



Base shape: \_\_\_\_\_

Name the solid figure.

Mathematical Practices

What shapes make up a decagonal prism, and how many are there? **Explain**.

Math

Talk

MATHEMATICAL O Analyze What special prism has congruent squares for bases and lateral faces?

**Pyramid** A **pyramid** is a polyhedron with only one base. The lateral faces of a pyramid are triangles that meet at a common vertex.

Like a prism, a pyramid is named for the shape of its base.



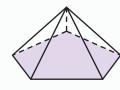
Identify the base shape of the pyramid. Use the terms in the box to correctly name the pyramid by its base shape.





pentagonal pyramid rectangular pyramid square pyramid triangular pyramid

**Types of Pyramids** 



Base shape: \_\_\_\_

Name the solid figure.

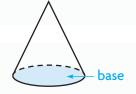
Base shape:

Name the solid figure.

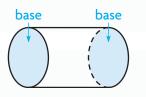
Base shape:

Name the solid figure.

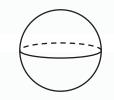
**Non-polyhedrons** Some three-dimensional figures have curved surfaces. These solid figures are *not* polyhedrons.



A **cone** has 1 circular base and 1 curved surface.



A **cylinder** has 2 congruent circular bases and 1 curved surface.



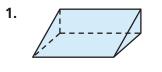
A **sphere** has no bases and 1 curved surface.

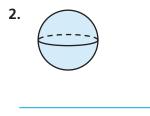
### Share and Show

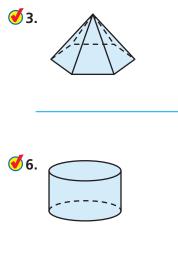


Classify the solid figure. Write prism, pyramid, cone, cylinder, or sphere.

5.

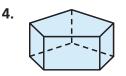






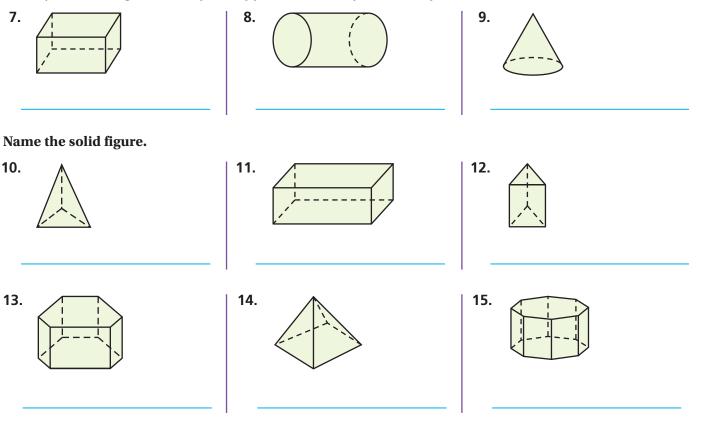
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Name the solid figure.



On Your Own

Classify the solid figure. Write *prism, pyramid, cone, cylinder,* or *sphere*.

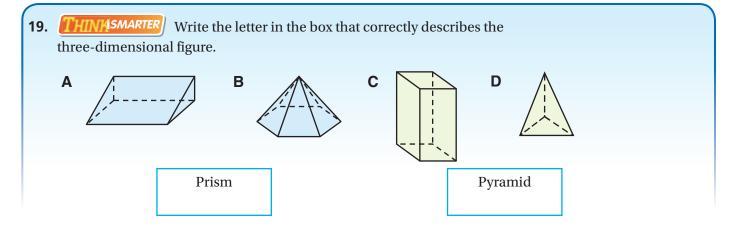


# **Problem Solving • Applications**

- **16. MATHEMATICAL O Use Math Vocabulary** Mario is making a sculpture out of stone. He starts by carving a base with five sides. He then carves five triangular lateral faces that all meet at a point at the top. What three-dimensional figure does Mario make?
- **17. THINASMARTER** What is another name for a cube? Explain your reasoning.

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- **18. GODEEPER** Compare the characteristics of prisms and pyramids. Tell how they are alike and how they are different.

MATHEMATICAL PRACTICES



# Connect to Reading

#### **Identify the Details** If you were given a description of a l

If you were given a description of a building and asked to identify which one of these three buildings is described, which details would you use to determine the building?

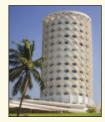
A word problem contains details that help you solve the problem. Some details are meaningful and are important to finding the solution and some details may not be. *Identify the details* you need to solve the problem.

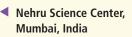
# **Example** Read the description. Underline the details you need to identify the solid figure that will name the correct building.

This building is one of the most identifiable structures in its city's skyline. It has a square foundation and 28 floors. The building has four triangular exterior faces that meet at a point at the top of the structure.



Flatiron Building, New York City, New York







Luxor Hotel, Las Vegas, Nevada

#### Identify the solid figure and name the correct building.

**20.** Solve the problem in the Example.

Solid figure:

Building:

**21.** This building was completed in 1902. It has a triangular foundation and a triangular roof that are the same size and shape. The three sides of the building are rectangles.

Solid figure: \_\_\_\_\_

Building:

**FOR MORE PRACTICE:** Standards Practice Book



# Mid-Chapter Checkpoint

Vocabulary



1. A closed plane figure with all sides congruent and all angles

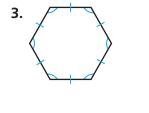
congruent is called a \_\_\_\_\_. (p. 466)

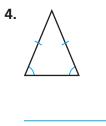
2. Line segments that have the same length, or angles that have

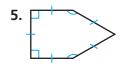
the same measure, are \_\_\_\_\_. (p. 466)

# **Concepts and Skills**

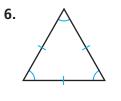
# Name each polygon. Then tell whether it is a *regular polygon* or *not a regular polygon*. (5.6.3)

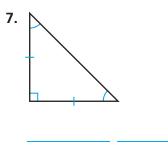


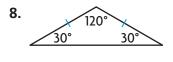




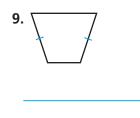
Classify each triangle. Write *isosceles, scalene,* or *equilateral*. Then write *acute, obtuse,* or *right*. (5.G.3, 5.G.4)

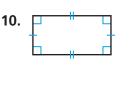




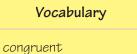


Classify the quadrilateral in as many ways as possible. Write all that apply: *quadrilateral, parallelogram, rectangle, rhombus, square,* or *trapezoid.* (5.G.4)





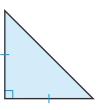




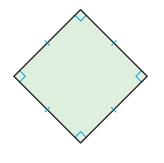
polyhedron

regular polygon

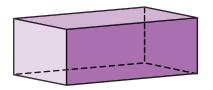
**12.** What type of triangle is shown below? (5.G.3, 5.G.4)

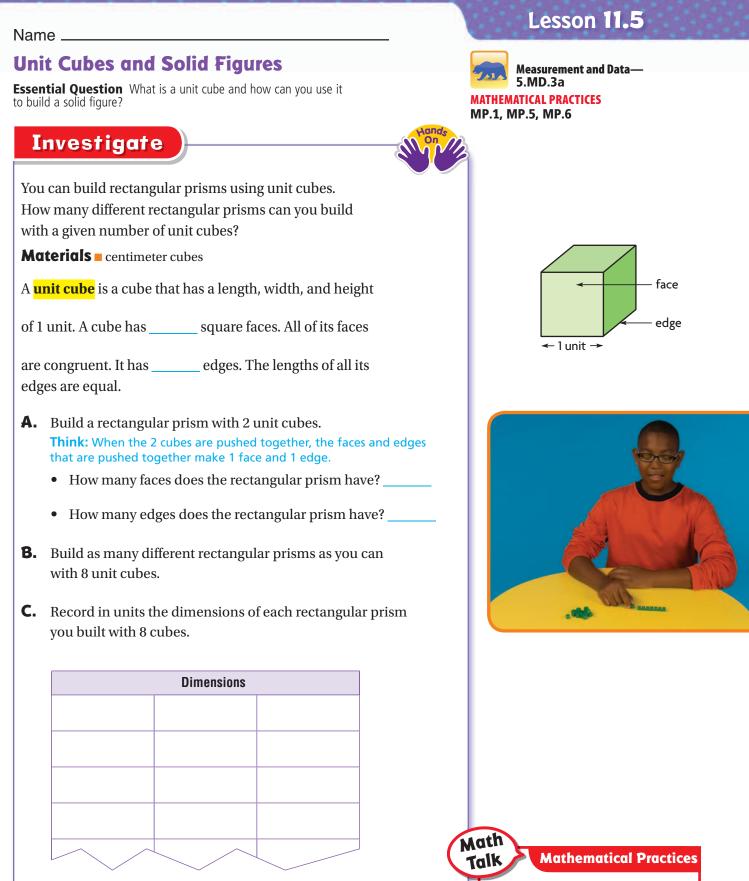


**13.** Classify the quadrilateral in as many ways as possible. (5.G.4)



**14.** Classify the following figure. (5.MD.3)





So, with 8 unit cubes, I can build \_\_\_\_\_ different rectangular prisms.

**Describe** the different rectangular prisms that you can make with

4 unit cubes.

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# **Draw Conclusions 1.** Explain why a rectangular prism composed of 2 unit cubes has 6 faces. How do its dimensions compare to a unit cube? **2. Explain** how the number of edges for the rectangular prism compares to the number of edges for the unit cube. **3. Explain O Describe** what all of the rectangular prisms you made in Step B have in common.

# **Make Connections**

You can build other solid figures and compare the solid figures by counting the number of unit cubes.

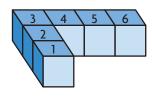




Figure 1 is made up of \_\_\_\_\_ unit cubes.

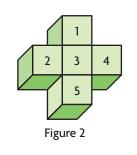
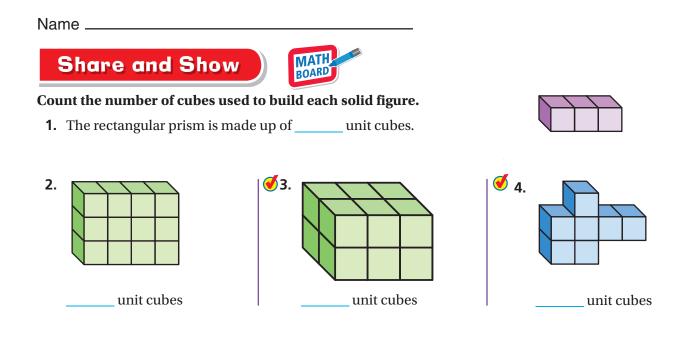


Figure 2 is made up of \_\_\_\_\_ unit cubes.

So, Figure \_\_\_\_\_\_ has more unit cubes than Figure \_\_\_\_\_\_.

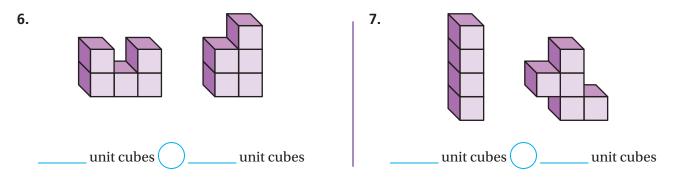
• Use 12 unit cubes to build a solid figure that is not a rectangular prism. Share your model with a partner. Describe how your model is the same and how it is different from your partner's model.



**5. WRITE** *Math* How are the rectangular prisms in Exercises 2–3 related? Can you show a different rectangular prism with the same relationship? Explain.

# **Problem Solving • Applications**

Compare the number of unit cubes in each solid figure. Use < , > or =.



8. **MATHEMATICAL** Use Reasoning Melissa makes a solid figure by stacking 1 cube on top of a row of 2 cubes on top of a row of 3 cubes. Then she rearranges the cubes to form a rectangular prism. Describe the arrangement of cubes in the rectangular prism.

# Connect to Art

*Architecture* is the art and science of designing buildings and structures.

The Cube Houses of Rotterdam in the Netherlands, shown at the top right, were built in the 1970s. Each cube is a house, tilted and resting on a hexagon-shaped pylon, and is meant to represent an abstract tree. The village of Cube Houses creates a "forest."

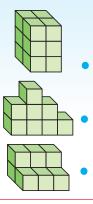
The Nakagin Capsule Tower, shown at the right, is an office and apartment building in Tokyo, Japan, made up of modules attached to two central cores. Each module is a rectangular prism connected to a concrete core by four huge bolts. The modules are office and living spaces that can be removed or replaced.

#### Use the information to answer the questions.

- **9. CODEFFER** There are 38 Cube Houses. Each house could hold 1,000 unit cubes that are 1 meter by 1 meter by 1 meter. Describe the dimensions of a cube house using unit cubes. Remember that the edges of a cube are all the same length.
- **10. THINKSMARTER** The Nakagin Capsule Tower has 140 modules, and is 14 stories high. If all of the modules were divided evenly among the number of stories, how many modules would be on each floor? How many different rectangular prisms could be made from that number?



**11. THINHSMARTER** Match the figure with the number of unit cubes that would be needed to build each figure. Not every number of unit cubes will be used.



FOR MORE PRACTICE: Standards Practice Book

486

- 6 unit cubes
- 7 unit cubes
- 8 unit cubes
- 9 unit cubes
- 10 unit cubes
- 12 unit cubes





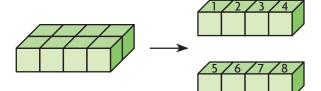
#### Name \_\_\_\_\_

#### Understand Volume

**Essential Question** How can you use unit cubes to find the volume of a rectangular prism?

#### Investigate

**CONNECT** You can find the volume of a rectangular prism by counting unit cubes. Volume is the measure of the amount of space a solid figure occupies and is measured in cubic units. Each unit cube has a volume of 1 cubic unit.



The rectangular prism above is made up of \_\_\_\_\_ unit cubes

and has a volume of \_\_\_\_\_ cubic units.

**Materials** rectangular prism net A centimeter cubes

- **A.** Cut out, fold, and tape the net to form a rectangular prism.
- **B.** Use centimeter cubes to fill the base of the rectangular prism without gaps or overlaps. Each centimeter cube has a length, width, and height of 1 centimeter and a volume of 1 cubic centimeter.
  - How many centimeter cubes make up the length of the first layer? the width? the height?

length: \_\_\_\_\_ width: \_\_\_\_\_ height: \_\_\_\_\_

- How many centimeter cubes are used to fill the base?
- **C.** Continue filling the rectangular prism, layer by layer. Count the number of centimeter cubes used for each layer.
  - How many centimeter cubes are in each layer?\_\_\_\_\_\_
  - How many layers of cubes fill the rectangular prism? \_\_\_\_\_\_
  - How many centimeter cubes fill the prism?\_\_\_\_\_

So, the volume of the rectangular prism is \_\_\_\_\_ cubic centimeters.

# Lesson 11.6

Measurement and Data– 5.MD.3b, 5.MD.4 MATHEMATICAL PRACTICES

MP.3, MP.5, MP.6



#### **Draw Conclusions**

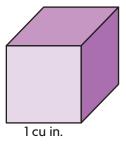
1. Describe the relationship among the number of centimeter cubes you used to fill each layer, the number of layers, and the volume of the prism.

2. Apply If you had a rectangular prism that had a length of 3 units, a width of 4 units, and a height of 2 units, how many unit cubes would you need for each layer? How many unit cubes would you need to fill the rectangular prism?

## Make Connections

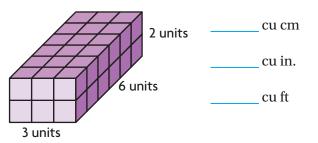
To find the volume of three-dimensional figures, you measure in three directions. For a rectangular prism, you measure its length, width, and height. Volume is measured using cubic units, such as cu cm, cu in., or cu ft.





• Which has a greater volume, 1 cu cm or 1 cu in.? Explain.

Find the volume of the prism if each cube represents 1 cu cm, 1 cu in., and 1 cu ft.

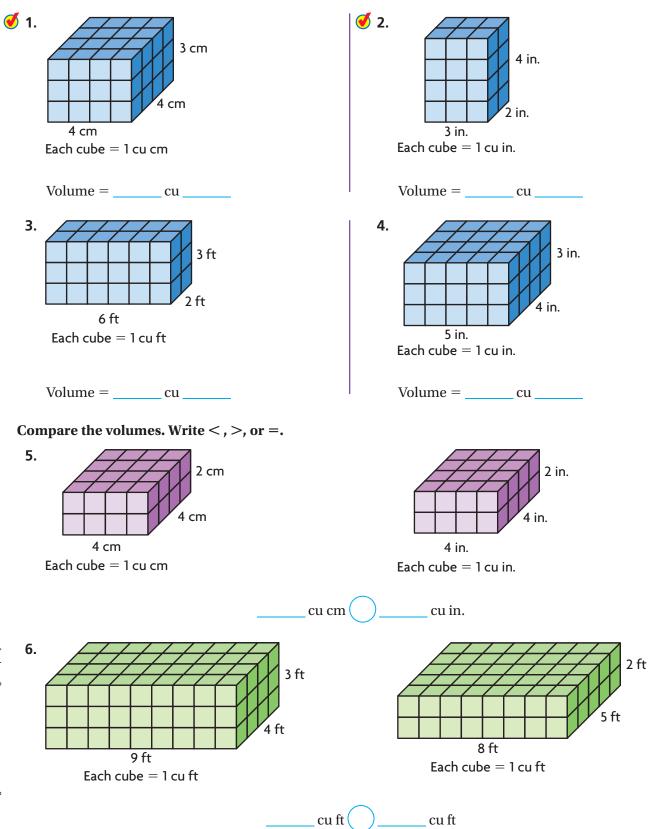


• MATHEMATICAL (6) Would the prism above be the same size if it were built with centimeter cubes, inch cubes, or foot cubes? Explain.





Use the unit given. Find the volume.



# Problem Solving • Applications 🞇

7. **WATHEMATICAL (D)** Verify the Reasoning of Others Gerardo says that a cube with edges that measure 10 centimeters has a volume that is twice as much as a cube with sides that measure 5 centimeters. Explain and correct Gerardo's error.

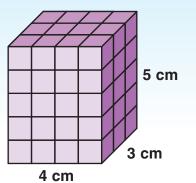
Show Your Work

- 8. **THIN ASMARTER** Pia built a rectangular prism with cubes. The base of her prism has 12 cm cubes. If the prism was built with 108 cm cubes, what is the height of her prism?
- **9. GODEEPER** A packing company makes boxes with edges each measuring 3 feet. What is the volume of the boxes? If 10 boxes are put in a larger, rectangular shipping container and completely fill it with no gaps or overlaps, what is the volume of the shipping container?
- **10. THINKISMARTER** Carlton used 1-centimeter cubes to build the rectangular prism shown.

Find the volume of the rectangular prism

Carlton built.

\_\_\_\_\_ cubic centimeters





#### Name \_\_\_\_

#### **Estimate Volume**

Essential Question How can you use an everyday object to estimate the volume of a rectangular prism?

# Lesson 11.7

Measurement and Data—5.MD.4 Also 5.MD.3b

MATHEMATICAL PRACTICES MP.1, MP.2, MP.6

# Investigate



Izzy is mailing 20 boxes of crayons to a children's-education organization overseas. She can pack them in one of two differentsized shipping boxes. Using crayon boxes as a cubic unit, about what volume is each shipping box, in crayon boxes? Which shipping box should Izzy use to mail the crayons?

**Materials** rectangular prism net B 2 boxes, different sizes

- **A.** Cut out, fold, and tape the net to form a rectangular prism. Label the prism "Crayons." You can use this prism to estimate and compare the volume of the two boxes.
- **B.** Using the crayon box that you made, count to find the number of boxes that make up the base of the shipping box. Estimate the length to the nearest whole unit.

#### Number of crayon boxes that fill the base:

Box 1: Box 2:

Starting with the crayon box in the same position, count to С. find the number of crayon boxes that make up the height of the shipping box. Estimate the height to the nearest whole unit.

#### Number of layers:

Box 2: \_\_\_\_\_ Box 1:

Box 1 has a volume of \_\_\_\_\_ crayon boxes

and Box 2 has a volume of \_\_\_\_\_ crayon boxes.

So, Izzy should use Box \_\_\_\_\_ to ship the crayons.





# **Draw Conclusions**

**1. Explain** how you estimated the volume of the shipping boxes.

2. Analyze If you had to estimate to the nearest whole unit to find the volume of a shipping box, how might you be able to ship a greater number of crayon boxes in the shipping box than you actually estimated? Explain.

#### Make Connections

The crayon box has a length of 3 inches, a width

of 4 inches, and a height of 1 inch. The volume of the

crayon box is \_\_\_\_\_ cubic inches.

Using the crayon box, estimate the volume of the box at the right in cubic inches.

• The box to the right holds \_\_\_\_\_ crayon boxes in each

of \_\_\_\_\_ layers, or \_\_\_\_\_ crayon boxes.

• Multiply the volume of 1 crayon box by the estimated number of crayon boxes that fit in the box at the right.

\_\_\_\_\_×\_\_\_\_=\_\_\_\_

So, the volume of the shipping box at the right

is about \_\_\_\_\_ cubic inches.





Share and Show



#### Estimate the volume.

1. Each tissue box has a volume of 125 cubic inches.

There are \_\_\_\_\_\_ tissue boxes in the larger box.

The estimated volume of the box holding the tissue

boxes is  $\_\_\_ \times 125 = \_\_$  cu in.

**2.** Volume of chalk box: 16 cu in.







Volume of large box:



# **Problem Solving • Applications**

- 4. **MATHEMATICAL** Use Reasoning Jamie is mailing a large box of donated books to a community center. The volume of each book is 80 cubic inches. The picture shows the number of books she put in the box. Jamie can fit one more layer of books in the box. About what is the volume of the box?
- 5. GODEEPER Anna is collecting boxes of cereal to deliver to a food bank. The volume of each cereal box is 324 cubic inches. The picture shows the cereal boxes she has collected so far. A large delivery box holds three times as many boxes as Anna collected. About what is the volume of the delivery box?

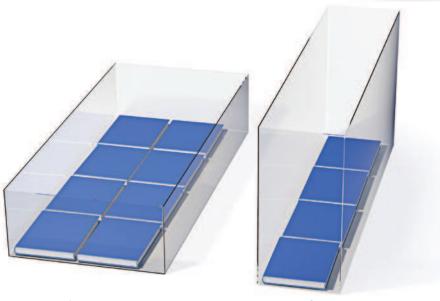


#### MATHEMATICAL PRACTICES

# THINMSMARTER Sense or Nonsense?

**6.** Marcelle estimated the volume of the two boxes below, using one of his books. His book has a volume of 48 cubic inches. Box 1 holds about 7 layers of books, and Box 2 holds about 14 layers of books. Marcelle says that the volume of either box is about the same.





Box 1

Box 2

 Does Marcelle's statement make sense or is it nonsense? Explain your answer.

7. THINHSMARTER A pack of folders have a length of 5 inches, a width of 12 inches, and a height of 1 inch. The pack of folders will be shipped in a box that holds 12 packs of folders. For numbers 7a-7c, select True or False for each statement. Each pack of folders has a volume of 60 cubic inches. O True ○ False 7a. The box has a volume of about 720 cubic inches. 7b. ○ True ○ False 7c. If the box held 15 packs of folders, it would have a ○ True ○ False volume of about 1,200 cubic inches.

#### Name \_

# **Volume of Rectangular Prisms**

**Essential Question** How can you find the volume of a rectangular prism?

**CONNECT** The base of a rectangular prism is a rectangle. You know that area is measured in square units, or units<sup>2</sup>, and that the area of a rectangle can be found by multiplying the length and the width.

Volume is measured in cubic units, or units<sup>3</sup>. When you build a prism and add each layer of cubes, you are adding a third dimension, height.

# PUnlock the Problem (Real World

Yuan built the rectangular prism shown at the right, using 1-inch cubes. The prism has a base that is a rectangle and has a height of 4 cubes. What is the volume of the rectangular prism that Yuan built?

You can find the volume of a prism in cubic units by multiplying the number of square units in the base shape by the number of layers, or its height.

Each layer of Yuan's rectangular prism

is composed of \_\_\_\_\_ inch cubes.

Height (in layers)	1	2	3	4	
Volume (in cubic inches)	12	24			Multiply the height by

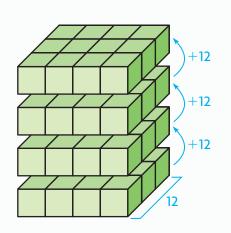
1. How does the volume change as each layer is added?

2. What does the number you multiply the height by represent?

So, the volume of Yuan's rectangular prism is \_\_\_\_\_ in.<sup>3</sup>

# Lesson 11.8

Measurement and Data—5.MD.5a, 5.MD.5b MATHEMATICAL PRACTICES MP.1, MP.7, MP.8

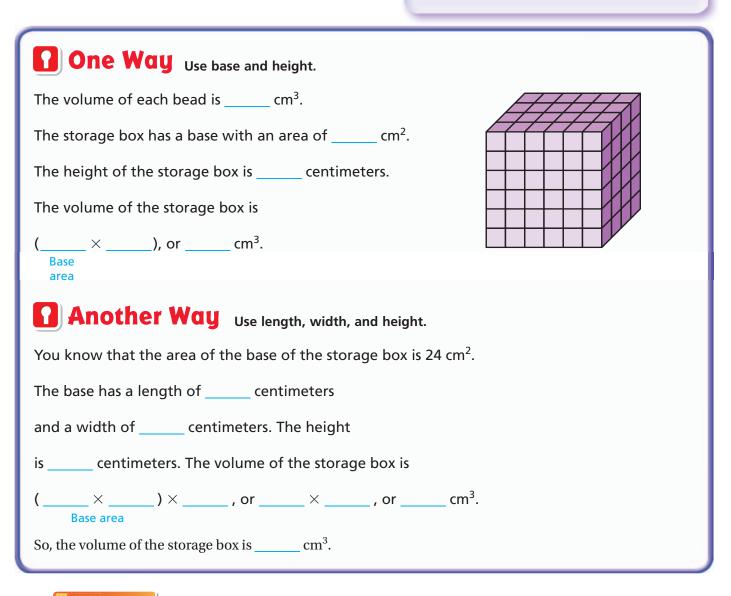


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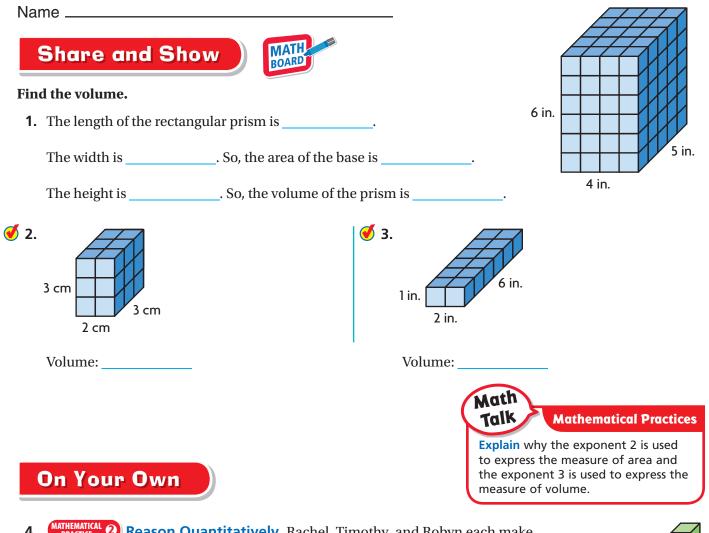
# **Relate Height to Volume**

Toni stacks cube-shaped beads that measure 1 centimeter on each edge in a storage box. The box can hold 6 layers of 24 beads with no gaps or overlaps. What is the volume of Toni's storage box?

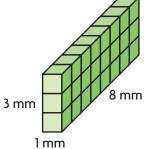
- What are the dimensions of the base of the box?
- What operation can you use to find the area of the base shape?



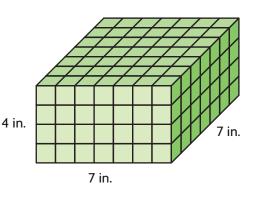
**3. THINASMARTER** What if each cube-shaped bead measured 2 centimeters on each edge? How would the dimensions of the storage box change? How would the volume change?



4. **PRACTICE 2 Reason Quantitatively** Rachel, Timothy, and Robyn each make the rectangular prism shown. If they stand all of their prisms together, side by side, to make one large rectangular prism, what is the volume of the new prism? How did the dimensions change?



5. **GODEEPER** The rectangular prism is made of 1-inch cubes. If two more layers of cubes are placed on top of the rectangular prism, how many more cubes are added to the prism? What would be the volume of the new rectangular prism?



# Problem Solving • Applications Real

- 6. Rich is building a travel crate for his dog, Thomas, a beagle-mix who is about 30 inches long, 12 inches wide, and 24 inches tall. For Thomas to travel safely, his crate needs to be a rectangular prism that is about 12 inches greater than his length and width, and 6 inches greater than his height. What is the volume of the travel crate that Rich should build?
- **7.** What happens to the volume of a rectangular prism if you double the height? Give an example.
- **8.** MATHEMATICAL **1** Use Math Vocabulary Describe the difference between area and volume.

**THINHSMARTER** John used 1-inch cubes to make the rectangular prism 9. shown. For numbers 9a-9d, write the value from the tiles that makes each statement correct. Each value can be used more than once or not at all. 1 7 3 5 12 35 125 175 5 in 9a. Each cube has a volume of cubic inch(es). 5 in. 9b. Each layer of the prism is made up of cubes. 9c. There are layers of cubes. 9d. The volume of the prism is cubic inches.



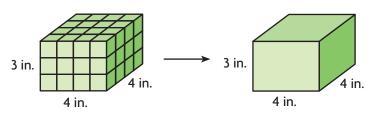
#### Name \_

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# **Apply Volume Formulas**

Essential Question How can you use a formula to find the volume of a rectangular prism?

**CONNECT** Both prisms show the same dimensions and have the same volume.

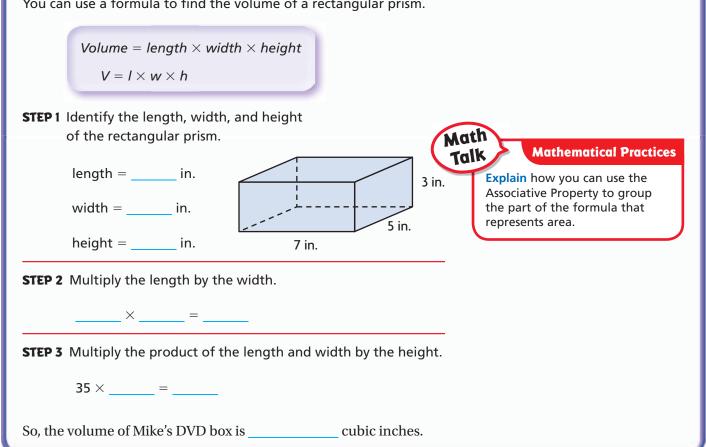


**P**Unlock the Problem Wor

Mike is making a box to hold his favorite DVDs. The length of the box is 7 inches, the width is 5 inches and the height is 3 inches. What is the volume of the box Mike is making?

# **One Way** Use length, width, and height.

You can use a formula to find the volume of a rectangular prism.



# ALGEBRA Lesson 11.9

**MATHEMATICAL PRACTICES** 

5.MD.5b

**MP.1, MP.6** 

Underline what you are asked to find.

• Circle the numbers you need to use to

solve the problem.

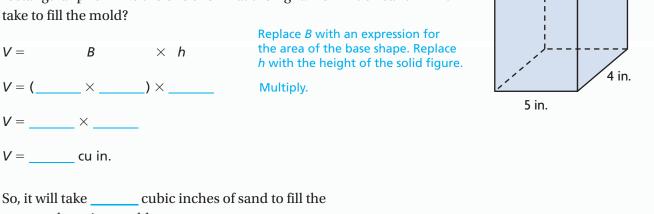
Measurement and Data—5.MD.5a,

You have learned one formula for finding the volume of a rectangular prism. You can also use another formula.

> Volume = Base area  $\times$  height  $V = B \times h$  B = area of the base shape, h = height of the solid figure.

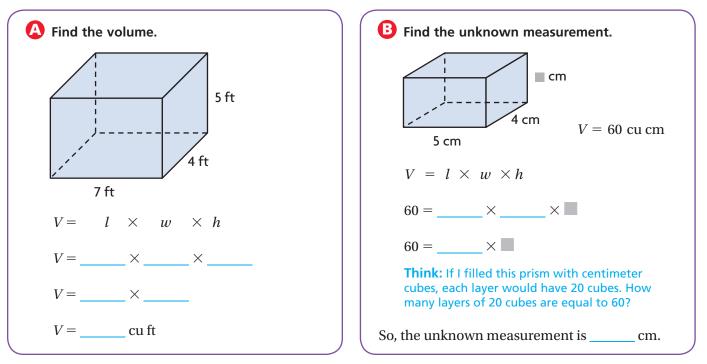
# Another Way Use the area of the base shape and height.

Emilio's family has a sand castle kit. The kit includes molds for several solid figures that can be used to make sand castles. One of the molds is a rectangular prism like the one shown at the right. How much sand will it take to fill the mold?

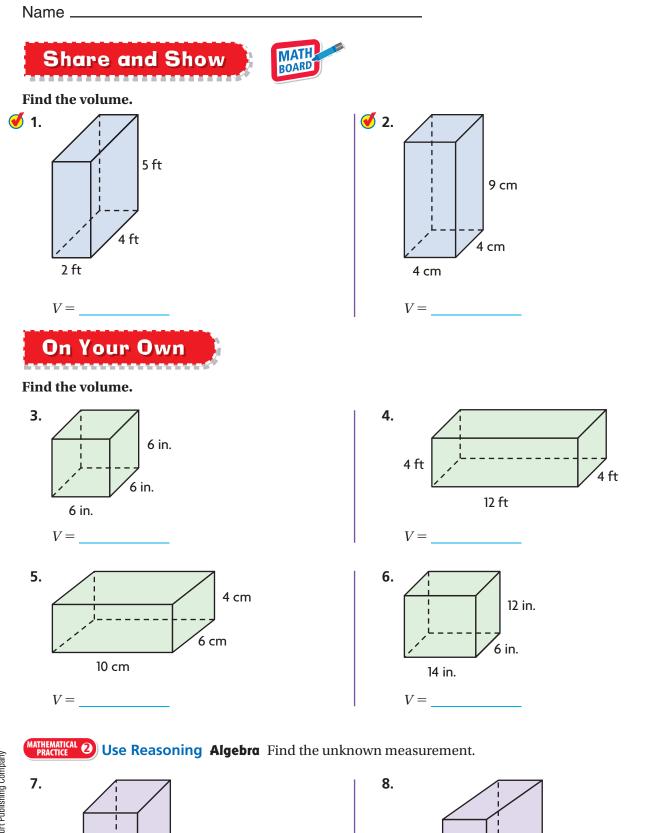


rectangular prism mold.

# **Try This!**



8 in.



cm

6 cm

V = 900 cu cm

🔳 ft

7 ft

V = 420 cu ft

6 ft

=\_\_\_\_\_ft

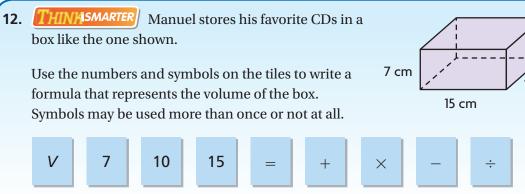
Chapter 11 • Lesson 9 501

= \_\_\_\_\_ cm

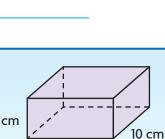
15 cm

# **Problem Solving • Applications**

- 9. The Jade Restaurant has a large aquarium on display in its lobby. The base of the aquarium is 5 feet by 2 feet. The height of the aquarium is 4 feet. How many cubic feet of water are needed to completely fill the aquarium?
- **10. [FIDEEPER]** The Pearl Restaurant put a larger aquarium in its lobby. The base of their aquarium is 6 feet by 3 feet, and the height is 4 feet. How many more cubic feet of water does the Pearl Restaurant's aquarium hold than the Jade **Restaurant's aquarium?**
- **11. THINASMARTER** Eddie measured his aquarium using a small fish food box. The box has a base area of 6 inches and a height of 4 inches. Eddie found that the volume of his aquarium is 3,456 cubic inches. How many boxes of fish food could fit in the aquarium? Explain your answer.



What is the volume of the box? \_\_\_\_\_ cubic centimeters







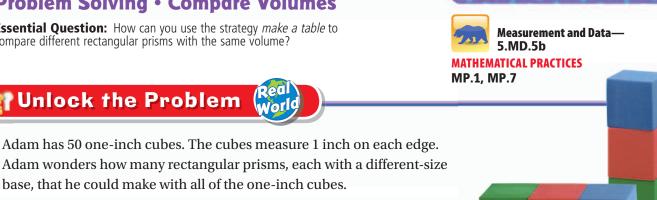
#### Name \_\_\_\_\_

# **Problem Solving · Compare Volumes**

**Essential Question:** How can you use the strategy *make a table* to compare different rectangular prisms with the same volume?

Unlock the Problem

# **PROBLEM SOLVING** Lesson 11.10



Use the graphic organizer below to help you solve the problem.

base, that he could make with all of the one-inch cubes.

# **Read the Problem**

What do I need to find?

I need to find the number of \_\_\_\_\_,

each with a different-size \_\_\_\_\_, that have

a volume of \_\_\_\_\_.

What information do I need to use?

I can use the formula

and the factors of \_\_\_\_\_.

## How will I use the information?

I will use the formula and the factors of

50 in a that shows all of the possible combinations of dimensions with a

volume of without repeating the dimensions of the bases.

# **Solve the Problem**

**Complete the table.** 

Base (sq in.)	Height (in.)	Volume (cu in.)
(1 × 1)	50	$(1 \times 1) \times 50 = 50$
(1 × 2)	25	$(1 \times 2) \times 25 = 50$
(1 × 5)	10	$(1 \times 5) \times 10 = 50$
(1 × 1 <i>0</i> )	5	$(1 \times 10) \times 5 = 50$
(1 X 25)	2	$(1 \times 25) \times 2 = 50$
(1 × 50)	1	$(1 \times 50) \times 1 = 50$

**1. MATHEMATICAL 0** Evaluate What else do you need to do to solve the problem?

**2.** How many rectangular prisms with different bases can Adam make

# Try Another Problem

Mrs. Wilton is planning a rectangular flower box for her front window. She wants the flower box to hold exactly 16 cubic feet of soil. How many different flower boxes, all with whole-number dimensions and a different-size base, will hold exactly 16 cubic feet of soil?

Use the graphic organizer below to help you solve the problem.



hat do I need to find? hat information do I need to use?		<b>Read the Problem</b>	Solve the Problem
hat information do I need to use?		hat do I need to find?	
	w will I use the information?	nat information do I need to use?	

**3.** How many flower boxes with different-size bases will hold exactly 16 cubic feet of soil, using whole-number dimensions?

C Houghton Mifflin Harcourt Publishing Company

## Name .

# Share and Show



1. A company makes concrete paving stones in different sizes. Each stone has a volume of 360 cubic inches and a height of 3 inches. The stones have different lengths and widths. No stones have a length or width of 1 or 2 inches. How many different paving stones, each with a different-size base, have a volume of 360 cubic inches?

First, think about what the problem is asking you to solve, and the information that you are given.

Next, make a table using the information from the problem.

Finally, use the table to solve the problem.

**2.** What if the 360 cubic-inch paving stones are 4 inches thick and any whole number length and width are possible? How many different paving stones could be made? Suppose that the cost of a paving stone is \$2.50, plus \$0.18 for every 4 cubic inches of concrete. How much would each paving stone cost?

**3.** One company makes inflatable swimming pools that come in four sizes of rectangular prisms. The length of each pool is twice the width and twice the depth. The depth of the pools are each a whole number from 2 to 5 feet. If the pools are filled all the way to the top, what is the volume of each pool?

# O Houghton Mifflin Harcourt Publishing Company

# **Unlock the Problem**

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

WRITE Math • Show Your Work •

Show Your Work

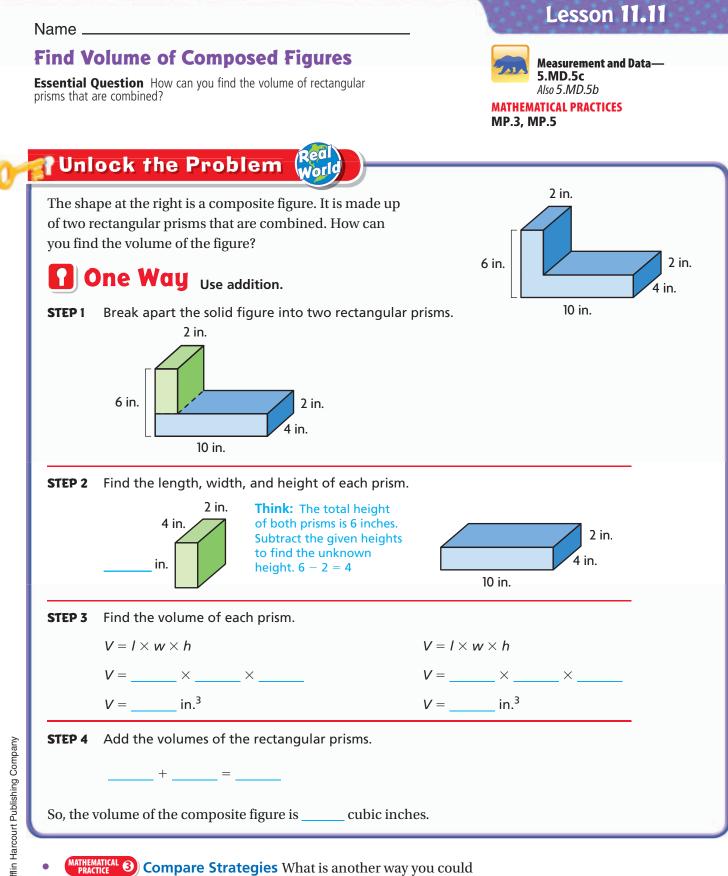
# **On Your Own**

- **4. GODEEPER** Ray wants to buy the larger of two aquariums. One aquarium has a base that is 20 inches by 20 inches and a height that is 18 inches. The other aquarium has a base that is 40 inches by 12 inches and a height that is 12 inches. Which aquarium has a greater volume? By how much?
- **5.** *ITHINASMARTER* Mr. Rodriguez works at a store. He wants to arrange 12 toys in a display shaped like a rectangular prism. The toys are in cube-shaped boxes. How many rectangular prisms with a different-size base can he make with the boxes?

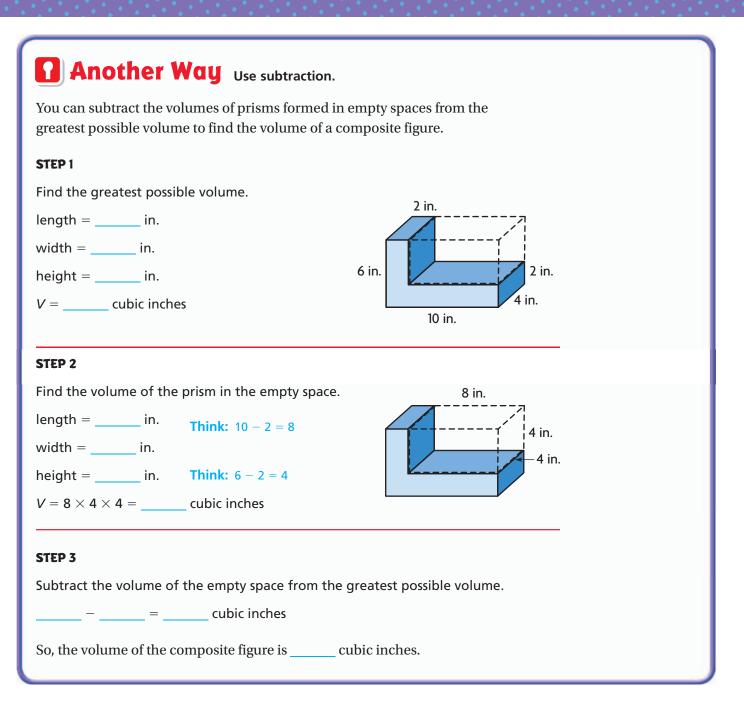


6. Marilyn has 4,000 one-inch cubes. She wants to pack them into a carton. The carton is 1 foot high and its base is 1 foot by 2 feet. Will all the cubes fit into the carton? **Explain** how you know.

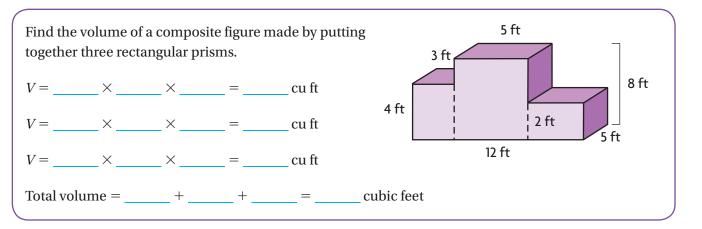
- **7. THINASMARTER** Dakota's wading pool has a volume of 8,640 cubic inches. Which could be the dimensions of the wading pool? Mark all that apply.
  - A 24 in. by 30 in. by 12 in.
  - **B** 27 in. by 32 in. by 10 in.
  - **C** 28 in. by 31 in. by 13 in.
  - **D** 30 in. by 37 in. by 18 in.



divide the composite figure into two rectangular prisms?



# **Try This!**



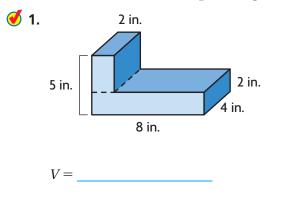


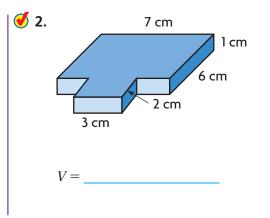


Find the volume of the composite figure.

MATH

BOARD

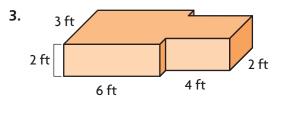


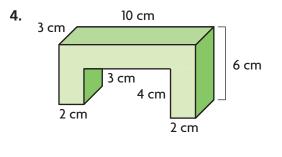


On Your Own

V =

Find the volume of the composite figure.



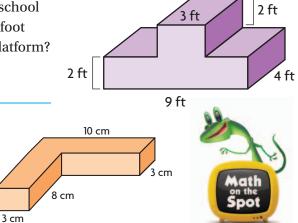


V =

2 cm

**5. GODEEPER** Mr. Williams' class built this platform for a school event. They also built a model of the platform in which 1 foot was represented by 2 inches. What is the volume of the platform? What is the volume of the model?

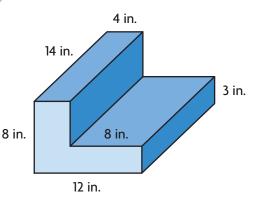
6. **THINKISMARTER** Patty added the values of the expressions  $2 \times 3 \times 11$  and  $2 \times 3 \times 10$  to find the volume of the composite figure. Describe her error. What is the correct volume of the composite figure?



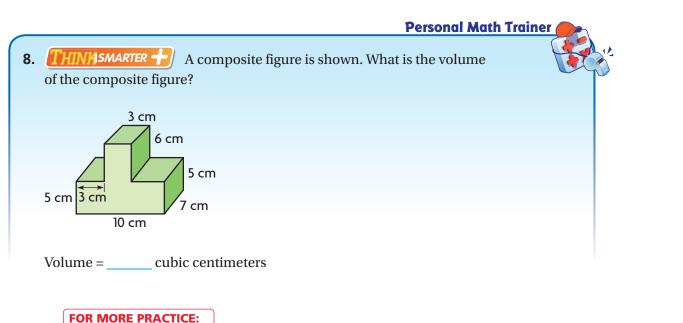
# Problem Solving • Applications 🎇

#### Use the composite figure at the right for 7-9.

- **7.** As part of a wood-working project, Jordan made the figure at the right out of wooden building blocks. How much space does the figure he made take up?
- **8.** What are the dimensions of the two rectangular prisms you used to find the volume of the figure? What other rectangular prisms could you have used?



- **9.** MATHEMATICAL **()** If the volume is found using subtraction, what is the volume of the empty space that is subtracted? Explain.
- **10. WRITE** *Math* Explain how you can find the volume of composite figures that are made by combining rectangular prisms.



**Standards Practice Book** 

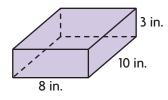


- 1. Fran drew a triangle with no congruent sides and 1 right angle. Which term accurately describes the triangle? Mark all that apply.
  - $(\mathbf{A})$ isosceles (C)
  - B

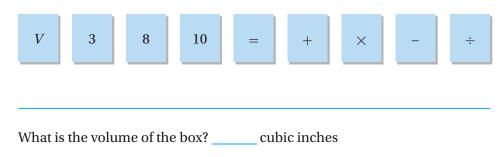
acute

scalene

- right (D
- **2.** Jose stores his baseball cards in a box like the one shown.

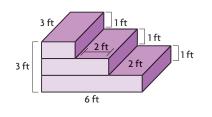


Use the numbers and symbols on the tiles to write a formula that represents the volume of the box. Symbols may be used more than once or not at all.



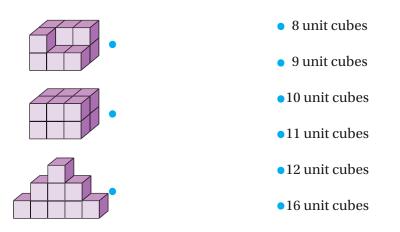
3. Mr. Delgado sees this sign while he is driving. For numbers 3a–3b, choose the values and term that YIELD correctly describes the shape Mr. Delgado saw. 3 0 3a. The figure has sides and 2 vertices. 4 3 5 not a polygon a regular polygon 3b. All of the sides are congruent, so the figure is not a regular polygon

**4.** What is the volume of the composite figure?



cubic feet

**5.** Match the figure with the number of unit cubes that would be needed to build each figure. Not every number of unit cubes will be used.



**6.** Chuck is making a poster about polyhedrons for his math class. He will draw figures and organize them in different sections of the poster.

# Part A

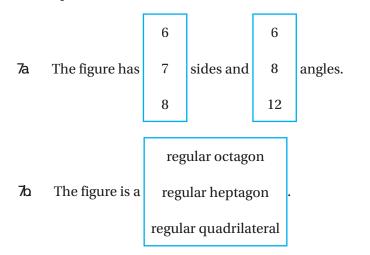
Chuck wants to draw three-dimensional figures whose lateral faces are rectangles. He says he can draw prisms and pyramids. Do you agree? Explain your answer.

## Part B

Chuck says that he can draw a cylinder on his polyhedron poster because it has a pair of bases that are congruent. Is Chuck correct? Explain your reasoning.

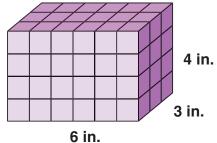
#### Name \_

**7.** Javier drew the shape shown. For numbers 7a–7b, choose the values and term that correctly describe the shape Javier drew.

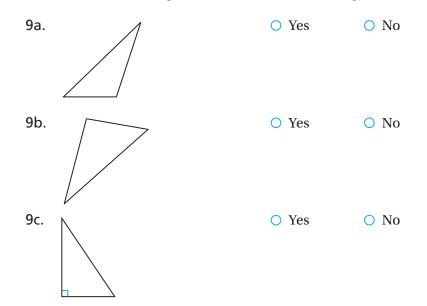


**8.** Victoria used 1-inch cubes to build the rectangular prism shown. Find the volume of the rectangular prism Victoria built.

\_\_\_\_ cubic inches



**9.** Nathan drew a scalene, obtuse triangle. For 9a–9c, choose Yes or No to indicate whether the figure shown could be the triangle that Nathan drew.



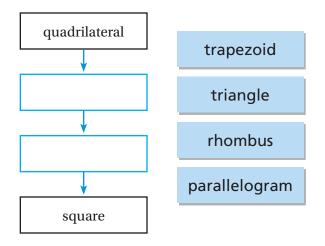
10. A shipping crate holds 20 shoeboxes. The dimensions of a shoebox are 6 inches by 4 inches by 12 inches. For numbers 10a–10b, select True or False for each statement.

10a.	Each shoebox has a volume of 22 cubic inches.	○ True	○ False
10b.	Each crate has a volume of about 440 cubic inches.	○ True	○ False
10c.	If the crate could hold 27 shoeboxes the volume of the crate would be about 7,776 cubic inches.	⊖ True	○ False

**11.** Mario is making a diagram that shows the relationship between different kinds of quadrilaterals. In the diagram, each quadrilateral on a lower level can also be described by the quadrilateral(s) above it on higher levels.

# Part A

Complete the diagram by writing the name of one figure from the tiles in each box. Not every figure will be used.

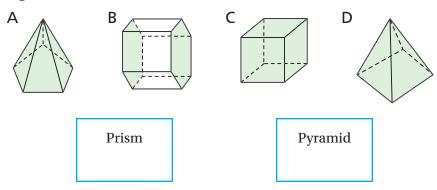


# Part B

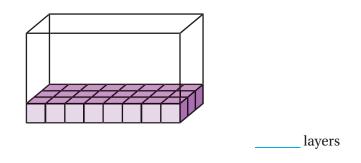
Mario claims that a rhombus is *sometimes* a square, but a square is *always* a rhombus. Is he correct? Explain your answer.

#### Name \_

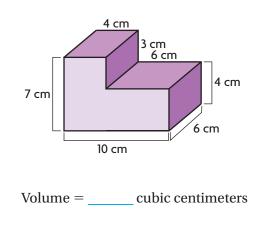
**12.** Write the letter in the box that correctly describes the three-dimensional figure.



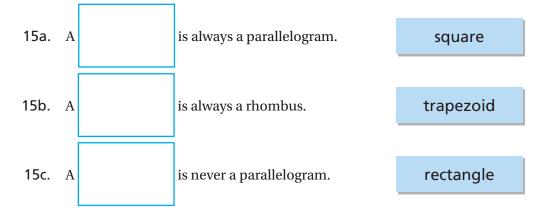
**13.** Mark packed 1-inch cubes into a box with a volume of 120 cubic inches. How many layers of 1-inch cubes did Mark pack?



**14.** A composite figure is shown. What is the volume of the composite figure?



**15.** For numbers 15a–15c, write the name of one quadrilateral from the tiles to complete a true statement. Use each quadrilateral once only.



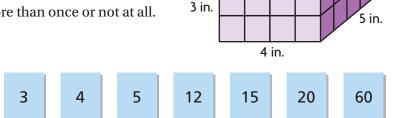
**16.** Megan's aquarium has a volume of 4,320 cubic inches. Which could be the dimensions of the aquarium? Mark all that apply.

A 16 in. by 16 in. by 18 in.	<b>C</b> 12 in. by 15 in. by 24 in.
<b>B</b> 14 in. by 18 in. by 20 in.	<b>D</b> 8 in. by 20 in. by 27 in.

**17.** Ken keeps paper clips in a box that is the shape of a cube. Each side of the cube is 3 inches. What is the volume of the box?

\_\_\_\_ cubic inches

18. Monica used 1-inch cubes to make the rectangular prism shown. For numbers 18a–18d, write the value from the tiles that makes each statement true. Each value can be used more than once or not at all.



- **18a**. Each cube has a volume of \_\_\_\_\_ cubic inch(es).
- **18b.** Each layer of the prism is made up of \_\_\_\_\_ cubes.
- **18c.** There are \_\_\_\_\_ layers of cubes.
- **18d.** The volume of the prism is \_\_\_\_\_ cubic inches.

1

# **Pronunciation Key**

a add, map ā ace, rate â(r) care, air ä palm, father b bat, rub ch check, catch d dog, rod e end, pet	<ul> <li>ē equal, tree</li> <li>f fit, half</li> <li>g o, log</li> <li>h hope, hate</li> <li>i it, give</li> <li>ī ice, write</li> <li>j joy, ledge</li> <li>k cool, take</li> <li>l look, rule</li> </ul>	m move, seem n nice, tin ng ring, song o odd, hot ō open, so ô order, jaw oi oil, boy ou pout, now ŏo took, full	oopool, foodppit, stoprrun, poorssee, passshsure, rushttalk, sitththin, bothththis, batheuup, done	<ul> <li>ù pull, book</li> <li>û(r) burn, term</li> <li>yoo fuse, few</li> <li>v vain, eve</li> <li>w win, away</li> <li>y yet, yearn</li> <li>z zest, muse</li> <li>zh vision,</li> <li>pleasure</li> </ul>
<ul> <li>the schwa, an unstressed vowel representing the sound spelled a in </li> <li>Separates words into syllables</li> </ul>				

- above, e in sicken, i in possible, o in melon, u in circus
- ' indicates stress on a syllable



# acute angle [ə•kyoot' ang'gəl] ángulo agudo

An angle that has a measure less than a right angle (less than 90° and greater than 0°) *Example:* 



# Word History

The Latin word for needle is *acus*. This means "pointed" or "sharp." You will recognize the root in the words *acid* (sharp taste), *acumen* (mental sharpness), and *acute*, which describes a sharp or pointed angle.

acute triangle [ə•kyoot' trī'ang•gəl] triángulo acutángulo A triangle that has three acute angles

- addend [ad'end] sumando A number that is added to another in an addition problem
- addition [ə•dish'ən] suma The process of finding the total number of items when two or more groups of items are joined; the inverse operation of subtraction

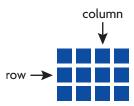
algebraic expression [al•jə•brā'ik ek•spresh'ən] expresión algebraica An expression that includes at least one variable Examples: x + 5, 3a - 4

angle [ang'gəl] ángulo A shape formed by two rays that share the same endpoint *Example:* 



area [âr'ē•ə] área The measure of the number of square units needed to cover a surface

array [ə•rā'] matriz An arrangement of objects in rows and columns Example:



Associative Property of Addition [ə•sō'shē•āt•iv präp' ər•tē əv ə•dish'ən] propiedad asociativa de la suma The property that states that when the grouping of addends is changed, the sum is the same

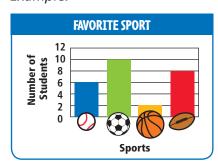
*Example:* (5 + 8) + 4 = 5 + (8 + 4)

Associative Property of Multiplication [ $\Rightarrow$ ·sō'shē·āt·iv präp'ər·tē  $\Rightarrow$ v mul·tə·pli·kā'shən] propiedad asociativa de la multiplicación The property that states that factors can be grouped in different ways and still get the same product Example: (2 × 3) × 4 = 2 × (3 × 4)



**balance** [bal'əns] **equilibrar** To equalize in weight or number

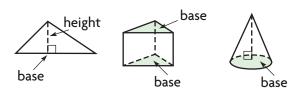
**bar graph** [bär graf] **gráfica de barras** A graph that uses horizontal or vertical bars to display countable data *Example:* 



**base (arithmetic)** [bās] **base** A number used as a repeated factor

*Example:*  $8^3 = 8 \times 8 \times 8$ . The base is 8.

base (geometry) [bās] base In two dimensions, one side of a triangle or parallelogram that is used to help find the area. In three dimensions, a plane figure, usually a polygon or circle, by which a three-dimensional figure is measured or named *Examples:* 



**benchmark** [bench'märk] **punto de referencia** A familiar number used as a point of reference



- capacity [kə•pɑs'i•tē] capacidad The amount a container can hold when filled
- **Celsius (°C)** [sel'sē•əs] **Celsius (°C)** A metric scale for measuring temperature
- centimeter (cm) [sen'tə•mēt•ər] centímetro (cm) A metric unit used to measure length or distance; 0.01 meter = 1 centimeter
- **closed figure** [klōzd fig'yər] **figura cerrada** A figure that begins and ends at the same point

common denominator [käm'ən dē•näm'ə•nāt•ər] denominador común A common multiple of two or more denominators *Example:* Some common denominators for  $\frac{1}{4}$  and  $\frac{5}{6}$  are 12, 24, and 36.

- common factor [käm'ən fak'tər] factor común A number that is a factor of two or more numbers
- common multiple [käm'ən mul'tə•pəl] múltiplo común A number that is a multiple of two or more numbers

Commutative Property of Addition

[kə•myoot'ə•tiv präp'ər•tē əv ə•dish'ən] propiedad conmutativa de la suma The property that states that when the order of two addends is changed, the sum is the same Example: 4 + 5 = 5 + 4

**Commutative Property of Multiplication** [kə•myōōt'ə•tiv präp'ər•tē əv mul•tə•pli•kā'shən] **propiedad commutativa de la multiplicación** The property that states that when the order of two factors is changed, the product is the same *Example:*  $4 \times 5 = 5 \times 4$ 

compatible numbers [kəm•pat'ə•bəl num'bərz] números compatibles Numbers that are easy to compute with mentally

composite number [kəm•päz'it num'bər] número compuesto A number having more than two factors *Example:* 6 is a composite number, since its

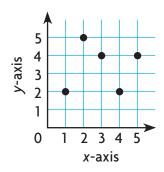
factors are 1, 2, 3, and 6.

**cone** [kon] **cono** A solid figure that has a flat, circular base and one vertex *Example:* 



congruent [kən•groo'ənt] congruente Having the same size and shape

**coordinate grid** [kō•ôrd'n•it grid] **cuadrícula de coordenadas** A grid formed by a horizontal line called the *x*-axis and a vertical line called the *y*-axis *Example:* 



**counting number** [kount'ing num'bər] **número natural** A whole number that can be used to count a set of objects (1, 2, 3, 4, . . .)

**cube** [kyoob] **cubo** A three-dimensional figure with six congruent square faces *Example:* 



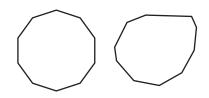
- **cubic unit** [kyōō'bik yōō'nit] **unidad cúbica** A unit used to measure volume such as cubic foot (ft<sup>3</sup>), cubic meter (m<sup>3</sup>), and so on
- cup (c) [kup] taza (t) A customary unit used to measure capacity; 8 ounces = 1 cup
- **cylinder** [sil'ən•dər] **cilindro** A solid figure that has two parallel bases that are congruent circles *Example:*





data [dāt'ə] datos Information collected about people or things, often to draw conclusions about them

decagon [dek'ə•gän] decágono A polygon with ten sides and ten angles Examples:



- decagonal prism [dek•ag'ə•nəl priz'əm] prisma decagonal A three-dimensional figure with two decagonal bases and ten rectangular faces
- **decimal** [des'ə•məl] **decimal** A number with one or more digits to the right of the decimal point
- decimal point [des'ə•məl point] punto decimal A symbol used to separate dollars from cents in money, and to separate the ones place from the tenths place in a decimal
- decimal system [des'ə•məl sis'təm] sistema decimal A system of computation based on the number 10
- decimeter (dm) [des'i•mēt•ər] decimetro (dm)
   A metric unit used to measure length or
   distance; 10 decimeters = 1 meter
- **degree (°)** [di•grē′] **grado (°)** A unit used for measuring angles and temperature
- **degree Celsius (°C)** [di•grē' sel'sē•əs] **grado Celsius** A metric unit for measuring temperature
- degree Fahrenheit (°F) [di•grē' fâr'ən•hīt]
  grado Fahrenheit A customary unit for
  measuring temperature
- **dekameter (dam)** [dek'ə•mēt•ər] **decámetro** A metric unit used to measure length or distance; 10 meters = 1 dekameter

denominator [dē•näm'ə•nāt•ər] denominador The number below the bar in a fraction that tells how many equal parts are in the whole or in the group

Example:  $\frac{3}{4} \leftarrow$  denominator

diagonal [dī•ag'ə•nəl] diagonal A line segment that connects two non-adjacent vertices of a polygon Example:



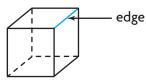
- difference [dif'ər•əns] diferencia The answer to a subtraction problem
- **digit** [dij'it] **dígito** Any one of the ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 used to write numbers
- dimension [də•men'shən] dimensión A measure in one direction

**Distributive Property** [di•strib'yooo•tiv pröp'ər•tē] propiedad distributiva The property that states that multiplying a sum by a number is the same as multiplying each addend in the sum by the number and then adding the products Example:  $3 \times (4 + 2) = (3 \times 4) + (3 \times 2)$   $3 \times 6 = 12 + 6$ 18 = 18

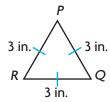
- divide [də•vīd'] dividir To separate into equal groups; the inverse operation of multiplication
- **dividend** [div'ə•dend] **dividendo** The number that is to be divided in a division problem *Example:*  $36 \div 6$ ;  $6)\overline{36}$  The dividend is 36.
- division [də•vizh'ən] división The process of sharing a number of items to find how many equal groups can be made or how many items will be in each equal group; the inverse operation of multiplication
- divisor [də•vī'zər] divisor The number that divides the dividend *Example:* 15 ÷ 3; 3)15 The divisor is 3.



edge [ej] arista The line segment made where two faces of a solid figure meet *Example:* 



- elapsed time [ē·lapst' tīm] tiempo transcurrido The time that passes between the start of an activity and the end of that activity
- endpoint [end' point] extremo The point at either end of a line segment or the starting point of a ray
- equal to (=) [ē'kwəl too] igual a Having the same value
- equation [ē•kwā'zhən] ecuación An algebraic or numerical sentence that shows that two quantities are equal
- equilateral triangle [ē•kwi•lat'ər•əl trī'ang•gəl] triángulo equilátero A triangle with three congruent sides Example:



- equivalent [ē•kwiv'ə•lənt] equivalente Having the same value
- equivalent decimals [ē•kwiv'ə•lənt des'ə•məlz] decimales equivalentes Decimals that name the same amount Example: 0.4 = 0.40 = 0.400
- equivalent fractions [ē•kwiv'ə•lənt frak'shənz] fracciones equivalentes Fractions that name the same amount or part Example:  $\frac{3}{4} = \frac{6}{8}$
- estimate [es'tə•mit] noun estimación (s) A number close to an exact amount
- estimate [es'tə•māt] verb estimar (v) To find a number that is close to an exact amount
- evaluate [ē·val'yōō·āt] evaluar To find the value of a numerical or algebraic expression
- even [ē'vən] par A whole number that has a 0, 2, 4, 6, or 8 in the ones place
- expanded form [ek•span'did fôrm] forma desarrollada A way to write numbers by showing the value of each digit *Examples:* 832 = 8 × 100 + 3 × 10 + 2 × 1  $3.25 = (3 \times 1) + (2 \times \frac{1}{10}) + (5 \times \frac{1}{100})$

**exponent** [eks' pon ont] **exponente** A number that shows how many times the base is used as a factor *Example:*  $10^3 = 10 \times 10 \times 10$ .

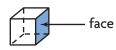
3 is the exponent.

expression [ek•spresh'ən] expresión A

mathematical phrase or the part of a number sentence that combines numbers, operation signs, and sometimes variables, but does not have an equal sign



face [fās] cara A polygon that is a flat surface of a solid figure Example:

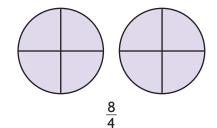


fact family [fakt fam'ə·lē] familia de operaciones A set of related multiplication and division, or addition and subtraction, equations Examples:  $7 \times 8 = 56$ ;  $8 \times 7 = 56$ ;  $56 \div 7 = 8$ ;  $56 \div 8 = 7$ 

- factor [fak'tər] factor A number multiplied by another number to find a product
- Fahrenheit (°F) [fâr'ən•hīt] Fahrenheit (°F) A customary scale for measuring temperature

fluid ounce (fl oz) [floo'id ouns] onza fluida A
customary unit used to measure liquid capacity;
1 cup = 8 fluid ounces

- foot (ft) [foot] pie (ft) A customary unit used to measure length or distance; 1 foot = 12 inches
- formula [fôr'myoo•lə] fórmula A set of symbols that expresses a mathematical rule Example:  $A = b \times h$
- fraction [frak'shən] fracción A number that names a part of a whole or a part of a group
- fraction greater than 1 [frak'shən grāt'ər <u>th</u>an wun] fracción mayor que 1 A number which has a numerator that is greater than its denominator *Example:*





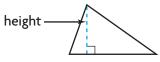
**gallon (gal)** [gal'ən] **galón (gal)** A customary unit used to measure capacity; 4 quarts = 1 gallon

general quadrilateral [jen'ər•əl kwä•dri•lat'ər•əl] cuadrilátero en general See quadrilateral.

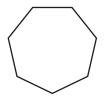
- gram (g) [gram] gramo (g) A metric unit used to measure mass; 1,000 grams = 1 kilogram
- greater than (>) [grāt'ər than] mayor que (>) A symbol used to compare two numbers or two quantities when the greater number or greater quantity is given first *Example:* 6 > 4
- greater than or equal to (≥) [grāt'ər than ôr ē'kwəl tōō] mayor que o igual a A symbol used to compare two numbers or quantities when the first is greater than or equal to the second
- greatest common factor [grāt'əst käm'ən fak'tər] máximo común divisor The greatest factor that two or more numbers have in common *Example:* 6 is the greatest common factor of 18 and 30.
- **grid** [grid] **cuadrícula** Evenly divided and equally spaced squares on a figure or flat surface



**height** [hīt] **altura** The length of a perpendicular from the base to the top of a two-dimensional or three-dimensional figure *Example:* 



heptagon [hep'tə•gän] heptágono A polygon with seven sides and seven angles



hexagon [hek'sə•gän] hexágono A polygon with six sides and six angles *Examples:* 



- hexagonal prism [hek•sag'ə•nəl priz'əm] prisma hexagonal A three-dimensional figure with two hexagonal bases and six rectangular faces
- horizontal [hôr•i•zänt'l] horizontal Extending left and right
- hundredth [hun'dradth] centésimo One of 100 equal parts Examples: 0.56,  $\frac{56}{100}$ , fifty-six hundredths

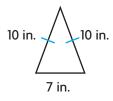


- Identity Property of Addition [ī•den'tə•tē präp'ər•tē əv ə•dish'ən] propiedad de identidad de la suma The property that states that when you add zero to a number, the result is that number
- Identity Property of Multiplication [ī•den'tə•tē präp'ər•tē əv mul•tə•pli•kā'shən] propiedad de identidad de la multiplicación The property that states that the product of any number and 1 is that number
- inch (in.) [inch] pulgada (pulg) A customary unit used to measure length or distance; 12 inches = 1 foot
- inequality [in•ē•kwôl'ə•tē] desigualdad A mathematical sentence that contains the symbol  $<, >, \leq, \geq$ , or  $\neq$
- intersecting lines [in•tər•sekt'ing līnz] líneas secantes Lines that cross each other at exactly one point Example:



interval [in'tər•vəl] intervalo The difference between one number and the next on the scale of a graph inverse operations [in'vûrs äp•ə•rā'shənz] operaciones inversas Opposite operations, or operations that undo each other, such as addition and subtraction or multiplication and division

isosceles triangle [ī•säs'ə•lēz trī'ang•gəl] triángulo isósceles A triangle with two congruent sides *Example:* 





- **key** [kē] **clave** The part of a map or graph that explains the symbols
- kilogram (kg) [kil'ō•gram] kilogramo (kg) A metric unit used to measure mass; 1,000 grams = 1 kilogram
- kilometer (km) [kə•läm'ət•ər] kilómetro (km) A metric unit used to measure length or distance; 1,000 meters = 1 kilometer

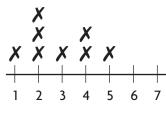


- lateral face [lat'ər•əl fās] cara lateral Any surface of a polyhedron other than a base
- least common denominator [lēst kām'ən dē•nām'ə•nāt•ər] mínimo común denominador The least common multiple of two or more denominators *Example:* The least common denominator for
  - $\frac{1}{4}$  and  $\frac{5}{6}$  is 12.
- **least common multiple** [lēst käm'ən mul'tə•pəl] mínimo común múltiplo The least number that is a common multiple of two or more numbers
- **less than (**<**)** [les <u>than</u>] **menor que (**<**)** A symbol used to compare two numbers or two quantities, with the lesser number given first *Example:* 4 < 6

- less than or equal to (≤) [les than ôr ē'kwəl too] menor que o igual a A symbol used to compare two numbers or two quantities, when the first is less than or equal to the second
- **line** [līn] **línea** A straight path in a plane, extending in both directions with no endpoints *Example:*

**line graph** [līn graf] **gráfica lineal** A graph that uses line segments to show how data change over time

line plot [līn plät] diagrama de puntos A graph that shows frequency of data along a number line Example:



**Miles Jogged** 

**line segment** [līn seg'ment] **segmento** A part of a line that includes two points called endpoints and all the points between them

**line symmetry** [līn sim'ə•trē] **simetría axial** A figure has line symmetry if it can be folded about a line so that its two parts match exactly.

**linear unit** [lin'ē•ər yōō'nit] **unidad lineal** A measure of length, width, height, or distance

liquid volume [lik'wid väl'yoom] volumen de un líquido The amount of liquid in a container

liter (L) [lēt'ər] litro (L) A metric unit used to measure capacity; 1 liter = 1,000 milliliters



mass [mas] masa The amount of matter in an object

meter (m) [mēt'ər] metro (m) A metric unit used to measure length or distance; 1 meter = 100 centimeters mile (mi) [mīl] milla (mi) A customary unit used to measure length or distance; 5,280 feet = 1 mile

- milligram (mg) [mil'i•gram] miligramo A metric unit used to measure mass; 1,000 milligrams = 1 gram
- **milliliter (mL)** [mil'i•lēt•ər] **millilitro (mL)** A metric unit used to measure capacity; 1,000 milliliters = 1 liter
- millimeter (mm) [mil'i•mēt•ər] milímetro (mm) A metric unit used to measure length or distance; 1,000 millimeters = 1 meter
- million [mil'yən] millón 1,000 thousands; written as 1,000,000
- **mixed number** [mikst num'bər] **número mixto** A number that is made up of a whole number and a fraction

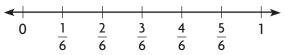
Example:  $1\frac{5}{8}$ 

- **multiple** [mul'tə•pəl] **múltiplo** The product of two counting numbers is a multiple of each of those numbers
- **multiplication** [mul•tə•pli•kā'shən] **multiplicación** A process to find the total number of items made up of equal-sized groups, or to find the total number of items in a given number of groups. It is the inverse operation of division.
- **multiply** [mul'tə•plī] **multiplicar** When you combine equal groups, you can multiply to find how many in all; the inverse operation of division



- nonagon [nän'a•gän] eneágono A polygon with nine sides and nine angles
- **not equal to** (≠) [not ē'kwəl too] **no igual a** A symbol that indicates one quantity is not equal to another

**number line** [num'bər līn] **recta numérica** A line on which numbers can be located *Example:* 



numerator [noo'mər•āt•ər] numerador The

number above the bar in a fraction that tells how many equal parts of the whole or group are being considered

Example:  $\frac{3}{4} \leftarrow \text{numerator}$ 

numerical expression [noo mer'i•kəl ek•spresh'ən] expresión numérica A mathematical phrase that uses only numbers and operation signs



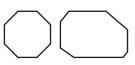
## obtuse angle [ab•toos' ang'gəl] ángulo obtuso

An angle whose measure is greater than 90° and less than 180°

Example:



- obtuse triangle [ab+toos' tri'ang•gəl] triángulo obtusángulo A triangle that has one obtuse angle
- octagon [äk'tə•gän] octágono A polygon with eight sides and eight angles *Examples:*



- octagonal prism [äk•tag'ə•nəl priz'əm] prisma octagonal A three-dimensional figure with two octagonal bases and eight rectangular faces
- **odd** [od] **impar** A whole number that has a 1, 3, 5, 7, or 9 in the ones place
- open figure [ō'pən fig'yər] figura abierta A figure that does not begin and end at the same point
- order of operations [ôr'dər əv äp•ə•rā'shənz] orden de las operaciones A special set of rules which gives the order in which calculations are done in an expression
- ordered pair [ôr'dərd pâr] par ordenado A pair of numbers used to locate a point on a grid. The first number tells the left-right position and the second number tells the up-down position

origin [ôr'ə•jin] origen The point where the two axes of a coordinate grid intersect; (0, 0)

ounce (oz) [ouns] onza (oz) A customary unit
 used to measure weight;
 16 ounces = 1 pound

overestimate [o'vər•es•tə•mit] sobrestimar An estimate that is greater than the exact answer



- **pan balance** [pan bal'əns] **balanza de platillos** An instrument used to weigh objects and to compare the weights of objects
- parallel lines [pâr'ə·lel līnz] líneas paralelas Lines in the same plane that never intersect and are always the same distance apart Example:



parallelogram [pâr+ə+lel'ə+gram] paralelogramo A quadrilateral whose opposite sides are parallel and have the same length, or are congruent Example:

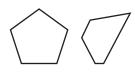


- parentheses [pə•ren'thə•sēz] paréntesis The symbols used to show which operation or operations in an expression should be done first
- partial product [pär'shəl präd'əkt] producto parcial A method of multiplying in which the ones, tens, hundreds, and so on are multiplied separately and then the products are added together
- partial quotient [pär'shəl kwō'shənt] cociente parcial A method of dividing in which multiples of the divisor are subtracted from the dividend and then the quotients are added together

pattern [pat'ərn] patrón An ordered set of numbers or objects; the order helps you predict what will come next *Examples:* 2, 4, 6, 8, 10



pentagon [pen'tə•gän] pentágono A polygon with five sides and five angles *Examples:* 



- pentagonal prism [pen•tag'ə•nəl priz'əm] prisma pentagonal A three-dimensional figure with two pentagonal bases and five rectangular faces
- pentagonal pyramid [pen•tag'ə•nəl pir'ə•mid] pirámide pentagonal A pyramid with a pentagonal base and five triangular faces

**perimeter** [pə•rim'ə•tər] **perímetro** The distance around a closed plane figure

period [pir'ē•əd] período Each group of three digits separated by commas in a multi-digit number

Example: 85,643,900 has three periods.

perpendicular lines [pər•pən•dik'yooo•lər līnz] líneas perpendiculares Two lines that intersect to form four right angles Example:



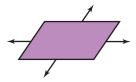
#### picture graph [pik'chər graf] gráfica con dibujos A graph that displays countable data with symbols or pictures Example:

HOW WE	HOW WE GET TO SCHOOL					
Walk	* * *					
Ride a Bike	* * *					
Ride a Bus	* * * * * *					
Ride in a Car	* *					
Key: Each 🛞= 10 students.						

pint (pt) [pīnt] pinta A customary unit used to measure capacity; 2 cups = 1 pint

**place value** [plās val'yoo] **valor posicional** The value of each digit in a number based on the location of the digit

**plane** [plān] **plano** A flat surface that extends without end in all directions *Example:* 



plane figure [plān fig'yər] figura plana See two-dimensional figure

point [point] punto An exact location in space

polygon [päl'i•gän] polígono A closed plane figure formed by three or more line segments *Examples:* 



Polygons

Not Polygons

**polyhedron** [päl•i•hē′drən] **poliedro** A solid figure with faces that are polygons *Examples:* 



pound (lb) [pound] libra (lb) A customary unit used to measure weight; 1 pound = 16 ounces

prime number [prīm num'bər] número primo A number that has exactly two factors: 1 and itself

*Examples:* 2, 3, 5, 7, 11, 13, 17, and 19 are prime numbers. 1 is not a prime number.

**prism** [priz'əm] **prisma** A solid figure that has two congruent, polygon-shaped bases, and other faces that are all rectangles *Examples:* 

	ſ]
en e	



rectangular prism

triangular prism

- product [präd'əkt] producto The answer to a multiplication problem
- protractor [pro'trak•tər] transportador A tool used for measuring or drawing angles
- **pyramid** [pir'ə•mid] **pirámide** A solid figure with a polygon base and all other faces are triangles that meet at a common vertex *Example:*



## **Word History**

A fire is sometimes in the shape of a pyramid, with a point at the top and a wider base. This may be how *pyramid* got its name. The Greek word for fire was *pura*, which may have been combined with the Egyptian word for pyramid, *pimar*.



#### quadrilateral [kwä•dri•lat'ər•əl] cuadrilátero

A polygon with four sides and four angles *Example:* 



quart (qt) [kwôrt] cuarto (ct) A customary unit used to measure capacity; 2 pints = 1 quart

**quotient** [kwo'shent] **cociente** The number that results from dividing *Example:*  $8 \div 4 = 2$ . The quotient is 2.



range [rānj] rango The difference between the greatest and least numbers in a data set

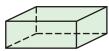
ray [rā] semirrecta A part of a line; it has one endpoint and continues without end in one direction Example:



rectangle [rek'tang•gəl] rectángulo A parallelogram with four right angles *Example:* 



rectangular prism [rek•tang'gyə•lər priz'əm] prisma rectangular A three-dimensional figure in which all six faces are rectangles Example:

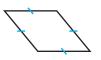


- rectangular pyramid [rek+tang'gyə+lər pir'ə+mid] pirámide rectangular A pyramid with a rectangular base and four triangular faces
- **regroup** [rē•groop'] **reagrupar** To exchange amounts of equal value to rename a number *Example:* 5 + 8 = 13 ones or 1 ten 3 ones
- regular polygon [reg'yə•lər päl'i•gän] polígono regular A polygon in which all sides are congruent and all angles are congruent
- related facts [ri•lāt'id fakts] operaciones relacionadas A set of related addition and subtraction, or multiplication and division, number sentences

Examples: $4 \times 7 = 28$	28 ÷ 4 = 7
$7 \times 4 = 28$	28 ÷ 7 = 4

remainder [ri•mān'dər] residuo The amount left over when a number cannot be divided equally

rhombus [räm'bəs] rombo A parallelogram with four equal, or congruent, sides *Example:* 



#### **Word History**

**Rhombus** is almost identical to its Greek origin, *rhombos*. The original meaning was "spinning top" or "magic wheel," which is easy to imagine when you look at a rhombus, an equilateral parallelogram. **right angle** [rīt ang'gəl] **ángulo recto** An angle that forms a square corner and has a measure of 90° *Example:* 



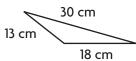
right triangle [rīt trī'ang•gəl] triángulo rectángulo A triangle that has a right angle *Example:* 



**round** [round] **redondear** To replace a number with one that is simpler and is approximately the same size as the original number *Example:* 114.6 rounded to the nearest ten is 110 and to the nearest one is 115.



- scale [skāl] escala A series of numbers placed at fixed distances on a graph to help label the graph
- scalene triangle [skā'lēn trī'ang•gəl] triángulo escaleno A triangle with no congruent sides Example:



- second (sec) [sek'and] segundo (seg) A small unit
  of time; 60 seconds = 1 minute
- sequence [sē'kwəns] sucesión An ordered list of numbers
- **simplest form** [sim'plast form] **mínima expresión** A fraction is in simplest form when the numerator and denominator have only 1 as a common factor.

skip count [skip kount] contar salteado A pattern of counting forward or backward *Example:* 5, 10, 15, 20, 25, 30, . . . **solid figure** [să'lid fig'yər] **cuerpo geométrico** See *three-dimensional figure* 

solution [sə•loo'shən] solución A value that, when substituted for the variable, makes an equation true

sphere [sfir] esfera A solid figure whose curved surface is the same distance from the center to all its points Example:



- square [skwar] cuadrado A polygon with four equal, or congruent, sides and four right angles
- square pyramid [skwâr pir'ə•mid] pirámide cuadrada A solid figure with a square base and with four triangular faces that have a common vertex Example:



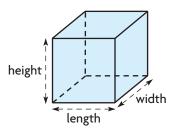
- **square unit** [skwar yoo'nit] **unidad cuadrada** A unit used to measure area such as square foot (ft<sup>2</sup>), square meter (m<sup>2</sup>), and so on
- standard form [stan'dərd fôrm] forma normal A way to write numbers by using the digits 0–9, with each digit having a place value *Example:* 456 ← standard form
- straight angle [strāt ang'gəl] ángulo llano An angle whose measure is 180° *Example:*



- subtraction [səb•trak'shən] resta The process of finding how many are left when a number of items are taken away from a group of items; the process of finding the difference when two groups are compared; the inverse operation of addition
- sum [sum] suma o total The answer to an
   addition problem



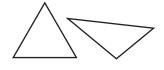
- tablespoon (tbsp) [tā'bəl•spoon] cucharada (cda) A customary unit used to measure capacity; 3 teaspoons = 1 tablespoon
- tally table [tal'ē tā'bəl] tabla de conteo A table that uses tally marks to record data
- **teaspoon (tsp)** [tē'spoon] **cucharadita (cdta)** A customary unit used to measure capacity; 1 tablespoon = 3 teaspoons
- **tenth** [tenth] **décimo** One of ten equal parts *Example:* 0.7 = seven tenths
- term [tûrm] término A number in a sequence
- thousandth [thou'zəndth] milésimo One of one thousand equal parts *Example:* 0.006 = six thousandths
- three-dimensional [thrē də•men'shə•nəl] tridimensional Measured in three directions, such as length, width, and height
- three-dimensional figure [thrē də•men'shə•nəl fig'yər] figura tridimensional A figure having length, width, and height *Example:*



- ton (T) [tun] tonelada A customary unit used to measure weight; 2,000 pounds = 1 ton
- trapezoid [trap'i•zoid] trapecio A quadrilateral with exactly one pair of parallel sides *Examples:*



triangle [trī'ang•gəl] triángulo A polygon with three sides and three angles *Examples:* 



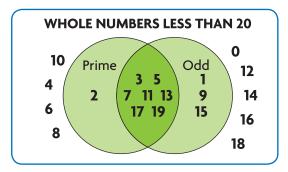
- triangular prism [trī•ang'gyə•lər priz'əm] prisma triangular A solid figure that has two triangular bases and three rectangular faces
- triangular pyramid [trī•ang'gyə•lər pir'ə•mid] pirámide triangular A pyramid that has a triangular base and three triangular faces
- two-dimensional [too da.men'sha.na] bidimensional Measured in two directions, such as length and width
- **two-dimensional figure** [too də•men'shə•nəl fig'yər] **figura bidimensional** A figure that lies in a plane; a figure having length and width



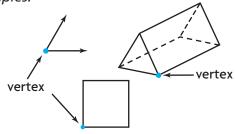
- underestimate [un·dər·es'tə·mit] subestimar An estimate that is less than the exact answer
- unit cube [yoo'nit kyoob] cubo unitaria A cube that has a length, width, and height of 1 unit
- unit fraction [yoo'nit frak'shən] fracción unitaria A fraction that has 1 as a numerator



- variable [vâr'ē•ə•bəl] variable A letter or symbol that stands for an unknown number or numbers
- Venn diagram [ven dī'ə•gram] diagrama de Venn A diagram that shows relationships among sets of things Example:



**vertex** [vûr'teks] **vértice** The point where two or more rays meet; the point of intersection of two sides of a polygon; the point of intersection of three (or more) edges of a solid figure; the top point of a cone; the plural of vertex is vertices *Examples:* 



### Word History

The Latin word *vertere* means "to turn" and also relates to "highest." You can turn a figure around a point, or vertex.

vertical [vûr'ti•kəl] vertical Extending up and down

volume [väl'yoom] volumen The measure of the space a solid figure occupies



weight [wāt] peso How heavy an object is

whole [hol] entero All of the parts of a shape or group

whole number [hōl num'bər] número entero One of the numbers 0, 1, 2, 3, 4, . . . ; the set of whole numbers goes on without end

word form [wûrd fôrm] en palabras A way to
write numbers in standard English
Example: 4,829 = four thousand, eight
hundred twenty-nine



*x*-axis [eks ak'sis] eje de la *x* The horizontal number line on a coordinate plane

x-coordinate [eks kō•ôrd'n•it] coordenada x The first number in an ordered pair; tells the distance to move right or left from (0, 0)



yard (yd) [yard] yarda (yd) A customary unit used to measure length or distance; 3 feet = 1 yard

- *y*-axis [wī ak'sis] eje de la *y* The vertical number line on a coordinate plane
- y-coordinate [wi kö·ôrd'n•it] coordenada y The second number in an ordered pair; tells the distance to move up or down from (0, 0)



Zero Property of Multiplication [zē'rō präp'ər•tē əv mul•tə•pli•kā'shən] propiedad del cero de la multiplicación The property that states that when you multiply by zero, the product is zero

# Correlations

ALA

# COMMON CALIFORNIA COMMON CORE STATE STANDARDS

## **Standards You Will Learn**

**Student Edition Lessons** 

Mathemati	Mathematical Practices		
MP.1	Make sense of problems and persevere in solving them.	Lessons 1.6, 1.9, 1.10, 2.1, 2.2, 2.5, 2.6, 2.8, 2.9, 3.11, 3.12, 4.2, 4.5, 4.6, 5.3, 5.7, 5.8, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.10, 7.9, 7.10, 8.2, 9.6, 10.3, 10.4, 11.2, 11.3, 11.5, 11.7, 11.8, 11.9, 11.10	
MP.2	Reason abstractly and quantitatively.	Lessons 1.2, 1.3, 1.8, 1.9, 1.10, 1.12, 2.2, 2.7, 2.8, 2.9, 3.2, 3.3, 3.4, 3.7, 3.9, 3.12, 4.7, 4.8, 5.3, 5.4, 5.5, 5.6, 5.8, 6.4, 6.5, 6.6, 6.7, 6.8, 6.10, 6.11, 7.3, 7.7, 7.9, 8.3, 8.5, 9.1, 9.7, 10.4, 10.5, 10.6, 11.7	
MP.3	Construct viable arguments and critique the reasoning of others.	Lessons 1.11, 2.4, 2.5, 3.10, 4.4, 5.2, 7.4, 7.5, 8.1, 8.4, 10.6, 11.6, 11.11	
MP.4	Model with mathematics.	Lessons 1.6, 1.7, 1.9, 1.10, 1.11, 1.12, 2.3, 2.7, 2.9, 3.8, 3.11, 4.1, 4.2, 4.4, 4.5, 7.5, 7.7, 7.9, 7.10, 8.2, 9.1, 9.2, 9.3, 9.4, 9.6, 9.7, 10.6, 11.2	
MP.5	Use appropriate tools strategically.	Lessons 1.1, 1.4, 1.6, 1.7, 1.8, 2.3, 3.1, 3.5, 3.6, 3.7, 3.8, 3.12, 4.2, 4.3, 4.6, 5.1, 5.2, 5.5, 5.8, 6.1, 6.2, 6.9, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 8.1, 8.2, 8.3, 8.4, 8.5, 9.2, 9.3, 9.4, 10.1, 10.2, 11.1, 11.5, 11.6, 11.11	
MP.6	Attend to precision.	Lessons 1.7, 1.8, 2.1, 2.3, 3.1, 3.3, 3.5, 3.6, 3.9, 4.5, 4.6, 4.7, 5.1, 5.5, 5.6, 5.7, 6.1, 6.6, 6.7, 7.1, 7.2, 7.3, 7.4, 7.5, 7.7, 7.8, 7.10, 8.2, 8.3, 10.2, 10.3, 10.4, 10.5, 10.7, 11.2, 11.4, 11.5, 11.6, 11.7, 11.9	
MP.7	Look for and make use of structure.	Lessons 1.1, 1.2, 1.4, 1.5, 3.1, 3.2, 3.4, 3.7, 3.10, 3.12, 4.1, 4.3, 4.8, 5.1, 5.4, 5.6, 6.1, 6.3, 6.4, 6.9, 6.11, 7.6, 8.3, 9.1, 9.4, 9.5, 9.6, 9.7, 10.1, 10.6, 10.7, 11.1, 11.2, 11.3, 11.4, 11.8, 11.10	
MP.8	Look for and express regularity in repeated reasoning.	Lessons 1.3, 1.5, 2.4, 2.6, 3.6, 4.1, 4.8, 6.2, 6.9, 6.11, 7.6, 9.3, 9.5, 10.5, 11.1, 11.3, 11.8	

Domain: Operations and Algebraic Thinking			
Write and i	nterpret numerical expressions.		
5.OA.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	Lessons 1.3, 1.10, 1.11, 1.12	
5.OA.2	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$ . Recognize that $3 \times$ (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.	Lesson 1.10	
5.OA.2.1	Express a whole number in the range 2–50 as a product of its prime factors. For example, find the prime factors of 24 and express 24 as $2 \times 2 \times 2 \times 3$ .	Lesson 6.4	
Analyze patterns and relationships.			
5.OA.3	Generate two numerical patterns using two given rules. Identify	Lessons 9.5, 9.6, 9.7	

5.OA.3	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.	Lessons 9.5, 9.6, 9.7
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**Domain: Number and Operations in Base Ten** 

Understand	Understand the place value system.			
5.NBT.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	Lessons 1.1, 1.2, 3.1		
5.NBT.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	Lessons 1.4, 1.5, 4.1, 5.1		
5.NBT.3	Read, write, and compare decimals to thousandths.			
5.NBT.3a	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7$ $\times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times$ (1/1000).	Lesson 3.2		
5.NBT.3b	Compare two decimals to thousandths based on meanings of the digits in each place, using $>$ , $=$ , and $<$ symbols to record the results of comparisons.	Lesson 3.3		
5.NBT.4	Use place value understanding to round decimals to any place.	Lesson 3.4		

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Perform op	erations with multi-digit whole numbers	and with decimals to hundredths.
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.	Lessons 1.6, 1.7
5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Lessons 1.8, 1.9, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8, 2.9
5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	Lessons 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8
Domain: N	umber and Operations—Fractions	
Use equiva	lent fractions as a strategy to add and sub	otract fractions.
5.NF.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example, $2/3 + 5/4$ = $8/12 + 15/12 = 23/12$ . (In general, a/b + c/d = (ad + bc)/bd.)	Lessons 6.1, 6.5, 6.6, 6.7, 6.8, 6.9, 6.11
5.NF.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result $2/5 + 1/2 = 3/7$ , by observing that $3/7 < 1/2$ .	Lessons 6.1, 6.2, 6.3, 6.10

	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.			
5.NF.3	Interpret a fraction as division of the numerator by the denominator ( $a/b = a \div b$ ). Solve word problems involving division of whole numbers leading to answers in the form of fractions, mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?	Lessons 2.7, 8.3		
5.NF.4	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.			
5.NF.4a	Interpret the product $(a/b) \times q$ as a parts of a partition of $q$ into $b$ equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$ . For example, use a visual fraction model to show $(2/3) \times 4 = 8/3$ , and create a story context for this equation. Do the same with $(2/3) \times (4/5) = 8/15$ . (In general, $(a/b) \times (c/d) = ac/bd$ .)	Lessons 7.1, 7.2, 7.3, 7.4, 7.6		
5.NF.4b	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	Lessons 7.7, 7.10		

	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. (Continued)		
5.NF.5	Interpret multiplication as scaling (resizing), by:		
5.NF.5a	Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	Lessons 7.5, 7.8	
5.NF.5b	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying $a/b$ by 1.	Lessons 7.5, 7.6, 7.8	
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	Lessons 7.9, 7.10	

	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. ( <i>Continued</i> )			
5.NF.7	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.			
5.NF.7a	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) $\div$ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) $\div$ 4 = 1/12 because (1/12) $\times$ 4 = 1/3.	Lessons 8.1, 8.5		
5.NF.7b	Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for $4 \div (1/5)$ , and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (1/5) = 20$ because $20 \times (1/5) = 4$ .	Lessons 8.1, 8.2, 8.5		
5.NF.7c	Solve real world problems involving division of unit fractions by non- zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?	Lessons 8.1, 8.4		
Domain: Measurement and Data				
Convert like measurement units within a given measurement system.				
5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi- step, real world problems.	Lessons 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7		

Standa	rds You Will Learn		Student Edition Lessons
Represent a	Represent and interpret data.		
5.MD.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.		Lesson 9.1
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.		
5.MD.3	Recognize volume as an attrik solid figures and understand of volume measurement.		Lesson 11.4
5.MD.3a	A cube with side length 1 uni a "unit cube," is said to have cubic unit" of volume, and ca used to measure volume.	"one	Lesson 11.5
5.MD.3b	A solid figure which can be pa without gaps or overlaps usin cubes is said to have a volume <i>n</i> cubic units.	g <i>n</i> unit	Lesson 11.6
5.MD.4	Measure volumes by counting cubes, using cubic cm, cubic ir ft, and improvised units.		Lessons 11.6, 11.7

	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (Continued)		
5.MD.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.		
5.MD.5a	Find the volume of a right rectangular prism with whole- number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole- number products as volumes, e.g., to represent the associative property of multiplication.	Lessons 11.8, 11.9	
5.MD.5b	Apply the formulas $V = I \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	Lessons 11.8, 11.9, 11.10	
5.MD.5c	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	Lesson 11.11	

## **Domain: Geometry**

Graph poin	Graph points on the coordinate plane to solve real-world and mathematical problems.			
5.G.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., <i>x</i> -axis and <i>x</i> -coordinate, <i>y</i> -axis and <i>y</i> -coordinate).	Lesson 9.2		
5.G.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	Lessons 9.3, 9.4		
Classify tw	o-dimensional figures into categories base	ed on their properties.		
5.G.3	Understand that attributes belonging to a category of two- dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.	Lessons 11.1, 11.2, 11.3		
5.G.4	Classify two-dimensional figures in a hierarchy based on properties.	Lessons 11.1, 11.2, 11.3		

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Write Math, Opportunities to write about mathematics appear in every exercise set. Some examples are: 7, 212, 264, 433, 455, 510

## Writing

Write Math, Opportunities to write about mathematics appear in every exercise set. Some examples are: 7, 212, 264, 433, 455, 510



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# **Table of Measures**

METRIC	CUSTOMARY					
Length						
1 centimeter (cm) = 10 millimeters (mm) 1 meter (m) = 1,000 millimeters 1 meter = 100 centimeters 1 meter = 10 decimeters (dm) 1 kilometer (km) = 1,000 meters	1 foot (ft) = 12 inches (in.) 1 yard (yd) = 3 feet, or 36 inches 1 mile (mi) = 1,760 yards, or 5,280 feet					
Capacity						
1 liter (L) = 1,000 milliliters (mL) 1 metric cup = 250 milliliters 1 liter = 4 metric cups 1 kiloliter (kL) = 1,000 liters	1 cup (c) = 8 fluid ounces (fl oz) 1 pint (pt) = 2 cups 1 quart (qt) = 2 pints, or 4 cups 1 gallon (gal) = 4 quarts					
Mass/Weight						
1 gram (g) = 1,000 milligrams (mg) 1 gram = 100 centigrams (cg) 1 kilogram (kg) = 1,000 grams	1 pound (lb) = 16 ounces (oz) 1 ton (T) = 2,000 pounds					

## TIME

1 minute (min) = 60 seconds (sec)
1 half hour $=$ 30 minutes
1 hour (hr) $=$ 60 minutes
1  day = 24  hours
1 week (wk) $=$ 7 days
1 year (yr) $=$ 12 months (mo), or
about 52 weeks
1 year = 365 days
1 leap year = 366 days
1 decade $=$ 10 years
1 century = 100 years
1 millennium = 1,000 years

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SYMBOLS						
= ≠ < (2, 3) ⊥ ∥	is equal to is not equal to is greater than is less than ordered pair ( <i>x</i> , <i>y</i> ) is perpendicular to is parallel to	<i>AB</i> <i>AB</i> <i>AB</i> ∠ <i>ABC</i> △ <i>ABC</i> ° °C °F	line <i>AB</i> ray <i>AB</i> line segment <i>AB</i> angle <i>ABC</i> , or angle <i>B</i> triangle <i>ABC</i> degree degrees Celsius degrees Fahrenheit			

FORMULAS							
	Perimeter		Area				
Polygon	P = sum of the lengths of sides	Rectangle	$A = b \times h$ , or $A = bh$				
Rectangle	$P = (2 \times l) + (2 \times w)$ , or P = 2l + 2w						
Square	$P = 4 \times s$ , or $P = 4s$						
Volume							
Rectangular prism $V = B \times h$ , or $V = I \times w \times h$ B = area of base shape, $h$ = height of prism							